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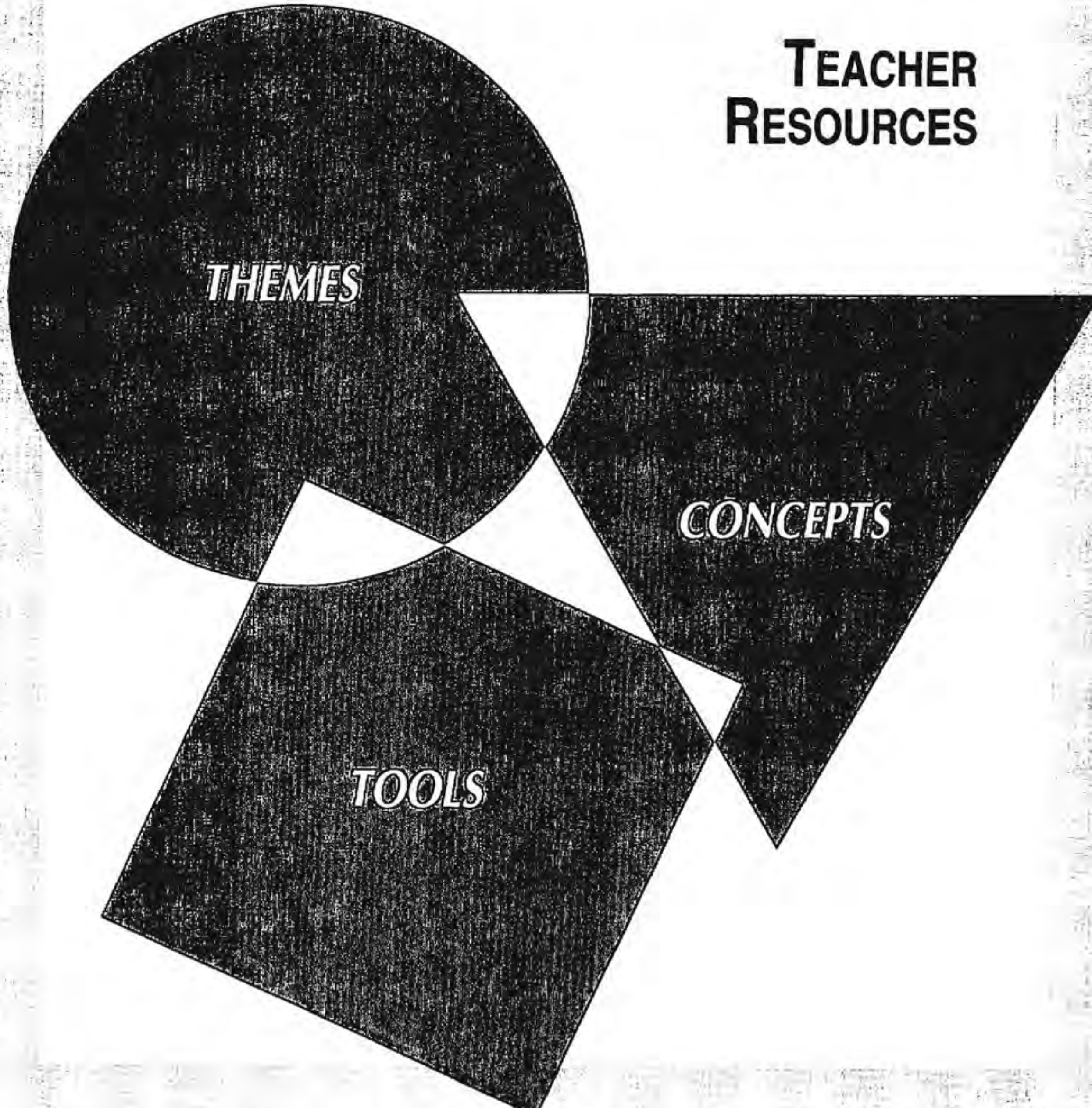
ALGEBRA

Teacher Resources



This binder of resources has been created to support the Algebra: Themes, Tools, Concepts *text by Anita Wah and Henri Picciotto.*

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PATHWAYS

A GUIDE TO CREATING YOUR OWN ALGEBRA COURSE

Dave Logothetti, a charismatic teacher who wrote and spoke about the teaching of problem solving, gave a talk about curriculum for algebra at a California Math Council conference several years ago. "Make a list of topics in your text that you find interesting," he said. "Make another list of topics you think your students will find interesting. There should be some overlap; just teach that." The nervous laughter that resulted reflected the difficulty that we teachers have in letting go of the traditional curriculum we grew up with. But Logothetti understood that having students study a few topics that really engaged them in thinking mathematically had far more value than giving them superficial command of a large body of techniques. There was little danger then that teachers would find too many topics in their texts that met Logothetti's two criteria!

With *Algebra: Themes, Tools, Concepts* we now have a text that offers far more to engage students and teachers than can be studied in a one-year course. Exploring, investigating, explaining, and generalizing take time, so difficult choices must be made about which topics to study. The purpose of these "Pathways" is to make it easier for you to construct a one-year course using the rich resources of this text to meet the needs of each group of students, while reflecting your own priorities and interests.

USING THE PATHWAYS

If you start from the beginning of the text doing those sections that seem most worthwhile and skipping those you find less appealing, it is likely that material in the later chapters which you may consider crucial will get skipped by default. The Pathways provide carefully chosen assignments that lead through the core material in an efficient way so that you can make effective choices between adding activities that enrich core material, and moving on to other topics. The Pathways consist of a basic path, a basic-plus path, additional strands, and alternate paths. For the basic and basic-plus paths, suggested classwork and homework assignments are provided for each day.

The basic path is a suggested "skeleton" from which to build a year-long course. It includes essential topics as well as those that reflect the unique strengths of the text. Topics about which there is debate concerning their inclusion in first-year algebra have been left out, as have the geometry lessons, except those needed to develop understanding of included algebra topics. Classwork and homework problems have been chosen to focus on the central concepts and to allow completion of the lessons in about 76 class days, so that plenty of time is left for additional topics.

The basic-plus path provides one option for expanding the basic path into a "core" course which may appeal to many teachers. It strikes a middle path on inclusion of factoring, embraces the text's emphasis on graphing (but does not assume the availability of graphing calculators), and takes advantage of the unique strengths of the Lab Gear approach. Its 130-day estimate leaves time for you to include additional enrichment topics.

The alternate paths suggest two ways to alter the basic-plus path to create core courses with particular emphases in either graphing or applications. Each of the alternate paths can be completed in approximately 130 class days.

The additional strands are sequences of textbook sections, each of which adds or goes deeper into a specific topic which you may wish to include or emphasize. The topics covered are: quadratic equations and functions, factoring, exponential growth, sequences, square roots, geometry, probability, and abstract algebra. They can be used to make adjustments to the basic-plus, graphing, or applications paths, or added at the end if time permits.

ESTIMATING TIME

Predicting how many days will be required to complete a given lesson or sequence of lessons is at best a fine art, and at worst a very crude science, but it is nonetheless essential to effective course planning. Variables include length of the class period, expected daily homework preparation time, amount of time allowed for homework discussion, frequency of quizzes and tests, and amount of time allowed for them, the ability and background of the students, and the size of the class. You will quickly see how the time estimates given in the basic-plus path compare to your actual teaching time. The estimates for the basic, basic-plus, and alternate paths include approximately one "wild-card" day for each three days of planned classwork. A wild-card day allows time for quizzes, tests, catch-up, review, group presentations, or optional enrichment. Even so, the 130-day estimate is plenty to begin with for one-year courses meeting every day. The basic-plus path and alternate paths omit many appealing lessons which reinforce and extend the concepts studied, and you'll want to do some of these if time permits.

MAKING ADJUSTMENTS

Wherever possible, the suggested classwork in the basic-plus path concludes with problems which can be finished for homework, as this enhances flexibility and encourages classroom productivity. But you will want to be careful not to assign as homework those problems that many students won't really grasp without discussion. It pays to stockpile homework problems from previous lessons to be used when not enough progress is made through the current lesson to assign the homework on it. These may be problems from the "review" or "discovery" sections which come at the end of many lessons, from the Essential Ideas section of the current or preceding chapter, or problems that you may have omitted from a previous assignment due to time considerations. For those lessons that clearly need two days in class before homework from the text can be assigned, there are problems in the Extra Practice section of this binder which can be used as homework to reinforce the first day's work.

Suggested homework for the first few sections of a chapter often is taken from the Essential Ideas section in the preceding chapter. This assumes that you are beginning the new chapter before giving a test on the preceding one. If you prefer to conclude a chapter with a test before moving on, the Essential Ideas can form the basis for a day or two of review, combined perhaps with discussion of reports the students have written or other enrichment work. In this case, the Essential Ideas homework assignments can be replaced with test corrections, or with "take-home" test problems that require more time than in-class testing allows. The "additional problems" in the Test Bank section of this binder are often good for such assignments.

The Basic and Basic-Plus Paths

The basic path includes the following essential topics of a first-year algebra course as well as those topics that reflect the unique strengths of the text:

- Investigation, data collection, and graphing.
- Simplifying variable expressions with Lab Gear and with symbols, including minus and opposites, distributive property, multiplication, and division.
- Powers: exponents and scientific notation, introduction to exponential growth, properties of exponents.
- Function diagrams and working backwards.
- Functions and graphs: rate, time, and distance; direct variation; step functions and piecewise equations; interpreting graphs; and solving with graphs.
- Division, reciprocals and rational expressions.
- Using rational expressions: proportions and averages, percent increase and decrease, midpoints and averages, unit conversions.
- Comparison: differences and ratios
- Introduction to inequalities.
- Linear equation solving with Lab Gear and with symbols: equivalent equations, transformations, identities, and "no solution."
- Linear modeling and applied equation solving.
- Linear functions: function diagrams and Cartesian graphs, magnification and slope, equations of lines.
- Distance and absolute value.
- Square roots, distance, and the Pythagorean Theorem.

The basic-plus path includes all the topics of the basic path and adds the following:

- Use of the Lab Gear to study factoring of simple quadratic expressions, as a way to provide insight into the structure of algebra.
- Use of both Lab Gear and graphic approaches to solve simple quadratic equations and to explore completing the square.
- More work with area on the geoboard.
- Review exercises on signed numbers and fractions.
- Linear systems, solved graphically and by substitution.
- Negative exponents and simple exponential functions.
- Introduction to probability.
- Similarity.
- Expanded study of linear functions, rational expressions, square roots, and using and interpreting graphs.

The chart on the following pages provides a day-by-day plan for classwork and homework assignments for all the lessons in the basic-plus plan. The lessons that are not included in the basic path are marked with a "+" sign. Many of the homework assignments require paper HomeWork Gear, which is available from Creative Publications or can be made by copying the page of Lab Gear blocks in the Support Masters section of this binder. Those homework assignments marked "***P***" are found in the Extra Practice section of this binder. For each lesson marked "***M***" there is a page in the Support Masters section of the binder that may assist you and your students in completing that lesson. The symbol "***G***" indicates problems that can be done effectively with a graphing calculator. Some of these graphing problems are already in the basic-plus assignments, and others are recommended for inclusion if graphing calculators are available.

The Basic and Basic-Plus Paths

Time estimates:

- Basic path = 57 days + 19 "wild card" days = 76 total class days.
- Basic-plus path = 98 days + 32 "wild card" days = 130 total class days.

Day	Lesson	Topic	Classwork	Notes	Homework
1	1.1	polyominoes: investigation, data collection	1–3, 5, 6	Begin 1.2: 1 in class.	1.1: 7–9 1.2: 1*M*
2	1.2	introduction to graphing	10–14, 6–9*M*	15–20: Discuss only.	1.2: 21–22
3	1.3 1.4	Lab Gear introduction substituting and evaluating	1–9 6–11	Discuss only. Discuss 1–5 first.	1.3: 11 1.A: 1–6*M*
4	1.5✚	dimension	6, 7, 11, 13, 14–18	Discuss 1–5 first.	1.A: 7
5	1.7✚	perimeter	4–9, 11, 12		1.7: 21–27
6	1.9	Lab Gear multiplication	2–11, 18		1.5: 19–21 1.6: 14–17, 21
7	1.12✚	geoboard area	4–17		p.39: 4–8, 12, 17
1	2.1	minus and opposite with Lab Gear	1–6		***P*** 2.1, 2.2: 1–10
2	2.2	adding zero	1, 7–12		***P*** 2.1, 2.2: 11–13 2.2: 2–5, 14, 15
3	2.3	multiplication	2–4, 6–8, 11–15		pp.40–41: 19–21
4	2.4	distributive law	1–6, 9, 12bc, 13, 15, 16		2.A
5	2.5	powers	1–5*M*		2.5: 8–13*M* 2.6: 28
6	2.7 2.8	function diagrams rate, time, distance diagrams	1–3, 9–12 1–3*M*		2.7: 7, 14–16, 4–6
7	2.9✚	function diagrams: inverse operations	1–8, 10–15*M*	***P*** 2.9: A good summary.	p.78: 1–6
8	2.12✚	geoboard triangles	1–9*M*		2.12: 10–13
1	3.1	working backwards	2–11		3.1: 12
2	3.2✚	negative numbers, Cartesian graphs and vocabulary	1, 3–23		Finish classwork.

✚ Lesson not in basic path ***P*** Extra Practice page ***M*** Support Master page ***G*** Graphing calculator problems

Day	Lesson	Topic	Classwork	Notes	Homework
3	3.3	distributing minus	1–5, 7–9		3.3: 10–12, 14–15 *P* 3.3: 1–4
4	3.3 3.5	distributing minus introduction to inequalities	16–20 3.5: 1, 2, 4, 5 *P* 3.5: 1–4 3.5: 14–17		3.3: 21–25, *P* 3.3: 5–8 *P* 3.5: 5–10 3.5: 18–21
5	3.5	introduction to inequalities	22–24		3.1: 13–14
6	3.6	division, and multiplication with tables	1–9acd, 10, 13–19		3.7: 1–4 *P* 3.6: 1–5
7	3.7	reciprocals	5–7, 10		*P* 3.7: 1–8
8	3.7	reciprocals	18–27		3.8: 1
9	3.8✚	C° versus F°: introduction to linearity, data	1–8*M*		3.8: 11–17
10	3.9	equation solving: cover-up method	1–8	*P* 3.9: More cover-up practice.	Finish classwork.
11 12	3.12✚	equivalent fractions and similarity	1–7, 10–16		3.C: 1–11 (2 nights)
1	4.1	rate, time, distance, and graph reading	1, 3–6, 8–13*M*		Finish classwork.
2	4.2	representations of functions	1–6, 8–10		Finish classwork.
3	4.2 4.3	representations of functions $-x^2$ vs $(-x)^2$	11–13 2–6*M*	 *G*: 1, 7–15	pp.119–120: 8–18
4	4.4	intercepts	1–9	*G*: 10–18, 21–23	4.4: 19–20 p.120: 26–31
5	4.A✚	graph reading	1–4		4.A: 5–9
6	4.5	ratio, proportion, lines	1–7	*G*: 1,2	4.6: 1–6
7	4.5	ratio, proportion, lines	8–16, 19–20		Finish classwork.
8	4.6	direct variation	7–23		Finish classwork.
9	4.10	graph reading	1–10, 16–20*M*		4.6: 24 4.10: 22,23
10	4.11	step functions, horizontal and vertical lines	1–10		p.163: 1–6
11	4.11✚	graph reading	12–15		p.160: 4, 6–12, 18

✚ Lesson not in basic path ***P*** Extra Practice page ***M*** Support Master page ***G*** Graphing calculator problems

Day	Lesson	Topic	Classwork	Notes	Homework
1	5.1✚	constant sums	1–5, 13–16		5.1: 17–20
2	5.2✚	constant products	1–9, 12, 13	*G*: 12	Finish classwork.
3	5.2✚ 5.3	graphing errors rational expressions	14 12–14, 16–18	14: Discuss only.	5.3: 20–25 ***P*** 5.3: 1–6
4	5.4✚	factoring	1–8		5.4: 15, 17, 20, 24 ***P*** 5.4: 1, 2
5	5.4✚ 5.6✚	factoring factoring	16, 18, 21abc 2, 3, 7–9, 11	Review table multiplication.	***P*** 5.4: 3, 4
6	5.6✚	factoring	13–16, 19–23	Review factor trees.	***P*** 5.6: 1–5 5.6: 17, 18, 24, 25
1	6.1	using graphs, piece-wise equations	1, 3, 6–11		6.1: 16–18 p.201: 5, 9, 10
2	6.1 6.2	using graphs, piece-wise equations inequalities, simplifying with parentheses	13–14 4, 6, 7, 9, 10		6.2: 11–13 5.7: 24
3	6.2 6.3	inequalities solving with Lab Gear	18, 20, 21 4–7 ***P*** 6.3: 1–11 odd		6.2: 14–15, 19, 22–23 p.201: 13–15 ***P*** 6.3: 2–12 even
4	6.3	transforming equations with Lab Gear	***P*** 6.3: 13, 14–22 even		***P*** 6.3: 15–23 odd 6.3: 12–19
5	6.4	identities, no solution	1, 10, 12abce, 16, 17		6.4: 23 6.A: 1–3
6	6.5	solving by graphing	1–9	*G*: 10–17	6.A: 4 6.5: 10ad, 11ad
7	6.6	equivalent equations, applied equation solving	12–18		6.5: 12 6.6: 19, 20, 22, 25–27
8	6.7	ratio and difference	1–4, 7, 8, 10, 12, 14–19, 21		Finish classwork.
9	6.8	equivalent equations	5–8, 10, 11, 14, 15, 17	Discuss 13.	6.8: 9, 12, 16, 18, 23, 24 ***P*** 6.8: 1–5
10	6.9	rational expressions	1, 5–8		6.9: 10–14 6.8: 25–27

✚ Lesson not in basic path ***P*** Extra Practice page ***M*** Support Master page ***G*** Graphing calculator problems

Day	Lesson	Topic	Classwork	Notes	Homework
11	6.10	using rational expressions	1–9		6.10: 13–18
12	6.12	preparation for square root,	6, 9, 10, distance	*G*: 23–28 11–13, 15	p.242: 5, 6, 8, 9
1	7.1✚ 7.2✚	squaring binomials applied squaring	1 1–3, 7*M*		7.2: 4–6, 8, 9*M*
2	7.3✚	Lab Gear squares	2, 3, 8, 9, 12–14*M*		7.3: 16–18 7.4: 2–5
3	7.4✚	difference of squares	6, 7, 8ac, 9–12		7.4: 21, 29 ***P*** 6.8: 6–10
4	7.4✚ 7.5✚	difference of squares identities with squares	14–16 11, 12		7.5: 13
5	7.6✚	solving quadratics with graphs	1, 2, 7, 8, 11	*G*: 1–19	7.4: 23, 25, 31 7.5: 26
6	7.7✚	solving quadratics with equal squares	1–4, 6–13	*G*: 1–5	7.7: 5 7.8: 1, 2
7	7.8	exponents (including 0)	4–11		7.8: 13–15, 19–23
8	7.9	scientific notation	2, 5–8, 12, 13		7.7: 29, 31 7.9: 10, 11
9	7.10	exponents and calculators	1–3, 6–11		7.11: 1, 2, 5, 6, 8, 9
10	7.12	square roots and distance	1–5, 7, 8, 15	Review 6.12: 10, 11	p.282: 1, 2, 21 8.1: 1–4
1	8.1	introduction to linear growth	8, 10–12	***P*** 8.1: Motivates work on functions.	***P*** 8.1: 1–3 8.2: 1–3
2	8.2	linear function diagrams	5		8.2: 6, 7 8.3: 1–3
3	8.2	linear function diagrams	8–10, 16–21	12–15: Nice for enrichment.	8.2: 22
4	8.3	slope	4–13, 15, 18–21		Finish classwork.
5	8.4	linear functions	2–14	*G*: 1	8.A: 1–4, 7 ***P*** 8.4 : 1
6	8.4	linear functions	15–27	Discuss last part of 28.	8.4: 28–30 8.A: 9
7	8.5	exponential growth, properties of exponents	1–9		8.5: 10–16

✚ Lesson not in basic path ***P*** Extra Practice page ***M*** Support Master page ***G*** Graphing calculator problems

Day	Lesson	Topic	Classwork	Notes	Homework
8	8.6✚ 8.7	exponential growth percent increase	1–5 1, 2, 4, 5, 7		8.7: 3 **P** 8.4: 2, 3
9	8.7	percent increase	8, 9, 11, 12, 15, 17		8.7: 10, 16, 20–26
10	8.8	percent decrease	1–8, 10, 11, 13		8.7: 27, 28, 30 **P** 8.7, 8.8: 1–4
11	8.9	properties of exponents	1–6, 17–19		8.9: 7–12, 20
12	8.10✚	properties of exponents	1, 3, 7–12ace, 14, 16–18		8.10: 12bdf, 19, 22, 25, 27 8.B: 1,2
13	8.11✚	negative exponents	1–9		8.11: 14, 15, 18–20, 23, 24, 29
14	8.12✚	scientific notation	1–7, 9–12		8.12: 14,15 8.C: 2 p.323: 8, 10
1	9.1	distance, absolute value	1, 2, 5–7, 11–19		p.324: 12–15
2	9.2	Pythagorean Theorem	4–9	Begin with definitions.	9.2: 10–12 p.324: 18, 22, 26, 27
3	9.6	midpoints and averages	1, 4, 5, 7–12, 17		9.6: 13–16, 18
4	9.B✚	applied square roots	1–6		9.10: 20–21, 25–32
1	10.1✚	linear modeling, constraints, simultaneous graphs	1–8		10.1: 9–11, 13–17
2	10.2✚	mixture	1–10*M*		10.1: 18–22 **P** 10.2: 1–5
3	10.3✚	simultaneous equations with Lab Gear	1–11		10.3: 16–27
4	10.4✚	solving simultaneous equations by substitution	1–10		**P** 10.4: 1–6 10.5: 1–5
5	10.5✚	$Ax + By = C$	6, 14, 15, 20, 21	*G*: 14–21	10.5: 22 10.6: 7, 8
6	10.6✚	simultaneous equations and graphs	1–6, 9–12	*G*: 21–26	10.6: 15–18, 28–30
7	10.6✚ 10.7✚	simultaneous equations and graphs two-variable word problems	20 1–6, 9, 13, 14		Finish classwork.
8	10.8✚	equations of lines	1–12, 15–17		**P** 10.8: 1–6
9	10.B✚	fitting a line	1–6		10.B: 7

✚ Lesson not in basic path ***P*** Extra Practice page ***M*** Support Master page ***G*** Graphing calculator problems

Day	Lesson	Topic	Classwork	Notes	Homework
1	11.3✚	slope	1–8		11.5: 1
2	11.5✚	introduction to probability	2–7, 9–12*M*		11.5: 15–19
3	11.6✚	more probability	1–5, 11–15		11.5: 20–22 11.6: 6–10
4	11.8	unit conversion	1–12		11.8: 19–23 p.423: 19–22b
1	12.8✚	linear graphs and review of function diagrams	1–10	11–21: Nice for enrichment.	Finish classwork.
1	13.6✚	completing squares	1–4, 8–14, 23		13.6: 15–22, 26, 27
1	14.2✚	rational expressions	1–7, 9–13		14.2: 24–26
2	14.3✚	rational expressions	1–13		p.507: 3–8, 10–17

✚ Lesson not in basic path ***P*** Extra Practice page ***M*** Support Master page ***G*** Graphing calculator problems

Alternate Paths: The Graphing Path

The graphing path takes fullest advantage of graphing calculators or computers with graphing capability in the classroom. It adds to the basic-plus path:

- Investigations on the relationship between the equation of a function and its graph, including translation of graphs and the effect of degree on graphs of polynomials.
- Extensive work on graphing quadratic functions.
- Graphic solutions to optimization problems.

In order to complete the graphing path in 130 class days, the following topics are deleted from the basic-plus path:

- Geoboard investigations of area and similarity.
- Differences of squares and perfect square identities.
- Application of a square root function.
- Modeling with linear systems.
- Probability.
- Extended work with slope.

ADD THESE LESSONS AND THE GRAPHING CALCULATOR PROBLEMS (MARKED "G") TO THE BASIC-PLUS PATH:
5.5 *M*
7.B
12.A
12.B
13.1
13.2
13.3
13.4
13.5
13.7
13.8
14.4
14.6

M Support Master page

DELETE THESE LESSONS FROM THE BASIC-PLUS PATH:
1.12
2.12
3.12
7.4 (except "Review")
7.5
8.6
9.B
10.1
10.2
10.7
11.3
11.5
11.6

Alternate Paths: The Applications Path

The applications path focuses on relating algebra to the real world. It adds to the basic-plus path:

- Collecting measurements and dealing with measurement error.
- Fitting a line to data.
- More work on exponential growth, including compound interest, and geometric mean.
- More probability.
- More unit conversions.
- Modeling population growth and motion.
- Applications from science: linear dependence, iterating linear functions, and direct, inverse, and combined variation.
- Optimization.

ADD THESE LESSONS TO THE BASIC-PLUS PATH:

4.7
4.8 (2 days) ***M***
4.9
8.6: "population predictions"
8.B
9.7 (2 days)
11.7
11.B
12.1
12.2 ***M***
12.3
12.4
12.A
12.5
12.7 (2 days)
13.1: 1-10
13.4
13.A
13.5
14.A

M Support Master page

In order to complete the applications path in 130 class days, the following topics are deleted from the basic-plus path:

- Equivalent fractions and similarity.
- Constant sums and products.
- Factoring quadratic polynomials, including differences of squares and perfect squares.
- Extended work on properties of exponents, linear graphs and function diagrams, and rational expressions.
- Solving linear systems.

DELETE THESE LESSONS FROM THE BASIC-PLUS PATH:

3.12
5.1
5.2
5.4
5.6
7.1
7.2
7.3
7.4 (except "Review")
7.5
8.10
10.2
10.3
10.5
10.6
10.7
12.8
13.6
14.2

Additional Strands

Use the strands described below to create a core path tailored to your needs and interests. Start with the basic-plus, graphing, or applications path and substitute the desired lessons for those which you find less compelling. (It is not recommended to remove lessons that are part of the basic path, however.) You may also have time to explore one or more of the additional strands after completing your core path. You can easily go back in the text to pick up lessons you skipped earlier.

Strand	Lessons in Basic-Plus Path	Additional Lessons
Abstract algebra: identity and inverse elements in finite groups, distributive laws.		3.11, 4.C, 5.B, 5.12, 6.C
Exponential growth: extended work, including negative exponents, compound interest, population growth, and geometric mean.	8.6	8.B, 9.7, 9.8, 12.1
Factoring: more complicated quadratics.	5.4, 5.6 7.4, 7.5: 11-13	2.4:"Related Products", 5.3: "Multiplying Binomials," 5.A, 5.7, 6.6: 28-33, 7.3: "Recognizing Perfect Squares," 7.5
Geometry: perimeter, area, volume, dimension, similarity, golden ratio.	3.12	1.10, 2.10*M*, 6.11, 7.A, 9.10, 9.11*M*, 9.12, 9.C, 14.1, 14.8
Probability: outcomes and events, relative frequency, theoretical probability.	11.5*M*, 11.6	11.7
Quadratic equations and functions: vertex form, intercept form, solving by graphing, equal squares, factoring, quadratic formula.	7.6, 7.7	5.5*M*, 13.1, 13.2, 13.3, 13.6, 13.7, 13.8, 13.B, 14.4, 14.5, 14.6, 14.7
Sequences: Fibonacci, arithmetic and geometric.		2.6: "Fibonacci Sequences," 2.10*M*, 5.9, 5.10, 5.11, 5.C, 11.1, 11.2, 14.8
Square roots: extended work with simplifying radical expressions, rational and irrational numbers.	9.B	9.3, 9.4, 9.A, 9.5, 9.8, 9.9, 9.C, 10.B "Discovery", 11.2, 11.4, 11.A

TEST BANK

HOW TO USE THIS TEST BANK

In this section you will find one chap-ter test for each of the 14 chapters in *Algebra: Themes, Tools, Concepts.* For Chapters 3, 5, 6, 7, 9, 10, and 13, you will also find some additional problems. Solutions for all the problems in this section follow the test for Chapter 14.

Most of the problems in the chapter tests are based on the Essential Ideas which appear at the end of each chapter in the student text. If your students have a good understanding of the Essential Ideas, they should be well prepared for these tests. However, some of the tests may require more time to complete than your students have in a typical class period. You may want to omit some problems, or spread your in-class testing over two days. Do not rush your students. Instead, give them sufficient time to complete their tests and emphasize the quality of their explanations. This course encourages students to be reflective and thorough in their work, and this same encouragement should carry over into test-taking.

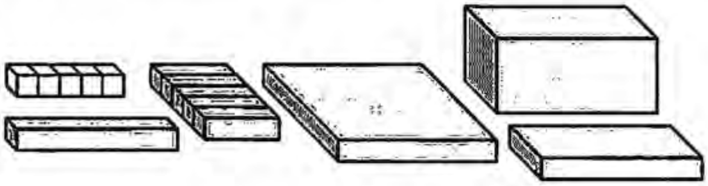
You can use the additional problems for mid-chapter quizzes, bonus problems, or as a resource when creating your own tests. Some teachers break the tests into two components: an in-class part and a take-home part. Because some of the additional problems are more challenging than those in the tests, they can provide a source of problems for the take-home part of the test.

If you prefer to give a cumulative test at the end of each chapter, keep a record of the most frequently missed problems. On subsequent tests, you can use the frequently missed problems from previous tests along with problems selected from the chapter tests and additional problems.

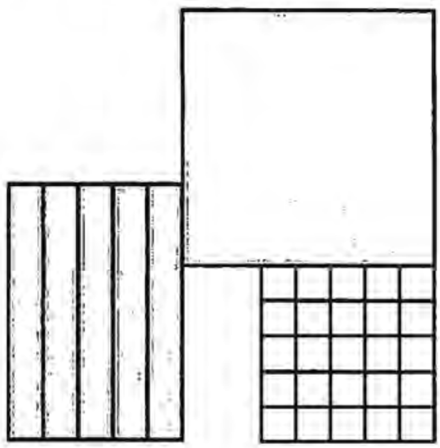
Note: It is assumed your students will have access to graph paper and dot paper for certain tests in this section.

Chapter 1 • Test   Name

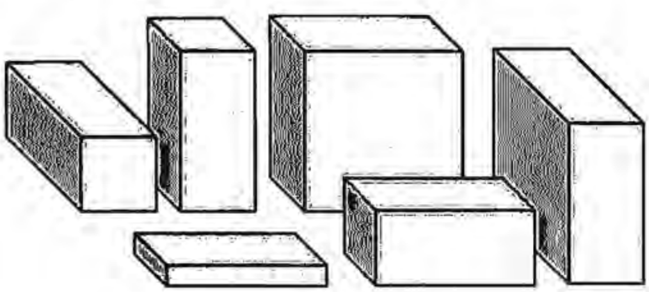
1. a. What expression do these blocks show?
   b. Evaluate the expression for $x = \frac{1}{2}$ and $y = 4$. Show your work.



2. Sketch a figure having the same area as the figure below, but a different perimeter. Find the area and the perimeter of each figure.



3. a. Write the name of the block on each block illustrated below.
   b. Write the expression you get when you combine like terms.
   c. Evaluate the expression for $x = 0$ and $y = 1$.



4. An algebra student combined terms incorrectly on all these problems. Every equation below is *incorrect*. Sketch both sides of each equation to show that the two sides are *not* equal.
   a. $x^2 + x^2 = x^4$
   b. $10x - x = 10$
   c. $3x + y = 3xy$
   d. $2x + 4x = 6x^2$

5. Tell whether each of the following problems is *sometimes*, *always*, or *never* true. Explain your answers, using sketches of the Lab Gear. If it is sometimes true, give an example of when it is true.
   a. $25 - 5x = 20x$
   b. $3(x + 6) = 3x + 6$

6. Use the Lab Gear to show each expression. Sketch.
   a. $5 + 2x + 3y$
   b. $5 + 5xy$
   c. $5 + 6xy$
   d. $7x + 3y$

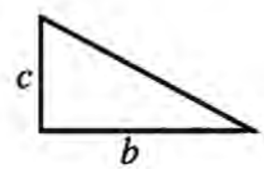
7. Find values for x and y so that
   a. all four expressions in problem 6 have different values;
   b. as many as possible of the given expressions are equal to each other.

Use the corner piece for problems 8 and 9.

8. Find the area of a rectangle having sides y and $y + 3$. Write a multiplication of the form *length times width = area.*

9. These equations are of the form *length times width = area*. Use the blocks to help you fill in the blanks.
   a. $x \cdot$ _____ $= x^2 + 3x$
   b. $(5 + x) \cdot$ _____ $= 10y + 2xy$
   c. (_____ $+ 4) \cdot x = 3xy +$ _____

10. What is the area of the triangle in the figure below, if $b = 12$ and $c = 3x$?



Chapter 2 • Test

Name

1. If $x = 2$, $-x$ is negative. If $x = -2$, $-x$ is positive. Find a value of x so that:

   a. $-6x$ is negative b. $6 - x$ is negative c. $-(x - 6)$ is negative
   d. $-6x$ is positive e. $6 - x$ is positive f. $-(x - 6)$ is positive

2. The opposite of an expression is the one you have to add to it to get zero. Write the opposite of the following expressions. Do not use parentheses in your final answer.

   a. $3x$ b. $3 + x$ c. $3 - x$

3. a. $30xy$ can be written as a product of two factors. Find five different ways to do it.

   b. $30xy$ can be written as a product of three factors. Find three different ways to do it.

4. Write equivalent expressions without parentheses.

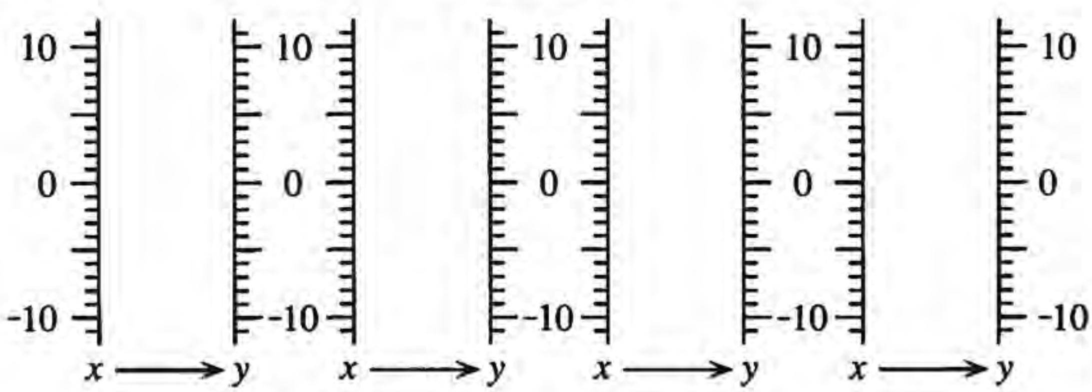
   a. $4(y - 5)$ b. $-1(y - 5)$ c. $(x + y - 5)(1 + x)$

Problems 5 through 8 are about the function diagrams below. The input is x and the output is y. For each problem:

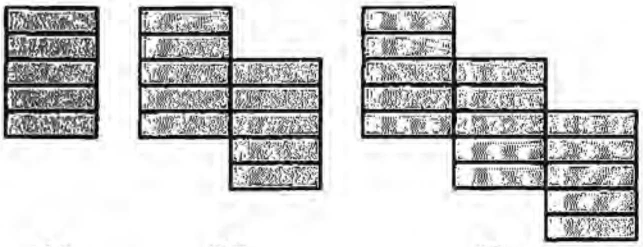
a. Make a function diagram satisfying the given condition. (Use a ruler on the diagrams below. Show at least five in-out lines. Use zero, some negative values, and some positive values for x.)

b. Write a function for the diagram, in the form $y = \dots$.

5. The output is three times the input.
6. The output is one third of the input.
7. The output is always 0.
8. The in-out lines cross each other in a point.



9. Look at the sequence of Lab Gear figures. Think about how it would continue, following the same pattern.



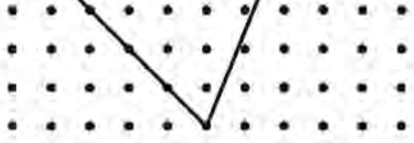
(1) (2) (3)

Figure #	Perimeter
1	
2	
3	
4 ⋮ 10 ⋮ 100 ⋮ *n*	

a. Sketch the next figure in the sequence, following the same pattern.

b. Complete the table.

10. Explain how to find the area of geoboard triangles. Use the three triangles below as examples. You may mention division by two, addition, and subtraction.



Chapter 3 • Test

Name

1. Simplify.

   a. $6 - (-7)$ b. $-[6 - (-7)]$ c. $-6 - (-7)$ d. $(-6) \cdot (-7)$

2. If possible, find a value of x that satisfies the condition. If it is not possible, explain.

   a. $12x$ is positive b. $-12x$ is positive c. $-12x^4$ is positive
   d. $3 - 12x$ is negative e. $-6x$ is negative f. $-6x^3$ is negative
   g. $x^2 - 4$ is zero h. $3 - 12x$ is zero

3. a. Translate each step into algebra.
   (1) *Think of a number.*
   (2) *Multiply the number by 6.*
   (3) *Subtract 4 from the result.*

   b. If the result after step 3, is -1, what was the original number? Explain how you got this answer, showing all your work.

4. a. Translate into algebra this rule for a function:
   Subtract 3 from x and multiply the result by $\frac{1}{2}$.

   b. Write in words the rule for the inverse of the function in part a.

   c. Translate into algebra the rule you wrote in part b.

Problems 5 through 7 are about the Celsius, Fahrenheit, and Kelvin temperature scales.

- To convert Celsius temperatures to Fahrenheit, multiply the Celsius temperature by 1.8, then add 32.
- To convert Celsius temperatures to Kelvin, add 273.

5. Describe in words or use an arrow diagram to show what you would do to convert

   a. Fahrenheit to Celsius; b. Fahrenheit to Kelvin.

6. Which of the following equations would be used for converting Fahrenheit to Kelvin? Defend your choice.

   a. $K = \frac{F - 32}{1.8} + 273$ b. $K = \frac{F + 32}{1.8} - 273$ c. $K = \frac{F - 273}{1.8} + 32$

7. a. Convert 59° Fahrenheit to Kelvin.

   b. Convert 373° Kelvin to Fahrenheit.

8. Simplify. (Perform the operations and combine like terms.)

   a. $12xy - (3x \cdot -2y) - 2xy$ b. $12xy - 3x - (2y - 2xy)$
   c. $12xy - 3x(-2y - 2xy)$ d. $(x + y + 2)(x + 3y)$

9. Let N be a number greater than 2.
   a. If you multiply 30 by $\frac{2}{N}$, will the result be greater than or less than 30? Explain.
   b. If you divide 30 by $\frac{2}{N}$, will the result be greater than or less than 30? Explain.

10. Possible or impossible? If it is possible, give an example. If it is impossible, explain.
    a. Subtract a negative number from a positive number and get a negative number.
    b. Subtract a negative number from a negative number and get a negative number.

Chapter 3 • Additional Problems

1. Give the answer if it exists. If the answer does not exist, explain why not.
   a. $\frac{0}{0}$ b. $4 \cdot 0$ c. $0 \cdot 0$ d. $\frac{4}{0}$ e. $\frac{0}{4}$
2. Is the reciprocal of the opposite of x *always*, *sometimes*, or *never* equal to the opposite of the reciprocal of x? Explain, using at least two examples.
3. Find all the numbers that satisfy the given condition.
   a. The number is its own reciprocal.
   b. The number does not have a reciprocal.
   c. The number is its own opposite.
   d. The number does not have an opposite.
4. Find at least two numbers that:
   a. are more than their reciprocals
   b. are less than their reciprocals
   c. are more than their opposites
   d. are less than their opposites
5. What is the result when you:
   a. multiply a number by its reciprocal?
   b. divide a number by its reciprocal?

Chapter 4 • Test

Name

1. Write the equation of:
   a. a line through the origin containing the point (3, 8)
   b. another first-degree polynomial containing the point (3, 8)
   c. a second-degree polynomial containing the point (3, 8)

Problems 2 through 4 are about the graph of the equation $y = {}^-x^2 - 5$.

2. Which of these points are on the graph? Explain how you know.
   (2, ⁻9) (⁻2, 9) (⁻2, ⁻9) (2, 9)
3. The point (⁻6, y) is on the graph. Find y.
4. The point (x, ⁻54) is on the graph. What are the two possible values of x?
5. If possible, find an (x, y) pair on the graph of $y = {}^-5x$ for which:
   a. x is negative and y is positive
   b. x is positive and y is negative
   c. x and y are both negative
   d. x and y are both positive
6. Repeat problem 5 for $y = x^2 + 3$.

For problems 7 and 8:
   a. Plot the points given in the table.
   b. Use the pattern you find to add more points to your table and graph.
   c. Write an equation that tells how to get the y-value from the x-value.

7.

x	y
0	-1
1	2
2	5
-1	-4

8.

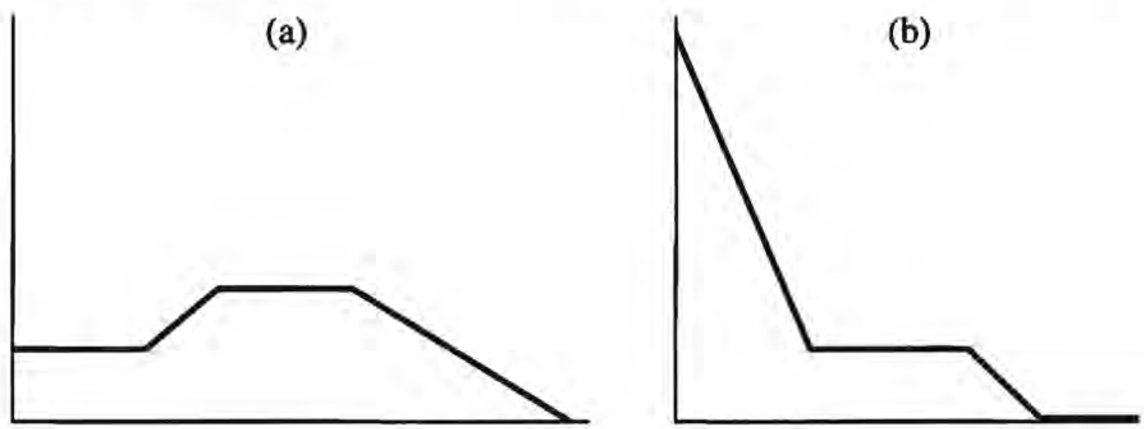
x	y
3	7
2	2
1	-1
0	-2
-1	-1
-2	2

9. Without graphing, tell which of the following lines pass through the origin.
   a. the line containing the points (7, 5) and (14, 10)
   b. the line containing the points (6, 4) and (30, 20)
   c. the line containing the points (6, 4) and (11, 9)
10. Explain how you got the answers to problem 9 without graphing the lines.

11. A line containing the point (4, 6) crosses the y-axis at the point (0, 1). Without graphing, tell whether or not it contains the point (20, 30). Explain your reasoning.

12. If y is 7 when x is 4, and y is 12 when x is 5, is the relationship between y and x direct variation? Explain your reasoning.

13. These graphs represent the motion of Teal's car. The vertical axis shows distance from her house, and the horizontal axis shows time. For each graph, add scales to the axes and write a short paragraph describing the trip it summarizes.



Chapter 5 · Test

Name

1. If possible, write an equation of the form $x + y = S$ such that its graph:
   a. passes through the point (-3, -4)
   b. passes through the point (-2.8, 1.4)
   c. lies in the 1st, 2nd, and 4th quadrants
   d. does not intersect the x-axis

2. If possible, write an equation of the form $x \cdot y = P$ such that its graph:
   a. lies in the 1st and 3rd quadrants
   b. contains the point (0.1, -52)
   c. intersects the graph of $y = x$ at the point (-4, -4)
   d. intersects the x-axis

3. Write one equation of the form $x + y = S$ and one of the form $x \cdot y = P$ such that the two graphs intersect at (-3, -6) and (-6, -3).

4. Write an equivalent expression without parentheses. Combine like terms.
   a. $(2x \cdot 3)(4x \cdot 5)$ b. $(2x \cdot 3)(4x + 5)$ c. $(2x + 3)(4x + 5)$

5. In which parts of problem 4 did you use the distributive law to remove parentheses? Explain.

6. Multiply. Combine like terms.
   a. $(2x + 5)(x + 1)$ b. $(2x + 5)(x - 1)$
   c. $(2x - 5)(x + 1)$ d. $(2x - 5)(x - 1)$

7. Divide.
   a. $\frac{3xy + 3y}{3y}$ b. $\frac{4x + 8y}{2}$

8. Factor completely.
   a. $x^3 + 3x^2 + 2x$ b. $(9x^2 + 3x)(4x + 16)$

9. How many x-intercepts does the parabola $y = x^2 + 6x + 8$ have? Explain your reasoning.

10. Find all the whole numbers that you can put in the blank so that $x^2 + 14x +$ ___ can be factored into a product of two binomials. For each case, write the factored form. Explain how you got your answer.

Chapter 5 • Additional Problems

1. Find all the whole numbers that you can put in the blank so that $x^2 +$ ___ $x + 16$ can be factored into a product of two binomials. For each case, write the factored form. Explain how you got your answer.
2. Find all the integers that you can put in the blank so that $x^2 +$ ___ $x + 16$ can be factored into a product of two binomials. For each case, write the factored form. Explain how you got your answer.
3. The graph of $xy = 36$ has two branches that do not connect. Sketch the graph and explain why the branches are not connected.
4. Explain, without graphing $x + y = 8$, how you know that it does not contain any points in the third quadrant.
5. A rack for displaying books in the library has eleven books on the bottom shelf and three on the top shelf. Each shelf will hold one more book than the one above it. What is the total number of books that the rack will hold?
6. What is the answer to problem 5 if there are T books on the top shelf and B on the bottom shelf?

For problems 7 through 9, you will need the Lab Gear and graph paper.

7. a. Find as many rectangles as possible that can be made using x^2, $10x$, and as many ones as you like. Write a *length* · *width* = *area* expression for each one.
   b. Which rectangle in part a is a square? Give its length, width, and area.
8. a. Find at least four parabolas of the form $y = x^2 + 10x +$ ___ that have two x-intercepts. Graph each one and label its intercepts.
   b. Find a parabola of the form $y = x^2 + 10x +$ ____ that has only one x-intercept.
9. How are your answers to problems 7b and 8b related? Explain.
10. Write without parentheses. Combine like terms.

    a. $6 - 8(x - 3)$ b. $(6 - 8)(x - 3)$
    c. $(6x - 8)(x - 3)$ d. $6x - 8(x - 3)$

Chapter 6 • Test

Name

1. On the same pair of axes, make an accurate graph of these four functions. Label each one with its equation.

   a. $y = -x$ b. $y = x + 5$
   c. $y = 2x + 1$ d. $y = 3(x - 1)$

2. On your graph, mark and label the point of intersection of $y = -x$ and $y = x + 5$.

3. Find the value of x that will satisfy each equation. Graphs may help you find or check the solutions.

   a. $-x = x + 5$ b. $2x + 1 = -x$
   c. $2x + 1 = 3(x - 1)$ d. $3x - 1 = -x$

4. Solve this compound inequality: $2x + 1 < -x < x + 5$. (Hint: It may help to refer to problems 1 and 3 above.)

5. Solve these inequalities. It may help to draw graphs.

   a. $2x < 7$ b. $x + 2 < 7$ c. $2x + 2 < 7$

6. Solve these equations.

   a. $\frac{2}{3}(x - 5) = 6$ b. $\frac{x - 2}{9} + 5 = 16$
   c. $\frac{2y - 5}{6} = \frac{5y + 2}{4}$ d. $(7 - d)(d + 3) = (5 - d)(d + 5)$

7. Solve for y in terms of x.

   a. $6x + 3y = 9$
   b. $6x - 3y = 8$

8. Joe's Pronto Pizza charges a certain amount for a plain cheese pizza and an additional amount for each topping. How much would you have to pay

   a. if the plain pizza cost \$10.95, toppings were \$1.50 each, and you ordered a pizza with three toppings?
   b. if the plain pizza cost \$10.95, toppings were \$$T$ each, and you ordered a pizza with three toppings?
   c. if the plain pizza cost \$$P$, toppings were \$$T$ each, and you ordered a pizza with n toppings?

9. The Statue of Liberty is about 111 feet 1 inch from her heel to the top of her head. Suppose the designer had used as his model a woman who was 5 feet 1 inch tall. If the woman had a thumb that was 2 inches long, about how long would you expect the thumb of the Statue of Liberty to be?

Chapter 6 • Additional Problems

1. At the end of January, Janet was running R miles per day. She wanted to increase her daily distance by $\frac{1}{4}$ mile per month. For example, after 1 month (at the end of February), she would be running $R + \frac{1}{4}$ miles per day.
   a. If she continued this plan, how far would she be running by the end of May?
   b. When would her daily distance reach $R + 2$ miles?
   c. What would her daily distance be after M months? (Express your answer in terms of R.)
   d. After how many months would her daily distance be 12 miles? (Express your answer in terms of R.)

2. A man in Indiana calls his granddaughter in Iowa every weekend. He has a choice of two long distance telephone plans. The Family Circle Plan costs \$7.50 for the first hour of phone calls each month and \$0.15 per minute after that. The Square Deal Plan costs \$0.20 per minute for all calls. How much would he spend for n minutes of long distance calls per month:
   a. using the Family Circle Plan?
   b. using the Square Deal Plan?

3. Compare the Family Circle Plan and the Square Deal Plan in problem 2. Show the calculations you would make to decide which plan is better, and explain your conclusions.

Chapter 7 • Test

Name

1. Multiply. Combine like terms.

   a. $(2x + 6)(x - 4)$ b. $(x + y + z)(y - x)$

2. Find the square of each binomial.

   a. $ax + b$ b. $ax - b$ c. $b - ax$ d. $bx + a$

3. Find the middle term that will make this a perfect square trinomial. Then write it as the square of a binomial.

   a. $25b^2 + \_\_\_\_ + 64c^2$ b. $\frac{1}{16}x^2 + \_\_\_\_ + y^2$

4. Find the missing terms.

   a. $y^2 - b^2 = (\_\_\_\_\_\_)(y + b)$ b. $(3y + \_\_\_)^2 = 9y^2 + \_\_\_\_ + a^2$

5. Solve for x. There may be no solution, one solution, or more than one solution.

   a. $x^2 = 49$ b. $25x^2 = 4$
   c. $x^2 - 12x + 36 = 4$

6. Solve these compound inequalities. Graphs may help.

   a. $-3 < 2x + 5 < 6$ b. $3 < 2x + 5 < 5$

7. Factor these polynomials.

   a. $9x^2 - 16$ b. $16 - 9x^2$ c. $9x^2 - 24x + 16$

8. a. Explain why 10^2 is in scientific notation and 2^{10} is not.
   b. Write 2^{10} in scientific notation.

The B. A. Regal Company sells kits of tiles for building square patios of different sizes. They are made with square colored tiles, each tile measuring one foot on each side. Red tiles are used for the interior and blue tiles for a border that goes all the way around the patio. As shown in the figure, one design has a border one tile wide, and the other design has a border two tiles wide.

One-tile border

Two-tile border

9. Make a sketch of what an 8-foot-by-8-foot patio would look like if the border is:

   a. one tile wide   b. two tiles wide

10. a. If an n-by-n patio has a border one tile wide, how many tiles of each color are used?

    b. Check your answers to part a by showing algebraically that the sum of the two expressions is n^2.

11. Repeat problem 10 for an n-by-n patio having a border two tiles wide.

12. The Galers ordered a kit for an n-by-n patio having a border one tile wide from the B. A. Regal Company. They changed their minds, and decided to make an $(n + 1)$-by-$(n + 1)$. How many additional tiles of each color will they need to increase the size of the patio? Explain your answer. Sketches may help.

Chapter 7 • Additional Problems

1. Use graphs to solve these inequalities.

   a. $x^2 < 25$ b. $x^2 > 25$ c. $-x^2 < -4$
   d. $-x^2 > -4$ e. $16 < x^2 < 25$ f. $3 < 5 - 2x < 5$

2. Find the area of the square having side:

   a. $3 + y$ b. $\frac{x}{4}$
   c. $2x - 3$ d. $4x$

3. Multiply. Combine like terms.

   a. $(x - 1 - y)(x - 1 + y)$ b. $(3x + 6y - 2)(3x + 6y + 2)$
   c. $(a + b - c)(a + b - c)$ d. $(a + b - c)(a - b + c)$

4. Find the missing terms.

   a. $(xy - \_\_\_)^2 = \_\_\_ - 2axy + \_\_\_$
   b. $a^2b^2 - \_\_\_ = (ab - c)(\_\_\_ + c)$

5. Factor. (Hint: First look for common factors.)

   a. $3x^2 - 75$ b. $4x^2 + 40x + 100$
   c. $4x^2 - 40x + 100$ d. $12xy^2 + 72xy + 108x$

Chapter 8 • Test

Name

1. Find the slope of the line joining each pair of points.
   a. (3, 2) and (4, -5)
   b. (2, 3) and (-5, 4)
   c. (3, 2) and (-5, 4)
   d. (2, 3) and (4, -5)

2. The points in the table lie on a line of the form $y = mx + b$.

x	y
-2	18
-1	13
0	8
3	-7

   a. Explain how you can tell by inspecting the table whether m is positive or negative.
   b. Find m and b for this line.

3. Possible or impossible? If possible, give an equation of the form $y = mx + b$ that fits the description. If it is impossible, explain.
   a. The line does not pass through the third quadrant, and both m and b are negative.
   b. The line does not pass through the third quadrant, and both m and b are positive.
   c. The line never crosses the y-axis.
   d. The line never crosses the x-axis.

4. Possible or impossible? If possible, give equations of a pair of lines that fit the description. If it is impossible, explain.
   a. The two lines intersect, and they have the same value of b.
   b. The two lines intersect, and they have the same value of m.

5. Write the equation of any line that does not intersect the line that passes through the points (-1.8, 3.4) and (3.2, 13.4). Explain your reasoning.

6. Give the equation of a line that satisfies the given conditions.
   a. It slopes uphill from left to right, has a smaller slope than the line $y = x$, and passes through the point (0, -4).
   b. It does not contain any points in the third quadrant and has a greater slope than $y = -x$.

7. Find the equation of the line that passes through the point:
   a. (3, -4) and never crosses the x-axis
   b. (5, -2) and never crosses the y-axis

8. A bacterial population weighs 20 grams and triples in weight every hour. How much does it weigh after
   a. 2 hours? b. x hours?
9. If possible, write as a power of 4.
   a. $2 \cdot 2^7$ b. $(2 \cdot 2)^5$ c. $2^3 \cdot 2^3$ d. $2^3 \cdot 2^4$
10. If possible, write as a power of 5. $25 \cdot 5^2 \cdot (5^5)^4 \cdot 2^0$
11. Simplify each ratio.
    a. $\frac{3y^4}{y^4}$ b. $\frac{(3y)^4}{y^4}$
    c. Explain why your answers to parts a and b are different.
12. Write in scientific notation.
    a. 60 million b. 60 millionths
13. Find the number or expression that makes each equation true. Write your answer as a power.
    a. $(6x)^4 =$ ____ $\cdot x^4$ b. $(20xy)^5 =$ ____ $\cdot (10xy)^5$
14. Simplify.
    a. $\frac{24 \cdot 10^{a+2}}{6 \cdot 10^a}$ b. $\frac{6 \cdot M^{b+3}}{24 \cdot M^b}$ c. $\frac{8 \cdot P^{c+4}}{2 \cdot P^c}$
15. Mr. A. B. Galer invested \$20,000 in an account that earned 5% compound interest every year. Ms. G. Balear invested \$22,000 per year in an account that earned 5.5% simple interest every year. They both left the interest in the account.
    a. What is the dollar amount that Ms. Balear earns in interest every year?
    b. Why does the dollar amount that Ms. Balear earns stay fixed, and why does the amount that Mr. Galer earns change?
    c. How will the amount of money in their accounts compare after two years? Five years? Show your computations.
    d. In how many years will Mr. Galer have more in his account than Ms. Balear?
16. 💡 Write as a power of 5. $\frac{5^{5+x}}{5^{5-x}}$.

Chapter 9 • Test

Name

1. On the number line, what is the distance between:

   a. 5 and -15? b. 5 and y?

2. On the number line, what points are at distance 3 from -1?

3. On the number line, what point is halfway between:

   a. 2 and its opposite? b. 2 and its reciprocal? c. x and y?

4. The midpoint of the segment from (x, y) to $(8, -6)$ is the point $(4, 0)$. What are the values of x and y?

5. On graph paper, show as many points as possible that are at distance 12 from the origin, using:

   a. taxicab distance b. Euclidean distance

6. Given the two points $(-2, 5)$ and $(7, -3)$, find:

   a. the taxicab distance between them
   b. the slope of the line that joins them
   c. the Euclidean distance between them

7. Find the length of the diagonal of a square if the side of the square is:

   a. 5 b. y

8. Find the length of the side of a square if the diagonal is:

   a. 5 b. y

9. What is the area of a rectangle having sides:

   a. 5 and $\sqrt{10}$ b. $\sqrt{5}$ and $\sqrt{10}$
   c. $2\sqrt{5}$ and $3\sqrt{10}$ d. $(2 + \sqrt{5})$ and $3\sqrt{10}$

10. A rectangle has area $12\sqrt{5}$. Give three possibilities for the sides.

11. Write in simplest radical form.

    a. $\sqrt{20}$ b. $\sqrt{40}$ c. $\sqrt{60}$ d. $\sqrt{80}$ e. $\sqrt{100}$

12. Simplify, then add or subtract.

    a. $\frac{2}{\sqrt{2}} + \sqrt{8}$ b. $15 - \sqrt{35} + \sqrt{25} - \sqrt{45}$

    c. $\frac{3}{\sqrt{2}} + \sqrt{16} + \sqrt{50}$ d. $\sqrt{3^5} + \frac{3}{\sqrt{3}}$

13. According to the U.S. Census Bureau, the population of Texas was 11,198,655 in 1970 and 14,225,513 in 1980. Estimate the population in 1975 assuming that during that decade the population was growing:
   a. linearly
   b. exponentially

Chapter 9 • Additional Problems

1. Give a value of x for which:
   a. $\sqrt{-x}$ is not a real number
   b. $\sqrt{-x}$ is a real number
   c. $\sqrt{-x} = \sqrt{x}$
2. Evaluate for $x = \frac{1}{2}$
   a. x^2
   b. $(-x)^2$
   c. $-x^2$
   d. x^{-2}
3. True or False? Explain your answer, giving examples.
   a. $\sqrt{x}\sqrt{y} = \sqrt{xy}$
   b. $\sqrt{x}\sqrt{x} = x$
   c. $\sqrt{x} + \sqrt{y} = \sqrt{x + y}$
   d. $(\sqrt{x} + \sqrt{y})^2 = x + y$
   e. $\frac{1}{\sqrt{x}} + \frac{1}{\sqrt{y}} = \frac{1}{\sqrt{x} + \sqrt{y}}$
4. On dot paper, draw and label segments of the lengths given.
   a. $\sqrt{17}$
   b. $\sqrt{10}$
   c. $\sqrt{5}$
   d. $\sqrt{2}$
5. On dot paper:
   a. Sketch a square having area 20 and a square having area 5.
   b. Explain how your sketch can be used to show that $\sqrt{20} = 2\sqrt{5}$.

Assume that the amount of material needed to make clothes is proportional to the surface area, while the amount of food needed is proportional to the volume.

6. In *Gulliver's Travels*, Gulliver is six feet tall and the Lilliputians are six inches tall.
   a. Gulliver is how many times as tall as a Lilliputian?
   b. Gulliver will need how many times as much material for clothes as a Lilliputian?
   c. Gulliver will need how many times as much food as a Lilliputian?

Chapter 10 • Test

Name

1. Solve each system. Check first to see if the system has no solution or an infinite number of solutions.

   a. $\begin{cases} 2x + 7y = 28 \\ y = 3x + 4 \end{cases}$
   b. $\begin{cases} m + n = 4 \\ 2m = 8 - 2n \end{cases}$

   c. $\begin{cases} 5a - 8b = 13 \\ a + 2b = 8 \end{cases}$
   d. $\begin{cases} 6x - 11y = 16 \\ 4x + y = -6 \end{cases}$

2. Create a system of equations that has the solution $x = -4$, $y = 11$. Explain your strategy for making up a system of equations having a given solution.

3. A line passes through the points (3, 7) and (-1, -5).

   a. Find two more points on this line.

   b. Is (5, 13) on the line? How do you know?

   c. Write the equation of the line passing through these points.

4. Write the equation of a line having slope $\frac{1}{2}$ that passes through

   a. (10, 6)
   b. (-6, -10)

5. The equations of six lines are given below. Find all possible pairs of parallel lines. Show how you solved this problem.

   a. $y = 2x - 4$
   b. $8y - 16x = 12$
   c. $x + y = 9$
   d. $y = 6 - x$
   e. $8x - 8y = 12$
   f. $20x = 10y$

6. Hillary owns and manages a small corner grocery store. She has a standing daily order with Chelsea's Creamery for 48 quarts of milk and 36 half-gallons of milk. Her daily bill is usually \$77.76. On January 20th her bill was larger than usual. She had been charged \$81.84. By doing a quick calculation, she figured out that she had been accidentally charged for 48 half-gallons and 36 quarts. How much does Chelsea's Creamery charge for each quart and each half-gallon?

7. a. Graph $x + 2y = 10$ and $x + y = 10$ on the same axes.

   b. Which graph is steeper?

   c. Do the graphs ever intersect? If so, where?

Chapter 10 • Additional Problems

1. If these two lines are parallel, what is t?
   $y = \frac{2}{t}x + 4$ $\qquad$ $y = \frac{t}{8}x + 7$
2. a. Sketch three different rectangles, each having perimeter 80.
   b. Sketch three rectangles, each having length 5 more than the width.
   c. Find a rectangle that satisfies both conditions above. Show all your work.
3. Find the equations of three lines that intersect at the point (-3, 5). Explain your strategy.
4. On a business trip, Zoe rented a car from Peru's Budget Rental for three days and drove 173 miles. On another trip two weeks later, she again rented a car from Peru's. This time, she had the car for two days and drove 112 miles. Zoe paid $79.45 for the first trip and $52.30 for the second, excluding taxes and insurance. Peru's charges a certain amount per day plus a certain amount per mile after the first 50 miles per day. (There is no charge per mile for the first 50 miles per day.) How much does Peru's charge per day and per mile?
5. Warren drove a total of 105 miles in 2 hours and 45 minutes. He had done some driving on city roads, on which his speed averaged 25 miles per hour, and other driving on the highway, where it averaged 50 miles per hour. Estimate the amount of time he spent on highway driving and the number of miles he traveled on the highway.
6. a. Graph $x + 2y = 8$, $x + 3y = 8$, and $x + 4y = 8$ on the same axes.
   b. Label the x-intercept and y-intercept of each line.
   c. Graph a line that is steeper than all three of these lines. Write its equation.
   d. Graph a line that is not as steep as any of the three lines. Write its equation.
7. Write the equations of two lines that have the same x-intercepts.
8. Write the equations of two lines that have the same y-intercepts.

Chapter 11 • Test

Name

1. Find each sum.
   a. $\frac{1}{5} + (\frac{1}{5})^2$
   b. $\frac{1}{5} + (\frac{1}{5})^2 + (\frac{1}{5})^3$
   c. $\frac{1}{5} + (\frac{1}{5})^2 + (\frac{1}{5})^3 + (\frac{1}{5})^4$
   d. $\frac{1}{5} + (\frac{1}{5})^2 + (\frac{1}{5})^3 + \ldots + (\frac{1}{5})^n$
2. Estimate the sum of this infinite series.
   $\frac{1}{5} + (\frac{1}{5})^2 + (\frac{1}{5})^3 + \ldots$
3. Some of the following sequences are geometric; find their common ratio. Some are arithmetic; find their common difference.
   a. $\frac{3}{5}, (\frac{3}{5})^2, (\frac{3}{5})^3, \ldots$
   b. $12, \frac{12}{5}, \frac{12}{25}, \ldots$
   c. $\frac{1}{3}, \frac{10}{3}, \frac{19}{3}, \frac{28}{3}, \ldots$
4. Find the sum of the first 50 terms of this sequence.
   $8, \frac{8}{4}, \frac{8}{16}, \frac{8}{64}, \ldots$
5. For each sequence, decide whether or not the sum of the infinite sequence converges to a finite number. If it does, find the sum.
   a. $8, \frac{8}{4}, \frac{8}{16}, \frac{8}{64}, \ldots$
   b. 1, 4, 16, 64,...
   c. $\frac{1}{3}, \frac{10}{3}, \frac{19}{3}, \frac{28}{3}, \ldots$
6. Many people believe, incorrectly, that $\frac{1}{3} = 0.3$. Write the correct decimal representation of $\frac{1}{3}$.
7. By how much does the correct decimal representation of $\frac{1}{3}$ differ from 0.3? Write your answer as:
   a. a fraction
   b. a decimal
8. Find the reciprocal of 6.25. Write your answer as:
   a. a fraction in simplest form
   b. a decimal
9. Explain why, if $2p^2 = q^2$, p and q cannot both be integers.

10. If you choose a letter at random from the word ALGEBRA, what's the probability that it's a vowel?

11. Which game, if either, is fair? Explain.
   a. If you toss a penny, a nickel, and a dime, each coin will land either heads or tails. If the total value of the coins landing heads is 10 cents or more, Player A wins. Otherwise, Player B wins.
   b. If you toss a penny, a nickel, a dime, and a quarter, each one will land either heads or tails. If the total value of the coins landing heads is 26 cents or more, Player A wins. Otherwise, Player B wins.

12. One *parsec* is the distance light travels in 3.26 years. Light travels 5.88 trillion miles in one year.
   a. How many miles in a parsec?
   b. How many parsecs does light travel in one year?

13. a. 💡 If you substitute whole numbers for x in the expression $\frac{1}{2x+1}$, will you *always*, *sometimes*, or *never* get a rational number? Explain.
   b. If you substitute whole numbers for x in the expression $\frac{1}{2x+1}$, will you *always*, *sometimes*, or *never* get a number that can be written as a terminating decimal? Explain.

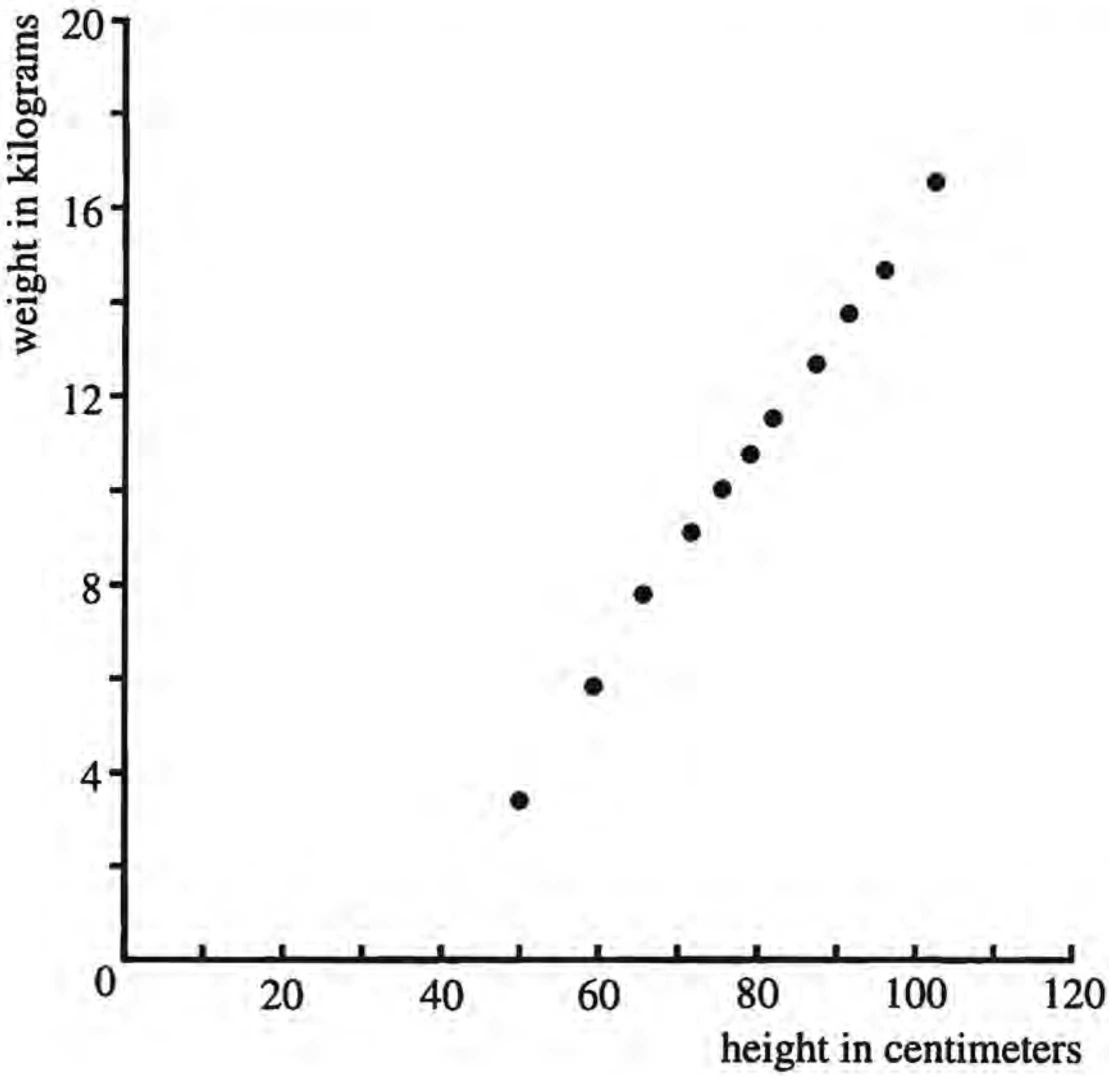
Chapter 12 • Test

Name

1. Kim lives 18 miles from work. One day, it took her $\frac{1}{2}$ hour to get to work in the morning. She got caught in a traffic jam on her way home, and the return trip took her 2 and $\frac{1}{2}$ hours.
   a. What was her average speed in miles per hour for the round trip?
   b. How many minutes, on the average, did it take her to go one mile?
2. Find Kim's average speed for a trip in which she drove:
   a. 18 miles at 45 mph and 18 miles at 60 mph
   b. 18 miles at 45 mph and 180 miles at 60 mph
   c. 180 miles at 45 mph and 18 miles at 60 mph
3. a. Explain why none of your answers to problem 2 is equal to $\frac{45 + 60}{2}$, or 52.5.
   b. Which answer is closest to 52.5? Which is closest to 45? Which is closest to 60? Why?
4. Gabe publishes a monthly magazine called *The Good News About Algebra*. He loses about 20% of his customers at the end of every school year, but gains about 85 more each September. How many customers will he end up with in the long run? Explain.

Dr. Terwit, a pediatrician, kept records of her son Joshua's height and weight from birth to age four years. You analyzed this table of data in Chapter 8.

Age	Height (cm)	Weight (kg)
birth	51	3.4
3 mos	60	5.7
6 mos	66	7.6
9 mos	71	9.1
12 mos	75	10.1
15 mos	79	10.8
18 mos	82	11.4
2 yrs	88	12.6
2.5 yrs	92	13.6
3 yrs	96	14.6
4 yrs	103	16.5



5. You should have a graph of the weight as a function of height. On this graph, use the median-median line method to fit a line.

6. a. What is the equation of your fitted line?
   b. What is the slope of your fitted line?

7. Use your equation to predict how much Joshua will weigh when he is 106 centimeters tall.

8. According to the data, Joshua weighed 10.8 kilograms when he was 79 centimeters tall. How does this compare with the weight predicted by your equation for a height of 79 centimeters?

9. According to your equation, how much weight does Joshua gain for every increase in height of one centimeter?

Chapter 13 • Test

Name

1. A pen is to be made having length 5 feet more than twice its width. If 70 feet of fencing is available to make the pen, what will its area be? Show your work. Include a sketch.

2. The perimeter of a rectangle is 85.

   a. Find the dimensions that will give it an area of 100.

   b. Find the dimensions that will give it the largest possible area.

3. Which graphs have the same x-intercepts? Explain.

   a. $y = 4x(9 - x)$ b. $y = x(18 - 2x)$
   c. $y = 2x(x - 9)$ d. $y = 6x(18 - 3x)$
   e. $y = x(x - 6)$ f. $y = 6x(9 - 3x)$

4. How many x-intercepts does each have?

   a. $y = 3x - 5$ b. $y = 3(x - 5)$
   c. $y = (x - 3)(x - 5)$ d. $y = 5x^2 - 5$
   e. $y = x^2 + 6x + 9$ f. $y = a(x - H)^2$

5. A movie theater has a bargain night every Tuesday during the summer. It charges $2.50 for a double feature. The attendance is usually about 400 people. The manager thinks that he could increase attendance by reducing the admission fee. After conducting a survey in town, he concludes that with every 25-cent reduction in the admission fee, he could increase attendance by 50 people. How much should he charge for admission to maximize the amount of money he takes in? How many people would attend?

6. Write an equation of any parabola that fits the description.

   a. The x-intercepts are (-2, 0) and (5, 0).
   b. The vertex is (-2, 6).
   c. The y-intercept is (0, -4).
   d. The vertex is at (4, -5) and one intercept is at (3, 0).

7. Solve these equations.

   a. $9x - x^2 = 20$ b. $x^2 - 12 = 0$
   c. $x^2 - 12x = 0$ d. $x^2 - 12x = -10$
   e. $x^2 - 12x = -9$ f. $x^2 - 12x - 9 = 0$

Chapter 13 • Additional Problems

1. Write the equations of three different parabolas that have x-intercepts (2, 0) and (-3, 0).

2. A parabola crosses the x-axis at (–1, 0) and (–5, 0) and has a vertex at (-3, -2). Write three equivalent equations for this parabola.

3. You have a square having sides 22 cm in length. You want to cut a small square out of each corner and fold up the sides to make a tray.
   a. If you want the base of the tray to be a 10-cm-by-10-cm square, what should be the size of the small squares that you cut out of each corner?
   b. Find the volume and surface area of the resulting tray.

4. A photocopying service will make 3000 copies or fewer at the rate of $5.00 per hundred copies. Customers who make large orders (over 3000 copies) may take advantage of the Discount Plan. The service gives a discount of 5 cents per hundred on the whole order for each hundred in excess of 3000.
   a. Under the Discount Plan, a person who ordered 3300 copies would get a discount of 15 cents per hundred. What would be the total cost of the order?
   b. What is the cost of the most expensive possible order? How many copies is it? (Hint: Use algebra or make a table.)
   c. According to this plan, what would be the cost of 10,000 copies? What about 13,000 copies?
   d. What restrictions would you advise the photocopying service to make on the Discount Plan? Explain.

5. Find two numbers whose product is 228 and whose sum is 31.

6. The sum of two numbers is 56. If their product is to be as great as possible, what are the two numbers?

7. Find the coordinates of the vertex.
   a. $y = -4(x + 2)(x - 3)$ b. $y = (x + 2)^2 - 5$
   c. $y = x^2 - 6x + 10$

8. Solve for x. $3(x + 2)(x - 5)(2x + 4) = 0$

Chapter 14 • Test

Name

1. Write a rational expression having a denominator of $12x$ that is equivalent to:
   a. $\frac{1}{12}$ b. 12
   c. $12x$ d. $12y$
2. Find a common denominator and add.
   a. $1 + \frac{6}{x}$ b. $y + \frac{4}{y}$ c. $\frac{6}{x} + \frac{4}{y}$
   d. $\frac{b}{a} + \frac{b^2}{2a}$ e. $\frac{a}{b} + \frac{a}{c}$

In problems 3 through 11, simplify if possible.

3. $\frac{6a + 6b}{5a + 5b}$
4. $\frac{3x + 3y}{x^2 - y^2}$
5. $\frac{y^2 + 6y}{y^2 + 5y}$
6. $\frac{2}{2x + 2}$
7. $\frac{2}{3x + 2}$
8. $\frac{10x - 5}{5}$
9. $\frac{10n^2}{2n}$
10. $\frac{3}{12a + 6b}$
11. $\frac{2x + 2}{6x + 6}$
12. Tell whether each equation is *always*, *sometimes*, or *never* true. If it is sometimes true, illustrate by substituting numbers for x and y that make it true.
    a. $\frac{2x + 2y}{2} = x + y$ b. $\frac{2x + 2y}{2x} = 2y$
    c. $\frac{2x + 2y}{x + y} = 2$ d. $\frac{2x + 2y}{2} = x + 2y$
13. Consider the equation $5x^2 = 20x$.
    a. Explain why you can divide both sides by 5, but not by x.
    b. Solve the equation correctly.
14. Solve for x.
    a. $1 + \frac{8}{x} = \frac{-7}{x^2}$ b. $1 + \frac{1}{x^2} = \frac{2}{x}$
    c. $1 + \frac{6}{x} = \frac{-4}{x^2}$ d. $1 + \frac{6}{x} = \frac{4}{x^2}$
15. Give the vertex, x-intercepts, and y-intercept of:
    a. $y = 3x^2 + 4x - 9$ b. $y = -4(x - 5)(x + 2)$
16. Write a quadratic equation that has the solutions $2 + \sqrt{7}$ and $2 - \sqrt{7}$.

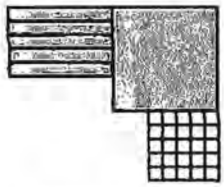
17. The reciprocal of $x + 2$ is $\frac{1}{x+2}$. Find the result of these operations. Write your answer as a single fraction in simplest form.
   a. Multiply $x + 2$ by its reciprocal.
   b. Add $x + 2$ to its reciprocal.
   c. Subtract $x + 2$ from its reciprocal.
   d. Divide $x + 2$ by its reciprocal.

18. Find the reciprocal of each expression.
   a. $\frac{x}{2}$
   b. $x + \frac{1}{2}$
   c. $2 + \frac{1}{x}$
   d. $1 + \frac{2}{x}$

Test Bank Solutions

Chapter 1

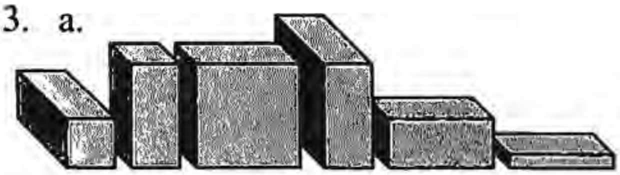
1. a. $y^2 + x^2y + xy + 5x + y + 5$
   b. $16 + (\frac{1}{4})(4) + (\frac{1}{2})(4) + (5)(\frac{1}{2})$
   $+ 4 + 5 =$
   $16 + 1 + 2 + 2.5 + 4 + 5 = 30.5$
2. Answers will vary. Two examples:



A = $y^2 + 5y + 25$
P = $6y + 10$

A = $y^2 + 5y + 25$
P = $4y + 20$

3. a.



x^2y x^2y xy^2 xy^2 x^2y xy

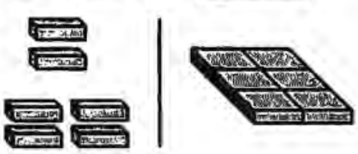
   b. $3x^2y + 2xy^2 + xy$
   c. If $x = 0, y = 1$,
   then $3x^2y + 2xy^2 + xy = 0$
4. a.

You can't draw x^4.

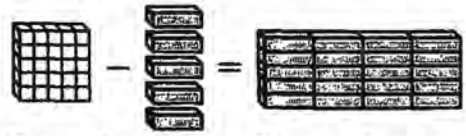
   b.

   c.

   d.

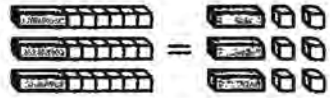


5. a.



Sometimes true. True when $x = 1$

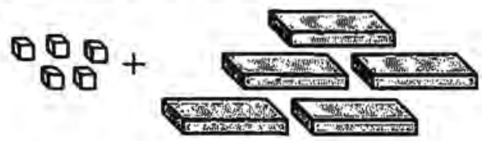
   b.



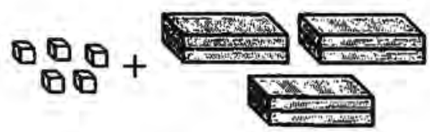
Never true.

6. a.

   b.



   c.



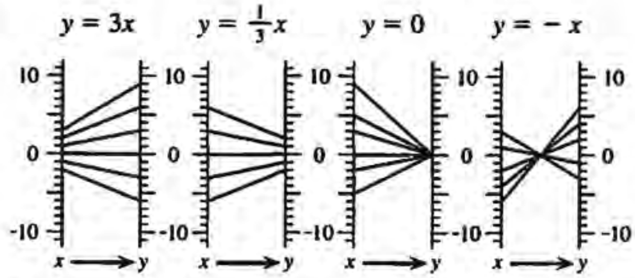
   d.

7. a. $x = 2, y = 2$ b. $x = 1, y = 1$
8. $y(y + 3) = y^2 + 3y$
9. a. $x + 3$ b. $2y$ c. $3y$ and $4x$
10. $18x$

Chapter 2

1. a. x = Any positive number
   b. x = Any number larger than 6
   c. x = Any number larger than 6
   d. x = Any negative number
   e. x = Any number smaller than 6
   f. x = Any number smaller than 6
2. a. $-3x$ b. $-3 - x$ c. $-3 + x$
3. a. Answers will vary. Some examples: $15 \cdot 2xy$; $5x \cdot 6y$; $2x \cdot 15y$; $30x \cdot y$; $30 \cdot xy$; $3 \cdot 10xy$
   b. Answers will vary. Some possibilities are: $30 \cdot x \cdot y$; $2x \cdot 3y \cdot 5$; $(-x)(15)(-2y)$

4. a. $4y - 20$ b. $5 - y$
   c. $x^2 + xy - 4x + y - 5$
5. $y = 3x$
6. $y = \frac{1}{3}x$
7. $y = 0$
8. $y = -x$



9. a. 

   b.

Figure #	Perimeter
1	$2x + 10$
2	$4x + 14$
3	$6x + 18$
4	$8x + 22$
⋮	
10	$20x + 46$
⋮	
100	$200x + 406$
⋮	
n	$2nx + 4n + 6$

10. Answers will vary. One way is to draw a rectangle around the triangle and then subtract the areas of the right-angle triangles formed between the inner triangle and the rectangle.

Chapter 3

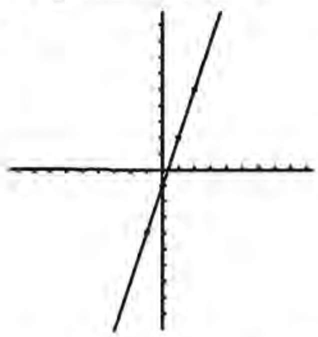
1. a. 13 b. -13 c. 1 d. 42
2. a. $x > 0$, x = Any positive number
   b. $x < 0$, x = Any negative number
   c. Not possible. All values of x when raised to the fourth power will be positive.
   d. $x > \frac{1}{4}$ x = Any positive number greater than $\frac{1}{4}$
   e. $x > 0$ x = Any positive number
   f. $x > 0$ x = Any positive number
   g. $x = \pm 2$
   h. $x = \frac{1}{4}$
3. a. (1) x
   (2) $6x$
   (3) $6x - 4$
   b. $6x - 4 = -1 \therefore 6x = 3; x = \frac{1}{2}$
4. a. $y = \frac{1}{2}(x - 3)$
   b. Multiply x by 2 and then add 3.
   c. $y = 2x + 3$
5. a. Subtract 32 from the Fahrenheit temperature, then divide by 1.8.
   b. Add 273 to the above equation.
6. The correct equation is a.
7. a. 288°K b. 212°F
8. a. $16xy$ b. $14xy - 3x - 2y$
   c. $18xy + 6x^2y$
   d. $x^2 + 4xy + 2x + 3y^2 + 6y$
9. a. Less than, because $\frac{2}{N} < 1$
   b. Greater than, because dividing by less than one results in a larger number
10. a. Not possible
    b. Possible when the number subtracted is the larger of the two

Chapter 3 • Additional Problems

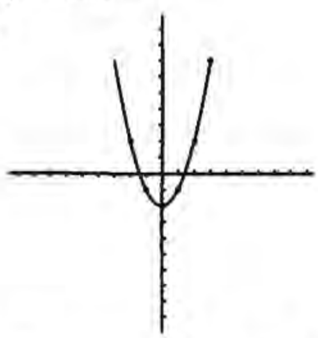
1. a. Does not exist
   b. 0
   c. 0
   d. Does not exist
   e. 0
2. Always. $\frac{1}{-x} = -(\frac{1}{x})$
   Examples will vary.
3. a. 1, −1 b. 0 c. 0 d. None
4. a. Answers will vary. $x > 1$ or $-1 < x < 0$
   b. Answers will vary. $0 < x < 1$ or $x < -1$
   c. Answers will vary. Any positive number
   d. Answers will vary. Any negative number
5. a. 1 b. The number is squared (x^2).

Chapter 4

1. a. $y = \frac{8}{3}x$
   b. Answers will vary. $y = 8$ is a possible answer.
   c. $y = x^2 - 1$
2. (2, -9) and (-2, -9) are on the graph by substitution in the equation.
3. $y = -41$
4. $x = \pm 7$
5. a. Any number for x less than zero
   b. Any number for x greater than zero
   c. Not possible
   d. Not possible
6. a. Any negative number for x, or zero
   b. Not possible
   c. Not possible
   d. Any number for x
7. a.



   b. Answers will vary. Possible answers: (3, 8), (-2, -7)
   c. $y = 3x - 1$
8. a.



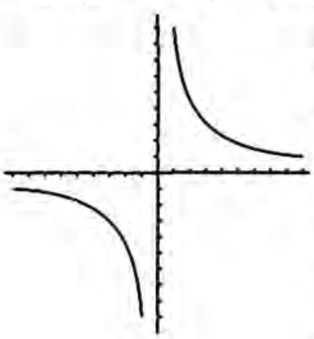
   b. Answers will vary. Possible answers: (-3, 7), (4, 14)
   c. $y = x^2 - 2$
9. a and b
10. Points that have the same x, y ratio are on a line through the origin.
11. It does not. The ratios are the same, but the line does not pass through the origin.
12. No. Direct variation is defined as passing through the origin and having a constant x to y ratio.
13. a. The car started at some (y) distance from the house and remained stationary until the slope. The car moved away from the house until it stopped and was stationary for the second horizontal distance (Time). The car then returned home.
    b. The car started a distance (y) from the house and proceeded toward home. The horizontal line shows a stop for some (x) period of time after which the car proceeded home. Velocities will be determined by the slope of the lines and the units chosen.

Chapter 5

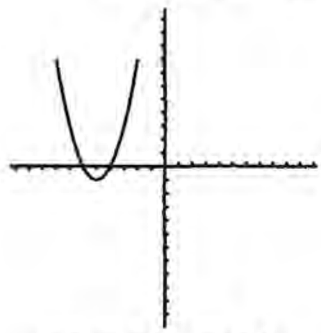
1. a. $x + y = -7$ b. $x + 2y = 0$
   c. Answers will vary. $x + y = S$, where $S > 0$.
   d. Not possible except when $x = 0$ and $S \neq 0$; ($y = \pm S$)
2. a. $xy = P$ where $P \neq 0$
   b. $xy = -5.2$
   c. $xy = 16$
   d. Not possible except $xy = 0$
3. $x + y = -9$
   $x \cdot y = 18$

4. a. $120x^2$ b. $24x^2 + 30x$
   c. $8x^2 + 22x + 15$
5. b and c
6. a. $2x^2 + 7x + 5$ b. $2x^2 + 3x - 5$
   c. $2x^2 - 3x - 5$ d. $2x^2 - 7x + 5$
7. a. $x + 1$ b. $2x + 4y$
8. a. $x(x + 1)(x + 2)$
   b. $12x(3x + 1)(x + 4)$
9. Two. At $y = 0$ (x-intercepts)
   $(x + 2)(x + 4) = 0$ or $x = -2, -4$
10. 13, 24, 33, 40, 45, 48, 49
    $(x + 13)(x + 1)$ $(x + 12)(x + 2)$
    $(x + 11)(x + 3)$ $(x + 10)(x + 4)$
    $(x + 9)(x + 5)$ $(x + 8)(x + 6)$
    $(x + 7)(x + 7)$

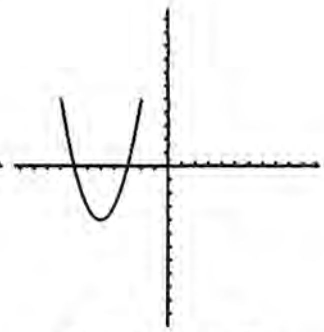
Chapter 5 • Additional Problems

1. 17 $(x + 1)(x + 16)$
   10 $(x + 2)(x + 8)$
   8 $(x + 4)(x + 4)$ or $(x + 4)^2$
2. 17 $(x + 1)(x + 16)$
   10 $(x + 2)(x + 8)$
   8 $(x + 4)(x + 4)$ or $(x + 4)^2$
   -17 $(x - 1)(x - 16)$
   -10 $(x - 2)(x - 8)$
   -8 $(x - 4)(x - 4)$ or $(x - 4)^2$
3. 
   Neither x nor y can be zero, therefore the curve cannot pass through the origin, nor can it touch either axis.
4. Two negatives cannot add to a positive.
5. 63
6. $\frac{B(B + 1)}{2} - \frac{T(T - 1)}{2}$

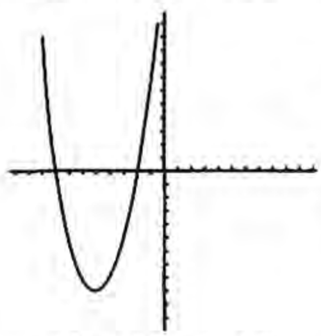
7. a. $(x + 0)(x + 10) = x^2 + 10x$
   $(x + 1)(x + 9) = x^2 + 10x + 9$
   $(x + 2)(x + 8) = x^2 + 10x + 16$
   $(x + 3)(x + 7) = x^2 + 10x + 21$
   $(x + 4)(x + 6) = x^2 + 10x + 24$
   $(x + 5)^2 = x^2 + 10x + 25$
   b. $(x + 5)^2 = x^2 + 10x + 25$
8. a. $x^2 + 10x + 24$
   $x^2 + 10x + 21$
   $x^2 + 10x + 16$
   $x^2 + 10x + 9$



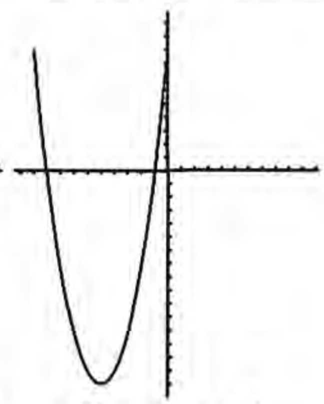
$x^2 + 10x + 24$



$x^2 + 10x + 21$



$x^2 + 10x + 16$
y-intercept = 16

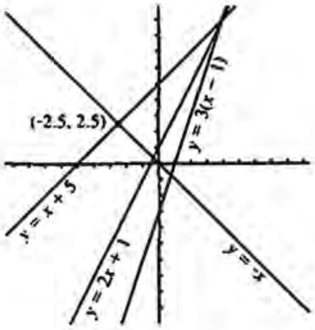


$x^2 + 10x + 9$
y-intercept = 9

   b. $x^2 + 10x + 25$
9. They are the same. $y = x^2 + 10x + 25$ has one x-intercept because $x^2 + 10x + 25 = (x + 5)(x + 5)$, so only $x = -5$ makes $y = 0$.
10. a. $30 - 8x$ b. $6 - 2x$
    c. $6x^2 - 26x + 24$ d. $24 - 2x$

Chapter 6

1. and 2.



3. a. -2.5 b. $-\frac{1}{3}$ c. 4 d. $\frac{1}{4}$
4. $-\frac{1}{3} > x > -2.5$ or $-2.5 < x < -\frac{1}{3}$
5. a. $x < 3.5$ b. $x < 5$ c. $x < 2.5$
6. a. $x = 14$ b. $x = 101$
   c. $y = -\frac{16}{11}$ d. $d = 1$
7. a. $y = 3 - 2x$ b. $y = 2x - \frac{8}{3}$
8. a. \$15.45 b. \$10.95 + \$3T
   c. \$$P$ + \$$nT$
9. 43.7 inches or 3.64 feet

Chapter 6 • Additional Problems

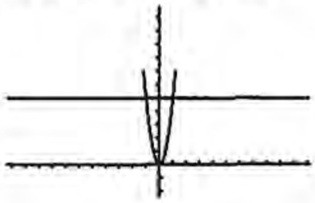
1. a. $R + 1$ mile per day
   b. end of September
   c. $R + \frac{M}{4}$ miles
   d. $M = 4(12 - R)$ for $R \leqslant 12$
2. a. FCP = \$7.50 for $n \leqslant 60$
   FCP = \$7.50 + \$0.15 $(n - 60)$
   for $n > 60$
   b. SDP = \$0.20n
3. Answers will vary. Graph or chart may be used.
   FCP = SDP at $n = 37.5$
   $0.2n = 7.50$ $n = 37.5$
   SDP is better when $n < 37.5$

Chapter 7

1. a. $2x^2 - 2x - 24$
   b. $y^2 - x^2 + yz - xz$
2. a. $a^2x^2 + 2abx + b^2$
   b. $a^2x^2 - 2abx + b^2$
   c. $a^2x^2 - 2abx + b^2$ or $b^2 - 2abx + a^2x^2$
   d. $b^2x^2 + 2abx + a^2$
3. a. $25b^2 + 80bc + 64c^2 = (5b + 8c)^2$
   b. $\frac{1}{16}x^2 + \frac{1}{2}xy + y^2 = (\frac{1}{4}x + y)^2$
4. a. $(y - b)$
   b. a; $6ay$ $[(3y + a)^2 = 9y^2 + 6ay + a^2]$
5. a. ± 7 b. $\pm\frac{2}{5}$ c. 4
6. a. $-4 < x < \frac{1}{2}$ b. $-1 < x < 0$
7. a. $(3x + 4)(3x - 4)$
   b. $(4 + 3x)(4 - 3x)$
   c. $(3x - 4)^2$
8. a. Scientific notation is defined as a power of base 10.
   b. 1.024×10^3
9. a.  b. 
10. a. $4(n - 2) + 4 = 4n - 4$ blue border tiles, $(n - 2)^2$ red interior tiles.
    b. $4n - 4 + (n^22)^2 = 4n - 4 + n^2 - 4n + 4 = n^2$
11. a. $8(n - 4) + 16 = 8n - 16$ blue border tiles
    b. $8n - 16 + (n - 4)^2 = 8n - 16 + n^2 - 8n + 16 = n^2$ red interior tiles.
12. Additional border tiles = new border − old border = $(n - 1)^2 - (n - 2)^2 = 2n - 3$. Additional interior tiles = $[4(n + 1) - 4] - (4n - 4) = 4$.

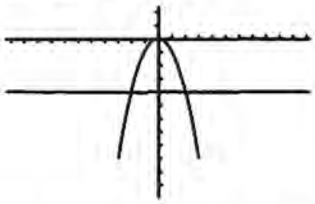
Chapter 7 • Additional Problems

1. a. $-5 < x < 5$
   b. $x < -5$ or $x > 5$



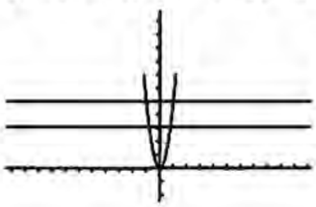
$y = 25$
$y = x^2$
units = 5

   c. $x < -2$ or $x > 2$
   d. $-2 < x < 2$



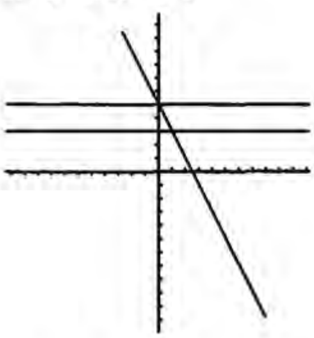
$y = -4$
$y = -x^2$

   e. $-5 < x < -4$ or $4 < x < 5$



$y = 25$
$y = 16$
$y = x^2$
units = 5

   f. $0 < x < 1$



$y = 5$
$y = 3$
$y = 5 - 2x$

2. a. $9 + 6y + y^2$ b. $\frac{x^2}{16}$
   c. $4x^2 - 12x + 9$ d. $16x^2$
3. a. $x^2 - 2x - y^2 + 1$
   b. $9x^2 + 36xy + 36y^2 - 4$
   c. $a^2 + 2ab - 2ac + b^2 - 2bc + c^2$
   d. $a^2 - b^2 + 2bc - c^2$
4. a. $(xy - a)^2 = x^2y^2 - 2axy + a^2$
   b. $a^2b^2 - c^2 = (ab - c)(ab + c)$
5. a. $3(x + 5)(x - 5)$ b. $4(x + 5)^2$
   c. $4(x - 5)^2$ d. $12x(y + 3)^2$

Chapter 8

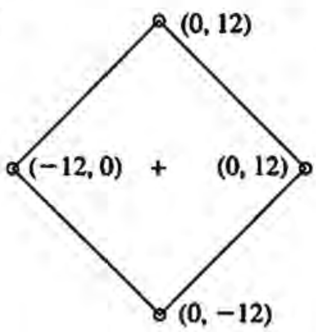
1. a. -7 b. $-\frac{1}{7}$ c. $-\frac{1}{4}$ d. -4
2. a. When x moves positive, y moves negative.
   b. $m = -5, b = 8$
3. a. Not possible
   b. Not possible
   c. Not possible
   d. $y = 0x + b$, when $b \neq 0$
4. a. Possible. Any 2 lines with same b, different m. Answers will vary.
   b. Not possible. All lines of slope m will be parallel.
5. $y = 2x + b$
   All lines of slope 2 will be parallel.
6. a. Answers will vary. Any equation where $m < 1$ and $b = 4$ will satisfy the conditions.
   b. Answers will vary. Any equation where $m > -1$ and $b \geqslant 0$
7. a. $y = -4$ b. $x = 5$
8. a. 180 grams b. $20 \cdot 3^x$
9. a. 4^4 b. 4^5 c. 4^3 d. $4^{3.5}$
10. 5^{24}
11. a. 3 b. 81
12. a. 6×10^7 b. 6×10^{-5}
13. a. 6^4 b. 2^5
14. a. $4 \cdot 10^2$ b. $\frac{1}{4}M^3$ c. $4P^4$

15. a. \$1210
b. Simple interest is calculated only on the principal. Compound interest is calculated on the principal plus accumulated interest.
c. At 2 years
Mr. G: \$20,000$(1.05)^2$
Ms. B: \$22,000 + 2(1210)
At 5 years
Mr. G: \$20,000$(1.05)^5$
Ms. B: \$22,000 + 5(1210)
d. 14

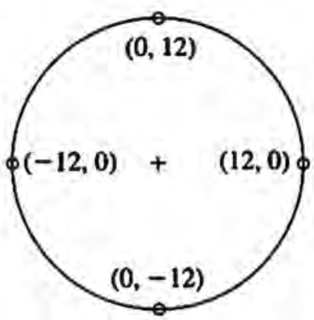
16. 5^{2x}

Chapter 9

1. a. 20 b. $|5 - y|$
2. -4 and 2
3. a. 0 b. 1.25 c. $\frac{x+y}{2}$
4. (0, 6)
5. a.



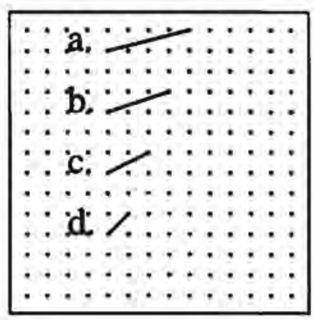
b.



6. a. 17 b. $-\frac{8}{9}$ c. 12.04
7. a. $5\sqrt{2}$ b. $y\sqrt{2}$
8. a. $\frac{5}{\sqrt{2}}$ b. $\frac{y}{\sqrt{2}}$
9. a. $5\sqrt{10}$ b. $\sqrt{50}$
c. $6\sqrt{50}$ d. $6\sqrt{10} + 3\sqrt{50}$
10. 12, $\sqrt{5}$ 3, $4\sqrt{5}$ 2, $6\sqrt{5}$
11. a. $2\sqrt{5}$ b. $2\sqrt{10}$ c. $2\sqrt{15}$
d. $4\sqrt{5}$ e. 10
12. a. $3\sqrt{2}$ b. $20 - 3\sqrt{5} - \sqrt{35}$
c. $4 + \frac{13}{2}\sqrt{2}$ d. $10\sqrt{3}$
13. a. 12,712,084 b. 12,621,673

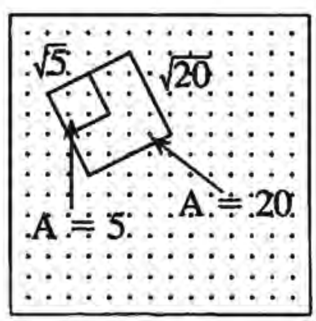
Chapter 9 • Additional Problems

1. a. Answers will vary.
An example is $x = 1$, or any positive number
b. Answers will vary.
An example is $x = -4$, or any negative number
c. $x = 0$
2. a. $\frac{1}{4}$ b. $\frac{1}{4}$ c. $-\frac{1}{4}$ d. 4
3. a. True b. True c. False
d. False e. False
4.



a. $\sqrt{17}$
b. $\sqrt{10}$
c. $\sqrt{5}$
d. $\sqrt{2}$

5. a.

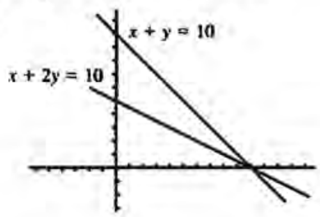


b. The side of the square with area = 20 is twice the side of the square with area 5, so $\sqrt{20} = 2\sqrt{5}$.

6. a. 12 times
   b. 144 times (12^2)
   c. 1728 times (12^3)

Chapter 10

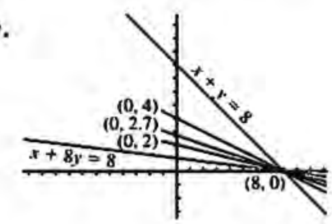
1. a. (0, 4)
   b. Infinite. Equations are equivalent.
   c. (5, 1.5)
   d. (-1, -2)
2. Answers will vary. One method using $ax + by = c$ is to make up values for a and b. Substitute the known values of x and y, and solve for c. Put that value of c in the equation.
3. a. Answers will vary. Possible answers are: (4, 10) (2, 4) (0, -2) (1, 1) (-2, -8)
   b. Yes
   c. $y = 3x - 2$
4. a. $x - 2y = -2$ or $y = \frac{1}{2}x + 1$
   b. $x - 2y = 14$ or $y = \frac{1}{2}x - 7$
5. a, b, and f are parallel.
   c and d are parallel.
6. quart = \$0.78
   half-gallon = \$1.12
7. a.



   b. $x + y = 10$
   c. Yes, at (10, 0)

Chapter 10 • Additional Problems

1. $t = 4$
2. a. Answers will vary.
      All will have $2W + 2L = 80$
   b. Answers will vary.
      All will have $L = W + 5$
   c. $2W + 2L = 80$
      $L = W + 5$
      $2W + 2(W + 5) = 80$
      $4W + 10 = 80$
      $4W = 70$
      $W = 17.5$
      $L = 17.5 + 5 = 22.5$
3. Answers will vary. Examples:
   $y = -x + 2$, $y = x + 8$, $y = -2x - 1$. The equation of any line that is satisfied by substituting (-3, 5)
4. \$24.95/day
   \$0.20/mile
5. Warren drove 1 hour 27 minutes and traveled 72.5 miles at highway speeds.
6. a. and b.



   c. $x + y = 8$
   d. $x + 8y = 8$
7. Answers will vary. Examples:
   $x + 2y = 10$, $x + 4y = 10$
8. Answers will vary. Examples:
   $x + 2y = 10$, $x + 4y = 20$

Chapter 11

1. a. 0.24
   b. 0.248
   c. 0.2496
   d. $\frac{1}{4}(1 - (\frac{1}{5})^n)$
2. $\frac{1}{4}$
3. a. Geometric $r = \frac{3}{5}$

b. Geometric $r = \frac{1}{5}$

c. Arithmetic $d = 3$

4. $10.\overline{6}$

5. a. Converges to $10.\overline{6}$

b. Does not converge

c. Does not converge

6. $0.\overline{3}$

7. a. $\frac{3}{90}$

b. $0.0\overline{3}$

8. a. $\frac{4}{25}$

b. 0.16

9. One has an odd number of prime factors and the other has an even number. Since each number has a unique prime factorization, these two numbers cannot be equal.

10. $\frac{3}{7}$

11. a. Fair. The dime is the only coin that affects the winner, and it has a 50% chance of being heads.

b. Not fair. There is a 50% chance of the quarter's landing heads, but a $\frac{7}{16}$ chance that the quarter and another coin will land heads, making the odds favor Player B.

12. a. 1.917×10^{13} miles

b. 0.3 parsec

13. a. Always. A rational number is the ratio of any two integers.

b. Sometimes. The equation results in reciprocals of only odd numbers. Some of these will result in a terminating decimal, e.g., $x = 2, x = 12, x = 312$.

Chapter 12

1. a. 12 mph

b. 5 minutes

2. a. 51.4 mph

b. 58.2 mph

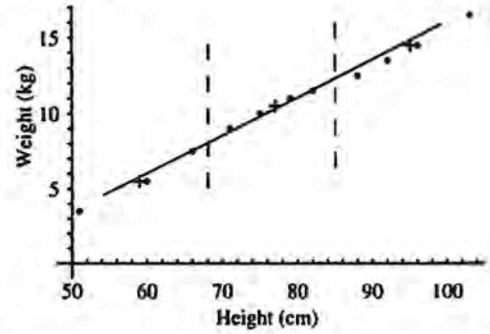
c. 46.05 mph

3. a. Average speed is obtained by dividing total distance by the total time. Average speed is the average of the speeds only when equal times are spent at each speed.

b. 51.4 because closest to = times at each speed; 46.05 because most time spent at 45 mph; 58.2 because most time spent at 60 mph

4. 425

5. Answers will vary. An example plot is shown.



6. Results may vary slightly in 6, 7, 8, and 9, but they should be close to the following:

a. $y = \frac{1}{4}x - 9$

b. $m = \frac{1}{4}$

7. 17.5 kg

8. 10.75

9. 0.25 kg

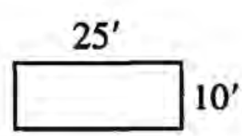
Chapter 13

1. $L = 2W + 5$

$L = 25$

$W = 10$

$A = 250$ square feet



2. a. $L = 40, W = 2.5$

b. $L = W = 21.25$

3. a and b have the same intercepts, $x = 9$

d and e have the same intercepts, $x = 6$

4. a. one
   b. one
   c. two
   d. two
   e. one
   f. one
5. \$2.25
   450 people
6. Answers may vary. Examples:
   a. $y = x^2 - 3x - 10$ or
      $y = (x + 2)(x - 5)$
   b. $y = (x + 2)^2 + 6$
   c. $y = x^2 - 4$
   d. $y = 5x^2 - 40x + 75$ or
      $y = 5(x - 3)(x - 5)$
7. a. $x = 5, x = 4$
   b. $x = \pm 2\sqrt{3}$
   c. $x = 0, x = 12$
   d. $x = 0.9, x = 11.1$
   e. $x = 0.8, x = 11.2$
   f. $x = -0.7, x = 12.7$

Chapter 13 • Additional Problems

1. Solutions will vary. Examples:
   $y = 2(x - 2)(x + 3)$
   $y = -(x - 2)(x + 3)$
   $y = 3(x - 2)(x + 3)$
2. Solutions will vary. Examples:
   $y = \frac{1}{2}(x + 1)(x + 5)$
   $y = \frac{1}{2}(x + 3)^2 - 2$
3. a. 6 cm-by-6 cm square
   b. V = 600 cm^3
      S = 680 cm^2
4. a. \$160.05
   b. \$211.25, 6500
   c. \$150; free?
   d. Answers will vary.
5. 12 and 9
6. 28 and 28
7. a. (-1, -12)
   b. (-2, -5)
   c. (3, 1)
8. $x = -2, x = 5$

Chapter 14

1. a. $\frac{x}{12x}$ b. $\frac{144x}{12x}$
   c. $\frac{144x^2}{12x}$ d. $\frac{144xy}{12x}$
2. a. $\frac{x+6}{x}$ b. $\frac{y^2+4}{y}$ c. $\frac{6y+4x}{xy}$
   d. $\frac{b(2+b)}{2a}$ e. $\frac{a(b+c)}{bc}$
3. $\frac{6}{5}$
4. $\frac{3}{x-y}$
5. $\frac{y+6}{y+5}$
6. $\frac{1}{x+1}$
7. Not possible
8. $2x - 1$
9. $5n$
10. $\frac{1}{2(2a+b)}$
11. $\frac{1}{3}$
12. a. Always true
    b. Sometimes true. When $x = y = 1$
    c. Always true
    d. Sometimes true. When $y = 0$
13. a. Solutions to an equation are not changed when dividing all terms by the same nonzero amount, but you can't divide by x, because x might $= 0$.
    b. $5x^2 - 20x = 0$
       $5x(x - 4) = 0$
       $x = 0, 4$
14. a. $(x + 7)(x + 1)$; $x = -7, x = -1$
    b. $(x - 1)^2$; $x = 1$
    c. $x^2 + 6x + 4 = 0$;
       $x = -3 \pm \sqrt{5}, x = -5.236, x = -0.764$

d. $x^2 + 6x - 4 = 0$;
$x = -3 \pm \sqrt{13}$, $x = -6.6$, $x = 0.6$

15. a. Results may differ slightly depending on method used.
Vertex: (-0.65, -10.3)
$x = 1.2$, $x = -2.5$ or $x = -\frac{2}{3} \pm \sqrt{\frac{31}{9}}$
$y = -9$ at $x = 0$

b. Vertex at (1.5, 49)
x-intercepts: $x = 5$, $x = -2$
y-intercept: $y = 40$ at $x = 0$

16. $y = (x - 2)^2 - 7$
$= x^2 - 4x + 4 - 7$
$= x^2 - 4x - 3$

17. a. 1
b. $\frac{(x + 2)^2 + 1}{x + 2}$
c. $\frac{1 - (x + 2)^2}{x + 2}$
d. $(x + 2)^2$

18. a. $\frac{2}{x}$
b. $\frac{2}{2x + 1}$
c. $\frac{x}{2x + 1}$
d. $\frac{x}{x + 2}$

QUIZ BANK

Using the Quiz Bank

The Quiz Bank contains questions keyed to each lesson in the text, which are designed to help you assess the student's understanding of the work they have done in class and on their homework. Copy a page of the Quiz Bank and "cut and paste" appropriate questions to make a customized quiz for your students. You might want to provide access to the Lab Gear or grid paper for certain questions.

OPEN-NOTE QUIZZES

The nature of the lessons in the text lends itself to open-note quizzes in which the students may refer to their homework and classwork, but not to the textbook. Reading students' explanations and answers to homework problems is a valuable form of assessment, but it may not be possible to do so daily. Giving open-note quizzes provides you with a quick way to assess student understanding. Such quizzes also reduce student anxiety and provide an incentive for students to write up classwork neatly and prepare homework carefully. The student who thoroughly answers the textbook questions, understands the reasoning, and writes the solutions clearly will have the resources to answer the quiz questions. The student whose work is incomplete, or who has written answers without understanding the concept will likely be stymied on a quiz.

When you prepare an open-note quiz, leave the lesson number next to the quiz question. This will help students find the relevant sections of work in their notebooks.

CLOSED-NOTE QUIZZES

Most of the questions in the Quiz Bank can be used to create more traditional quizzes in which the students are not allowed to refer to their notebook or textbook. Some questions are appropriate **only** for open-note quizzes, because they refer directly to particular problems in the lesson; these are labeled **O.N.** in the margin.

A quiz question may sometimes be posed for a concept or skill that is being introduced for the first time in that lesson. Until you expect your students to have mastered a skill or concept, questions on it are best used in the open-note quiz setting.

Chapter 1

[1.1] What is the area of a 6-omino?

[1.1] Draw a 6-omino with a perimeter of 14.

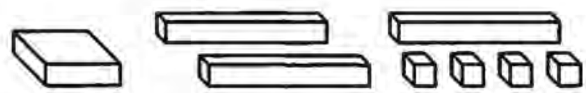
[1.2] What are all the possible perimeters for a 7-omino?

[1.2] What is the longest possible perimeter for a polyomino of area 49?

[1.2] What is the shortest possible perimeter for a polyomino of area 49?

[1.3] Sketch what $x^2 + 5x + 2$ would look like with the Lab Gear.

[1.4] Evaluate, for $x = 2$ and $y = 6$:



[1.4] Give three examples of values for ◊ and Δ that make each equation true. If you can give no values, explain why.

a) $\Diamond + \Diamond = 3 \cdot \Delta$ b) $\Delta + 2 = 2 + \Delta$ c) $\Diamond + 5 = \Diamond$

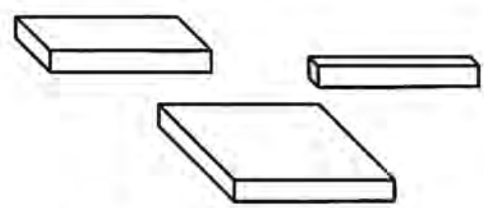
[1.5] Sketch the following:

a) Eight 1-blocks arranged to model a one-dimensional line segment.

b) Eight 1-blocks arranged to model a two-dimensional rectangle.

c) Eight 1-blocks arranged to model a three-dimensional box.

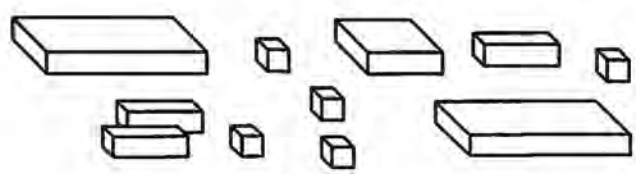
[1.5] Arrange these blocks into a rectangle. Make a top-view sketch. Write the length, width, and area of the rectangle.



[1.6] What is the degree of each term: a) 5 b) $3x$ c) x^2y

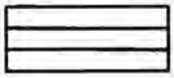
[1.6] What is the degree of $x^3 + 2x^2 + 4$?

[1.6] Write the short way:



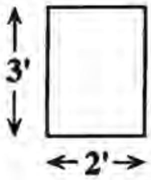
[1.6] What terms are missing in the equation: $4x^2 + 2x + \_\_\_\_ = 8x^2 + 6x + 4$?

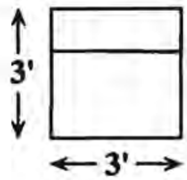
[1.7] Find the area and perimeter:

a) 

b) 

O.N. [1.8] What is the price for each window?

a) 

b) 

[1.9] Multiply with the corner piece. Sketch and state the product.

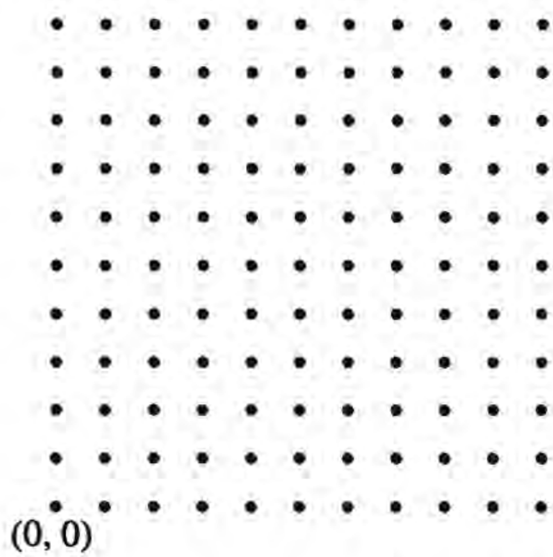
a) $x \cdot 2y$ 

b) $x(2 + y)$ 

[1.10] Find the surface area of the xy block.

[1.11] Show how to use rectangular numbers to find the 50th triangular number.

[1.12] Draw the triangle with vertices at (0, 3), (0, 8), and (4, 4). Find the area of the triangle and explain your work.

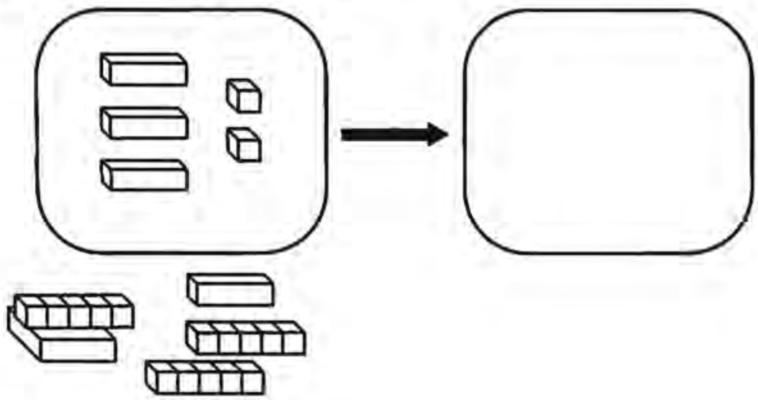


Chapter 2

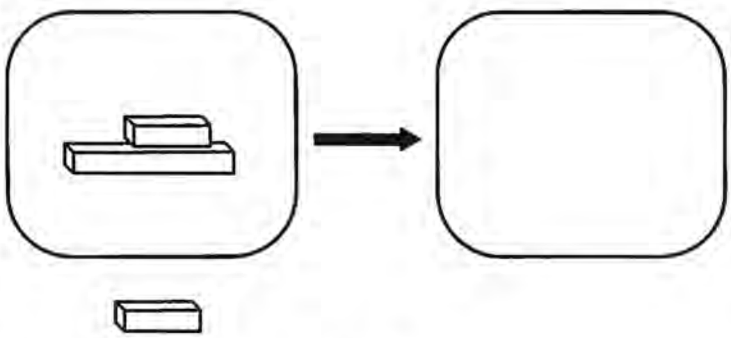
[2.1] Tell whether each minus sign means negative, opposite, or subtract in the expression $-2 - (-x)$.

[2.2] Simplify each Lab Gear expression, and sketch the result:

a)



b)



[2.2] Simplify with or without Lab Gear:

a) $5 - (3x + 2)$

b) $(x + 5) - (3x - 2)$

[2.3] a) Use the corner piece to model the multiplication $(x + 2)(2x + 1)$, and sketch the result.

b) On the sketch write the area of each of the smaller rectangles that make up the larger rectangle.

c) Write the result of the multiplication. Combine like terms.

[2.3] Write the addition $x^2 + 3xy + x$ as a multiplication. Include a Lab Gear sketch to explain.

[2.4] Find the product $x(y - 3)$ using the Lab Gear. Sketch.

[2.4] Use the distributive law to multiply $3y(4 + 2x - y)$.

[2.4] a) Show the quantity $x^2 - x$ with the Lab Gear, arranged so that the uncovered part is a rectangle. Sketch.

b) Write a multiplication of the type *length* · *width* = *area* for the uncovered rectangle.

[2.5] Suppose Abe gets \$1 on January 1, \$3 on February 1, \$9 on March 1, and so on, tripling the amount each month.

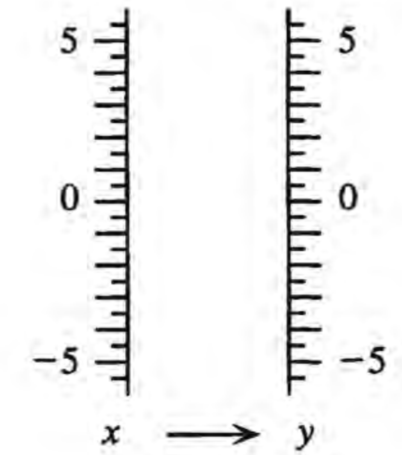
a) How much does Abe get on the first day of the sixth month?

b) How much does Abe get on the first day of the *n*th month?

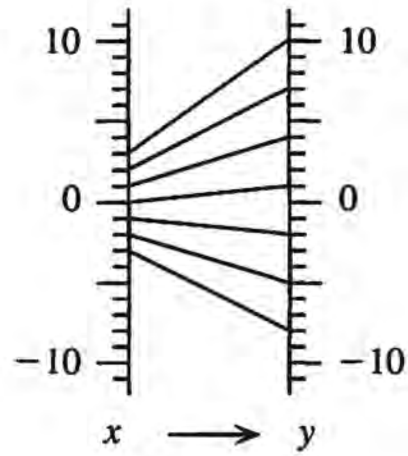
O.N. [2.6] What will someone pay to park for four and one-half hours in Zalman's garage?

[2.6] Here is a portion of the Fibonacci sequence: ..., 89, 144, 233, ... Find the next two numbers in the sequence.

[2.7] Make a function diagram for the function $y = 2x - 1$, showing five in-out pairs.

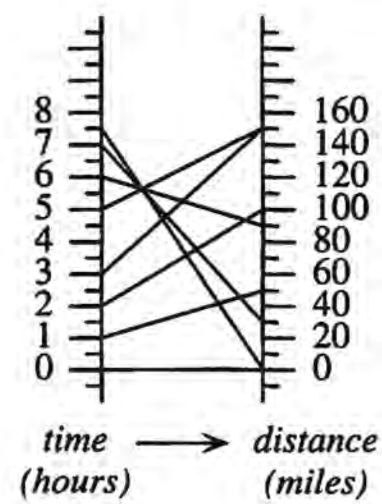


[2.7] Assume that in-out lines can be added to the function diagram, following the same pattern. Complete the chart below.



Input	Output
2	
−4	
0.5	
	16
	6

[2.8] The function diagram shows Grabel's distance from home, and time since leaving on a day-long car trip she took to Oakville.



a) How far from Grabel's home is Oakville?

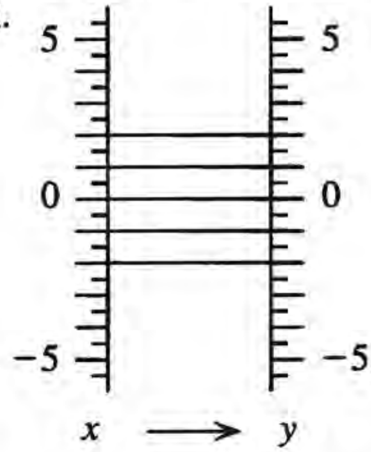
b) Assuming her rate is constant, how fast does she travel on the way to Oakville? Explain how you know.

c) Grabel spends two hours in Oakville. Assuming her rate is constant, how fast does she travel on the way home?

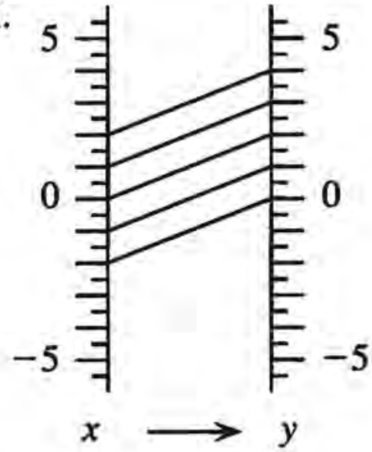
[2.9] a) Which of the function diagrams below represent functions of the form $y = x + b$?

b) Which of the function diagrams below represent functions of the form $y = mx$?

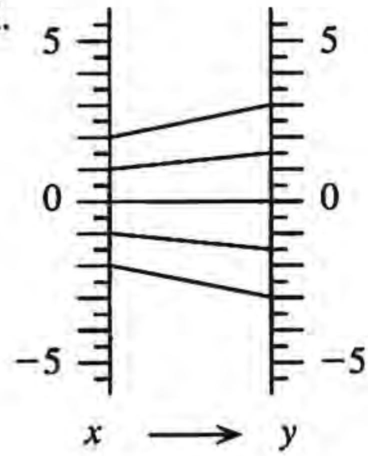
i.



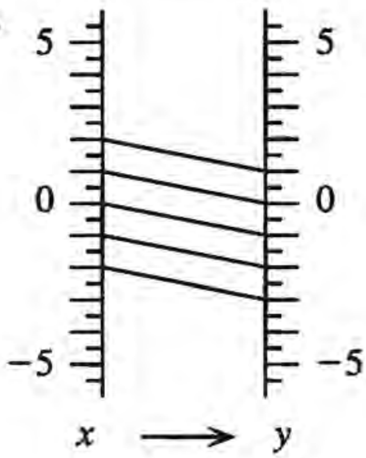
ii.



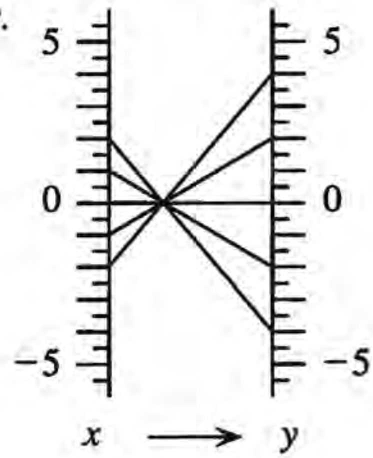
iii.



iv.



v.



[2.10] Complete the table for the sequence of block figures shown.

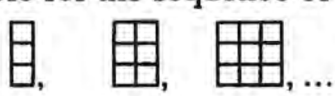
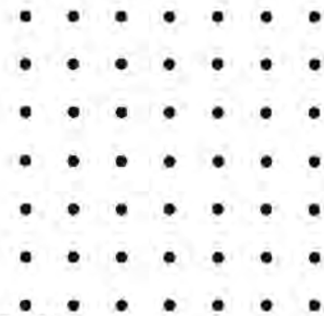


Figure #	1	2	3	4	10	n
Perimeter	8	10	12			

[2.11] A polyomino has area 20, with 5 eyes. What is its perimeter?

[2.12] Draw the geoboard triangle with vertices at (0, 4), (6, 5), and (4, 2). Find the area of the triangle and explain your work.

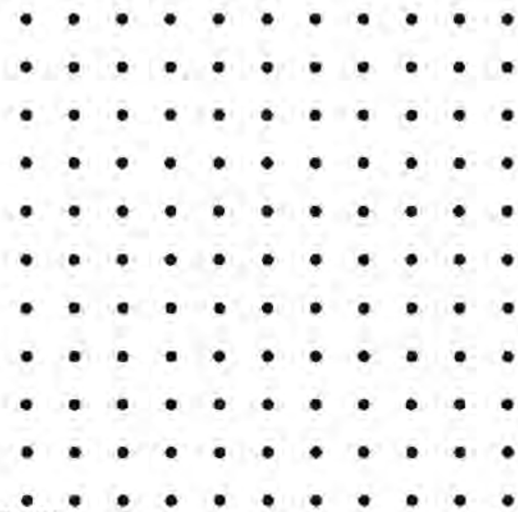

(0, 0)

[2.12] A geoboard triangle has vertices at (2, 0), (8, 0), and (2, 5).

a) What is the area of the triangle?

b) Suppose the vertex at (2, 5) is changed to $(x, 5)$. How does the value of x affect the area of the triangle?

c) Suppose (2, 5) is changed to $(2, n)$. Express the area of the triangle as a function of n.


(0, 0)

Chapter 3

[3.1] Algebank II has a new plan to attract wealthy investors. Each month they multiply your balance by 1.5, and then subtract a service charge of \$500.

a) If Ms. Alar has \$550 after 2 months of this plan, how much did she start with?

b) What is the smallest amount an investor should begin with in order to make money under this plan? Explain.

[3.2] For what values of x will the function $y = 3 - x$ have y-values that are greater than three? Explain.

[3.2] Find the product: $(-5x)(-2)(-7y)$

[3.3] Write an equivalent expression without parentheses: $2x - (-4 + 3y)$

[3.3] Fill in the blank: $3x^2 - 5x + 7 = x^2 - 2x - (\qquad)$.

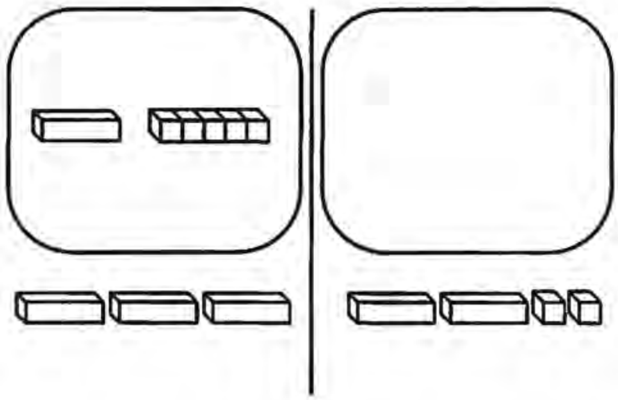
[3.4] Find what the last step or steps of this magic trick should be so that the final result always equals the original number:

1) Think of a number.
2) Add three.
3) Multiply by two.
4) Add the original number.
5) Subtract six.

???????

[3.5] Simplify both sides on the workmat. Write the simplified expressions in the blanks. Write the correct symbol (>, <, =) in the circle.

________ ◯ ________



[3.5] Decide which side is greater. If you would have to know the value of x, then give one value of x that makes the left side greater and one that makes the right side greater.

a) $(x^2 - 5 - x) \, ? \, (x^2 - 10 - x)$　　b) $(5 - x) \, ? \, (5 - 3x)$

[3.6] Divide: $\dfrac{4x^2 + 6x}{2x}$

[3.6] Show how to use a table to multiply: $(x + 3)(y + 2 - x)$

[3.7] Find two numbers a and b that satisfy the equation: $\dfrac{3}{5} \cdot a \cdot b = 7$

[3.7] a) If $4 \cdot x = 12$, what does x equal?

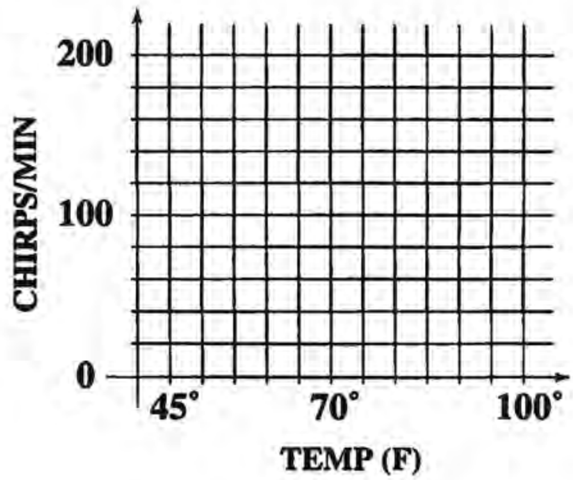
b) If $\dfrac{4}{x} = 12$, what does x equal?

c) How are these answers related?

O.N. [3.8] Convert 50° Celsius to Fahrenheit.

[3.8] Bobbie lives in the country, and she notices that the warmer it is, the faster the crickets chirp. She decides to learn more about this, and over several months she collects the data shown in the table.

Temp (F)	47	62	77	87
Chirps/min	40	100	160	200



a) Graph the points in the table.

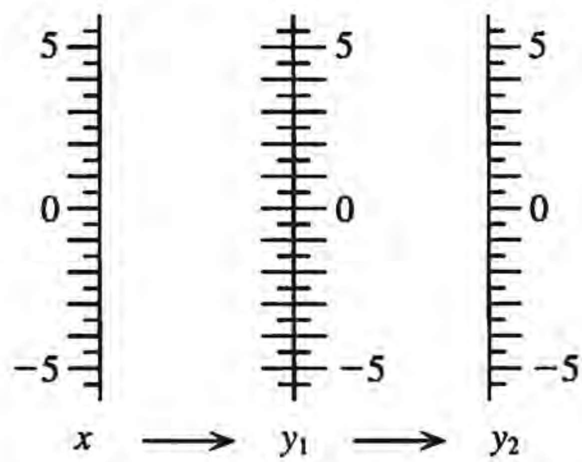
b) Use your graph to estimate the number of chirps per minute when the temperature is 70°.

c) If the temperature increases by one degree, by about how much does the number of chirps per minute increase? What does the graph show? Can you use the chart to check this?

[3.9] Solve the equation $7 - 5(x - 3) = 6$ using the cover-up method. Show your work with a sequence of equations leading to the solution.

[3.10] a) Make a two-step function diagram which combines the functions $y_1 = x - 2$ and $y_2 = 3x$ by performing y_1 first and then y_2. Show at least three in-out lines.

b) If you summarize the diagram in (a) with a one-step diagram, what function corresponds to that diagram?



[3.10] What is the inverse function for the function which has the rule: Multiply by four, then add three?

O.N. [3.11] Use your addition table to convert 3 ducats, 2 ecus, and 1 florin to the smallest possible number of coins.

[3.11] The Queen of Zipnorg decrees a single infinite month, called Ondne, but with 3-day weeks as shown in the calendar below. She calls the days Ro, Sham, and Bo.

Calendar

Ro	Sham	Bo
	1	2
3	4	5
6	7	8
9	10	...

Addition Table

sum	Ro	Sham	Bo
Ro			
Sham			
Bo			

a) Complete the addition table showing how to add the days of the weeks.

b) What is Calendar Zero? Explain.

c) What days are Calendar Opposites? Explain.

[3.12] Name the vertices of a geoboard rectangle that is similar to the one with vertices at (0, 0), (6, 0), (6, 8), and (0, 8).

[3.12] Consider three rectangles with dimensions 9 by 12, 12 by 16, and 7 by 9. Which, if any, of these rectangles are similar to each other? Explain how you can tell by using ratios and by using dot paper.

Chapter 4

[4.1] Lea travels at a speed of 25 mph on a bike and Gabe goes 30 mph on a scooter. They start out on the same route at the same time.

a) How far apart will they be after H hours? Explain.

b) If you graph each person's travel, with time elapsed on the x-axis and distance covered on the y-axis, what will the graphs look like? How will Gabe's greater speed be apparent from the appearances of the graphs?

c) Biff also starts out on the same route at the same time. If he is 10 miles ahead of Gabe after 3 hours, how long will it take Biff to travel 100 miles?

[4.2] Is the point (3.4, 0) on the graph of the function $y = 7 - 2x$? Explain how you can be sure.

[4.2] If the point $(x, -3)$ is on the graph of the function $y = 7 - 2x$, what must x equal?

[4.3] Complete the table:

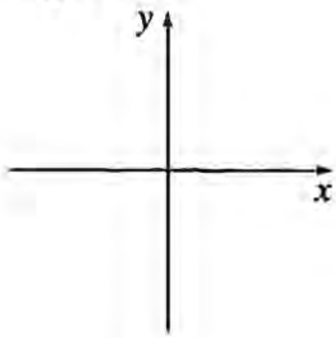
x	x^2	$-x^2$	$(-x)^2$	x^3	$-x^3$	$(-x)^3$
3	9			27		
−2				−8		

[4.3] Which of these functions have the same graph: $y_1 = x$, $y_2 = x^2$, $y_3 = -x^2$, $y_4 = (-x)^2$, $y_5 = x^3$, $y_6 = -x^3$, $y_7 = (-x)^3$.

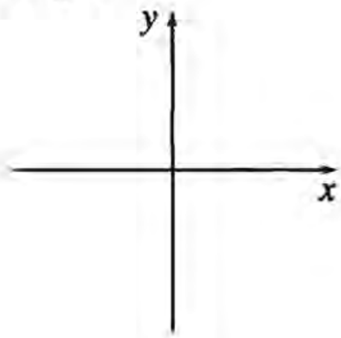
[4.3] What is the degree of the polynomial function $y = 2x + 5 - x^3$?

[4.3] Sketch a graph that could be a function of:

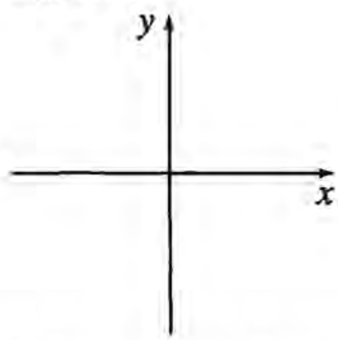
a) degree 0



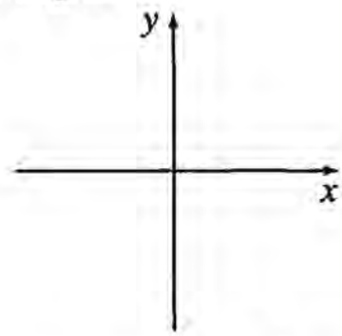
b) degree 1



c) degree 2



d) degree 3



[4.4] Find the equation of a second-degree function whose graph passes through the point (0, 4).

[4.4] Find the equation of a third-degree function whose graph passes through the origin.

[4.4] Find the coordinates of the y-intercept of the graph of $y = 2x - 6$.

[4.4] Find the coordinates of the x-intercept of the graph of $y = 2x - 6$.

[4.5] Explain how to find the exact coordinates of two more points on the line through the origin and the point (6, 9), without graphing.

[4.5] Find the equation of the line through the origin and the point (6, 9).

[4.6] Bea and Gabe did another experiment weighing amounts of unknown liquids, and Gabe (sigh…) forgot to subtract the weight of the cylinder again. Here is their data. Describe the pattern in the numbers which shows that their liquids have the same density.

Bea		Gabe	
volume	weight	volume	weight
10 ml	13 g	40 ml	82 g
20 ml	26 g	50 ml	95 g
30 ml	39 g	60 ml	108 g

[4.6] What does the graph of a direct variation look like? Be as specific as possible.

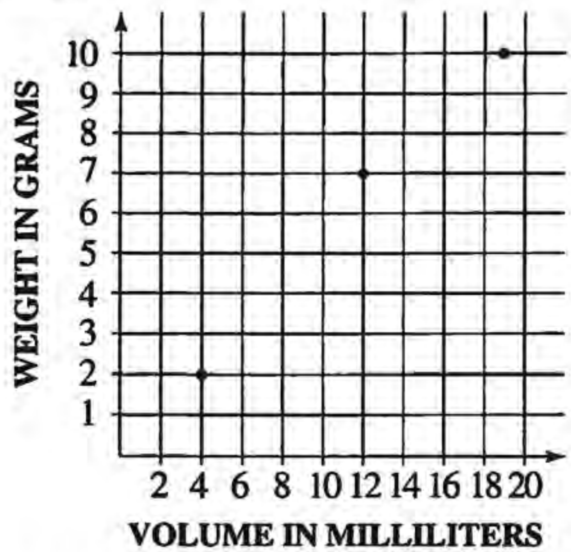
[4.6] What number pattern is always true of the (x, y) pairs of a direct variation?

[4.7] A student trying to find the density of a mystery substance came up with volume and weight data from three samples.

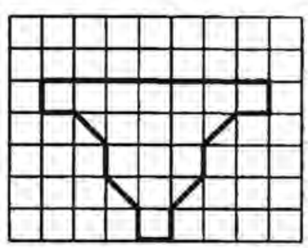
Sample 1: (12 ml, 7 g)
Sample 2: (4 ml, 2 g)
Sample 3: (19 ml, 10 g)

a) Estimate the density by drawing a line through the origin on the graph. Show your work.

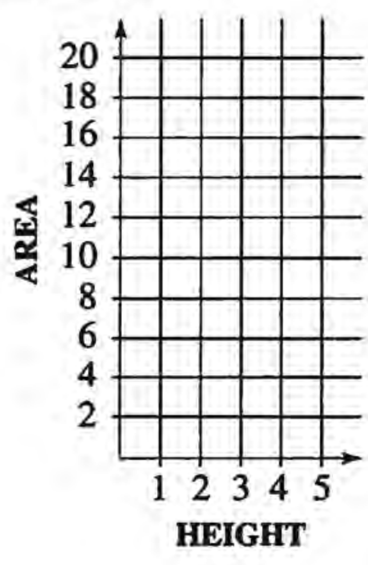
b) Estimate the density by another method. Show your work.



[4.8] Complete the chart and graph for the flat jar shown below.



Height	Area
1	
2	
3	
4	
5	

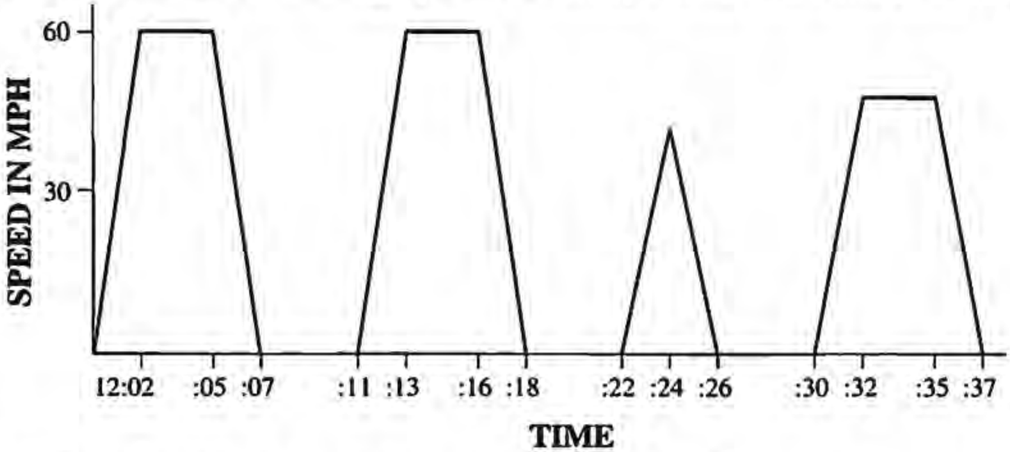


O.N. [4.9] Barney is driving his car at 50 mph.

a) How long is the safe distance according to the 3-Second Rule?

b) If Barney's car is 16 feet long, what is the safe distance according to the 1-for-10 Rule?

[4.10] A commuter train leaves on its midday run at 12:00, beginning at station A and ending at station E. The graph shows its speed at each time during the run.



a) How long does the train wait at each station?

b) Describe what happens at 12:24.

c) Between two of the stations there is a 45-mph speed limit. Which two stations are they?

[4.11] a) What is the equation of the vertical line through the point (2, 5)?

b) What must be true of the coordinates of any point chosen to the right of this line?

c) What inequality describes all points to the left of this line?

[4.12] a) What would be the area of a geoboard figure with 50 boundary dots and 0 inside dots?

b) What would be the area of a geoboard figure with 50 boundary dots and 40 inside dots?

Chapter 5

[5.1] Find a constant sum function with each property. If impossible, explain why.

a) All the in-out lines on the function diagram slant upward.

b) The function diagram includes the in-out line (−4, 12).

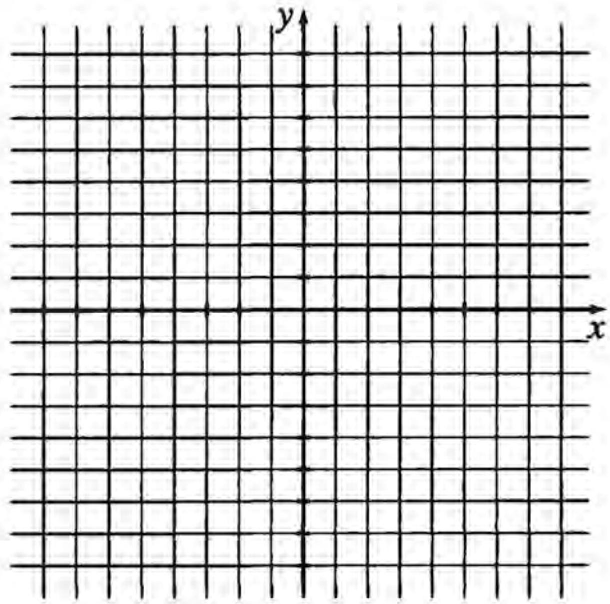
c) The graph has x-intercept (−4, 0).

d) The graph is in quadrants II and III only.

e) The graph has x-intercept (5, 0) and y-intercept (0, 10).

[5.2] a) Sketch a constant product graph that includes the point (6, 1).

b) Find the coordinates of a point on the graph which has a positive x-coordinate less than 1/4.



[5.2] Explain why a constant product graph has no x- and y-intercepts.

[5.3] Divide: $\frac{12x^2 + 4xy - 8x}{4x}$. Use Lab Gear if you wish.

[5.4] Find all trinomials of the form $x^2 + 6x +$ ____ which can be factored, and write them in factored form. (Assume the missing number is not negative.)

[5.4] Factor: $x^2 - 12x + 35$

[5.5] Consider the graph of the function $y = x^2 - 9x + 20$, which can be written in factored form as $y = (x - 4)(x - 5)$. Find the x-intercepts without graphing, and explain how you know they are correct.

[5.5] Write the equation of a frown parabola having x-intercepts at (6, 0) and (−1, 0).

[5.6] Factor completely: $15x^2 - 10x$

[5.6] Factor completely: $x^3 + 3x^2 + 2x$

[5.7] Use the Lab Gear to multiply $(x - 2)(2x - 3)$, and sketch the resulting Lab Gear figure.

[5.8] Suppose you have an unlimited supply of 7-cent and 10-cent stamps. What is the largest postage amount that you cannot make exactly?

[5.9] Show how to find the sum of the staircase $10 + 11 + 12 + \ldots + 17$ by making a rectangle or using Gauss' method.

[5.10] What is the sum of the first 200 odd numbers?

[5.10] Find the 500th term of the arithmetic sequence 11, 18, 25, 32, 39, ...

[5.11] Find the mean and the sum of the arithmetic sequence: 18, 23, 28, 33, 38, 43, ..., 1018 (201 terms). Show your work.

O.N. [5.12] Simplify: $f_1 a f_2 c s$

[5.12] Consider the sequence of carpet moves:
NE,NE,S,NE,N,E,NW,N,SE

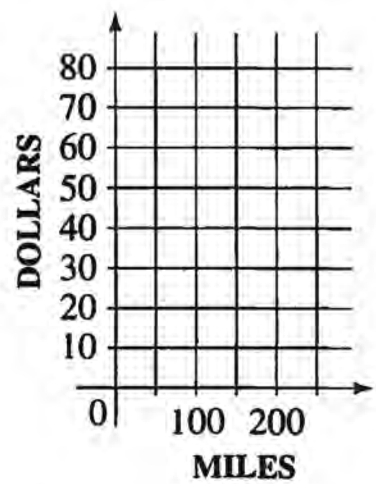
↗ ↗ ↓ ↗ ↑ → ↖ ↑ ↘

a) Starting at (0, 0), where will these moves take you?

b) Simplify the sequence of carpet moves using N, E, W, S notation.

Chapter 6

[6.1] Rental company B has a spring sale, lowering the daily rate to \$24, with 100 "free" miles and \$0.30 for each additional mile.



a) Graph the cost as a function of the number of miles driven.

b) Approximately how many miles must you drive in order for this rental to be more expensive than company D's sale rate of \$35 with unlimited mileage?

c) Show how to find the answer to (b) on the graph.

[6.1] Company A has a sale, and the cost as a function of the miles driven is given by

$$\begin{cases} y = 29.95 & \text{if } x \leq 100 \\ y = 29.95 + 0.25(x - 100) & \text{if } x > 100 \end{cases}$$

Explain in words the cost of rental during this sale. Include the daily rate, number of free miles, and cost per additional mile.

[6.2] The table at the right compares the expressions $3x - 1$ and $x + 9$ for some values of x.

a) Extend the table to include at least one value of x for which $3x - 1$ is greater than $x + 9$.

b) Find a value of x for which the two expressions are equal.

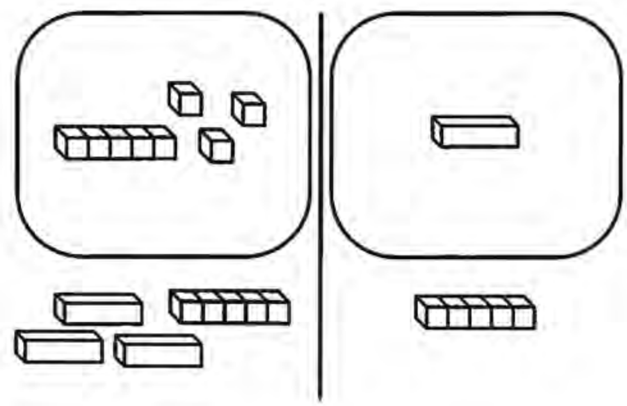
x	$3x - 1$	$x + 9$
−10	−31	0
−5	−16	−5

[6.2] Simplify $4 - 2[4 - (x + 3)]$.

[6.3] a) Write the equation shown at the right.

b) Use the Lab Gear to find the solution. Write equations to show some of the steps as you move your blocks.

c) Write the solution.



[6.4] Solve with or without Lab Gear:

a) $3(2x - 1) = 6(x + 1) - 9$

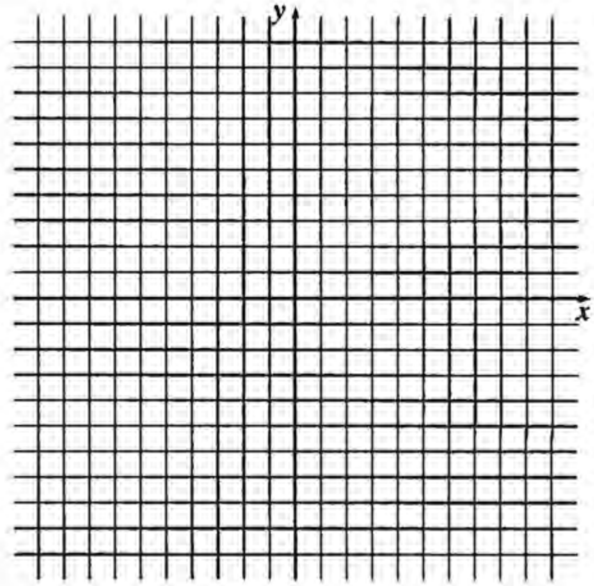
b) $3(2x - 1) = 6(x + 1) - x$

c) $3(2x - 1) = 6(x + 1)$

[6.5] a) Graph $y = x - 6$ and $y = 4x - 3$ on the same pair of axes.

b) Show how to use the graphs to solve the inequality $x - 6 < 4x - 3$.

c) Write the solution.



[6.6] Abel has \$675 in his bank account at the start of the year. He earns \$50 per week, spends \$28 of his earnings during the week, and saves the rest.

a) Write an expression that gives the amount of money he has n weeks after the start of the year.

b) Use a table, graph, or equation to find out how long it will take Abel to have \$1199 to buy a motor scooter. Explain.

[6.7] a) $12y$ is how much more than 4?

b) $12y$ is how many times as much as 4?

[6.7] A scale model of an airliner is 1.05 meters long. The actual jet is 90 meters long. If the tail fin on the model is 0.12 meters tall, how tall is the tail fin on the jet?

[6.7] When Carlos was 8, his mother was 32. How old will Carlos be when his mother is only twice his age?

[6.8] Solve: a) $\frac{3}{5}x = 27$ b) $\frac{3}{5}(2x - 7) = 27$

[6.8] Solve: $2 + 9x = 6 - 5x$

[6.8] Transform $2y + 5x = 8$ so that y is in terms of x.

[6.9] Solve: $\frac{2x + 5}{x - 1} = 4$

[6.10] Suppose Abra has made 13 out of 20 free throws so far this season. Write an expression for her season average if she attempts x more free throws this season and makes half of them.

[6.11] In the movie "Honey, I Shrunk the Kids" a 32-inch-tall boy is shrunk to 1.5 inches.

a) The height of the shrunken boy is how many times the original height of the boy?

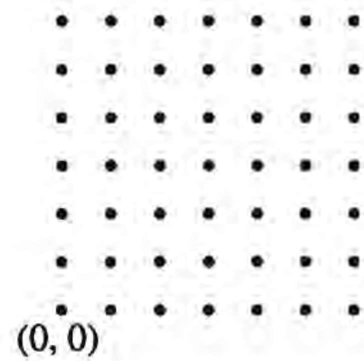
b) If his shoes were originally 5 inches long, how long should his shrunken shoes be?

[6.12] A geoboard square has vertices at (0, 5) and (2, 0).

a) What are the other vertices of the square?

b) Show how to find the area of the square using subtraction.

O.N. c) Show how to find the area using the formula from problem 10d.



Chapter 7

[7.1] Make a Lab Gear sketch representing each expression with as few squares as possible:

a) $(x + 3)^2$ b) $x^2 + 9$

[7.1] How much larger is $(x + y)^2$ than $x^2 + y^2$? Make a Lab Gear sketch to help explain your answer.

[7.2] Find the numbers of corner, edge, and inside panes needed for a 60-foot by 60-foot window.

[7.3] Build a Lab Gear square using 6 x-blocks and any other blocks except more x-blocks. What are the dimensions and area of the square?

[7.3] Look at each of the expressions below. If it is a perfect square trinomial write it as the square of a binomial. If it is not, change one term to make it a perfect square, and then write your new expression as the square of a binomial.

a) $x^2 + 18x + 36$

b) $9x^2 + 12x + 4$

[7.4] Factor: $16x^2 - 9$

[7.4] If a square having area y^2 is cut out of a square having area 100, and the remaining area is rearranged into a rectangle, what are the length and width of that rectangle?

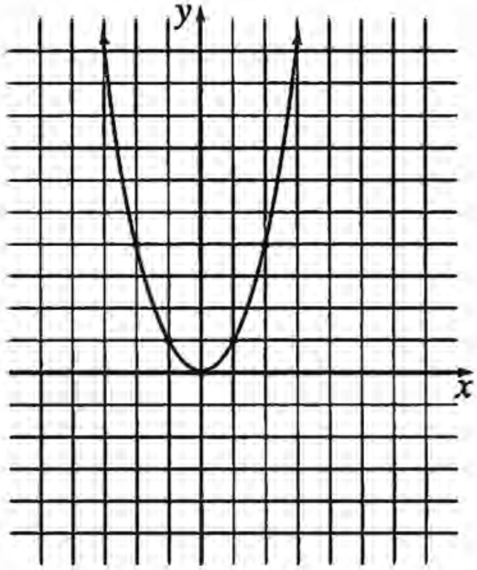
[7.5] Use the identities of Lesson 7.5 to factor:

a) $4y^2 - 4y + 1$

b) $x^2 - 64$

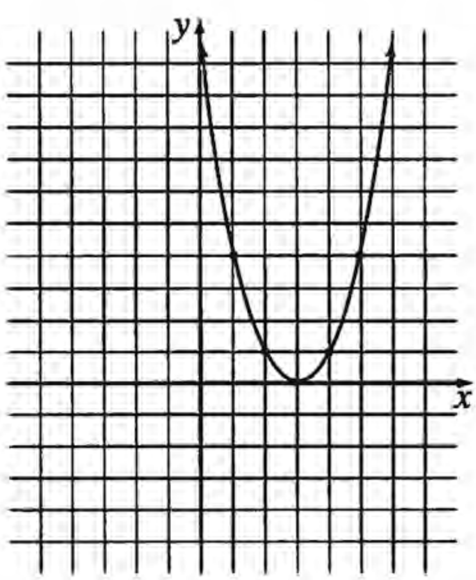
c) $9x^2 + 12x + 4$

[7.6] The graph of $y = x^2$ is shown at the right. Draw the graph of $y = 2 - x$ on the same grid. Explain how to use the graph to decide how many solutions there are to the equation $x^2 = 2 - x$.



[7.6] The solutions to $x^2 - 8 = 0$ are the x-values where the graph of $y = x^2$ intersects with the graph of what line?

[7.7] The graph of $y = (x - 3)^2$ is shown at the right. Use the graph to estimate the solutions to the equation $(x - 3)^2 = 7$. Explain.



[7.7] Use the equal squares method to solve the equation $(x + 2)^2 = 49$. Use the Lab Gear if you wish.

[7.8] On day zero, Zea learns a secret. On day one she tells three people. On day two each of them tells three people. Each person who is told then tells three people the next day.

a) How many people are told on the 5th day?

b) How many people are told on the nth day?

c) What does this formula give for $n = 0$? Is this correct? Explain.

[7.9] Write 5.1 trillion in scientific notation.

[7.9] Write an approximation to 3,000 using a power of 2 multiplied by a number between 1 and 2.

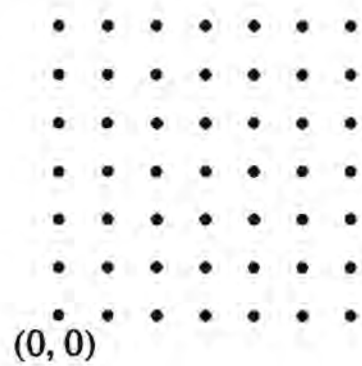
[7.10] a) $8(10^{15})$ is how many times as large as $4(10^9)$? Express your answer in scientific notation.

b) Explain how to find the answer without using a calculator.

[7.11] Write 42,895,000,000,000 in scientific notation.

[7.12] What is the side of a square having area 20?

[7.12] Find the distance between (5, 2) and (1, 4).



Chapter 8

[8.1] Open your book to page 286 and refer to the table to answer these questions.

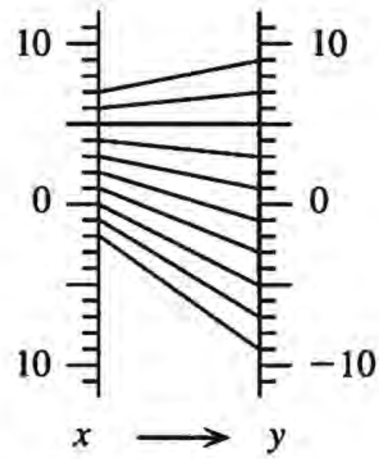
a) What was the average rate of growth in centimeters per month of Joshua's height between ages 12 months and 2 years?

b) Between what ages did Joshua's weight grow at the fastest rate? Explain your answer.

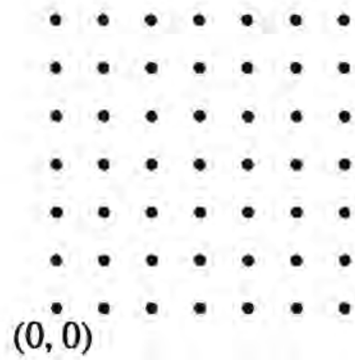
[8.2] a) What is the magnification of the function pictured?

b) What is the b-parameter? Explain how to find it on the function diagram.

c) What is the equation of the function?



[8.3] What is the slope of the line joining (2, 1) and (5, 6)?



[8.3] If the slope of a ramp is 0.2, how many inches of height do you gain for every 50 inches you move horizontally?

[8.4] Find the slope and y-intercept of each function. Put the function into slope-intercept form if necessary.

a) $y = -\frac{1}{3}x + 8$ b) $y = 2(-3 + x)$

[8.5] 5^{12} is how many times as large as 5^4? Write your answer as a power.

[8.5] Write as a single power:

a) $4^3 \cdot 4^5$ b) $\frac{6^8}{6^2}$

[8.6] A population starts at 500 and is multiplied by 6 each day. Write an expression for the population after x days of growth.

[8.6] Simplify: $\frac{200(3^{x+5})}{50(3^5)}$

[8.7] Bar starts her job at a salary of $40,000 per year and gets a raise of 5% each year. By what number can you multiply each year's salary to get the next year's salary?

[8.7] If a CD set costs \$24.90 including 6% sales tax, what is the cost without the tax?

[8.8] An aging algebra teacher loses 1% of his strength each year. He can lift 150 pounds now. Write an equation that gives the amount he can lift (A) as a function of the number of years from now (n).

[8.9] Explain how to write any power of 25 as a power of 5. Include an example.

[8.9] Simplify: $(x^3)^5$

[8.10] Write $5x^9$ as a product of two monomials in four different ways.

[8.10] Simplify each expression:

a) $(4ab)^3$ b) $\left(\frac{3x}{y}\right)^4$

[8.11] At 12 noon a bacterial culture weighs 50 grams, and its weight x hours later is given by $S = 50 \cdot 4^x$. Find the weight two hours *before* noon. Explain.

[8.11] What is the value of 4^{-3}? Show how to find it without using a calculator.

[8.12] Write 0.00000583 in scientific notation.

[8.12] If popcorn has $6.2(10^2)$ kernels per liter, express in scientific notation the volume in liters of one kernel?

Chapter 9

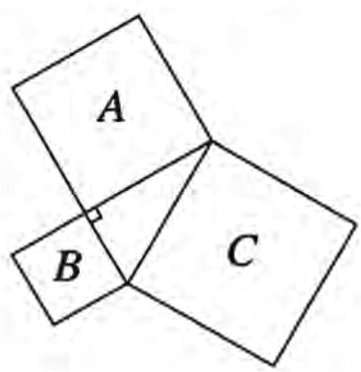
[9.1] What is the taxicab distance between (1, 7) and (4, −2)?

[9.1] Find the absolute value of −0.68.

[9.1] Write an expression for the distance between 5 and y on the number line.

[9.2] Find the Euclidean distance between (1, 7) and (4, −2).

[9.2] A, B, and C are squares built on the side of a right triangle as shown. If the area of B is 8 and the area of C is 20, what is the area of square A?



[9.3] Multiply without a calculator. Show your work.

a) $5\sqrt{3} \cdot 2\sqrt{3}$ b) $\sqrt{5} \cdot \sqrt{20}$

[9.4] Write $\sqrt{54}$ in simple radical form.

[9.4] What number times $\sqrt{6}$ equals $3\sqrt{10}$?

[9.4] Simplify $\sqrt{50} + \sqrt{2}$.

[9.5] Give an example of a number x such that:

a) $x^2 < x$ b) $\sqrt{x} > x$

[9.6] Explain two different methods for finding the number that is halfway between -18 and 87.

[9.6] Find the midpoint of the segment joining (6, 1) and (2, 8).

[9.7] Bobbi's salary grew from $6.50 per hour to $17 per hour in 4 years. How much was her salary after 2 years if you assume

a) linear growth? b) exponential growth?

[9.8] Write $\sqrt{5(10^{10})}$ in simple radical form.

[9.8] What is the meaning of $x^{1/2}$? Explain why this makes sense. (Assume x is not negative.)

[9.9] Multiply: $(5 - \sqrt{2})(3\sqrt{2} + 4)$

[9.9] Rationalize the denominator: $\frac{2}{\sqrt{5} + 1}$

[9.10] A polyomino with area 10 and perimeter 20 is stretched by doubling horizontally, or vertically, or both horizontally and vertically. For each of the following, give the requested area or perimeter if possible. If you would need to see the figure, say "can't tell."

a) dimensions doubled horizontally: area = ?

b) dimensions doubled vertically: perimeter = ?

c) dimensions doubled both ways: perimeter = ?

d) dimensions doubled both ways: area = ?

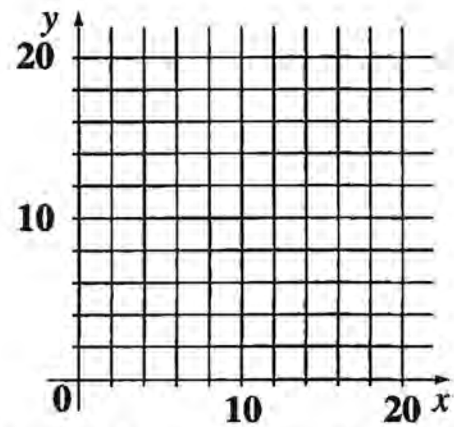
[9.11] A 6-inch-diameter pizza costs $4. What will an 18-inch pizza cost with the same price per square inch?

[9.12] Two similar figures have a ratio of similarity equal to 4. If the area of the smaller figure is 10 square units, what is the area of the larger figure?

[9.12] Two similar figures have perimeters of 12 and 8. What is the ratio of the two areas?

Chapter 10

[10.1] Suppose a van pool has 5 adults and 3 children, and the expenses each week total \$60. Let x be a child's weekly fare and let y be an adult's weekly fare. Draw a graph showing the possible combinations of x and y, and write an equation for the graph.



[10.2] Suppose you went to the post office to spend \$10 on stamps for postcards and letters, and found that the price was \$0.20 per postcard stamp and \$0.30 per letter stamp.

a) Write an expression in terms of x and y for the cost of x postcards and y letters.

b) Find at least three (x, y) combinations of \$0.20 and \$0.30 stamps that would cost exactly \$10.

c) What equation must all answers to part (b) satisfy?

O.N.

[10.2] Suppose Nelson found that the cranberry-apple juice he was mixing with pure apple juice was actually 75% cranberry and 25% apple. Let x be the amount of pure apple juice, and y the amount of cranberry-apple juice.

a) Write an expression in terms of x and y for the total amount of apple juice in the mix.

b) Write an expression in terms of x and y for the total amount of cranberry juice in the mix.

c) What would be the smallest amount of apple juice possible in the one of Nelson's 20-cup mixtures?

[10.3] Solve the system. Use Lab Gear if desired. Show your work or explain fully how you solved it.

$$\begin{cases} 3x - y = 5 \\ y = 2x + 1 \end{cases}$$

[10.3] Solve for y: $2x + 5y = 10$

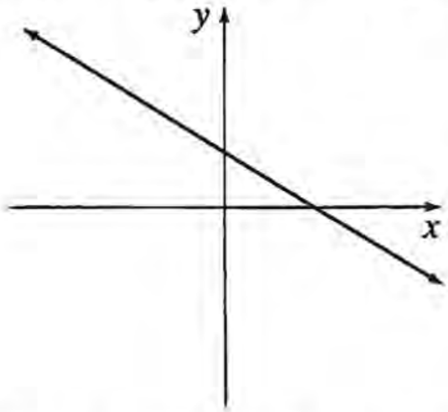
[10.4] Solve the system: $\begin{cases} 3x - y = 7 \\ x + 2y = 7 \end{cases}$

[10.4] Solve the system: $\begin{cases} 3x - 2y = 8 \\ 5x + 4y = 6 \end{cases}$

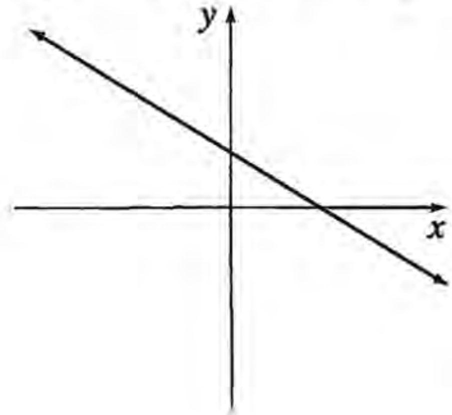
[10.5] Find the equation of a line that has intercepts (0, 3) and (5, 0).

O.N. [10.5] Consider the graphs of $Ax + By = C$ pictured. Sketch on the same axes the graph that could result if:

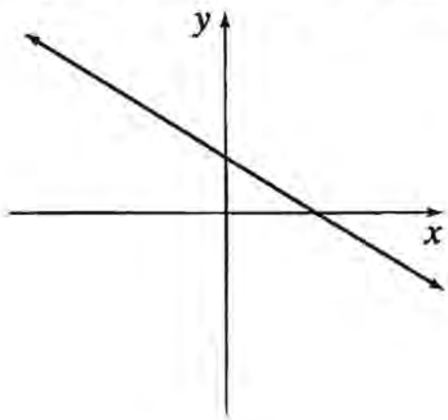
a) C gets larger (A, B unchanged)



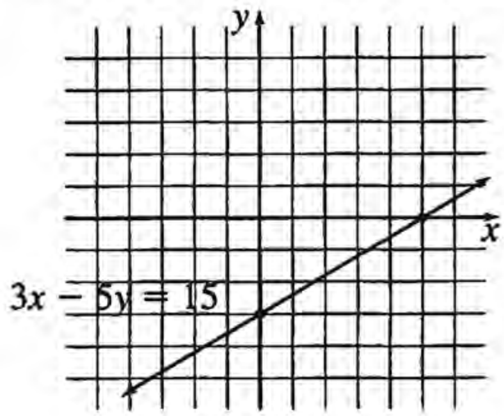
b) A gets larger (B, C unchanged)



c) B gets smaller (A, C unchanged)



[10.6] Mark the point on the graph of $3x - 5y = 15$ where the sum of x and y is 4.



[10.6] Consider the system: $\begin{cases} 5x - y = 7 \\ Ax + By = C \end{cases}$

Find values of A, B, and C so that the lines

a) are parallel.

b) are the same line, but $A \neq 5$.

c) meet in one point.

[10.7] Anna bought a total of one hundred \$0.19 and \$0.29 stamps, and they cost her \$25.50. How many stamps of each denomination did she buy? Show your work.

[10.7] At Gelb's Deli, all sandwiches are the same price, and all sodas are the same price (which might be different from the sandwich price). One person bought 6 sandwiches and 5 sodas for \$23.35, and the next person paid \$14.60 for 3 sandwiches and 7 sodas. How much does a sandwich cost? How much does a soda cost? Show your work.

[10.8] Find an equation of the line through (8, 1) with slope $= -\frac{3}{2}$.

[10.8] Find an equation of the line through the points (−3, 1) and (6, 4). Show your work.

Chapter 11

[11.1] A ball is dropped from a height of 150 ft. with a bounce ratio of 0.6. Show how to use the multiply-subtract-solve method to find the total distance traveled by the ball in 20 bounces.

[11.2] Consider the repeating decimal $0.14\overline{14}$, and think of it as the sum of a geometric sequence.

a) What are the first term and the common ratio?

b) Use the multiply-subtract-solve method to find a fractional expression for the sum of the first three terms. Show your work.

c) How would the answer to part (b) change if you were finding the sum of the first 100 terms?

d) What fraction does this sum get closer to as the number of terms increases?

[11.2] Show that $0.\overline{76}$ is rational.

[11.3] Find the rise and run for two different staircases for the line $y = 6x - 2$.

[11.3] If a line passes through the origin and the point (1, 1.4), what is a general description of all the lattice points on the line?

[11.4] Show that $\sqrt{5}$ is irrational.

[11.5] In this game two dice are rolled and if the total is 2, 4, 6, 9, 10, or 11, then player one wins. If the total is 3, 5, 7, 8, or 12, then player two wins. Is this a fair game? Explain.

[11.6] If two dice are rolled, what is the probability the product is more than 23?

[11.6] Zoltan decided to investigate the probability of getting at least one tail in three tosses of a coin. He did 20 trials, and got at least one tail on 18 of the trials.

a) What was the relative frequency of Zoltan's getting at least one tail?

b) Does this answer represent the probability of getting at least one tail in 3 tosses of a coin? Why or why not?

[11.7] How many equally likely outcomes are there for 10 tosses of a coin?

O.N. [11.7] If you take a random walk from the origin in which heads means move one unit right and tails means move one unit up, what is the probability that you are at (4, 2) after six tosses?

[11.8] What is the conversion factor used to convert inches into feet? Include the units in your answer.

[11.8] What is the conversion factor used to convert inches per day to feet per week? Include the units in your answer.

Chapter 12

[12.1] The population of Picolo was 1,234 in 1970 and 1,485 in 1980. Estimate the population in 1990 assuming

a) linear growth.

b) exponential growth.

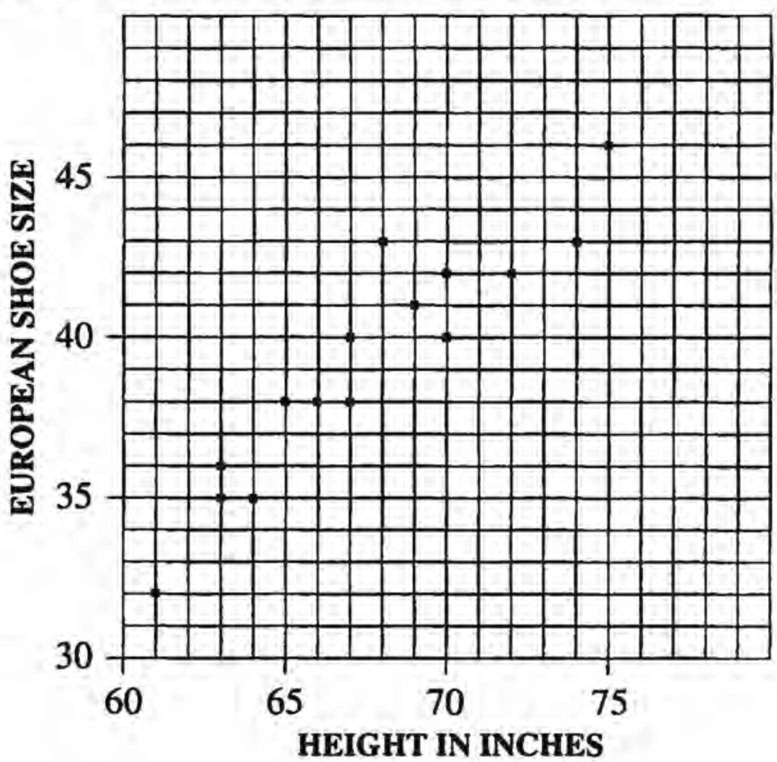
[12.2] A survey was taken of height and shoe size of 15 people.

Height in inches	61	63	63	64	65	66	67	67	68	69	70	70	72	74	75
European shoe size	32	35	36	35	38	38	38	40	43	41	40	42	42	43	46

a) Mark with a + on the graph the three points used to find the median-median line.

b) Draw the median-median line.

c) Find the equation of the median-median line.



[12.3] The number of days, D, needed to paint a house depends on the surface area, S, and the number of painters, P, according to the formula $D = S/(500P)$. For each pair of variables, tell whether they are directly proportional, inversely proportional, or neither. (Assume the third variable is held constant.)

a) D versus S

b) D versus P

c) S versus P

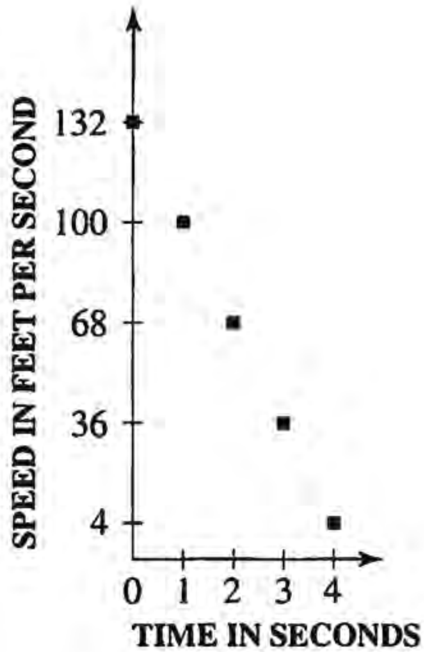
[12.4] A baseball player throws a ball as hard as he can straight up, and its speed,as tracked with a radar gun, is shown on the graph.

a) At what speed was the ball thrown?

b) How much speed does the ball lose each second?

c) What is the equation that relates speed to time elapsed?

d) Can the graph be extended? Discuss why or why not.



[12.5] If I ride my bike uphill for 1.5 miles at a speed of 6 mph and then ride back down at 30 mph, what is my average speed for the trip?

[12.5] Ms. Valdez left for work, forgetting her briefcase. Her husband left 1/6 of an hour later, and caught her after 1/3 hour more. If Ms. Valdez averaged 30 mph, what was her husband's average speed?

[12.6] A bike with 28-inch-diameter wheels has its chain on a chainwheel with 42 teeth and a rear sprocket with 35 teeth.

a) What is the gear ratio?

b) What is the gear?

c) What is the distance traveled for each turn of the pedals?

d) At a cadence of 60 revolutions per minute, what is the speed in miles per hour?

[12.7] Obie Ease weighs 300 lbs., and he is on a diet. His plan is to lose 2% of his weight each month, and reward himself at the end of each successful month with a feast which will add 4 lbs.

a) Write a recurrence equation expressing Obie's weight at the end of each month in terms of his weight at the end of the previous month, assuming he follows his plan successfully.

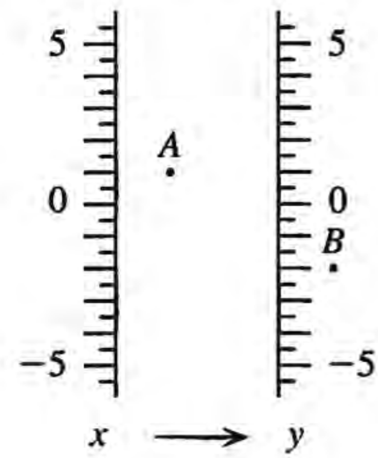
b) What will happen in the long run. Explain how you know.

[12.8] Each dot on the function diagram is the focus of an equation of the form $y = mx + b$.

a) Draw an in-out line which shows the b-parameter of equation A.

b) Draw another in-out line through A and use it to find equation A.

c) If lines A and B were represented on a Cartesian graph, at what point would they intersect? Explain how you can find this from the function diagram, without finding equation B.



Chapter 13

[13.1] A rectangle has perimeter 80 and length L.

a) Write an expression for the width.

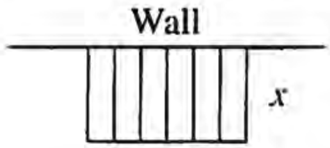
b) Write an expression for the area.

c) If you graph the area as a function of length, what will be the coordinates of the highest point on the graph? What do these coordinates represent in terms of rectangles with perimeter 80?

[13.1] Find the x-intercepts and vertex of each parabola.

a) $y = x(16 - x)$ b) $y = x(x - 16)$

[13.2] Six rectangular pens are made with 200 ft. of fencing, using a wall to form one side, as shown. If the length of each segment perpendicular to the wall is x, write an expression for the total area of the pens.



[13.2] Find a function of the form $y = ax(x - q)$ for a parabola with x-intercepts 0 and 8, and vertex (4, 32).

[13.2] Find the intercepts and vertex of the parabola $y = x(24 - 6x)$.

[13.3] Use the zero-product property to solve $x^2 + 4x = -3$. Show your work.

[13.3] Find the intercepts and vertex of the parabola $y = 0.5(x - 6)(x + 10)$.

[13.4] Suppose you want to make a rectangular pen of area 100 square feet.

a) Write an expression for the perimeter in terms of the length, L.

b) What is the minimum perimeter?

c) Is there a maximum perimeter? Explain.

[13.4] If two numbers have a product of 60, what is the smallest value their sum could take?

[13.5] If a tray is formed from a 30-cm-by-30-cm piece of cardboard by cutting a square of side x from each corner and folding up the sides, what is the volume of the tray in terms of x?

[13.5] If a tray is formed from a 30-cm-by-30-cm piece of cardboard by cutting a square of side x from each corner and folding up the sides, what is the height of the tray that will give the maximum volume?

[13.6] Complete the square to solve the equation $x^2 + 10x = -9$. Explain each step and illustrate with Lab Gear sketches.

[13.7] Write the equation of a parabola that is a translation of $y = x^2$ and has vertex $(3, -5)$.

[13.7] Find H and V (the coordinates of the vertex) for the graph of $y = x^2 + 4x + 10$.

[13.7] Explain how the Lab Gear drawing of $x^2 + 8x + 19$ can be used to find the coordinates of the vertex of $y = x^2 + 8x + 19$.

[13.8] A parabola which is a translation of $y = x^2$ has vertex at $(-3, -5)$. What are the exact values of the x-intercepts?

[13.8] Write an equation of the form $y = x^2 + bx + c$, neither b nor $c = 0$, which has

a) one x-intercept.

b) no x-intercepts.

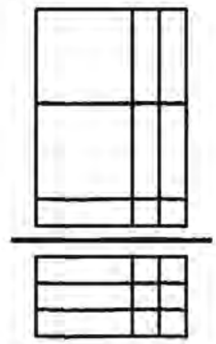
Chapter 14

[14.1] A rectangle has width 5 and length x. It is cut into two equal rectangles, each with dimensions 5 by $\frac{1}{2}x$. Each smaller rectangle is similar to the original. Find x. Explain your work.

[14.1] A rectangle has width 5 and length x. When the rectangle is cut into 9 equal parts, each small rectangle is similar to the original. What is x?

[14.2] a) Write the fraction represented by the figure at the right.

b) Write the simplified fraction.



[14.2] Simplify the fraction: $\dfrac{2x^2 + 6x}{5x + 15}$

[14.2] When is it true that $\dfrac{5x^2 - 10x}{x - 2} = 5x$?

[14.3] Write a fraction equivalent to $\dfrac{6x}{x - 1}$ that has

a) numerator $12x^2y$.

b) denominator $3x^2 - 3x$.

[14.3] Find a common denominator and add: $\dfrac{2}{5x} + \dfrac{y}{4x^2}$.

[14.3] Rewrite as an equivalent quadratic equation: $x = 5 - \dfrac{3}{x}$.

[14.4] A parabola has vertex (0, 0) and contains the point (2, −12). What is its equation?

[14.4] Find the coordinates of the vertex of the graph of $y = 5x^2 + 20x - 11$. Show your work.

[14.5] The coordinates of the vertex of $y = 3x^2 + 12x + 8$ are $(-2, -4)$. Show how to use this to find the x-intercepts of the parabola. Illustrate with a sketch.

[14.5] Use the quadratic formula to solve: $5x^2 + 2x - 6 = 0$. Show your work.

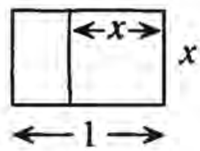
[14.6] What is the equation of a frown parabola having the same shape as $y = 3x^2$ and vertex $(-5, 2)$?

[14.6] Solve $(x + 4)^2 - 6 = 0$ by the equal squares method.

[14.7] Explain why a parabola with equation $y = ax^2 + bx + c$ and vertex (H, V) in which a and V have the same sign has no x-intercepts.

[14.7] Explain what we can conclude about a, H, and V if the parabola $y = a(x - H)^2 + V$ has two x-intercepts.

[14.8] A rectangle has length 1 foot and width x feet. When a square is cut off one end of the rectangle, the remaining rectangle is similar to the original one. Find x. Explain your work.



[14.8] Consider the Fibonacci-like sequence: $1, a, 1 + a, 1 + 2a, 2 + 3a, \ldots$

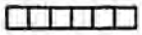
a) What is the next term?

b) If the sequence is also geometric, write an equation which must be true, and solve to find the value of a.

Quiz Bank Answers

Chapter 1

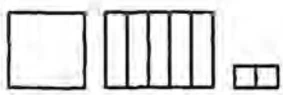
[1.1] 6

[1.1] 

[1.2] 12, 14, 16

[1.2] 90

[1.2] 28

[1.3] 

[1.4] 26

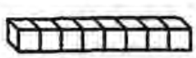
[1.4] a)

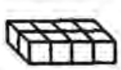
◊	Δ
0	0
3	2
6	4
9	6

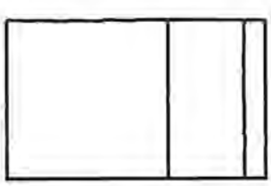
Answers will vary. Any values in ratio 3:2 are correct.

b) Δ = 1 is the only possible value because if Δ + 2 = 3Δ, then 2Δ must equal 2.

c) No value. A number cannot be 5 more than itself.

[1.5] a) 

b)  c) 

[1.5] 

length = $y + x + 1$, width = y, area = $y^2 + xy + x$

[1.6] a) 0 b) 1 c) 3

[1.6] 3

[1.6] $x^2 + 2xy + 3x + 5$

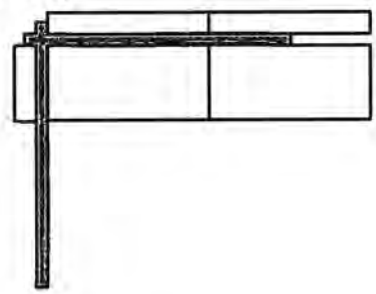
[1.6] $4x^2 + 4x + 4$

[1.7] a) area = $3y$, perimeter = $2y + 6$

b) area = $xy + 2$, perimeter = $2y + 2x + 2$

[1.8] a) $26 b) $39

[1.9] a) $2xy$



b) $2x + xy$

[1.10] $2xy + 2x + 2y$

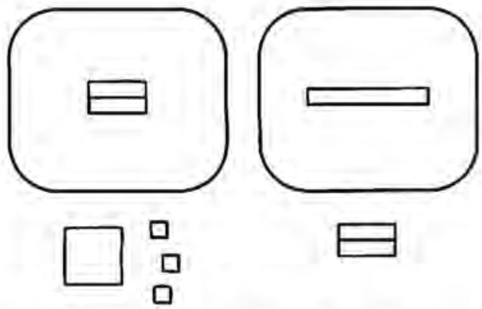
[1.11] 50th rectangular number is 50(51) = 2550. 50th triangular number is half that, 1275.

[1.12] Area = 10. Explanations will vary.

Chapter 2

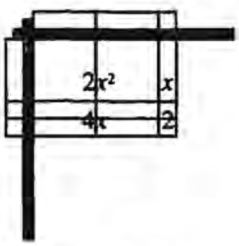
[2.1] first: negative or opposite
second: subtract
third: opposite

[2.2] a) b)



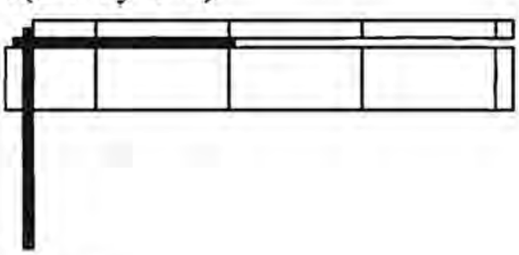
[2.2] a) $3 - 3x$ b) $7 - 2x$

[2.3] a, b)



c) $2x^2 + 5x + 2$

[2.3] $x(x + 3y + 1)$



[2.4] $xy - 3x$

[2.4] $12y + 6xy - 3y^2$

[2.4] a)

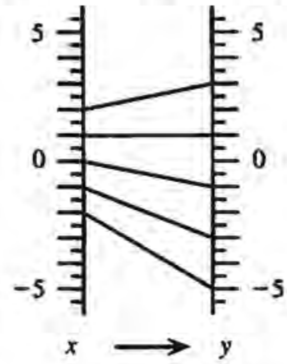
b) $x \cdot (x - 1) = x^2 - x$

[2.5] a) $243 b) 3^{n-1}

[2.6] $3.60

[2.6] 377, 610

[2.7] Answers will vary.



[2.7]

Input	Output
2	7
−4	−11
0.5	2.5
5	16
$1\frac{2}{3}$	6

[2.8] a) 150 miles

b) 50 mph. For the first 3 hours, as the time increases by 1 hour, the distance increases by 50 miles.

c) 60 mph

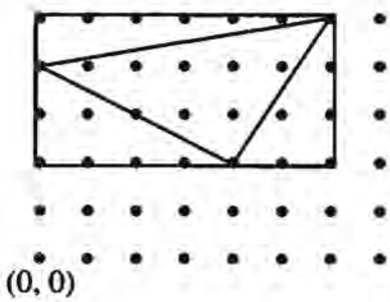
[2.9] a) i, ii, iv b) i, iii, v

[2.10]

Figure #	4	10	n
Perimeter	14	26	$2n + 6$

[2.11] 32

[2.12] Area = 8. Surrounding rectangle has area 18; corner triangles have areas 4, 3, and 3.
So $18 - 4 - 3 - 3 = 8$.



[2.12] a) 15

b) It has no effect; the area stays 15.

c) area = $3 \cdot n$

Chapter 3

[3.1] a) $800

b) $1000 is the break-even point, so investments above that will make money.

[3.2] For negative values of x, because then when you calculate the y-value you'll be subtracting a negative number from 3, which is the same as adding a positive number, so it gives an answer bigger than three.

[3.2] $-70xy$

[3.3] $2x + 4 - 3y$

[3.3] $-2x^2 + 3x - 7$

[3.4] step 6: Divide by three. (Answers may vary.)

[3.5] $2x - 5 < 2x + 2$

[3.5] a) $x^2 - 5 - x > x^2 - 10 - x$

b) Depends on x. Any $x > 0$ makes $5 - x > 5 - 3x$. Any $x < 0$ makes $5 - x < 5 - 3x$.

[3.6] $2x + 3$

[3.6]

	x	$+2$	$-x$
x	xy	$2x$	$-x^2$
$+3$	$3y$	6	$-3x$

answer = $xy - x^2 - x + 6 + 3y$

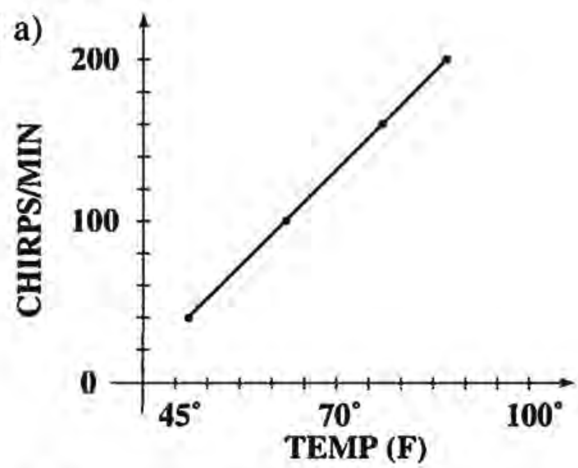
[3.7] answers may vary: $a = 5/3$, $b = 7$

[3.7] a) 3 b) 1/3

c) They are reciprocals, because multiplying by three is the same as dividing by the reciprocal of three.

[3.8] 122°F

[3.8] a)



b) Approximately 130 chirps per min.

c) As the graph shows, each time the temperature goes up 1°, the chirps go up about 4. To check with the chart, observe that when the temperature increases by 15°, the chirps increase by 60.

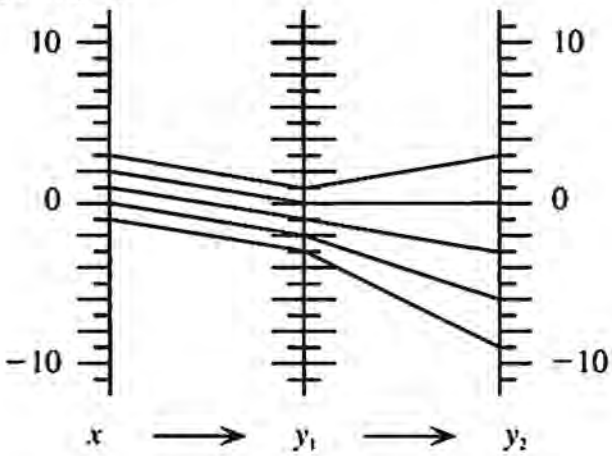
[3.9] $7 - 5(x - 3) = 6$

$5(x - 3) = 1$

$x - 3 = \frac{1}{5}$

$x = 3\frac{1}{5}$

[3.10] a)



b) $y = 3(x - 2)$

[3.10] Subtract three, then divide by four; or $y = \frac{x - 3}{4}$

[3.11] 1 florin

[3.11] a)

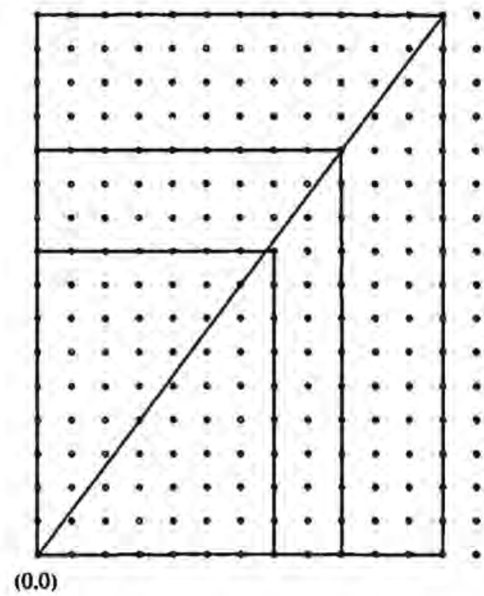
sum	Ro	Sham	Bo
Ro	Ro	Sham	Bo
Sham	Sham	Bo	Ro
Bo	Bo	Ro	Sham

b) Ro. When Ro is added to another day the sum is that day.

c) Sham and Bo are Calendar Opposites because they add up to make Calendar Zero. Ro is its own Calendar Opposite.

[3.12] (0, 0) (3, 0) (3, 4) (0, 4)

[3.12] The ratios are 12/9 = 1.333..., 16/12 = 1.333..., 9/7 = 1.286, so the 9 by 12 and 12 by 16 rectangles are similar. On dot paper, their diagonals coincide.



Chapter 4

[4.1] a) $5H$ miles, because Gabe gains 5 miles for each hour that they travel.

b) Each person's graph will be a line through the origin. Gabe's greater speed will cause his line to rise more steeply.

c) 3 hours

[4.2] No, because when 3.4 is substituted for x, the resulting y-value is 0.2, not 0.

[4.2] 5

[4.3]

x	x^2	$-x^2$	$(-x)^2$	x^3	$-x^3$	$(-x)^3$
3	9	−9	9	27	−27	−27
−2	4	−4	4	−8	27	27

[4.3] $y_2 = x^2$ and $y_4 = (-x)^2$; $y_6 = -x^3$ and $y_7 = (-x)^3$.

[4.3] 3

[4.3] Answers will vary.

a) Any horizontal line

b) Any slanted line

c) Any parabola

d) Any cubic

[4.4] Answers are of the form $y = Ax^2 + Bx + 4$, for $A \neq 0$.

[4.4] Answers are of the form $y = Ax^3 + Bx^2 + Cx + 0$, for $A \neq 0$.

[4.4] (0, −6)

[4.4] (3, 0)

[4.5] x, y must be in the ratio 2:3, so (2, 3), (4, 6), and any point ($2k$, $3k$).

[4.5] $y = \frac{3}{2}x$

[4.6] In both Bea's and Gabe's tables, each time volume increases by 10 ml, weight increases by 13 g.

[4.6] A line through the origin.

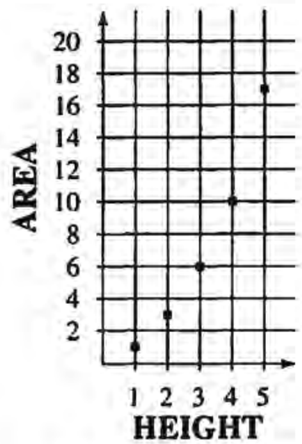
[4.6] The ratio of the coordinates is constant (except for the point (0, 0) which is always included). Also, y is always a constant multiple of x.

[4.7] a) Answers will vary. The line through the origin and (18, 10) comes close to all the points. Its equation is $y = \frac{5}{9}x$, so the density is approximately $\frac{5}{9} = 0.555$.

b) The three sample densities are $\frac{7}{12} = 0.586$, $\frac{2}{4} = 0.5$, and $\frac{10}{19} = 0.526$. The average of these is 0.537, which is another estimate for the density of the mystery substance.

[4.8]

Height	Area
1	1
2	3
3	6
4	10
5	17



[4.9] a) 220.5 ft b) 80 ft

[4.10] a) 4 minutes

b) The train goes instantly from speeding up to slowing down

c) D and E

[4.11] a) $x = 2$

b) x must be larger than 2, but y can be anything.

c) $x < 2$

[4.12] a) 24 b) 64

Chapter 5

[5.1] a) Impossible. If the in-out line (a, b) is in the diagram, so is the line (b, a). One slants up and the other slants down.

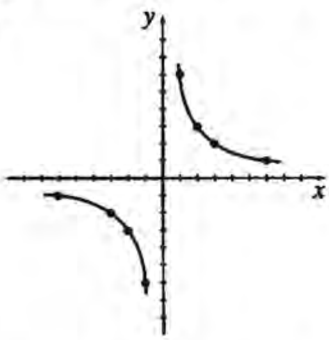
b) $x + y = 8$

c) $x + y = -4$

d) Impossible. If the constant sum is positive, the graph is in quadrants I, II, IV; if negative, II, III, IV; and if zero, II and IV.

e) Impossible. The two pairs given have different sums.

[5.2] a)



b) Answers will vary. Example: (0.1, 60)

[5.2] Any point on the x- or y-axis has one coordinate of zero, so the product of its coordinates is zero. Therefore, the only constant product graph that could contain any of those points is $xy = 0$. That graph doesn't cross the axes; it *is* the axes.

[5.3] $3x + y - 2$

[5.4] $x(x + 6) = x^2 + 6x$

$(x + 1)(x + 5) = x^2 + 6x + 5$

$(x + 2)(x + 4) = x^2 + 6x + 8$

$(x + 3)(x + 3) = x^2 + 6x + 9$

[5.4] $(x - 5)(x - 7)$

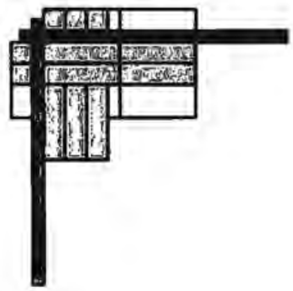
[5.5] x-intercepts are (4, 0) and (5, 0). Because the function has factors of $(x - 4)$ and $(x - 5)$, if x equals either 4 or 5, y will equal 0.

[5.5] $y = -(x - 6)(x + 1)$

[5.6] $5x(3x - 2)$

[5.6] $x(x + 1)(x + 2)$

[5.7] $2x^2 - 7x + 6$



[5.8] \$0.53

[5.9] The staircase 10 + 11 + ... + 17 has 8 steps. Placing a second copy of the staircase upside down on the first forms an 8 by 27 rectangle. The sum of the staircase is $(8 \cdot 27)/2 = 108$. By Gauss's method we write the staircase twice:

$$\begin{array}{l} 10 + 11 + \dots + 16 + 17 \\ \underline{17 + 16 + \dots + 11 + 10} \\ 27 + 27 + \dots + 27 + 27 = 8 \cdot 27. \end{array}$$

The sum of the staircase is half that, or 108.

[5.10] $200^2 = 40{,}000$

[5.10] 3504

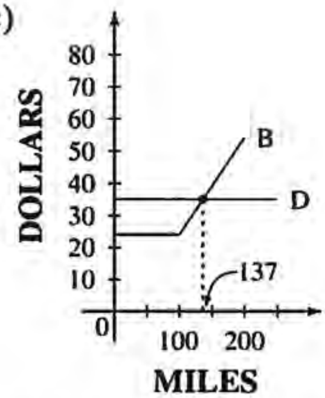
[5.11] Mean = (18 + 1018)/2 = 518. Sum = (201)(518) = 104,118.

[5.12] s

[5.12] a) (4, 4) b) N^4E^4

Chapter 6

[6.1] a) and c)



b) at least 137 miles

[6.1] The sale cost is \$29.95 per day, with 100 "free" miles, and \$0.25 for each additional mile.

[6.2] a) Answers will vary.
$3x - 1 < x + 9$ when $x < 5$.
$3x - 1 > x + 9$ when $x > 5$.

b) $x = 5$

[6.2] $2 + 2x$

[6.3] a) $3x + 5 - 8 = 5 - x$

b) Sequence of equations will vary.

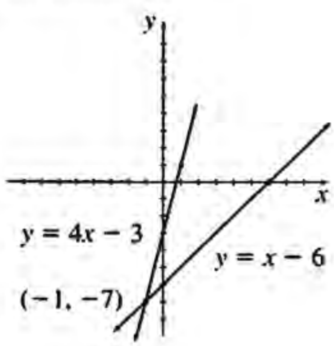
c) $x = 2$

[6.4] a) identity: solution is all numbers

b) $x = 9$

c) no solution

[6.5] a)



b) The graphs intersect at $(-1, -7)$, and $y = x - 6$ is below $y = 4x - 3$ for all x's to the right of that point, so the solution is $x > -1$.

c) $x > -1$

[6.6] a) $675 + 22n$

b) $675 + 22n = 1199$, so $n = 23.8$. It will take Abel 24 weeks.

[6.7] a) $12y - 4$ b) $3y$

[6.7] about 10.29 meters

[6.7] 24 years old

[6.8] a) $x = 45$ b) $x = 26$

[6.8] $x = \dfrac{2}{7}$

[6.8] $y = 4 - 2.5x$

[6.9] $x = 4.5$

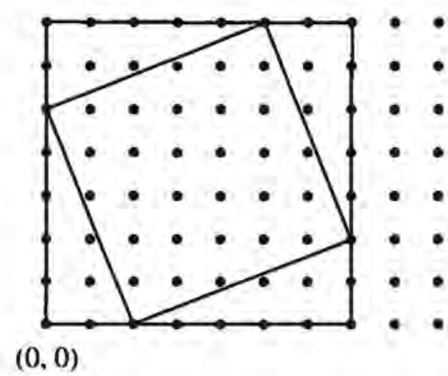
[6.10] $\dfrac{13 + 0.5x}{20 + x}$

[6.11] a) $\dfrac{3}{64}$ times

b) about 0.234 inches

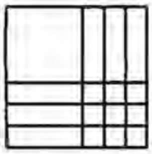
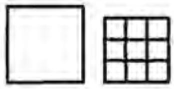
[6.12] a) (7, 2) and (5, 7)

b) Outer square − corner triangles $= 49 - 4(5) = 29$



c) $a = 2, b = 5,$
$a^2 + b^2 = 4 + 25 = 29$

Chapter 7

[7.1] a)  b) 

[7.1] $2xy$

[7.2] Four corner panes, 232 edge panes, and 3364 inside panes

[7.3] Side = $x + 3$, area = $x^2 + 6x + 9$

[7.3] a) not a perfect square; change $18x$ to $12x$ to get $(x + 6)^2$, or change 36 to 81 to get $(x + 9)^2$.

b) $(3x + 2)^2$

[7.4] $(4x - 3)(4x + 3)$

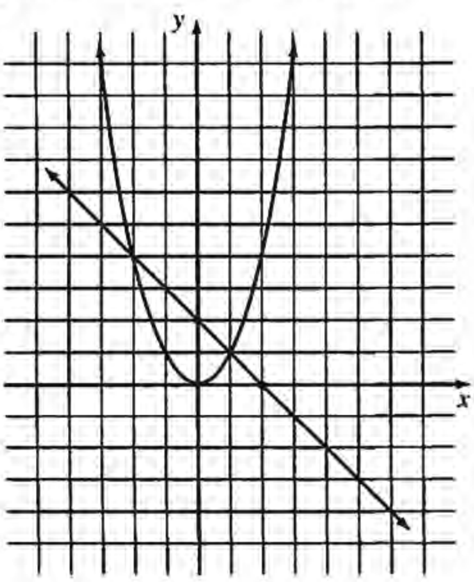
[7.4] length = $10 + y$, width = $10 - y$

[7.5] a) $(2y - 1)^2$

b) $(x - 8)(x + 8)$

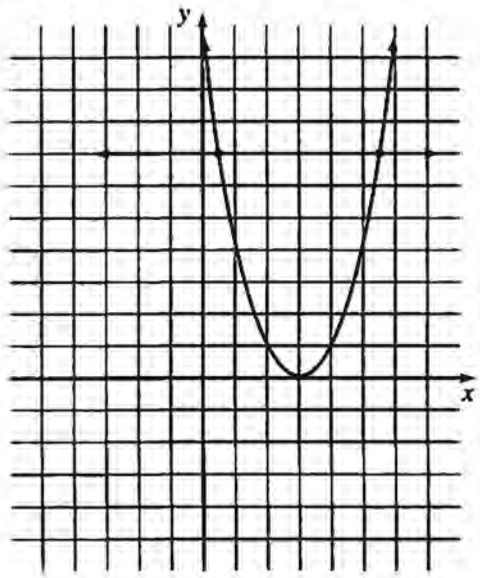
c) $(3x + 2)^2$

[7.6] There are two solutions because the line $y = 2 - x$ crosses the parabola $y = x^2$ at two points.



[7.6] $y = 8$

[7.7] The solutions are approximately $x = 5.5$ and $x = 0.5$, because the line $y = 7$ crosses the parabola at points with those two x-values.



[7.7] $(x + 2)^2 = 7^2$; $x + 2 = 7$ or $x + 2 = -7$; $x = 5$ or -9.

[7.8] a) 243 b) 3^n
c) It gives 3^0 which is correct, because $3^0 = 1$.

[7.9] $5.1(10^{12})$

[7.9] about $1.456(2^{11})$

[7.10] a) $2(10^6)$

b) $8/4 = 2$ and $10^{15}/10^9 = 10^{15-9} = 10^6$.

[7.11] $4.2895(10^{13})$

[7.12] approx. 4.47 units, or $\sqrt{20}$.

[7.12] approx. 4.47 units, or $\sqrt{20}$.

Chapter 8

[8.1] a) About 1.08 cm/month or 13 cm/year.

b) Between birth and 3 months, when his weight grew 0.76 pounds/month.

[8.2] a) 2

b) -5, because that's where the in-out line from $x = 0$ goes.

c) $y = 2x - 5$

[8.3] $\frac{5}{3}$

[8.3] 10 inches

[8.4] a) slope $= -1/3$, y-int. $= 8$

b) slope $= 2$, y-int. $= -6$

[8.5] 5^8

[8.5] a) 4^8 b) 6^6

[8.6] $500(6^x)$

[8.6] $4(3^x)$

[8.7] 1.05

[8.7] \$23.49

[8.8] $A = 150(0.99^n)$

[8.9] Double the power when the base changes from 25 to 5. Example: $25^3 = 5^6$.

[8.9] x^{15}

[8.10] $5 \cdot x^9, 5x \cdot x^8, 5x^2 \cdot x^7, 5x^3 \cdot x^6$, etc.

[8.10] a) $64a^3b^3$ b) $\frac{81x^4}{y^4}$

[8.11] Let $x = -2$, then $S = 50(4^{-2}) = 50\left(\frac{1}{16}\right) = 3.125$.

[8.11] $\frac{1}{4^3} = \frac{1}{64}$

[8.12] $5.83(10^{-6})$

[8.12] $1.6129(10^{-3})$

Chapter 9

[9.1] 12

[9.1] 0.68

[9.1] $|5 - y|$ or $|y - 5|$

[9.2] $\sqrt{3^2 + 9^2} = \sqrt{90}$

[9.2] 12

[9.3] a) $5\sqrt{3} \cdot 2\sqrt{3} = 5 \cdot 2 \cdot \sqrt{3}\sqrt{3}$
$= 5 \cdot 2 \cdot 3 = 30$

b) $\sqrt{5} \cdot \sqrt{20} = \sqrt{100} = 10$

[9.4] $3\sqrt{6}$

[9.4] $\sqrt{15}$

[9.4] $6\sqrt{2}$

[9.5] a) any number between 0 and 1

b) any number between 0 and 1

[9.6] method 1: $\frac{-18 + 87}{2} = 34.5$

method 2: $\frac{87 - (-18)}{2} + (-18) = 34.5$

[9.6] (4, 4.5)

[9.7] a) \$11.75/hr b) \$10.51/hr

[9.8] $10^5\sqrt{5}$

[9.8] $x^{1/2}$ means the positive square root of x. By the properties of exponents $(x^{1/2})(x^{1/2}) = x^1 = x$. If $x^{1/2}$ times itself makes x, then it must be a square root of x.

[9.9] $11\sqrt{2} + 14$

[9.9] $\frac{\sqrt{5} - 1}{2}$

[9.10] a) 20 b) can't tell

c) 40 d) 40

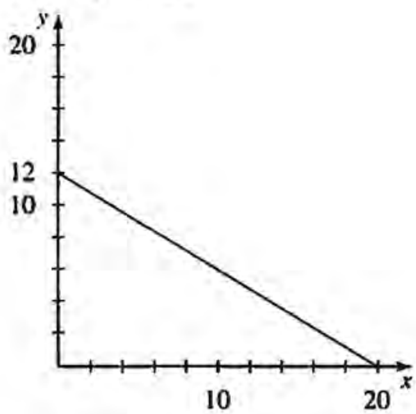
[9.11] \$36

[9.12] 160 square units

[9.12] $\frac{9}{4}$ or 9:4

Chapter 10

[10.1] $3x + 5y = 60$



[10.2] a) $0.20x + 0.30y$

b) Answers will vary.

c) $0.20x + 0.30y = 10$

[10.2] a) $x + 0.25y$ b) $0.75y$ c) 5 cups

[10.3] (6, 13)

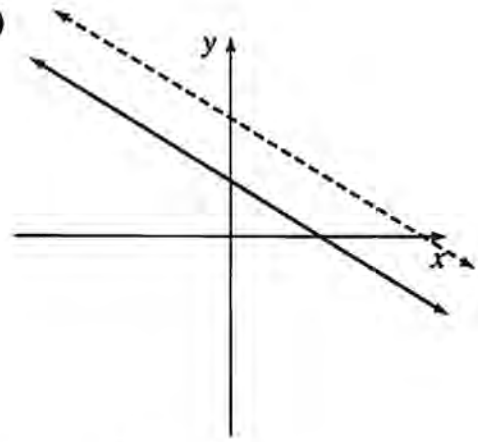
[10.3] $y = \frac{10 - 2x}{5}$ or $y = 2 - 0.4x$

[10.4] (3, 2)

[10.4] (2, −1)

[10.5] $3x + 5y = 15$

[10.5] a)



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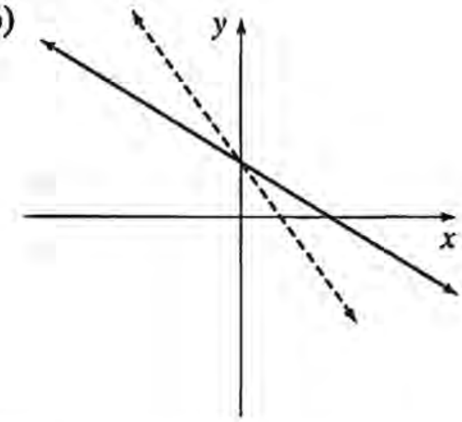
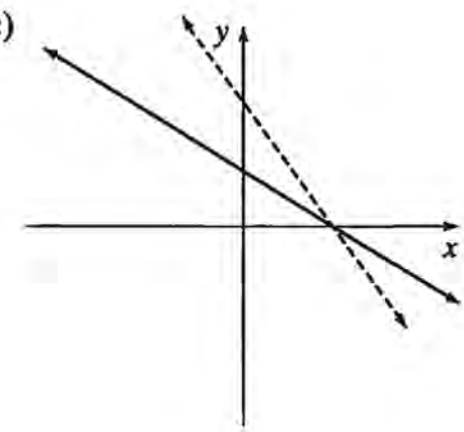
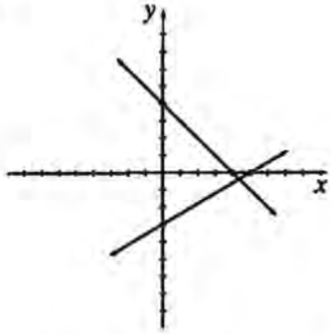


c)



[10.6]



[10.6] a) $A = 5, B = -1, C \neq 7$ (or A and B the same multiples of 5 and -1, with C not that same multiple of 7)

b) $A = 10, B = -2, C = 14$ (or A, B, C the same multiples of 5, -1, 7 respectively)

c) $A = 1, B = 1, C = 1$ (or any A and B, with $A/B \neq -5$)

[10.7] 35 \$0.19 stamps and 65 \$0.29 stamps

[10.7] Sandwiches \$3.35, sodas \$0.65

[10.8] $y = -\frac{3}{2}x + 13$

[10.8] $y = \frac{1}{3}x + 2$

Chapter 11

[11.1] $D_{20} = 150 + 150(0.6) + 150(0.6^2) + ... + 150(0.6^{19})$

$D_{20}(0.6) = 150(0.6) + 150(0.6^2) + ... + 150(0.6^{19}) + 150(0.6^{20})$

$D_{20} - D_{20}(0.6) = 150 - 150(0.6^{20})$

$D_{20} = \frac{150 - 150(0.6^{20})}{0.4} =$ 374.99 ft

$U_{20} = (0.6)D_{20} = 0.6(374.989) =$ 224.99 ft

Total distance $= D_{20} + U_{20} =$ 599.98 ft

[11.2] a) first term = 0.14, common ratio = 0.01

b) $S = 0.14 + 0.14(0.01) + 0.14(0.01^2)$

$0.01S = 0.14(0.01) + .014(0.01^2) + 0.14(0.01^3)$

$0.99S = 0.14 - 0.14(0.01^3)$

$S = \frac{0.14(1 - 0.01^3)}{0.99}$

c) $S = \frac{0.14(1 - 0.01^{100})}{0.99}$

d) $\frac{0.14}{0.99} = \frac{14}{99}$

[11.2] $S = 0.\overline{76}$; $100S = 76.\overline{76}$; $99S = 76$; $S = \frac{76}{99}$; so S is rational.

[11.3] Answers will vary. Ratio of rise to run must be 6 to 1.

[11.3] points of the form $(5k, 7k)$ for any integer k

[11.4] Suppose $\frac{p}{q} = \sqrt{5}$, for some integers p and q. Then $\frac{p^2}{q^2} = 5$, and $p^2 = 5q^2$. Since all perfect squares have an even number of prime factors, p^2 has an even number of prime factors, but then $5q^2$ has an odd number of prime factors, so p^2 cannot equal $5q^2$, and $\frac{p}{q}$ cannot equal $\sqrt{5}$.

[11.5] It is a fair game. There are 36 total outcomes possible from rolling two dice, and the total number of outcomes that yield 2, 4, 6, 9, 10, or 11 is 18, so each player has an 18 out of 36 chance of winning.

[11.6] $\frac{4}{36} = \frac{1}{9}$

[11.6] a) $\frac{18}{20} = 0.9$

b) No. The relative frequency approaches the theoretical probability over a large number of trials. There are 8 possible outcomes for 3 coin tosses, and 7 of them have at least one head, so the theoretical probability is $\frac{7}{8} = 0.875$.

[11.7] $2^{10} = 1024$

[11.7] $\frac{15}{64} = 0.234375$

[11.8] $\frac{1\ foot}{12\ inches}$

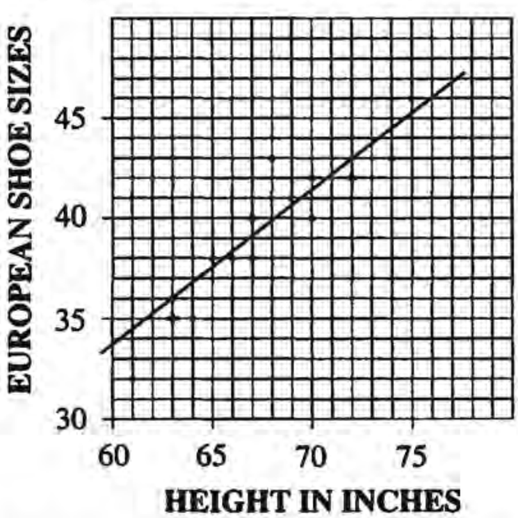
[11.8] $\frac{7\ days}{1\ week} \cdot \frac{1\ foot}{12\ inches}$

Chapter 12

[12.1] a) 1736 b) 1787

[12.2] a) (63, 35), (67, 40), (72, 42)

b) Answers may vary slightly.



c) $y = .77x - 12.5$ Answers may vary slightly.

[12.3] a) directly b) inversely

c) directly

[12.4] a) 132 ft/sec b) 32 ft/sec

c) $s = 132 - 32t$

d) It makes sense to extend the line as far as the x-axis. At that point the ball's speed has fallen to zero because it is at the top of its trajectory. Extending the line would yield negative speed, which makes no sense. In reality the ball begins to gain speed again as it falls to earth, so the graph would go upward again.

[12.5] 10 mph

[12.5] 45 mph

[12.6] a) 42/35 = 6/5 = 1.2

b) 1.2(28) = 33.6

c) $33.6\pi = 105.6$ inches

d) about 6 mph

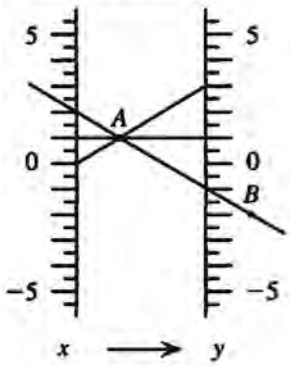
[12.7] a) $y = 0.98x + 4$, where y = next month's weight and x = this month's weight.

b) His weight will approach 200 lbs., because that is the fixed point for the equation in a). 0.98(200) + 4 = 200.

[12.8] a) Draw line from 0 to 3. $b = 3$

b) Draw line from 1 to 1. Magnification is -2. Equation is $y = -2x - 3$.

c) Connect A and B and extend the line to cross both the x- and y-lines of the function diagram. This line goes from 2 to -1, so $(2, -1)$ is the point of intersection.



Chapter 13

[13.1] a) $\frac{80 - 2L}{2} = 40 - L$

b) $L\left(\frac{80 - 2L}{2}\right) = L(40 - L)$

c) (20, 400) This point represents the rectangle of largest area possible with perimeter 80. It is a square of side 20 and area 400.

[13.1] a) x-intercepts: (0, 0) (16, 0), vertex (8, 64)

b) x-intercepts: (0, 0) (16, 0), vertex (8, −64)

[13.2] $x(200 - 7x)$

[13.2] $y = -2x(x - 8)$

[13.2] intercepts: (0, 0) (4, 0), vertex (2, 24)

[13.3] $x^2 + 4x + 3 = (x + 3)(x + 1) = 0$

$x + 3 = 0$ or $x + 1 = 0$

$x = -3$ or $x = -1$

[13.3] intercepts: (0, −30), (6, 0), (−10, 0); vertex (−2, −32)

[13.4] a) $2L + 2\left(\frac{100}{L}\right) = 2L + \frac{200}{L}$

b) 40 feet

c) No, the perimeter can be made as large as desired by making the length large enough.

[13.4] $2\sqrt{60}$ or $4\sqrt{15}$

[13.5] $x(30 - 2x)^2$

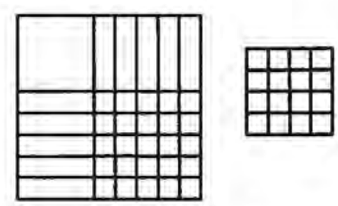
[13.5] 5

[13.6] $x^2 + 10x + 25 = -9 + 25 = 16$

$(x + 5)^2 = 4^2$

$x + 5 = 4$ or $x + 5 = -4$

$x = -1$ or $x = -9$



[13.7] $y = (x - 3)^2 - 5$

[13.7] $H = -2, V = 6$

[13.7] $x^2 + 8x + 19$ makes a perfect square with 3 extra one-blocks, so $V = 3$. Because the square is $(x + 4)^2$, $H = -4$.

[13.8] $(-3 + \sqrt{5}, 0), (-3 - \sqrt{5}, 0)$

[13.8] a) $x^2 + 2x + 1$ (or any b and c such that $c = \frac{b^2}{4}$)

b) $x^2 + 2x + 2$ (or any b and c such that $c > \frac{b^2}{4}$)

Chapter 14

[14.1] The smaller rectangles have length 5 and width $\frac{x}{2}$,and since they are similar to the original, then

$$\frac{x}{5} = \frac{5}{\left(\frac{x}{2}\right)}$$

$$\frac{x^2}{2} = 25$$

$$x^2 = 50$$

$$x = \sqrt{50}$$

[14.1] 15

[14.2] a) $\frac{2x^2 + 5x + 2}{3x + 6}$ b) $\frac{2x + 1}{3}$

[14.2] $\frac{2x}{5}$

[14.2] always true except when $x = 2$

[14.3] a) $\frac{12x^2y}{2x^2y - 2xy}$ b) $\frac{18x^2}{3x^2 - 3x}$

[14.3] common denominator = $20x^2$,

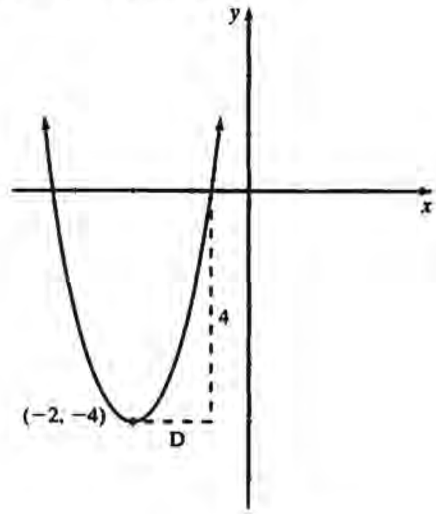
$$\text{sum} = \frac{8x + 5y}{20x^2}$$

[14.3] $x^2 = 5x - 3$ or $x^2 - 5x + 3 = 0$

[14.4] $y = -3x^2$

[14.4] The given function is a vertical translation of $y = 5x^2 + 20x = 5x(x + 4)$, so it has the same H. x-intercepts are at $x = 0$ and $x = -4$, so $H = -2$ (halfway between). Substitute $H = -2$ in for x in the original function to find $V = -31$. Vertex is $(-2, -31)$.

[14.5] The parabola is a translation of $y = 3x^2$. $3D^2 = 4$, so $D^2 = \frac{4}{3}$, $D = \sqrt{\frac{4}{3}}$, and the intercepts are at $(-2 + D, 0)$ and $(-2 - D, 0)$.



[14.5] $a = 5, b = 2, c = -6$, so

$$x = \frac{-2 \pm \sqrt{2^2 - 4(5)(-6)}}{2(5)}$$

$$= \frac{-2 \pm \sqrt{4 + 120}}{10}$$

$$= \frac{-2 \pm \sqrt{124}}{10}$$

$$\approx .9136 \text{ or } -1.3136$$

[14.6] $y = -3(x + 5)^2 + 2$

[14.6] $(x + 4)^2 = 6$

$x + 4 = \sqrt{6}$ *or* $x + 4 = -\sqrt{6}$

$x = -4 + \sqrt{6}$ *or* $x = -4 - \sqrt{6}$

[14.7] If both a and V are positive, then it is a smile parabola with vertex above the x-axis. Since the vertex is the lowest point of a smile parabola, the graph does not hit the x-axis. If both a and V are negative, then it is a frown parabola with vertex below the x-axis. Since the vertex is the highest point of a frown parabola, the graph does not hit the x-axis.

[14.7] V and a must have opposite signs, but we cannot conclude anything about H.

[14.8] The remaining rectangle has length x and width $1 - x$. Since it is similar to the original, $\frac{1}{x} = \frac{x}{1-x}$. Thus $x^2 = 1 - x$, or $x^2 + x - 1 = 0$. Solving by the quadratic formula and disregarding the negative answer gives $x = \frac{-1 + \sqrt{5}}{2}$

[14.8] a) $3 + 5a$

b) $\frac{a}{1} = \frac{1 + a}{a}$

$a^2 = 1 + a$

$a^2 - a - 1 = 0$

$a = \frac{1 \pm \sqrt{5}}{2}$

EXTRA PRACTICE

The Extra Practice pages support an effective course in several ways. Many of them reinforce in-class group work so that students can verify their personal understanding at home. Exercises that require the use of the Lab Gear can be done at home with the HomeWork Gear, available from Creative Publications, or with copies of the Paper HomeWork Gear page in the Support Masters section of this binder. Some pages provide additional practice in important skills, should it be needed. A few of the Extra Practice pages provide additional in-class problems to supplement those in the text. The basic-plus path in the Pathways section of this binder gives suggestions for using these pages. Selected answers appear at the end of this section.

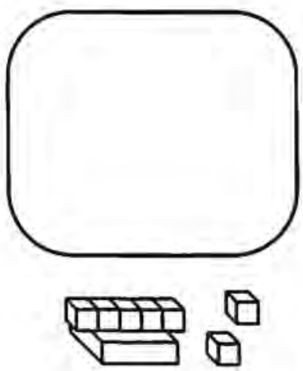
Extra Practice 2.1, 2.2 **Name** ____________________

SIMPLIFYING POLYNOMIALS WITH LAB GEAR

For problems 1-6:

a) Write an expression for the quantity represented.
b) Copy the figure with your Lab Gear and simplify by removing opposites where possible.
c) Write an expression for the simplified figure, in the simplest way.

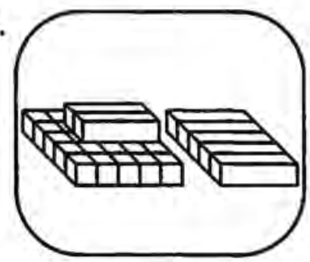
1.



a) ____________________

c) ____________________

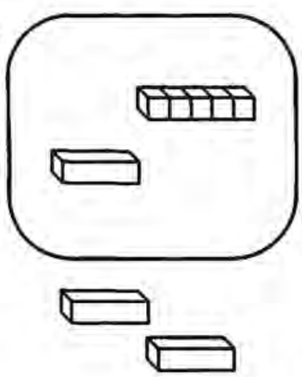
2.



a) ____________________

c) ____________________

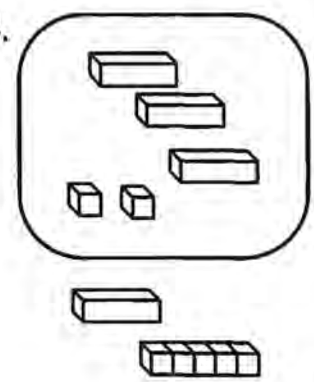
3.



a) ____________________

c) ____________________

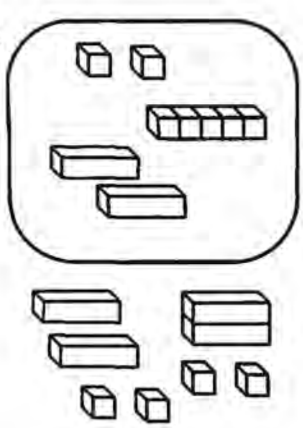
4.



a) ____________________

c) ____________________

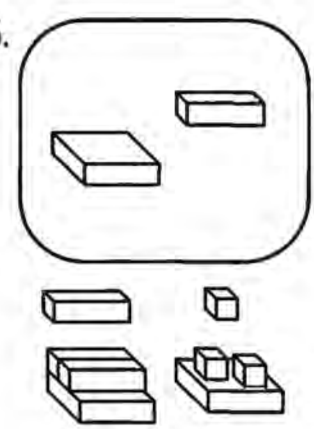
5.



a) ____________________

c) ____________________

6.



a) ____________________

c) ____________________

For problems 7–10:

a) Build the quantity with your Lab Gear and sketch it.

b) Simplify by removing opposites, and write the simplified expression in the blank.

7. $5 - (x^2 + 10) =$ ______________

8. $(x - 3) + (10 - x) - 5 =$ ______________

9. $x^2 + 2x - (5x - 3) =$ ______________

10. $x^2 - 1 - (x^2 + 2) =$ ______________

For problems 11 and 12, follow the directions above, but use adding zero to get everything downstairs when simplifying:

11. $(3x + 1) - (10 + 2x) =$ ______________

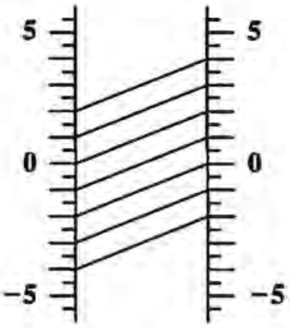
12. $(x^2 - 3x) - (10x - x^2) =$ ______________

13. Look at the answers to 11 and 12 and compare them to the original expressions. Describe any patterns that you notice.

Extra Practice 2.9 Name ______________________

NINE FUNCTION DIAGRAMS

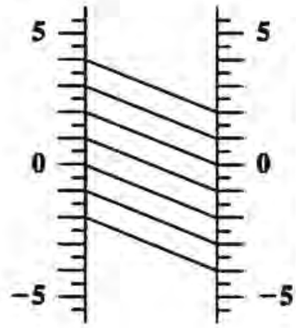
a.



x	y

$x \longrightarrow y =$ ______

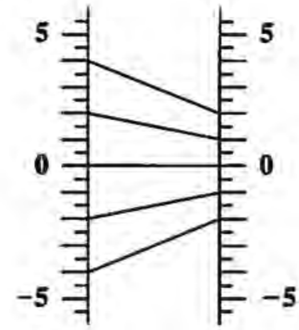
b.



x	y

$x \longrightarrow y =$ ______

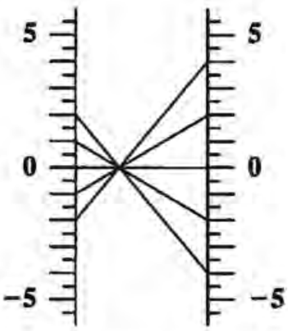
c.



x	y

$x \longrightarrow y =$ ______

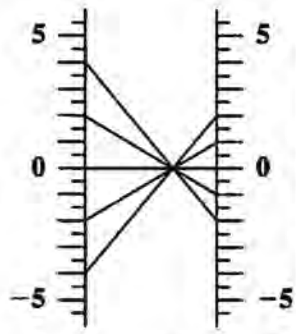
d.



x	y

$x \longrightarrow y =$ ______

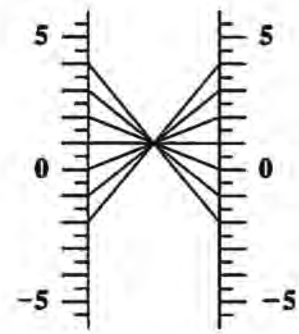
e.



x	y

$x \longrightarrow y =$ ______

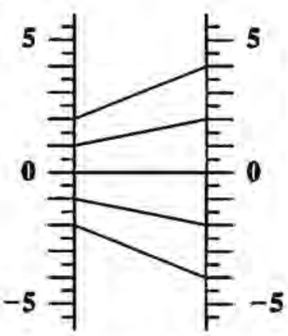
f.



x	y

$x \longrightarrow y =$ ______

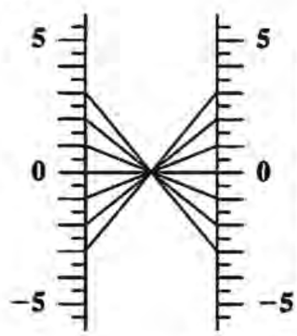
g.



x	y

$x \longrightarrow y =$ ______

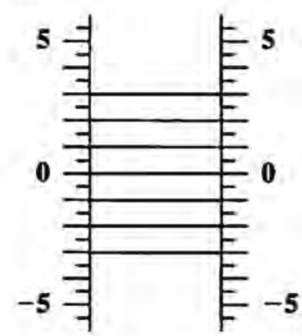
h.



x	y

$x \longrightarrow y =$ ______

i.



x	y

$x \longrightarrow y =$ ______

 Name ____________________

Instructions:

1. Add 3 lines to each diagram, following the pattern. Use a ruler. Use negative and decimal values for x.

2. Make in-out tables for the nine diagrams.

3. Complete the function equation $y = \ldots$ for each diagram.

4. Three diagrams represent functions of the form $y = x + b$. What are the functions?

5. Six diagrams represent functions of the form $y = mx$. What are the functions?

6. A diagram for $y = x + b$ has parallel in-out lines that slant upward. What can you say about b?

7. A diagram for $y = x + b$ has parallel in-out lines that slant downward. What can you say about b?

8. A diagram for $y = x + b$ has parallel in-out lines that go straight across. What can you say about b?

9. A diagram for $y = mx$ has in-out lines that move closer to each other. What can you say about m?

10. A diagram for $y = mx$ has in-out lines that move apart from each other. What can you say about m?

11. A function diagram for $y = mx$ has in-out lines that cross each other. What can you say about m?

12. Two diagrams above represent functions of the form $y = b - x$. What are the functions?

Extra Practice 3.3

Name

Distributing the Minus Sign

Simplify each expression. Show any work you do. Circle your final answer.

1. $2x - 2 + 4x - 5$

2. $2x - 2 - (4x - 5)$

3. $(x^2 - 3x + 2) - (x^2 - 3x - 5)$

4. $5x - (2 + 3x - x^2)$

Find the missing expressions.

5. $3x + (4x + 9) = 3x - (\qquad\qquad)$

6. $(x + 5) - (3 - x^2) = (x + 5) + (\qquad\qquad)$

7. $3x^2 - 7 = x^2 - (\qquad\qquad)$

8. $y^2 - 3xy + 2 = xy - y^2 - (\qquad\qquad)$

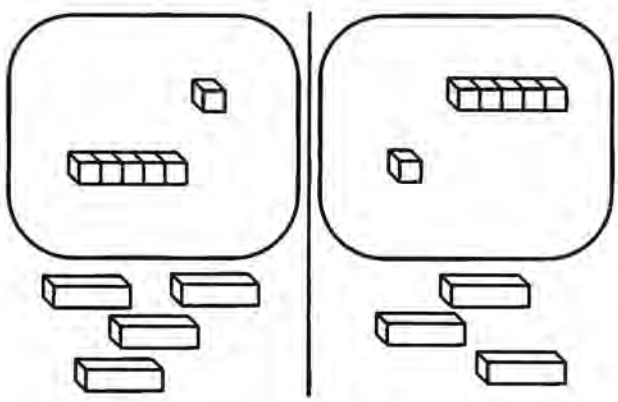
Extra Practice 3.5

Name ____________________

INEQUALITIES WITH LAB GEAR

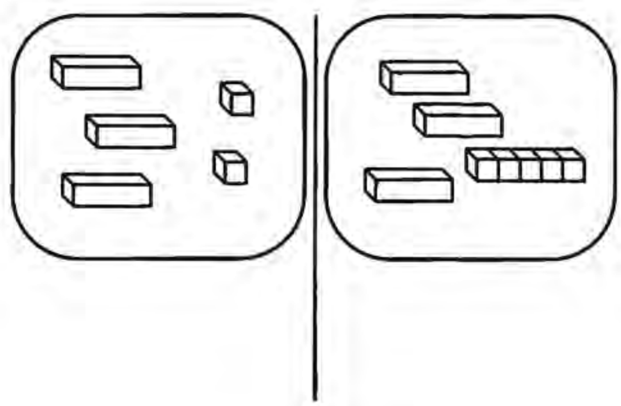
For each problem, decide which side is greater. Write the two expressions shown and place the correct sign (> or <) in the circle. If it is impossible to tell which side is greater, write "?" in the circle.

1.



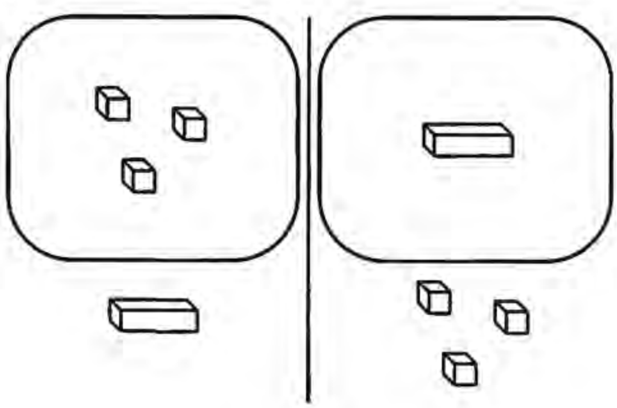
________ ◯ ________

2.



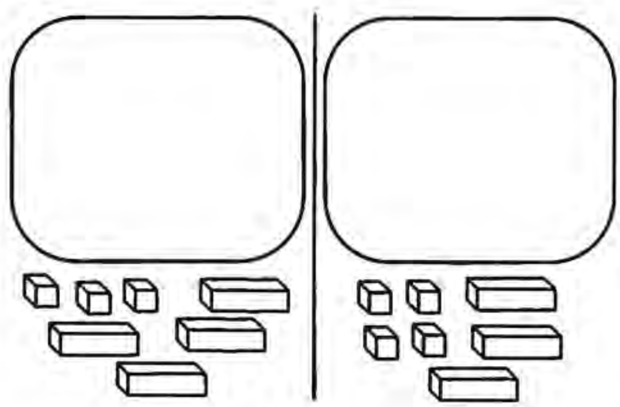
________ ◯ ________

3.



________ ◯ ________

4.



________ ◯ ________

For each problem, arrange the blocks on your workmat to decide which side is greater. Write the correct sign (> or <) in the circle. If you would have to know the value of x to determine which side is greater, put a "?" in the circle, then give one value of x that makes the left side greater, and one that makes the right side greater.

5. $5 - 3x$ ◯ $2 - 3x$

6. $x^2 + 2x - 2$ ◯ $x^2 + 2x + 1$

7. $x^2 - 4$ ◯ $4 - x^2$

8. $(5x + 5) - x^2$ ◯ $5x - (x^2 - 5)$

9. $x^2 + 5x + 5$ ◯ $x^2 + 10x$

10. $3x$ ◯ $6 - 3x$

Extra Practice 3.6 **Name** ____________________

Division with Lab Gear

For each problem, divide. Show your work by making a sketch of the Lab Gear or a table. Circle your answer.

1. $\dfrac{4x + 12}{4} =$

2. $\dfrac{4x + 12}{x + 3} =$

3. $\dfrac{5x^2 + xy}{x} =$

4. $\dfrac{5x^2 + xy}{5x + y} =$

5. $\dfrac{x^2 + 5x + 6}{x + 3} =$

6. $\dfrac{x^2 + 2xy + y^2}{x + y} =$

Extra Practice 3.7 **Name**

Using Reciprocals

Problems like those in Lesson 3.7 #10 provide a way to use reciprocals to solve equations like $\frac{2}{3} \cdot x = 10$. In #10c you were asked to find two numbers a and b, neither equal to 1, so that $\frac{2}{3} \cdot a \cdot b = 10$. One possible solution was $a = \frac{3}{2}$ and $b = 10$, because $\frac{2}{3} \cdot \frac{3}{2} \cdot 10 = 10$. Thus, to solve $\frac{2}{3} \cdot x = 10$, we can let $x = a \cdot b = \frac{3}{2} \cdot 10 = 15$.

Example: Find x, if $10 \cdot x = \frac{2}{3}$
Solution: Using reciprocals, we know that $10 \cdot \frac{1}{10} \cdot \frac{2}{3} = \frac{2}{3}$, so $x = \frac{1}{10} \cdot \frac{2}{3} = \frac{1}{15}$

For problems 1–3, find values for a and b that the first equation, then find x in the second equation.

1. $3 \cdot a \cdot b = 5$ $\quad a =$ $\quad b =$
   $3 \cdot x = 5$ $\quad x =$
2. $7 \cdot a \cdot b = 2$ $\quad a =$ $\quad b =$
   $7 \cdot x = 2$ $\quad x =$
3. $24 \cdot a \cdot b = 8$ $\quad a =$ $\quad b =$
   $24 \cdot x = 8$ $\quad x =$

For problems 4–7, find the value of x that satisfies the equation.

4. $\frac{1}{7}x = 3 \quad x =$
5. $6x = \frac{1}{5} \quad x =$
6. $\frac{1}{12}x = \frac{1}{4} \quad x =$
7. $\frac{2}{3}x = \frac{3}{5} \quad x =$
8. Generalization: Suppose m and n are specific numbers, and you wish to find x so that $mx = n$. Explain how to find x.

Extra Practice 3.9 Name

EQUATIONS AND THE COVER-UP METHOD

Solve each equation using the cover-up method. For each step, box the part you're covering up, then write a new equation stating what the boxed expression must equal. Check your solution by substitution.

Example: $6(5 - 2x) = 24$

$6\boxed{(5 - 2x)} = 24$

$5 - \boxed{2x} = 4$

$2\boxed{x} = 1$

$x = 0.5$ *Check*: $6(5-2(0.5)) = 6(5 - 1) = 6(4) = 24$

1. $5 - x = -7$

2. $2 + 16x = 10$

3. $12(9 - x) = -24$

4. $12(x - 9) = 6$

5. $\frac{x - 1}{8} = 3$

6. $3 + \frac{x}{12} = 0$

7. $\frac{220}{x} - 4 = 6$

8. $7 - \frac{15}{x + 1} = 2$

9. $\frac{2x - 1}{7} - 4 = 5$

Extra Practice 5.3

Name

Distributing Division

Divide.

1. $\dfrac{10x^2 + 6x + 2}{2} =$

2. $\dfrac{12x + 18y}{6} =$

3. $\dfrac{12x + 18y}{2x + 3y} =$

4. $\dfrac{14xy - 6x^2}{2x} =$

5. $\dfrac{x^2 - 6x + 2xy}{x} =$

6. $\dfrac{5y^3 - 2y^2 - y}{y} =$

7. $\dfrac{x^2y + xy^2}{xy} =$

8. $\dfrac{x(y + 1) + 2(y + 1)}{y + 1} =$

Extra Practice 5.4

Name ______________________

Factoring Trinomials

1. Find all trinomials of the form $x^2 + 10x +$ ___ that can be factored, and write each one in factored form. Use Lab Gear if you wish.

2. Find all trinomials of the form $x^2 +$ ___ $x + 48$ that can be factored, and write them in factored form. Lab Gear may help.

3. Factor each trinomial into the product of two binomials, if possible:

a) $x^2 + 10x + 9 =$ ______________ b) $x^2 - 10x + 9 =$ ______________

c) $x^2 + 7x + 6 =$ ______________ d) $x^2 - 7x + 6 =$ ______________

e) $x^2 + 12x + 20 =$ ______________ f) $x^2 - 11x + 18 =$ ______________

g) $x^2 + 6x + 4 =$ ______________ h) $x^2 - 7x + 10 =$ ______________

4. Suppose that a trinomial of the form $x^2 + bx + c$ can be factored into $(x + p)(x + q)$. What is the relationship among p, q, and b? What is the relationship among p, q, and c?

Extra Practice 5.6 Name

FACTORING COMPLETELY

Write each expression below as a product of two or three factors in the number of ways given. (Changing the order of the factors doesn't count, and neither does including 1 as a factor!). You may use Lab Gear if you wish.

1. 18 in 3 ways

2. $5xy$ in 4 ways

3. $10x + 20$ in 4 ways

4. $3x^2 + 6x$ in 3 ways

5. $3x(5x + 10)$ in 4 ways

6. $2(6xy + 9y)$ in 4 ways

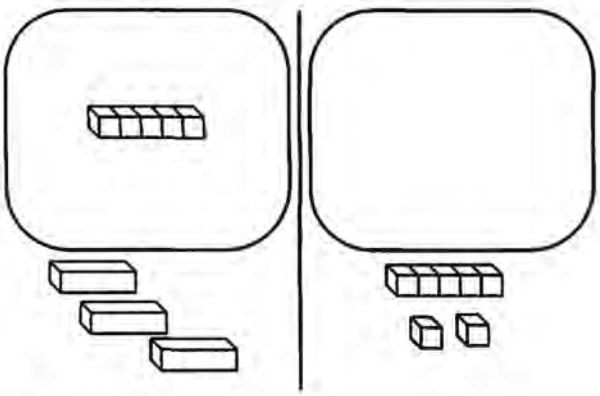
Extra Practice 6.3 **Name**

SOLVING LINEAR EQUATIONS WITH LAB GEAR

For problems 1-4:

a) Write the equation represented in the Lab Gear picture.
b) Use the Lab Gear to find the solution. Each time you change the Lab Gear write the new equation that results.

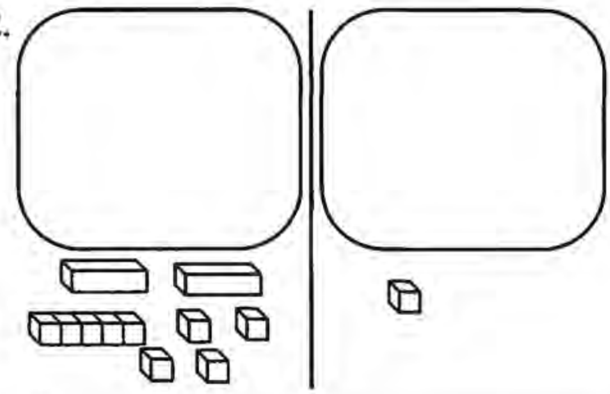
1.



a) ____________________

b)

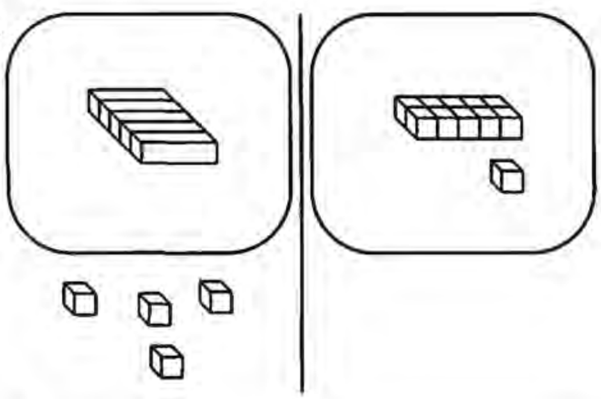
2.



a) ____________________

b)

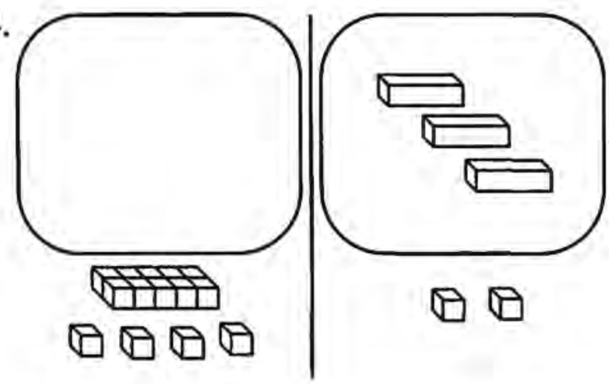
3.



a) ____________________

b)

4.



a) ____________________

b)

 Name ______________________________

For problems 5–12:

a) Build each equation with Lab Gear.

b) Use the Lab Gear to find the solution. Write equations to show some of the steps as you move the blocks.

5. $5x = 12 - x$

6. $2x = 20 - 3x$

7. $5x + 2 = 3x + 12$

8. $x - 8 = 4x - 2$

9. $3x + 8 = 6x + 20$

10. $5 - 2x = 11 - 4x$

11. $6x - 5 = 4x + 7$

12. $3x - 2 = 5x + 6$

13. Look over the sequences of equations you wrote while solving problems 1–12 and describe any patterns you notice as you go from one equation to the next. Compare those to any shortcuts you discovered in solving with the Lab Gear.

 Name ____________________

Solve each equation. Use the Lab Gear, patterns you discovered with the Lab Gear, and/or the cover-up method. Show your work by writing a sequence of equations leading to the solution.

14. $4 + 5x = 14 + 10x$

15. $6x + 2 = 10x + 10$

16. $6x + 2 = 10x - 10$

17. $1 + 8x = 11x - 5$

18. $5x + 3 = 11 - 3x$

19. $5x - 3 = 11 - 2x$

20. $-7 + 2x = -12x$

21. $4x = -5x - 36$

22. $-4 - 3x = 2 + 3x$

23. $8 - x = 4 - 3x$

Extra Practice 6.8 **Name** ______

Solving Linear Equations

Solve each equation. Use Lab Gear if you wish. Show your work by writing a sequence of equations leading to the solution.

1. $3x = 7 - x$

2. $5(x+3) - 2(x-1) = 4 - 3x$

3. $\frac{1}{4}x = \frac{1}{12}$

4. $10(0.3 - 0.7x) = 4$

5. $7 - 8x = 2x + 2$

6. $\frac{6}{x} - 1 = -2$

7. $2x - 7 = 5 - 2(x + 4) + 2$

8. $\frac{2}{3}(5x + 4) = 10x$

9. $\frac{6x + 8}{2} = x + 1$

10. $2x - 3(2x-1) = 4(1 - x)$

Extra Practice 8.1 Name

Introduction to Linear Functions

Answer these questions using any method you like, but be sure you can explain your reasoning. Don't get frustrated if you can't solve it right away; you haven't been given a method. Think about it for a while, and try what seems logical.

Elg and Abra spent a day at Dizzyland Amusement Park, and came home broke but happy. Rea asked them, "How much does Dizzyland cost?"

Elg replied, "Well, it depends on how many Thrill Rides you take; those cost extra. I took 8 Thrill Rides, and spent $30.50."

Abra added, "I only took 1 Thrill Ride, and I spent $14.75."

1. How much would it cost Rea to go to Dizzyland and take 9 Thrill Rides? Explain how you got your answer.

2. Find the cost of admission to Dizzyland with no Thrill Rides. Explain how you got your answer.

3. Find a formula for the total cost, C, of a visit to Dizzyland for a person who takes T Thrill Rides. Explain what each part of your formula represents.

Extra Practice 8.4 Name ____________________

Applying Linear Functions

For each problem:

a) Draw a graph of the data given on grid paper.
b) Write a function equation.
c) Find the slope and y-intercept of the function.
d) Explain what the slope and y-intercept mean in terms of the problem situation.

1. Guido has a water storage tank that he fills in winter to use throughout the spring and summer. One day in spring he begins using 12.5 gallons of water per day to water his garden. After 23 days of watering he has 6212.5 gallons remaining in the tank. (No water has been added since he began using it.) Find a function equation for the amount of water, y, left after x days of watering.

   b) $y =$ ________ c) slope = ________ y-intercept = ________

   d)

2. A Minnesota police officer has theorized that there is a linear relationship between the daily high temperature and the number of crimes in the city. On a day when the high was $-5°$, there were 17 crimes, and on a $+35°$ day there were 37 crimes. Find a function equation for the number of crimes, y, on a day when the high temperature is x, if the officer's theory is correct.

   b) $y =$ ________ c) slope = ________ y-intercept = ________

   d)

3. If a San Andreas Airlines flight to L.A. flies with only 20 passengers, the airline loses $3,000. If there are 170 passengers, the flight makes a profit of $7,350. Assume that this is a linear relationship. Find a function equation for the profit, y, resulting from a flight with x passengers.

   b) $y =$ ________ c) slope = ________ y-intercept = ________

   d)

Extra Practice 8.7, 8.8 Name

PERCENT INCREASE AND DECREASE

1. Alegra receives annual salary raises of 8%.
   a) If she earns approximately $30,000 per year now, how much will she earn next year, and the following year?

   b) By what number can you multiply each year's salary to get the next year's? (It's not 0.08; that just gives the increase, not the new salary.)

   c) How much did Alegra earn last year, if she received an 8% raise to get to $30,000?

2. A. B. Large, a store for big and tall men, has a clearance sale. Beginning August 1, each item will be reduced in price 5%. On each successive day the price will be reduced by 5%, until it is sold.
   a) A sportcoat is priced at $190 on August 2. How much will it cost on August 3? on August 4? on August 5?

   b) By what number can you multiply each day's price to get the next day's price?

   c) How much did the sportcoat cost on August 1?

3. Barb paid $31.30 for a pair of jeans, which included 8% sales tax. What was the pre-tax price of the jeans?

4. Gabe bought a suit at Marcy's, where he works. Using his employee's discount of 30%, he paid $160.30. What was the full price of the suit?

Extra Practice 10.2 Name

TWO-VARIABLE EQUATIONS WITH CONSTRAINTS

The Drama Society is setting ticket prices for their spring musical, "Hare." Max decides on $4 for children and $8 for adults. Sophie reminds him that they need to make $600 each night to cover their expenses.

1. If 60 adults attend and ticket sales total $600, how many children must attend?

2. If 70 children attend and ticket sales total $600, how many adults must attend?

3. If x is the number of children and y is the number of adults attending a performance at which ticket sales total $600, what equation must x and y satisfy?

4. Make a table showing at least 5 possible values of x and y that satisfy the equation in #3. Check a few of the pairs to see that, if x is the number of children's tickets and y is the number of adults' tickets, they do yield $600 in ticket sales. This will verify that the equation in #3 is correct.

5. Find (x, y) pairs that satisfy both the equation in #3 above and each of the constraints given below. Some may not be possible.
   a) all 140 seats in the theater are full.

   b) the number of adults is twice the number of children.

   c) there are 18 more children than adults.

   d) there are 3 times as many children as adults.

   e) a total of 70 tickets are sold.

Extra Practice 10.4 Name

Solving Linear Systems

Solve each system. Write your solution as an (x, y) pair. Use the Lab Gear if you wish. Remember that you can transform either equation into any equivalent equation.

1. $\begin{cases} x - 2y = -6 \\ x + 3y = 14 \end{cases}$

2. $\begin{cases} y = 3x - 4 \\ y = \frac{1}{2}x + 5 \end{cases}$

3. $\begin{cases} 2x + 3y = 4 \\ y = 9 - 2x \end{cases}$

4. $\begin{cases} 7x - 2y = -7 \\ 2y = 4x + 1 \end{cases}$

5. $\begin{cases} -3x - y = 9 \\ 2x + 6y = -22 \end{cases}$

6. $\begin{cases} 6x + 5y = -1 \\ 2x - 9 = 3y \end{cases}$

Extra Practice 10.8 Name ____________________

Finding Equations of Lines

For each line described below:

a) Find an equation in slope-intercept or standard form.

b) Sketch the line. Use the sketch to check that your equation is correct.

1. through (0, −2), with slope = $\frac{4}{5}$

   a) ____________________

   b)

2. through (0, 6) and (3, 4)

   a) ____________________

   b)

3. through (−1, 7) and (5, 7)

   a) ____________________

   b)

4. through (3, 7), with slope = 4

   a) ____________________

   b)

5. through (−1, 8) and (4, 0.5)

   a) ____________________

   b)

6. through (5, −1) and (5, 3)

   a) ____________________

   b)

Selected Answers

2.1, 2.2

1. a) $x^2 - 5 + 2$ c) $x^2 - 3$
2. a) $-[(25 - 2x) + 5x]$
   c) $-(25 + 3x)$ or $-25-3x$
3. a) $2x - (x + 5)$ c) $x - 5$
4. a) $x + 5 -(2 + 3x)$
   c) $3 - 2x$
5. a) $(3x - x) + 4 -(2x + 7)$
   c) -3
6. a) $(2x^2 - 2x - 2) +$
   $x + 1 - (x^2 + x)$
   c) $x^2 - 2x - 1$
7. b) $-(x^2 + 5)$ or $-x^2 - 5$
8. b) 2
9. b) $x^2 - 3x + 3$
10. b) -3
11. b) $x - 9$
12. b) $2x^2 - 13x$
13. Answers will vary.

2.9

3. a) $y = x + 2$
   b) $y = x + (-2)$
   c) $y = \frac{1}{2}x$
   d) $y = -2x$
   e) $y = -\frac{1}{2}x$
   f) $y = 2 - x$
   g) $y = 2x$
   h) $y = -x$
   i) $y = x$
4. a) $y = x + 2$
   b) $y = x + (-2)$
   i) $y = x + 0$
5. c) $y = 0.5x$
   d) $y = -2x$
   e) $y = -\frac{1}{2}x$
   g) $y = 2x$
   h) $y = -1x$
   i) $y = 1x$
6. b is positive.
7. b is negative.
8. b is zero.
9. $0 < m < 1$
10. $m > 1$
11. m is negative.
12. f) $y = 2 - x$
    h) $y = 0 - x$

3.3

1. $6x - 7$
2. $-2x + 3$
3. 7
4. $x^2 + 2x - 2$
5. $-4x - 9$
6. $-3 + x^2$
7. $-2x^2 + 7$
8. $-2y^2 + 4xy - 2$

3.5

1. $4x - 6$? $3x - 6$
2. $-3x - 2 > -3x - 5$
3. $x - 3$? $3 - x$
4. $3 + 4x$? $4 + 3x$
5. $>$
6. $<$
7. $>$ if $x > 2$ or $x < -2$
   $<$ if $-2 < x < 2$
8. $=$
9. $>$ if $x < 1$
   $<$ if $x > 1$
10. $>$ if $x > 1$
    $<$ if $x < 1$

3.6

1. $x + 3$
2. 4
3. $5x + y$
4. x
5. $x + 2$
6. $x + y$

3.7

1. $a = \frac{1}{3}, b = 5, x = \frac{5}{3}$
2. $a = \frac{1}{7}, b = 2, x = \frac{2}{7}$
3. $a = \frac{1}{24}, b = 8, x = \frac{1}{3}$
4. $x = 21$
5. $x = \frac{1}{30}$
6. $x = 3$
7. $x = \frac{9}{10}$
8. $x = (1/m) \cdot n$ or $x = n$ times the reciprocal of m.

3.9

1. $x = 12$
2. $x = 0.5$
3. $x = 11$
4. $x = 9.5$
5. $x = 25$
6. $x = -36$
7. $x = 22$
8. $x = 2$
9. $x = 32$

5.3

1. $5x^2 + 3x + 1$
2. $2x + 3y$
3. 6
4. $7y - 3x$
5. $x - 6 + 2y$
6. $5y^2 - 2y - 1$
7. $x + y$
8. $x + 2$

5.4

1. $x^2 + 10x = x(x+10)$
   $x^2 + 10x + 9 = (x + 1)(x + 9)$
   $x^2 + 10x + 16 = (x + 2)(x + 8)$
   $x^2 + 10x + 21 = (x + 3)(x + 7)$
   $x^2 + 10x + 24 = (x + 4)(x + 6)$
   $x^2 + 10x + 25 = (x + 5)(x + 5)$
2. $x^2 + 49x + 48 = (x + 1)(x + 48)$
   $x^2 + 26x + 48 = (x + 2)(x + 24)$
   $x^2 + 19x + 48 = (x + 3)(x + 16)$
   $x^2 + 16x + 48 = (x + 4)(x + 12)$
   $x^2 + 14x + 48 = (x + 6)(x + 8)$

   Some students may also find six additional answers with corresponding negative linear coefficients. In the context of the question, the positive answers are sufficient.
3. a) $(x + 9)(x + 1)$
   b) $(x - 9)(x - 1)$
   c) $(x + 6)(x + 1)$
   d) $(x - 6)(x - 1)$
   e) $(x + 10)(x + 2)$
   f) $(x - 9)(x - 2)$
   g) not factorable
   h) $(x-5)(x-2)$
4. $p + q = b$ and $pq = c$.

5.6

Answers may vary. Sample answers are given.

1. $9 \cdot 2, 6 \cdot 3, 3 \cdot 3 \cdot 2$
2. $5 \cdot x \cdot y, (5x) \cdot y, 5 \cdot (xy), (5y) \cdot x$
3. $10(x + 2), 2(5x + 10), 5(2x + 4),$
   $2 \cdot 5 \cdot (x + 2)$

4. $3(x^2 + 2x)$, $x(3x + 6)$, $(3x)(x + 2)$, $3 \cdot x \cdot (x + 2)$
5. $3(5x^2 + 10x)$, $x(15x + 30)$, $(15x)(x + 2)$, $3 \cdot 5 \cdot (x^2 + 2x)$, $5(x)(3x + 6)$
6. $(2y)(6x + 9)$, $3 \cdot 2 \cdot (2xy+3y)$, $6 \cdot y \cdot (2x+3)$, $2(3y)(2x + 3)$, $6(2xy + 3y)$

6.3

Sequences of steps will vary.

1. $x = 4$
2. $x = -4$
3. $x = 3$
4. $x = -4$
5. $x = 2$
6. $x = 4$
7. $x = 5$
8. $-2 = x$
9. $-4 = x$
10. $3 = x$
11. $x = 6$
12. $-4 = x$
13. Answers will vary.
14. $-2 = x$
15. $-2 = x$
16. $3 = x$
17. $2 = x$
18. $x = 1$
19. $x = 2$
20. $x = 0.5$
21. $x = -4$
22. $-1 = x$
23. $x = -2$

6.8

1. $x = 1.75$
2. $x = -\frac{13}{6}$
3. $x = \frac{1}{3}$
4. $x = -\frac{1}{7}$
5. $x = 0.5$
6. $x = -6$
7. $x = 1.5$
8. $x = 0.4$
9. $x = -1.5$
10. no solution

8.1

1. Elg took 7 more Thrill Rides than Abra, and spent \$15.75 more, so each Thrill Ride costs one-seventh of \$15.75, or \$2.25. Rea is taking one more Thrill Ride than Elg, and will pay \$2.25 more, or \$32.75.
2. Abra's cost minus the cost of one Thrill Ride is \$12.50, the basic admission fee.
3. $C = \$12.50 + \$2.25T$. The \$12.50 is the basic admission charge, and the $\$2.25T$ is the additional cost for T Thrill Rides.

8.4

1. $y = 6500 - 12.5x$. There were 6500 gallons in the tank when he began watering, $6212.5 + 23(12.5)$. Slope is -12.5, which is how much the water volume changes each day. y-intercept is 6500, which is the water volume after 0 days of watering.
2. $y = 19.5 + 0.5x$. Slope is 0.5, which is how much the number of crimes changes each time the temperature goes up one degree. y-intercept is 19.5, which is the number of crimes on a day when the temperature is 0°.

3. $y = 69x - 4380$. Slope is 69, which is the change in the airline's profit for each additional passenger. y-intercept is -4380, which is the "profit" (actually a loss) if the flight has zero passengers.

8.7, 8.8

1. a) \$32,400, \$34,992
   b) 1.08
   c) \$27,777.78
2. a) \$180.50, \$171.48, \$162.90
   b) 0.95
   c) \$200
3. \$28.98
4. \$229

10.2

1. 30
2. 40
3. $4x + 8y = 600$
4. Answers will vary.
5. a) (130, 10)
   b) (30, 60)
   c) (62, 44)
   d) (90, 30)
   e) not possible

10.4

1. (2, 4)
2. (3.6, 6.8)
3. (5.75, −2.5)
4. (−2, −3.5)
5. (−2, −3)
6. (1.5, −2)

10.8

1. a) $y = \frac{4}{5}x - 2$
2. a) $y = -\frac{2}{3}x + 6$
3. a) $y = 7$
4. a) $y = 4x - 5$
5. a) $y = -1.5x + 6.5$
6. a) $x = 5$

SUPPORT MASTERS

The Pathways section of this binder refers to Support Masters that can be used to create transparencies and student pages to enhance the lessons. You may find the remaining Support Masters useful in creating your own tests, quizzes, student record sheets, transparencies, or worksheets.

1.2 Perimeter of Polyominoes. A chart for #1 and a grid for #10.

1.A Graphing Rectangle Areas. A chart and grid for #3-6.

2.5 Powers. Charts for #1 and 8.

2.8 Time, Distance, Speed. Five enlarged function diagrams.

2.9 Operations and Function Diagrams: Addition. Six functions of the form $y = x + b$ to chart and diagram.

2.9 Operations and Function Diagrams: Multiplication. Six functions of the form $y = mx$ to chart and diagram.

2.10 Perimeter Functions. Charts for #1-6.

2.12 Geoboard Triangles. A two-page summary worksheet on finding the areas of geoboard triangles.

3.8 A Hot Day: Comparing Temperature Scales. A grid for #5-10.

4.1 A 100-Mile Trip. Grids for #4-12.

4.3 Polynomial Functions: Order of Operations. Tables and grids for #2-6.

4.3 Polynomial functions: Degree. Coordinate axes for #8-11.

4.8 Jarring Discoveries. Charts and grids for #2.

4.10 Up in the Air. Enlarged graphs for #1-11.

5.5 Graphing Parabolas. Recording sheet for #7-10.

7.2 Square Windows. A chart for #3 and a grid for #5.

7.3 Squares of Sums. Recording sheet for #2-7.

9.11 Let's Eat!:Pizza Prices. Charts for #4.

10.2 How Much of Each Kind? Charts for #2, 6, and 11.

11.5 Dice Games. Charts for #2 and 11.

12.2 The Median-Median Line. An enlarged graph of highway versus city mileage.

Paper HomeWork Gear. Four copies, cut apart, make a set of Lab Gear. Reduce this page to use as clip art.

Geoboard Dot Paper

Algebra Lab Gear Clip Art: 3-D Blocks

Algebra Lab Gear Clip Art: Workmats and Corner Pieces

Algebra Lab Gear Workmat

Lesson 1.2

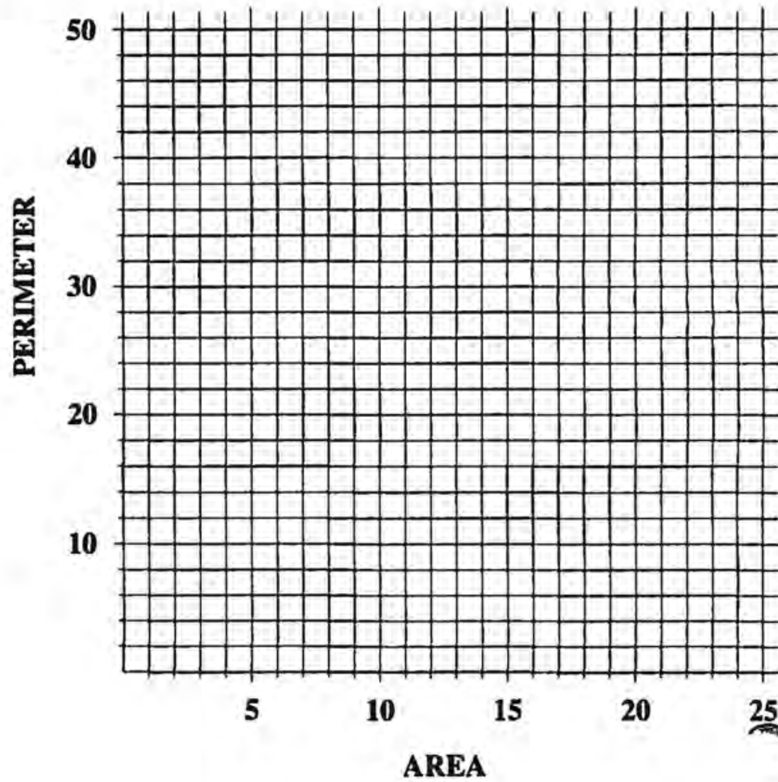
Name ______________________

PERIMETER OF POLYOMINOES

1.

Area	Shortest Perimeter	Longest Perimeter
1	4	4
2	6	6
3		
4	8	10
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		

10.



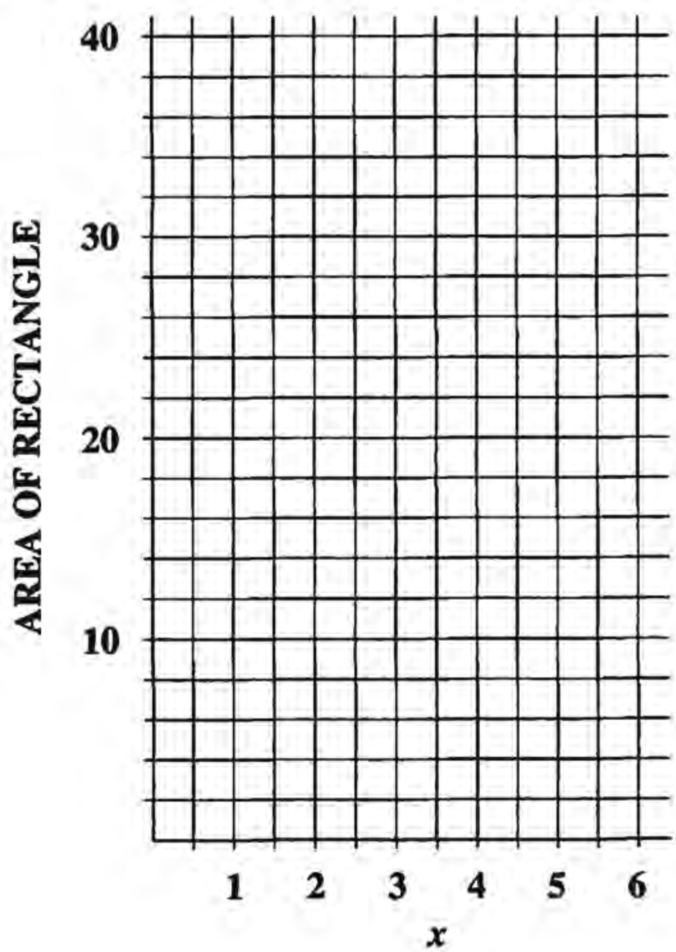
Thinking/Writing 1.A Name

GRAPHING RECTANGLE AREAS

3. **Area of Rectangle Having Dimensions:**

x	1 by x	2 by x	3 by x	x by x
1	1	2	3	1
2				
3				
4				
5				
6				

4, 5, 6. Use a different color for each of the graphs.



Lesson 2.5

Name

POWERS

1.

Day #	Cents	Total
1	1	1
2	2	3
3	4	7
4		
5		
6		
7		
8		
9		
10		

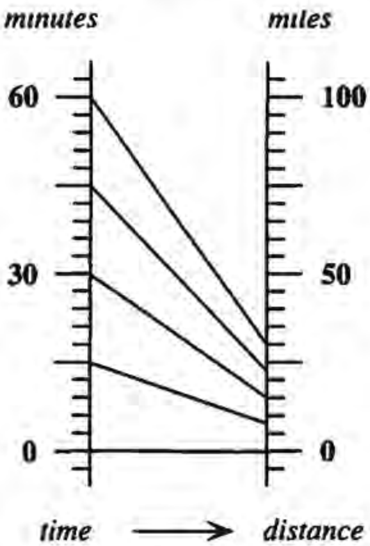
8.

Week #	Letters received this week	Total number received so far
1	5	5
2	25	30
3		
4		
5		
6		
7		
8		
9		
10		

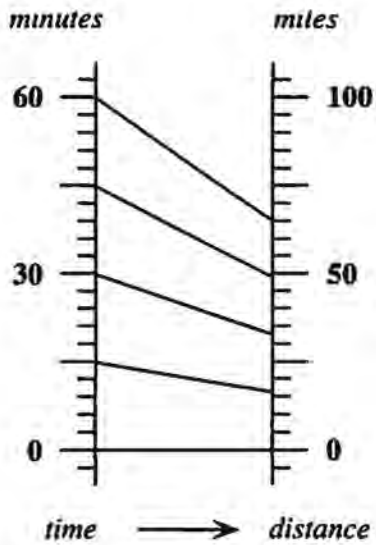
Lesson 2.8

Name

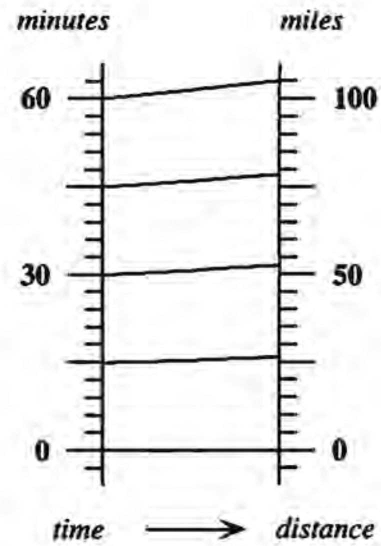
TIME, DISTANCE, SPEED



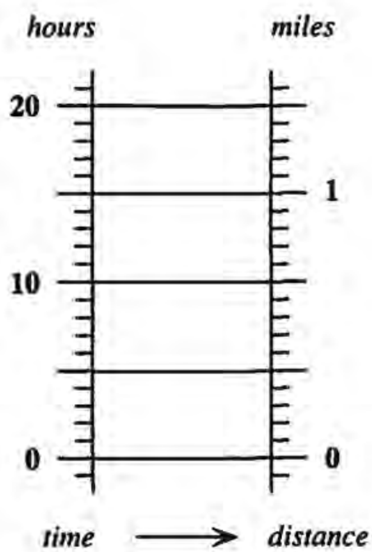
ROLLER SKATER



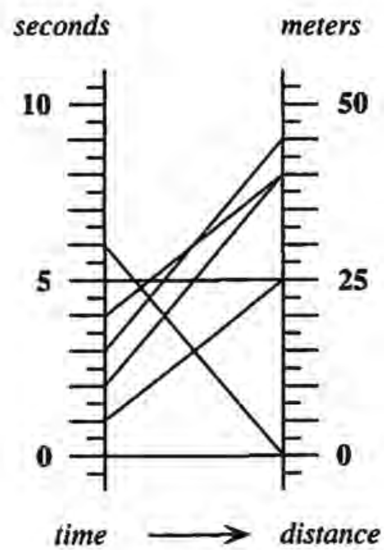
CHEETAH



NEEDLETAIL



SLOTH

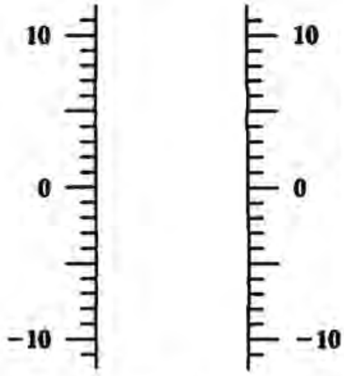


BALL

Lesson 2.9 Name

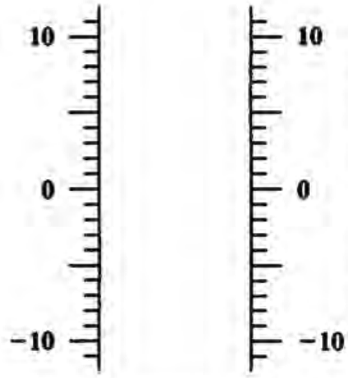
Operations and Function Diagrams: Addition

The function rules shown below are all of the form $y = x + b$, and are helpful in answering problems 1–4. Complete the input-output table for each function rule given. Then draw the function diagram.



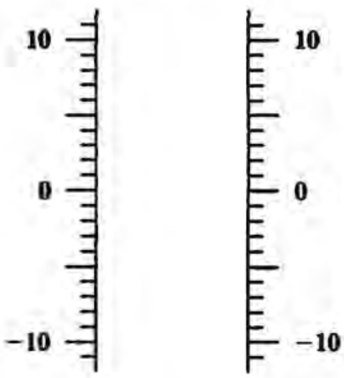
x	y
0	
−3	
4	
−1	
2	
−5	
6	

$x \longrightarrow y = \underline{x + 3}$



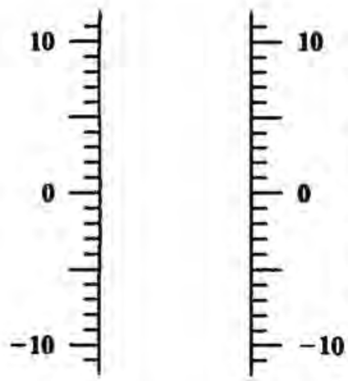
x	y
0	
−3	
4	
−1	
2	
5	
−10	

$x \longrightarrow y = \underline{x + 6}$



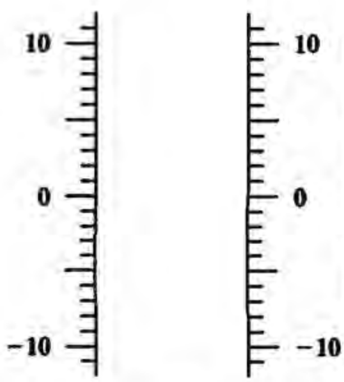
x	y
0	
−3	
4	
−1	
2	
10	
−8	

$x \longrightarrow y = \underline{x + (-2)}$



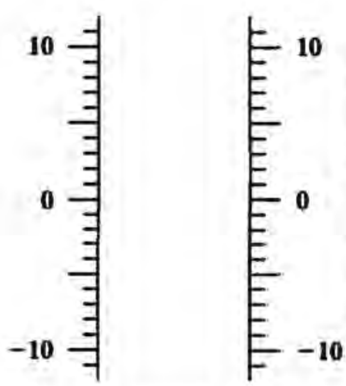
x	y
0	
−3	
4	
−1	
2	
−6	
5	

$x \longrightarrow y = \underline{x + (-4)}$



x	y
0	
−3	
4	
−1	
2	
−10	
9	

$x \longrightarrow y = \underline{x}$

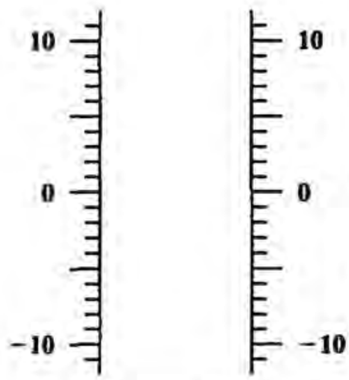


x	y
0	
−3	
−5	
+1	
−10	
−1	
−8	

$x \longrightarrow y = \underline{x + 10}$

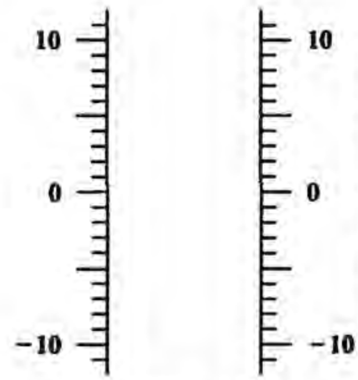
Operations and Function Diagrams: Multiplication

The function rules shown below are all of the form $y = mx$, and are helpful in answering problems 5–9. Complete the input-output table for each function rule given. Then draw the function diagram.



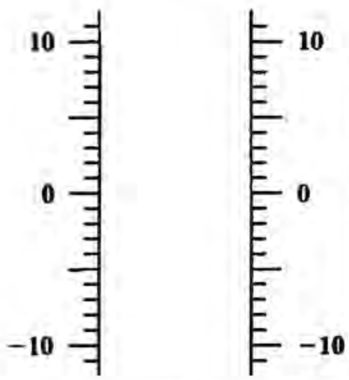
x	y
0	
−3	
4	
−5	
2	
1	
−1	

$x \longrightarrow y = \underline{2x}$



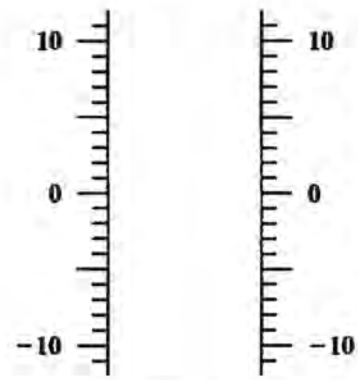
x	y
0	
−3	
4	
−5	
2	
1	
−1	

$x \longrightarrow y = \underline{-2x}$



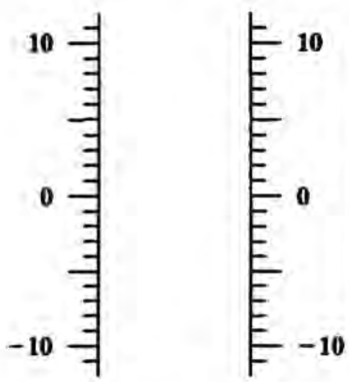
x	y
0	
−6	
8	
−10	
4	
−2	
10	

$x \longrightarrow y = \underline{\tfrac{1}{2}x}$



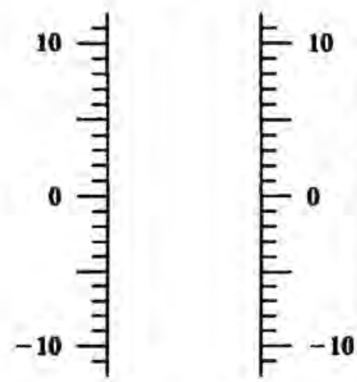
x	y
0	
−1	
2	
−3	
1	
3	
−2	

$x \longrightarrow y = \underline{3x}$



x	y
0	
−1	
2	
−3	
1	
3	
−2	

$x \longrightarrow y = \underline{-3x}$



x	y
0	
−9	
6	
−3	
−6	
9	
3	

$x \longrightarrow y = \underline{\tfrac{1}{3}x}$

Lesson 2.10

Name ______________________________

PERIMETER FUNCTIONS

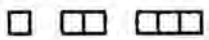
1. 

Fig. #	Perimeter
1	4
2	6
3	8
4	
10	
100	
n	

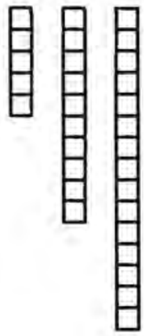
2. 

Fig. #	Perimeter
1	
2	
3	
4	
10	
100	
n	

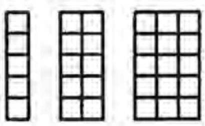
3. 

Fig. #	Perimeter
1	
2	
3	
4	
10	
100	
n	

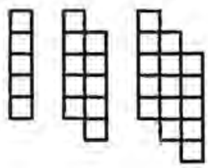
4. 

Fig. #	Perimeter
1	
2	
3	
4	
10	
100	
n	

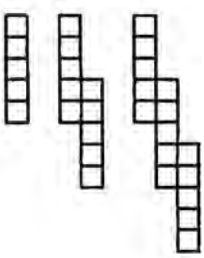
5. 

Fig. #	Perimeter
1	
2	
3	
4	
10	
100	
n	

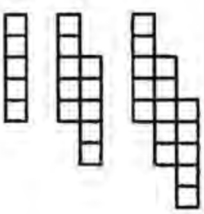
6. 

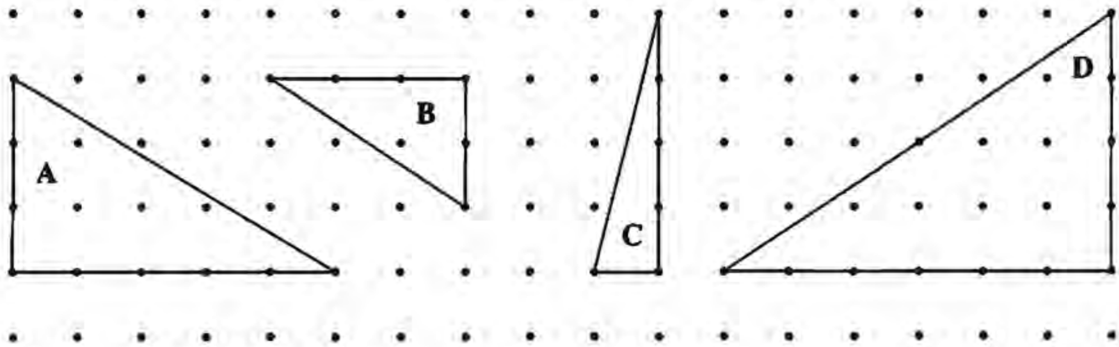
Fig. #	Perimeter
1	
2	
3	
4	
10	
100	
n	

Lesson 2.12 Name

Geoboard Triangles

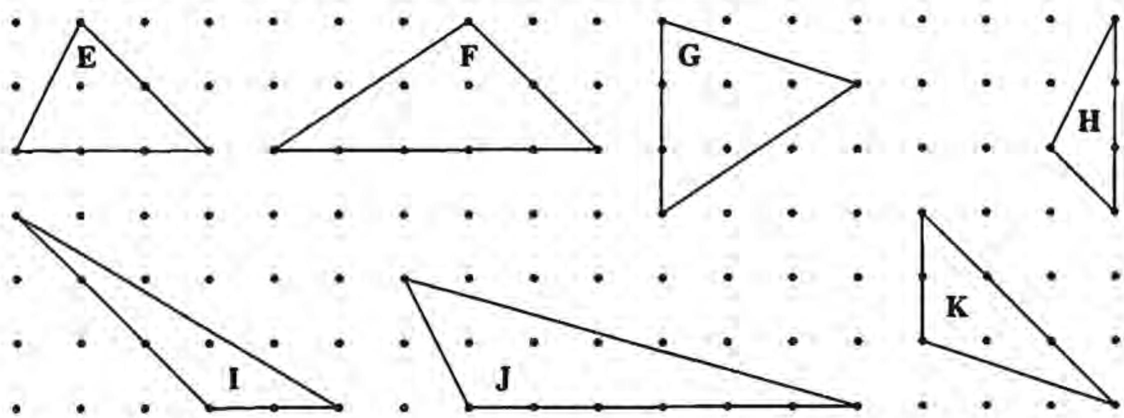
Find the area of each of the geoboard triangles. Then describe your method for finding the area.

1. Triangles with one vertical side and one horizontal side:



My method for finding the area of this type of triangle is:

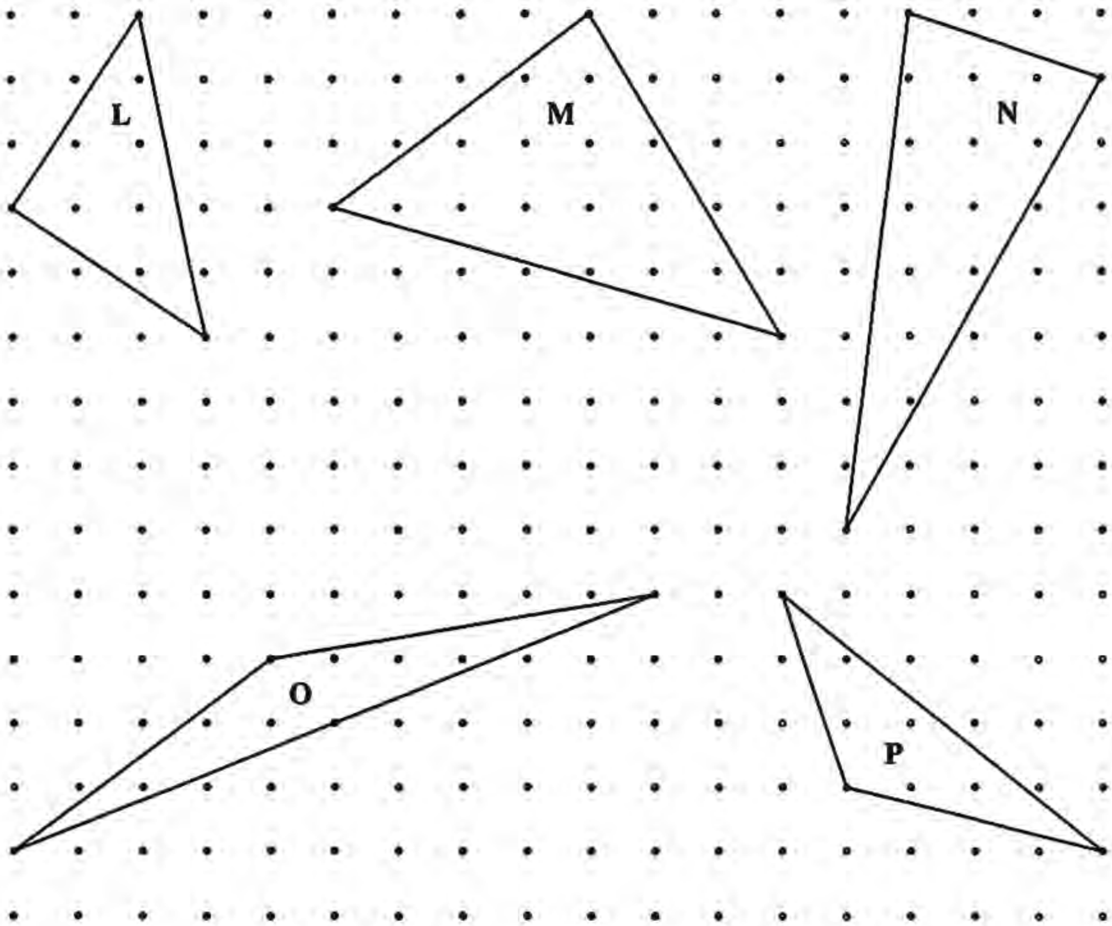
2. Triangles with only one side vertical or horizontal:



My method for finding the area of this type of triangle is:

Geoboard Triangles

3. Triangles with no horizontal or vertical sides:



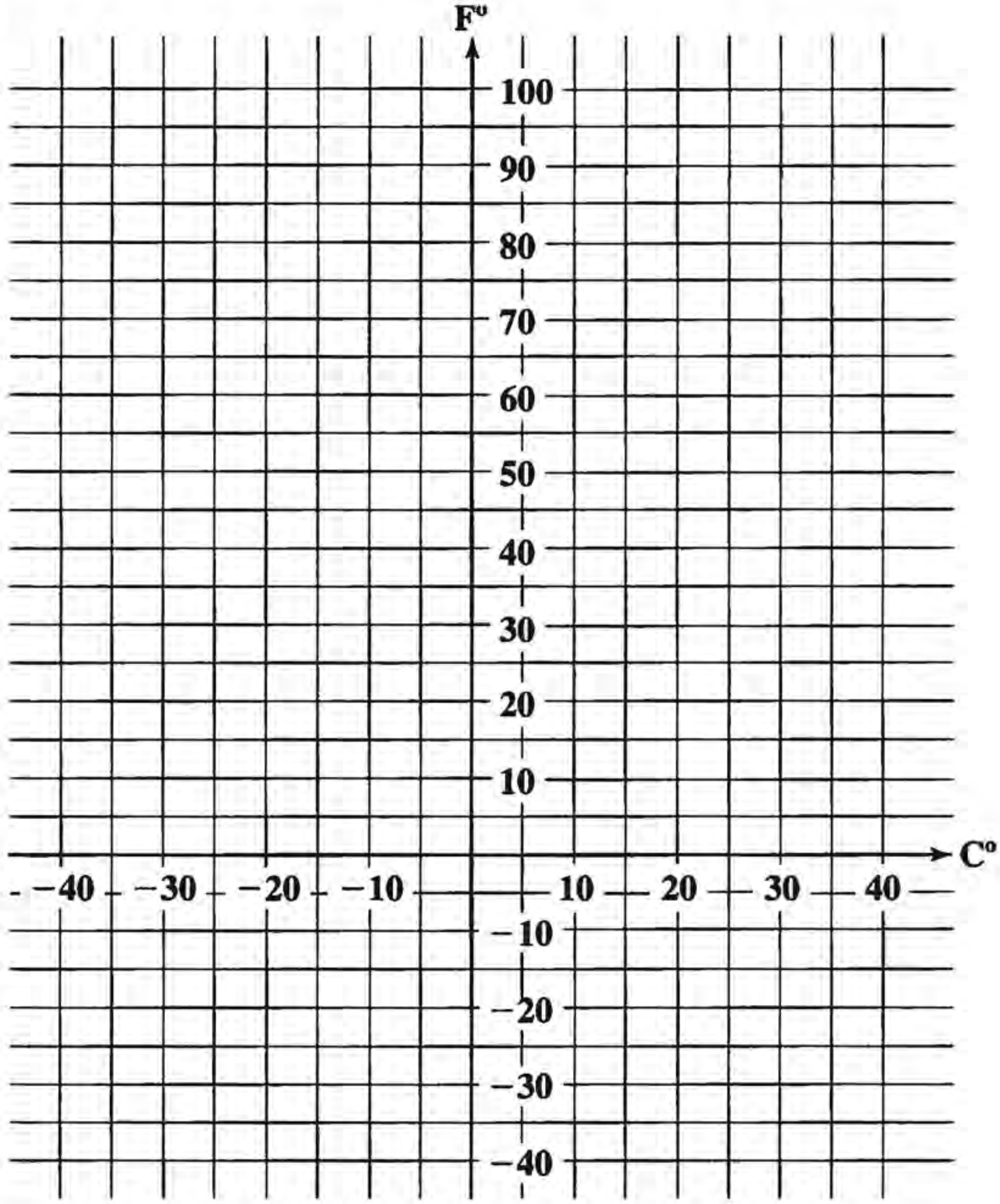
My method for finding the area of this type of triangle is:

Lesson 3.8

Name

A Hot Day: Comparing Temperature Scales

5-10.

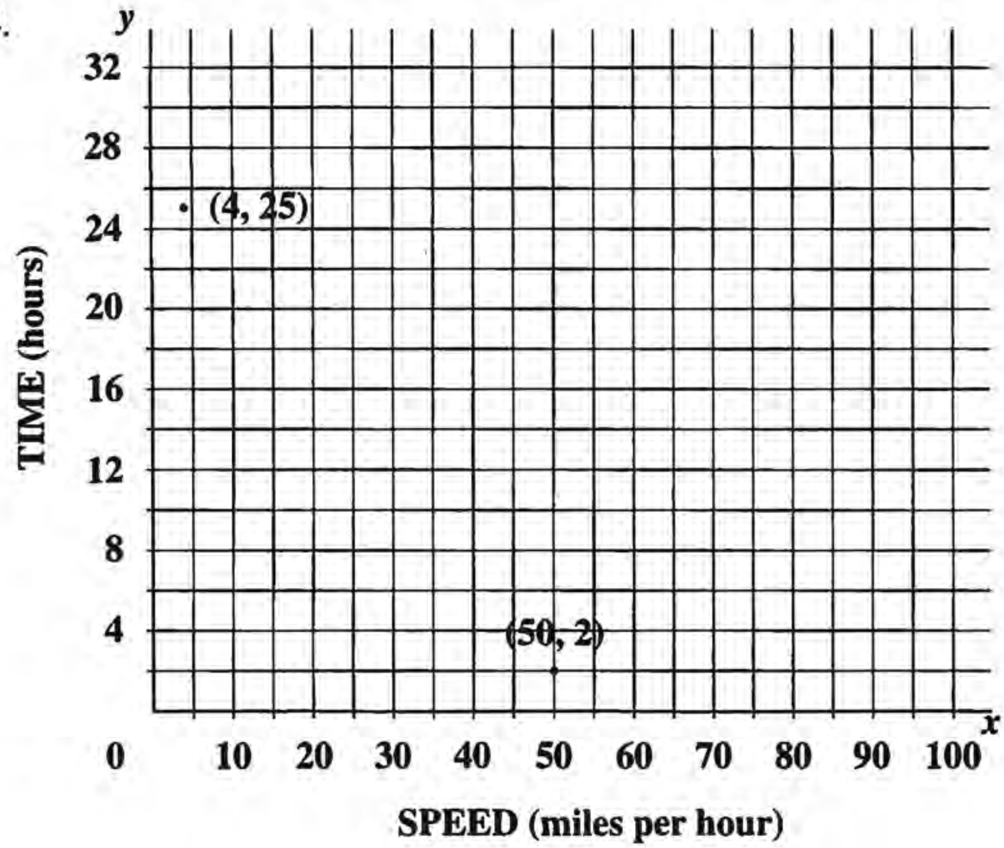


Lesson 4.1

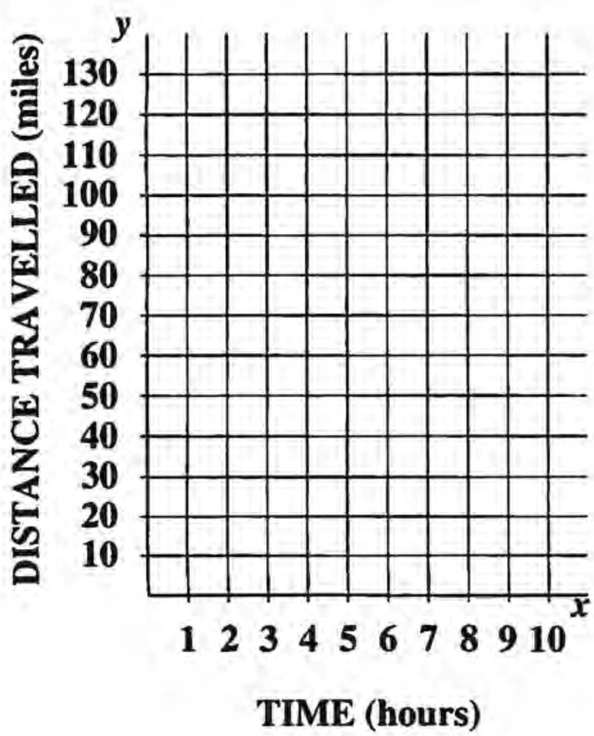
Name

A 100-MILE TRIP

4.



6-12.



Lesson 4.3

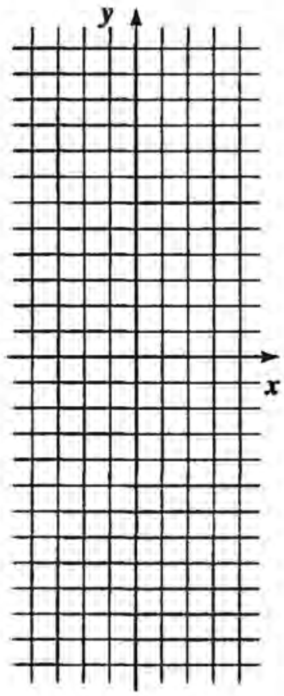
Name

Polynomial Functions: Order of Operations

2-6. Complete each table. Draw the graph of the function.

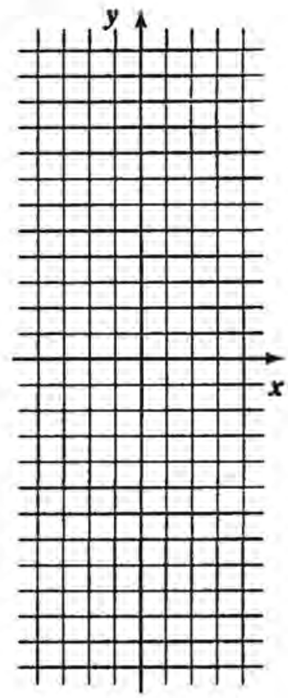
$y = x^2$

x	y
−3.5	
−3	
−2	
−1	
−0.5	
0	
0.5	
1	
2	
3	
3.5	



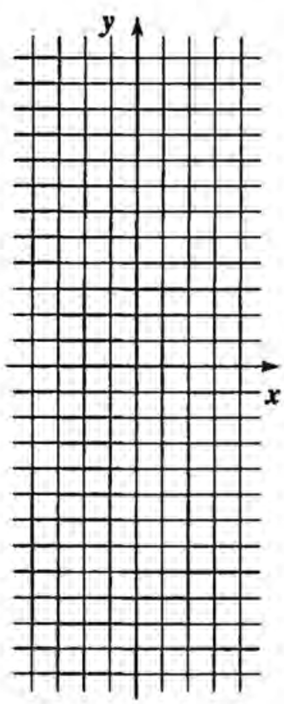
$y = -x^2$

x	y
−3.5	
−3	
−2	
−1	
−0.5	
0	
0.5	
1	
2	
3	
3.5	



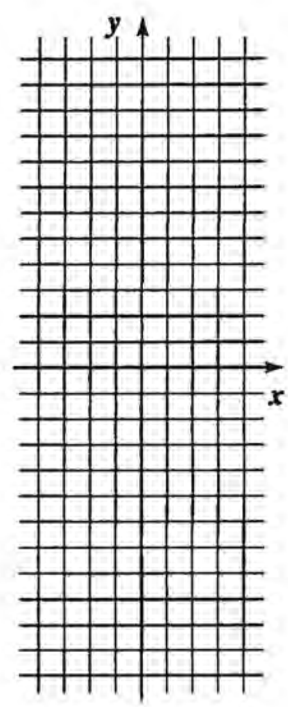
$y = x^3$

x	y
−2.3	
−2	
−1.5	
−1	
−0.5	
0	
0.5	
1	
1.5	
2	
2.3	



$y = -x^3$

x	y
−2.3	
−2	
−1.5	
−1	
−0.5	
0	
0.5	
1	
1.5	
2	
2.3	

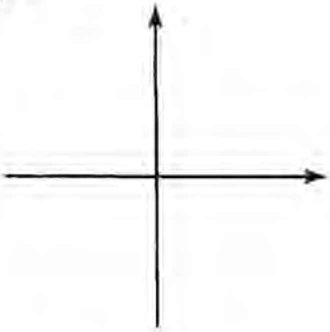


 Name ______________________________

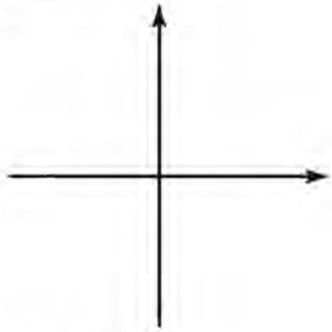
Polynomial Functions: Degree

8-11. Sketch the graph of each function.

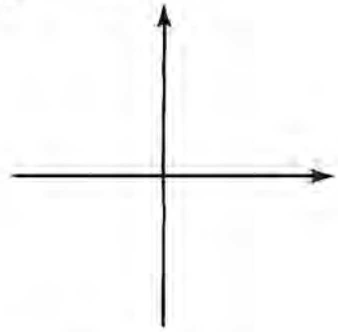
$y = 2x^3$



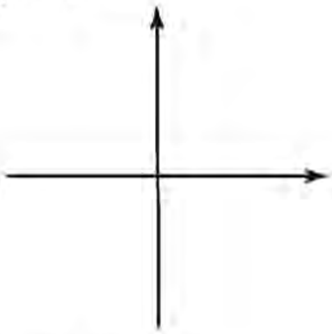
$y = x^3 + 1$



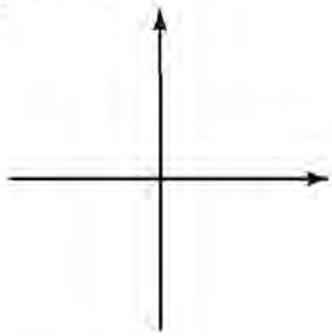
$y = -x^3 - 2$



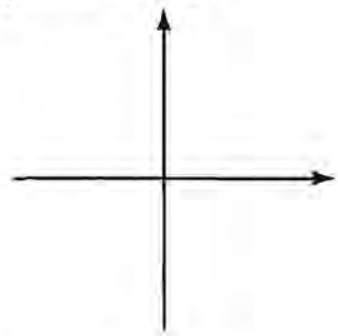
$y = x^2 - 1$



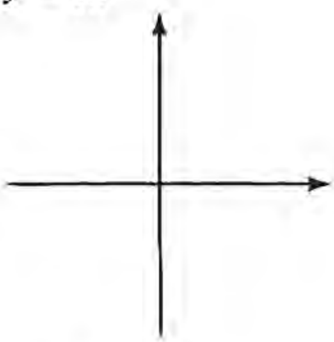
$y = -3x^2$



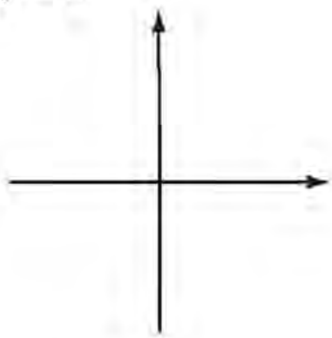
$y = -x^2 + 2$



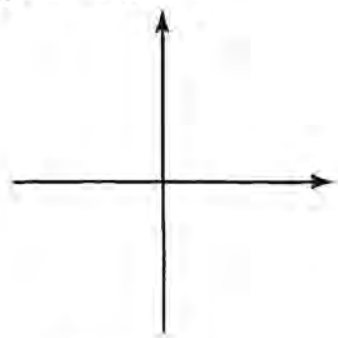
$y = 5x$



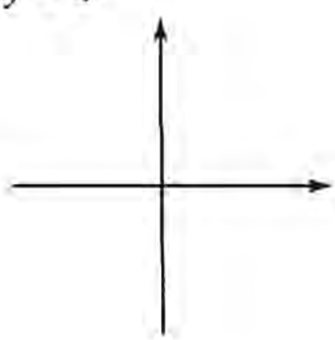
$y = x$



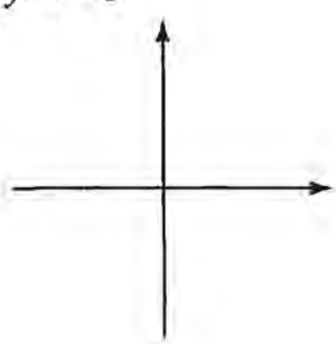
$y = -2x + 1$



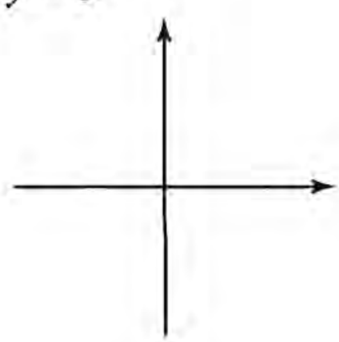
$y = 4$



$y = -3$



$y = 0$



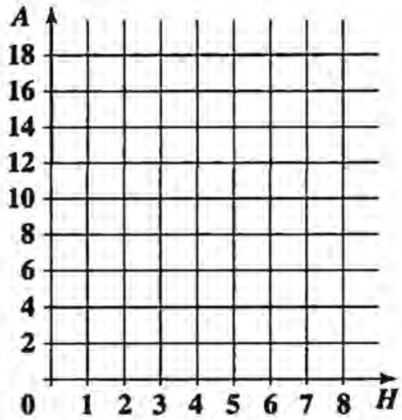
Lesson 4.8

Name

Jarring Discoveries

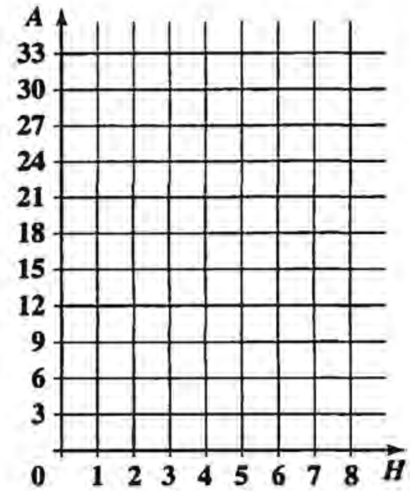
2b.

H	A
1	
2	
3	
4	
5	
6	
7	
8	



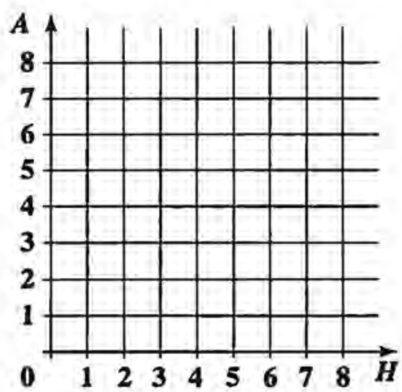
c.

H	A
1	
2	
3	
4	
5	
6	
7	
8	



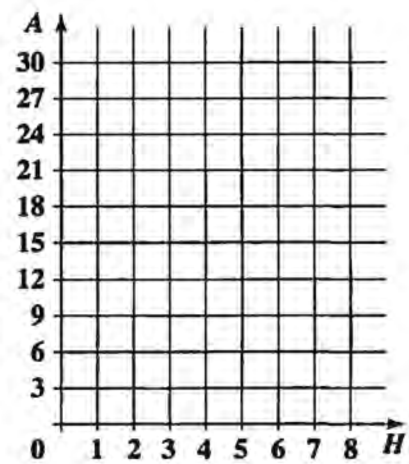
d.

H	A
1	
2	
3	
4	
5	
6	
7	
8	



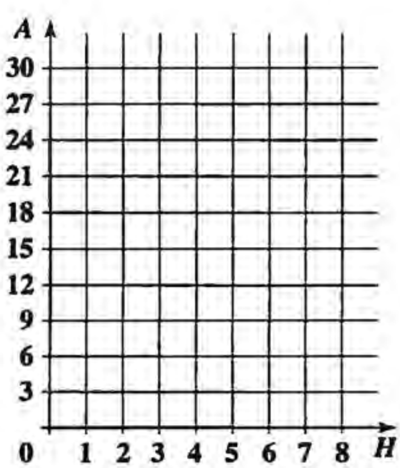
e.

H	A
1	
2	
3	
4	
5	
6	
7	
8	



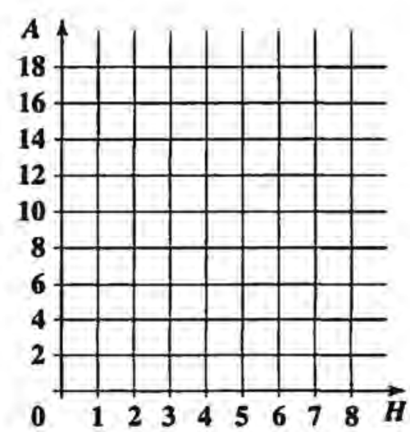
f.

H	A
1	
2	
3	
4	
5	
6	
7	
8	



g.

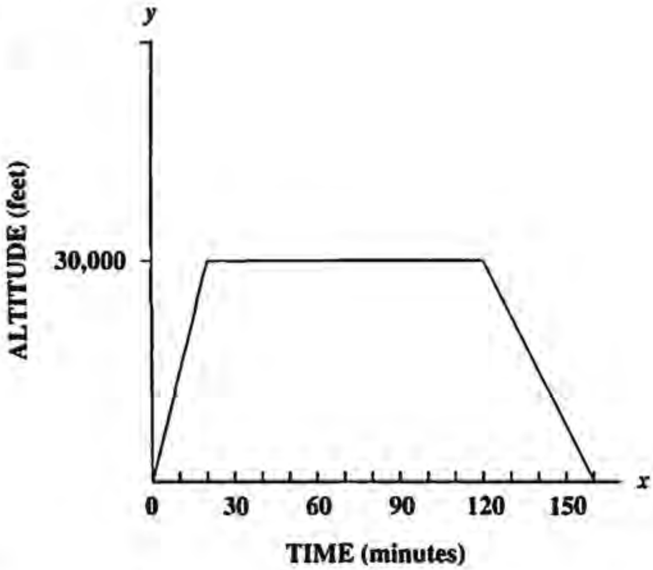
H	A
1	
2	
3	
4	
5	
6	
7	
8	



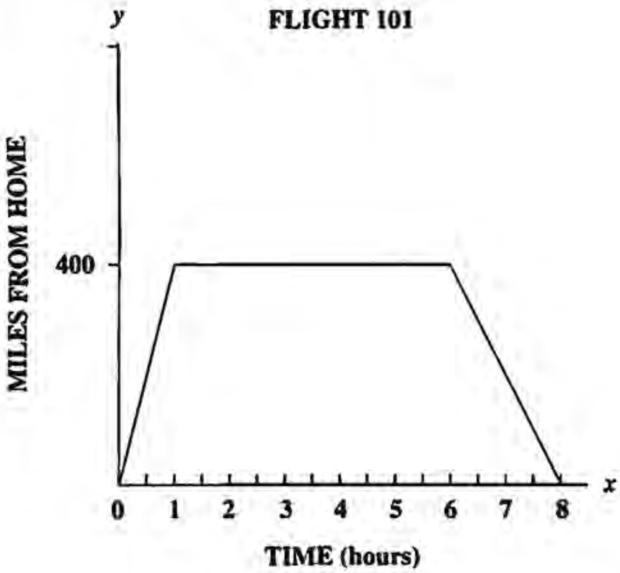
Lesson 4.10 **Name**

UP IN THE AIR

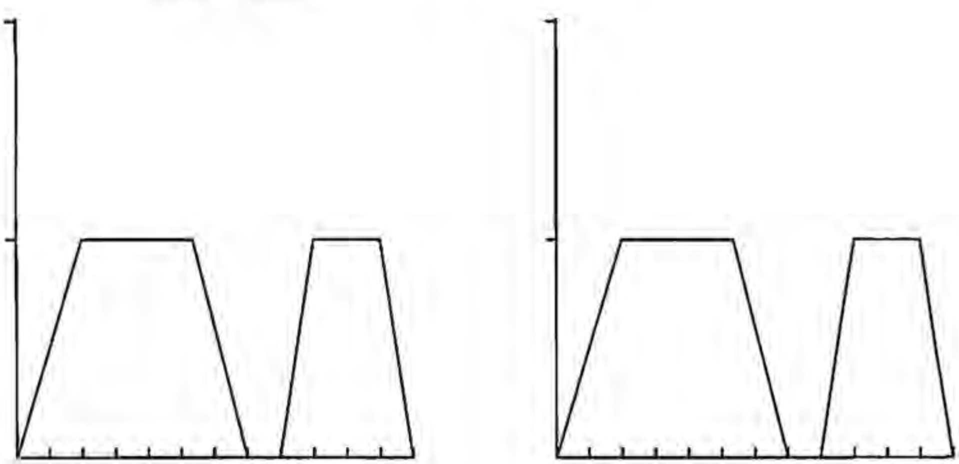
1-4.



5-8.



9-11.

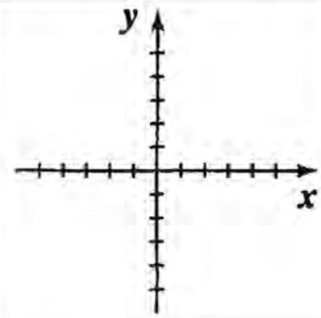
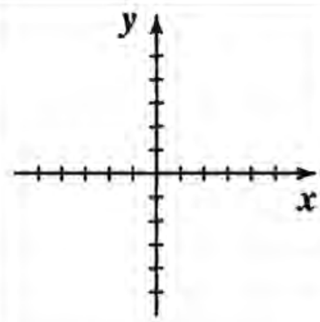
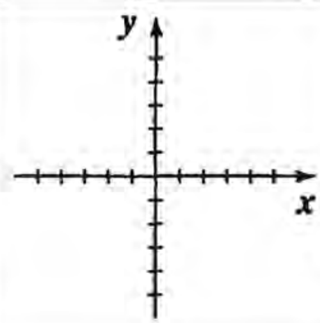
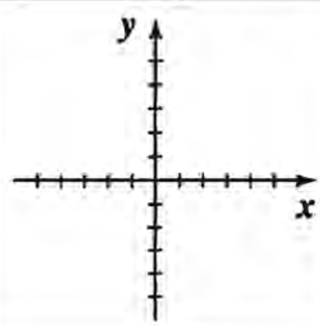


Lesson 5.5

Name

GRAPHING PARABOLAS

7-10.

Function	Factored form	x-intercept(s)	y-intercept	Vertex	Graph
$y = x^2 - 2x - 3$					
$y = x^2 + 4x + 3$					
$y = x^2 - 4x + 3$					
$y = x^2 + 2x - 3$					

Lesson 7.2

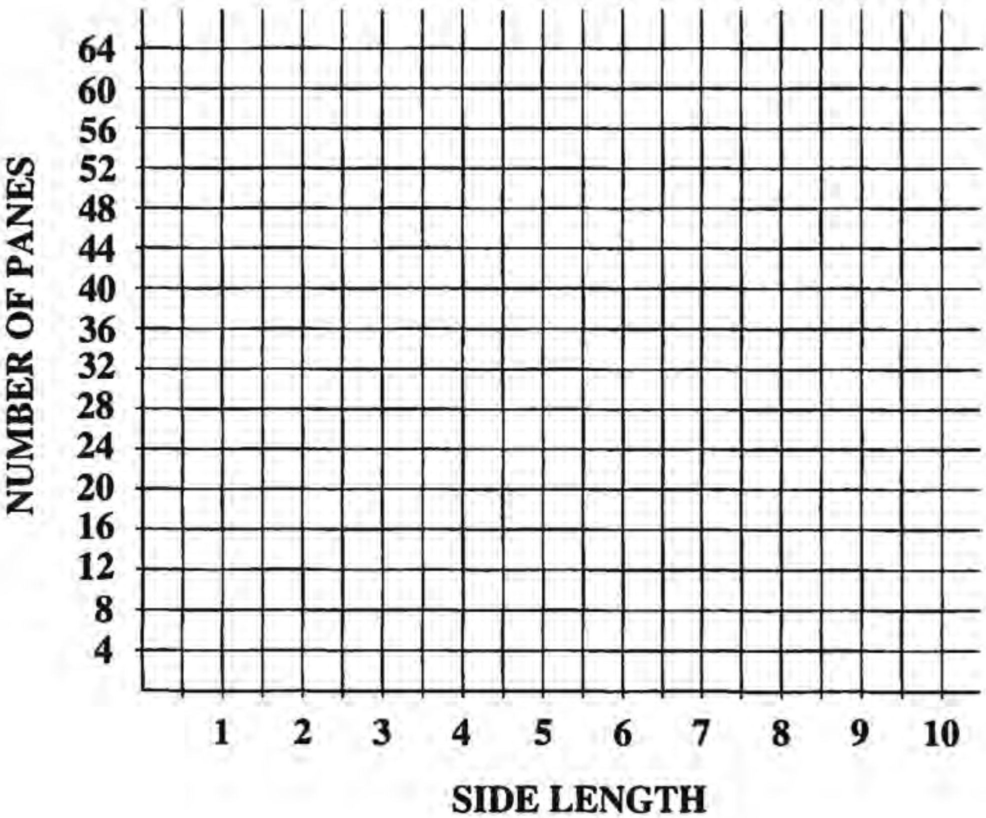
Name ______________________

SQUARE WINDOWS

3.

Window Dimensions	Number of Corner Panes	Number of Edge Panes	Number of Inside Panes	Total Number of Panes
2 by 2				
3 by 3	4	4	1	9
4 by 4				
5 by 5				
6 by 6				
7 by 7				
8 by 8				
9 by 9				
10 by 10				

5.



Lesson 7.3 Name

Squares of Sums

2-7. a. Use the Algebra Lab Gear to build a square using the blocks specified.
b. Write the dimensions of the square and the area of the square.
c. If it is impossible to build a square, explain in the comments column.
d. If it is possible to build more than one square, indicate the dimensions of other squares that you could build in the comments column.

Blocks to build the square with	Dimensions of square	Area of square	Comments (Impossible? More squares?)
10 x-blocks and any other blocks that you want (except more x-blocks)			
16 one-blocks and any other blocks that you want (except more yellow blocks)			
8 xy-blocks and any other blocks that you want (except more xy-blocks)			
3 x^2-blocks and any other blocks that you want (except more x^2-blocks)			
15 one-blocks and any other blocks that you want (except more yellow blocks)			
4 x^2-blocks and any other blocks that you want (except more x^2-blocks)			

Lesson 9.11

Name

Let's Eat!: Pizza Prices

Pinky's Prices

Size	Diameter	Price
Small	8″	$4.25
Medium	12″	$8.50
Large	14″	$10.20

Primo's Prices

Size	Diameter	Price
Small	10″	$6.44
Medium	12″	$8.84
Large	14″	$9.91

Pinky's

Diameter (inches)	Area (square inches)	Price	Price per square inch
8	16π	$4.25	
12		$8.50	
14		$10.20	

Primo's

Diameter (inches)	Area (square inches)	Price	Price per square inch
10			
12			
14			

Lesson 10.2

Name

HOW MUCH OF EACH KIND?

2, 6.

Nickels		Quarters		Total Coins	
no.	value	no.	value	no.	value
45	225	11	275	56	500
x	$5x$	y	$25y$		

11.

Apple juice		Cranberry-apple		Mixture	
apple	cran	apple	cran	apple	cran
15	0	2.5	2.5	17.5	2.5
8	0	6	6	14	6
6	0				
		8			
			9.5		
x		$0.50y$		$x + 0.50y$	

Lesson 11.5

Name

DICE GAMES

2. All possible two-dice sums.

Sum	2	3	4	5	6	7	8	9	10	11	12
Possible ways	(1, 1)					(1, 6) (2, 5) (3, 4) (4, 3) (5, 2) (6, 1)					
# of ways	1					6					

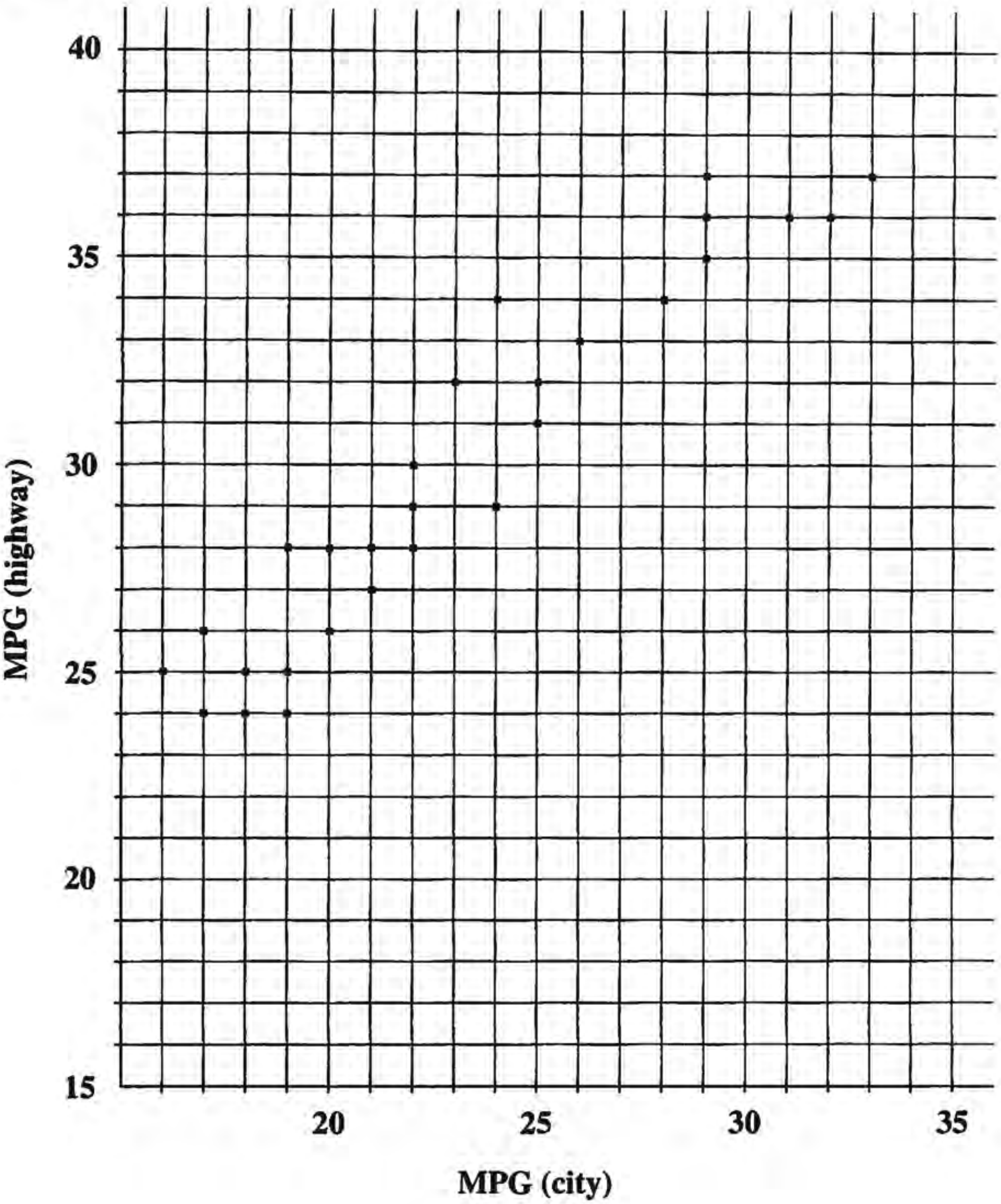
11. Possible outcomes in the two-dice experiment.

BLUE DIE

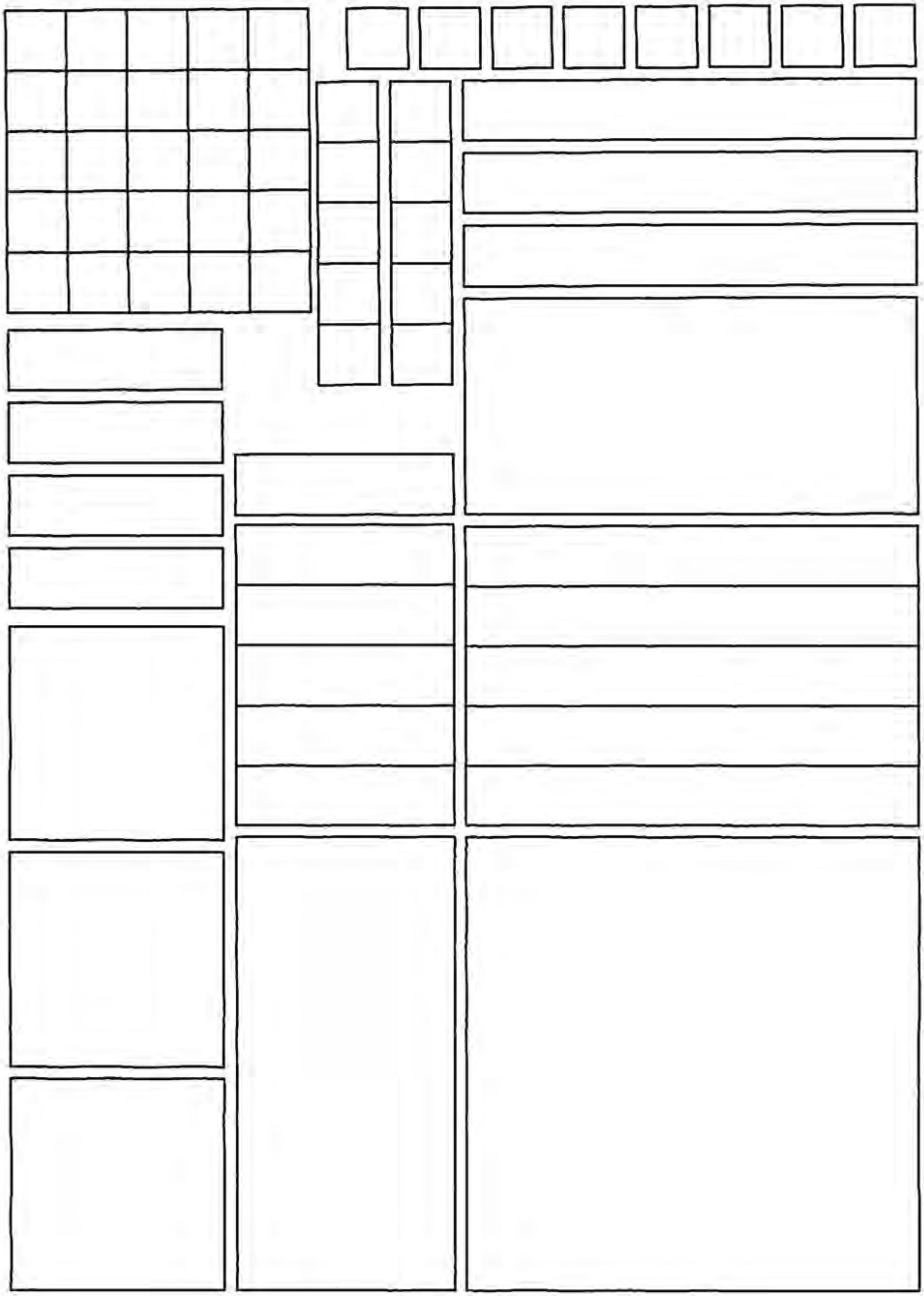
RED DIE		1	2	3	4	5	6
	1	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
	2	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
	3						
	4						
	5						
	6						

 Name

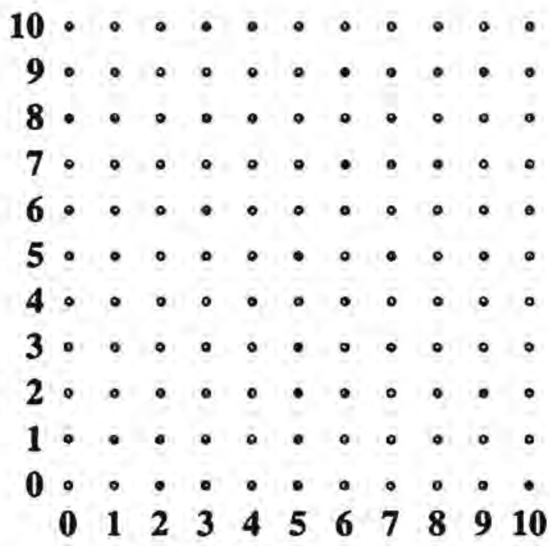
THE MEDIAN-MEDIAN LINE

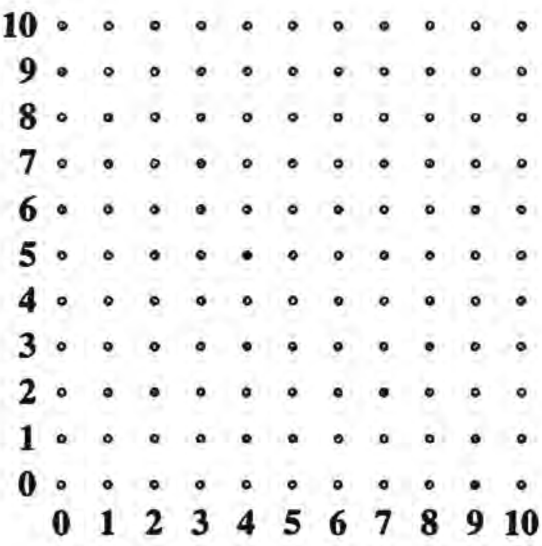


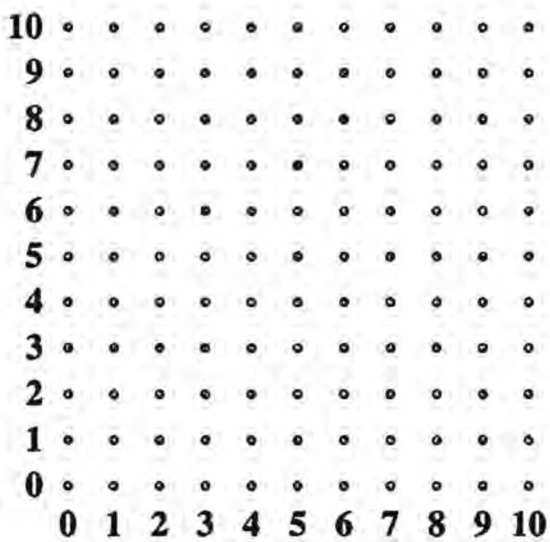
Paper HomeWork Gear

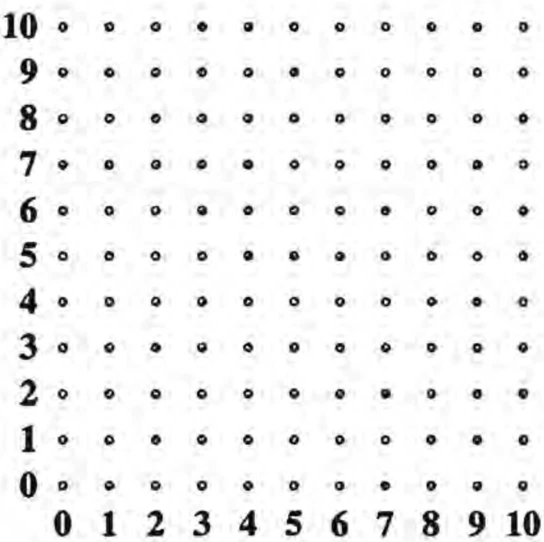


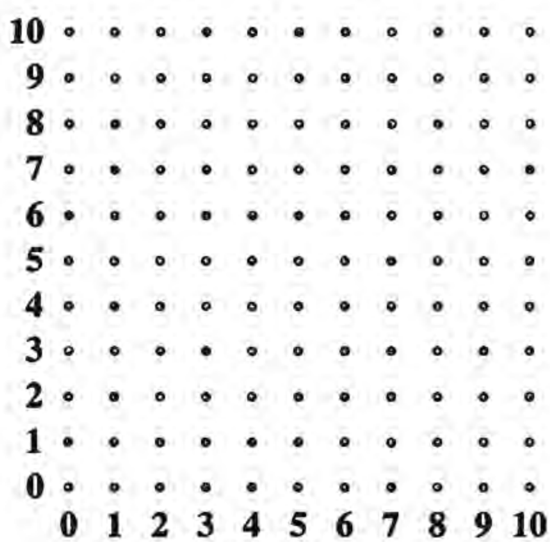
Geoboard Dot Paper

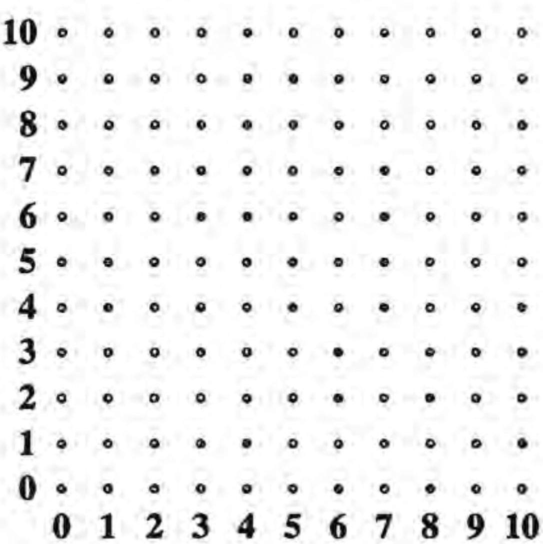




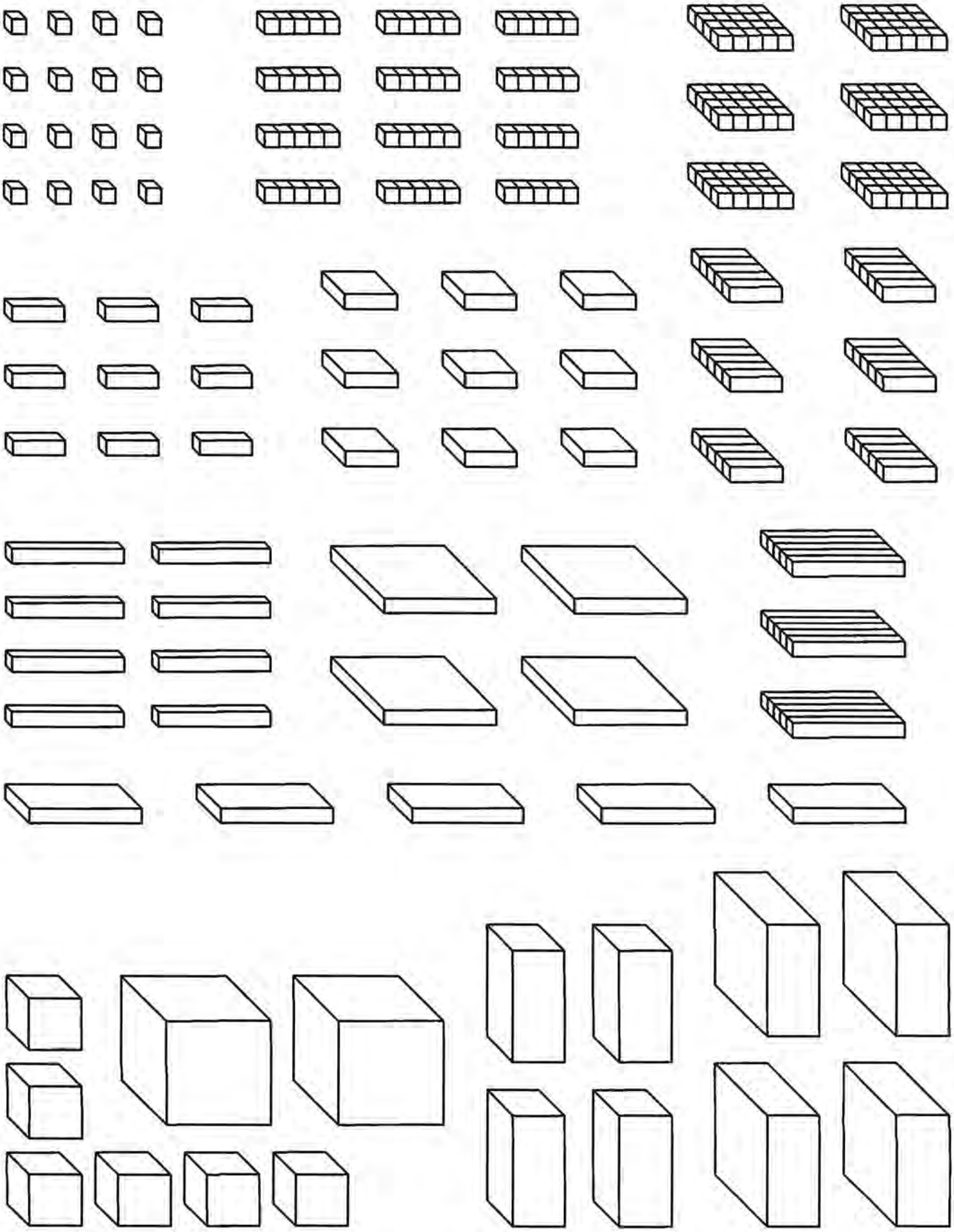




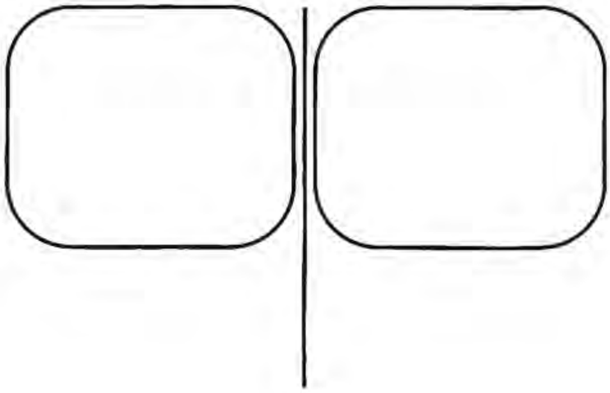


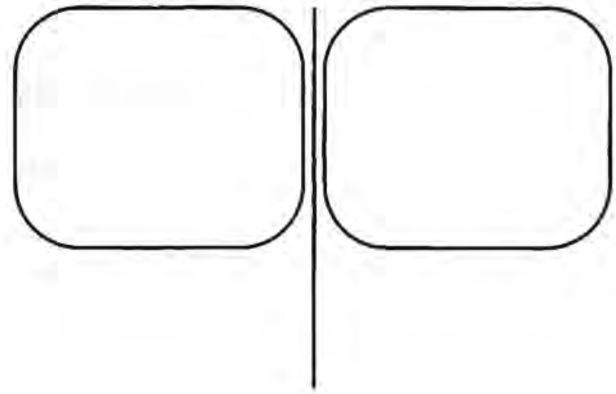


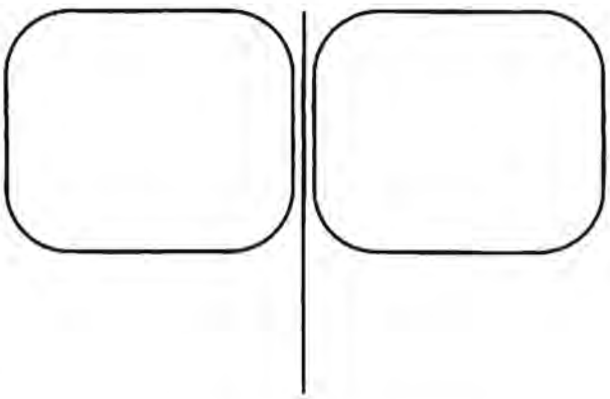
Algebra Lab Gear Clip Art: Blocks in 3-D View

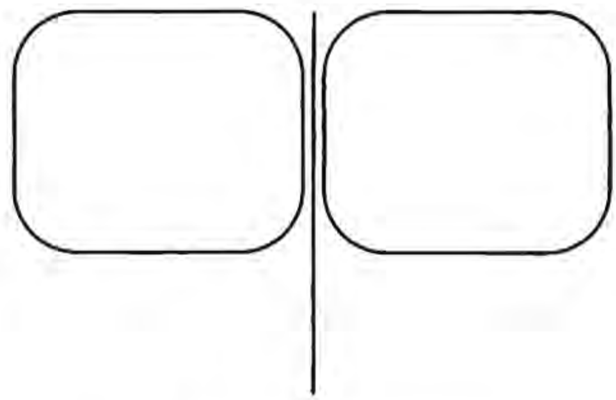


Algebra Lab Gear Clip Art: Workmats and Corner Pieces









Algebra Lab Gear Workmat