Chapter 1

1.1 Exercises

1. Answers may vary. For example: You will be successful; your income will increase with education; you will pay back the loan.

2. Answers may vary. For example: Your instructor assumes you have access to a computer and internet.

3. Answers may vary. For example: Your instructor assumes you will read the section before class.

4. Answers may vary. For example: Assume your teacher knows your last name and in which class you are enrolled.

5. Answers may vary. For example: Activities outside of school, attitude, motivation, family commitments and home life, work commitments, etc…

6. Answers may vary. For example: Attendance policy, homework policy, study habits, etc…

7. Answers may vary. For example: Amount of time spent on study time, strength of mathematical background, communication skills, etc…

8. Answers may vary. For example: Amount of time available to spend, course interest, dedication level, know and recall prior course content, motivation level, etc…

9. kinesthetic, verbal, visual

10. Look for patterns in relationships, discover concepts for yourself, seek out applications, work out examples and explorations on your own before looking at solutions.

11. Explaining to another person.

12. You don't have enough time to do everything you would like to do.

13. **a.** 50 **b.** 36 **c.** 65 **d.** 70

14. no

15. Study review material within text, work with other students, refer to your last textbook, get advice from your instructor, seek help from resource centers, labs or online reviews.

1.2 Exercises

1. **a.** \$2016 **b.** 10

2.

Credit Hours	Tuition Cost
14	$14 \cdot (\$67) = \$938$
15	$15 \cdot (\$67) = \$1005$
16	$16 \cdot (\$67) = \$1072$
17	$17 \cdot (\$67) = \$1139$
18	$18 \cdot (\$67) = \$1206$
19	\$1500
20	\$1500

3.

Credit Hours	Tuition Cost
2	$2 \cdot (\$75) = \$150$
4	$4 \cdot (\$75) = \$300$
6	$6 \cdot (\$75) = \$450$
8	$8 \cdot (\$75) = \$600$
10	$10 \cdot (\$75) = \$750$
12	\$900
14	\$900
16	\$900
18	\$900
20	$\$900 + (20-18) \cdot \$40 = \$980$

4. **a.** $(1364-20) \div 168 = 1344 \div 168$
= 8 credit hours

b. $(1878-30) \div 168 = 1848 \div 168$
= 11 credit hours

5. 4 panels are required for each pen: $4 \cdot 20 = 80$.

6. 3 panels are required for each pen: $3 \cdot 20 = 60$.

7. Dean is assuming that the animals may be tied to the panels; 3 panels for the 1st pen, 2 additional panels for each pen after that: $3 + 2 \cdot 19 = 41$.

8. 2 panels are required for each pen: $2 \cdot 20 = 40$

9. **a.** \$20 **b.** \$35 **c.** \$45 **d.** \$80

10. **a.** \$35 **b.** \$60 **c.** \$85 **d.** \$125

11. Answers may vary. For example: The number 4 is a member of the set of whole numbers. Ben has a swing set.

12. Answers may vary. For example: The number 2.3 is a real number. I like real whip cream.

13. Answers may vary. For example: $\frac{2}{3}$ is a rational number. I make rational decisions.

14. Answers may vary. For example: In exercise 1.2.3, 2 credit hours is the input value for tuition of \$150. I gave input on that decision.

15. Answers may vary. For example: 4 is a whole number. I ate a whole apple.

16. Answers may vary. For example: A negative value is less than zero. Negative people are hard to be around.

17. a. Natural numbers

b. Negative real numbers

c. Rational numbers

d. Integers

18. a. 0 **b.** $\frac{2}{3}$ **c.** -2 or 0

19. positive

20. Any negative proper fraction or a terminating or repeating decimal number.

21. a. $0.30 = \frac{3}{10}$

b. $0.05 = \frac{5}{100} = \frac{1}{20}$

c. $0.125 = \frac{125}{1000} = \frac{1}{8}$

d. $0.02 = \frac{2}{100} = \frac{1}{50}$

22. a. $0.40 = \frac{40}{100} = \frac{20 \cdot 2}{20 \cdot 5} = \frac{2}{5}$

b. $0.08 = \frac{8}{100} = \frac{4 \cdot 2}{4 \cdot 25} = \frac{2}{25}$

c. $0.625 = \frac{625}{1000} = \frac{125 \cdot 5}{125 \cdot 8} = \frac{5}{8}$

d. $0.56 = \frac{56}{100} = \frac{4 \cdot 14}{4 \cdot 25} = \frac{14}{25}$

23. a. $\frac{7}{16} = 0.4375$

b. $\frac{4}{5} = 0.8$

c. $\frac{18}{25} = 0.72$

d. $\frac{9}{20} = 0.45$

24. a. $\frac{3}{4} = 0.75$

b. $\frac{1}{5} = 0.20$

c. $\frac{5}{8} = 0.625$

d. $\frac{7}{25} = 0.28$

25. a. $\frac{16}{9} = \frac{9}{9} + \frac{7}{9} = 1 + \frac{7}{9} = 1\frac{7}{9}$

b. $\frac{27}{8} = \frac{24}{8} + \frac{3}{8} = 3 + \frac{3}{8} = 3\frac{3}{8}$

c. $\frac{20}{7} = \frac{14}{7} + \frac{6}{7} = 2 + \frac{6}{7} = 2\frac{6}{7}$

d. $\frac{16}{6} = \frac{12}{6} + \frac{4}{6} = 2 + \frac{2}{3} = 2\frac{2}{3}$

26. a. $\frac{25}{8} = \frac{24}{8} + \frac{1}{8} = 3 + \frac{1}{8} = 3\frac{1}{8}$

b. $\frac{31}{7} = \frac{28}{7} + \frac{3}{7} = 4 + \frac{3}{7} = 4\frac{3}{7}$

c. $\frac{9}{6} = \frac{6}{6} + \frac{3}{6} = 1 + \frac{1}{2} = 1\frac{1}{2}$

d. $\frac{22}{10} = \frac{20}{10} + \frac{2}{10} = 2 + \frac{1}{5} = 2\frac{1}{5}$

27. a. $1\frac{4}{5} = \frac{5}{5} + \frac{4}{5} = \frac{9}{5}$

b. $2\frac{1}{3} = \frac{6}{3} + \frac{1}{3} = \frac{7}{3}$

c. $4\frac{3}{4} = \frac{16}{4} + \frac{3}{4} = \frac{19}{4}$

d. $3\frac{1}{2} = \frac{6}{2} + \frac{1}{2} = \frac{7}{2}$

28. a. $3\frac{5}{6} = \frac{18}{6} + \frac{5}{6} = \frac{23}{6}$

b. $2\frac{3}{8} = \frac{16}{8} + \frac{3}{8} = \frac{19}{8}$

c. $2\frac{5}{9} = \frac{18}{9} + \frac{5}{9} = \frac{23}{9}$

d. $3\frac{2}{3} = \frac{9}{3} + \frac{2}{3} = \frac{11}{3}$

29. a. $\frac{25}{35} = \frac{5 \cdot 5}{5 \cdot 7} = \frac{\cancel{5} \cdot 5}{\cancel{5} \cdot 7} = \frac{5}{7}$

b. $\frac{25}{32}$ is already in lowest terms. There are no common factors that can be divided out.

c. $\frac{42}{63} = \frac{21 \cdot 2}{21 \cdot 3} = \frac{\cancel{21} \cdot 2}{\cancel{21} \cdot 3} = \frac{2}{3}$

d. $\frac{27}{36} = \frac{9 \cdot 3}{9 \cdot 4} = \frac{\cancel{9} \cdot 3}{\cancel{9} \cdot 4} = \frac{3}{4}$

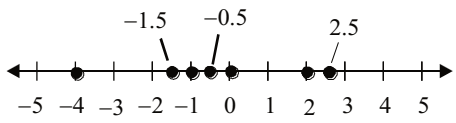
30. a. $\frac{16}{28} = \frac{4 \cdot 4}{4 \cdot 7} = \frac{\cancel{4} \cdot 4}{\cancel{4} \cdot 7} = \frac{4}{7}$

b. $\frac{36}{45} = \frac{9 \cdot 4}{9 \cdot 5} = \frac{\cancel{9} \cdot 4}{\cancel{9} \cdot 5} = \frac{4}{5}$

c. $\frac{30}{54} = \frac{6 \cdot 5}{6 \cdot 9} = \frac{\cancel{6} \cdot 5}{\cancel{6} \cdot 9} = \frac{5}{9}$

d. $\frac{9}{25}$ is already in lowest terms. There are no common factors that can be divided out.

31.



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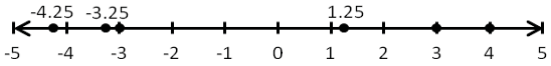

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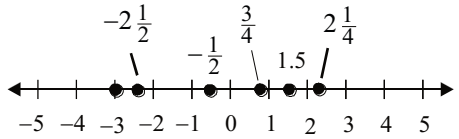

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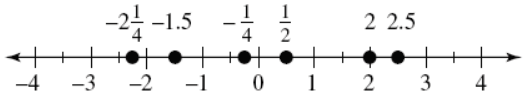

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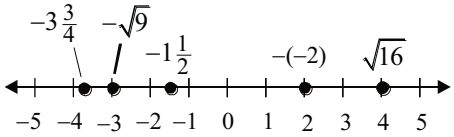

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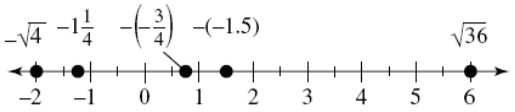

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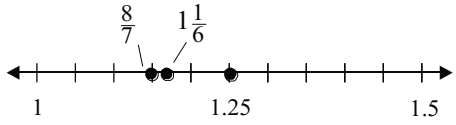

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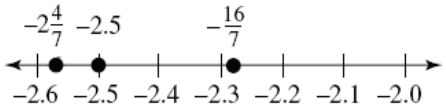


39. addition: $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

subtraction: $\frac{1}{2} - \frac{1}{3} = \frac{3}{6} - \frac{2}{6} = \frac{1}{6}$

multiplication: $\frac{1}{2} \cdot \frac{1}{3} = \frac{1}{6}$

division: $\frac{1}{2} \div \frac{1}{3} = \frac{1}{2} \cdot \frac{3}{1} = \frac{3}{2}$

40. addition: $\frac{3}{4} + \frac{1}{3} = \frac{9}{12} + \frac{4}{12} = \frac{13}{12}$

subtraction: $\frac{3}{4} - \frac{1}{3} = \frac{9}{12} - \frac{4}{12} = \frac{5}{12}$

multiplication: $\frac{3}{4} \cdot \frac{1}{3} = \frac{3}{12} = \frac{1}{4}$

division: $\frac{3}{4} \div \frac{1}{3} = \frac{3}{4} \cdot \frac{3}{1} = \frac{9}{4}$

41. addition: $\frac{3}{5}+\frac{1}{3}=\frac{9}{15}+\frac{5}{15}=\frac{14}{15}$

subtraction: $\frac{3}{5}-\frac{1}{3}=\frac{9}{15}-\frac{5}{15}=\frac{4}{15}$

multiplication: $\frac{3}{5}\cdot\frac{1}{3}=\frac{3}{15}=\frac{1}{5}$

division: $\frac{3}{5}\div\frac{1}{3}=\frac{3}{5}\cdot\frac{3}{1}=\frac{9}{5}$

42. addition: $\frac{1}{2}+\frac{2}{5}=\frac{5}{10}+\frac{4}{10}=\frac{9}{10}$

subtraction: $\frac{1}{2}-\frac{2}{5}=\frac{5}{10}-\frac{4}{10}=\frac{1}{10}$

multiplication: $\frac{1}{2}\cdot\frac{2}{5}=\frac{2}{10}=\frac{1}{5}$

division: $\frac{1}{2}\div\frac{2}{5}=\frac{1}{2}\cdot\frac{5}{2}=\frac{5}{4}$

43. addition: $1\frac{1}{3}+\frac{5}{6}=\frac{4}{3}+\frac{5}{6}=\frac{13}{6}=2\frac{1}{6}$

subtraction: $1\frac{1}{3}-\frac{5}{6}=\frac{4}{3}-\frac{5}{6}=\frac{8}{6}-\frac{5}{6}=\frac{3}{6}=\frac{1}{2}$

multiplication: $1\frac{1}{3}\cdot\frac{5}{6}=\frac{4}{3}\cdot\frac{5}{6}=\frac{20}{18}=\frac{10}{9}=1\frac{1}{9}$

division: $1\frac{1}{3}\div\frac{5}{6}=\frac{4}{3}\div\frac{5}{6}=\frac{4}{3}\cdot\frac{6}{5}=\frac{24}{15}=\frac{8}{5}=1\frac{3}{5}$

44. addition: $1\frac{1}{4}+\frac{3}{8}=\frac{5}{4}+\frac{3}{8}=\frac{13}{8}=1\frac{5}{8}$

subtraction: $1\frac{1}{4}-\frac{3}{8}=\frac{5}{4}-\frac{3}{8}=\frac{10}{8}-\frac{3}{8}=\frac{7}{8}$

multiplication: $1\frac{1}{4}\cdot\frac{3}{8}=\frac{5}{4}\cdot\frac{3}{8}=\frac{15}{32}$

division: $1\frac{1}{4}\div\frac{3}{8}=\frac{5}{4}\div\frac{3}{8}=\frac{5}{4}\cdot\frac{8}{3}=\frac{40}{12}=\frac{10}{3}=3\frac{1}{3}$

45. addition: $3\frac{1}{5}+2\frac{1}{2}=\frac{16}{5}+\frac{5}{2}=\frac{32}{10}+\frac{25}{10}=\frac{57}{10}=5\frac{7}{10}$

subtraction: $3\frac{1}{5}-2\frac{1}{2}=\frac{16}{5}-\frac{5}{2}=\frac{32}{10}-\frac{25}{10}=\frac{7}{10}$

multiplication: $3\frac{1}{5}\cdot 2\frac{1}{2}=\frac{16}{5}\cdot\frac{5}{2}=\frac{80}{10}=8$

division: $3\frac{1}{5}\div 2\frac{1}{2}=\frac{16}{5}\div\frac{5}{2}=\frac{16}{5}\cdot\frac{2}{5}=\frac{32}{25}=1\frac{7}{25}$

46. addition: $2\frac{2}{3}+1\frac{5}{8}=\frac{8}{3}+\frac{13}{8}=\frac{64}{24}+\frac{39}{24}=\frac{103}{24}=4\frac{7}{24}$

subtraction: $2\frac{2}{3}-1\frac{5}{8}=\frac{8}{3}-\frac{13}{8}=\frac{64}{24}-\frac{39}{24}=\frac{25}{24}=1\frac{1}{24}$

multiplication: $2\frac{2}{3}\cdot 1\frac{5}{8}=\frac{8}{3}\cdot\frac{13}{8}=\frac{104}{24}=\frac{13}{3}=4\frac{1}{3}$

division: $2\frac{2}{3}\div 1\frac{5}{8}=\frac{8}{3}\div\frac{13}{8}=\frac{8}{3}\cdot\frac{8}{13}=\frac{64}{39}=1\frac{25}{39}$

47. Written response.
The fraction bar implies division, so we divide 5 by 8. In decimal notation we compare numbers by place values. In fractions we would need to change to common denominators.

48. Written response.
Change the fraction to an improper fraction, $\frac{28}{25}$, and then divide the 28 by 25. Or, divide the 3 by 25 and add 1 to the resulting decimal. Both give 1.12 as the result.

49. Written response.
Neither $\frac{21}{12}$ nor $\frac{28}{16}$ are in lowest terms.

$1\frac{3}{4}=\frac{4}{4}+\frac{3}{4}=\frac{7}{4}$

$\frac{7}{4}$ is in lowest terms.

$\frac{14}{8}=1\frac{3}{4}$ as does $\frac{35}{20}$.

Because $1\frac{3}{4}=\frac{7}{4}$, multiply the numerator and denominator by 50 to obtain $\frac{350}{200}$.

50. All describe 61 panels. All are correct.

51. All describe 41 panels. All are correct.

52. a. Initial guesses may vary.
$3+9=12$ and $3\cdot 9=27$
The numbers are 3 and 9.

b. Initial guesses may vary.
$3+7=10$ and $3\cdot 7=21$
The numbers are 3 and 7.

53. a. Initial guesses may vary.
$4\cdot 9=36$ and $4+9=13$
The numbers are 4 and 9.

b. Initial guesses may vary.
$4\cdot 6=24$ and $4+6=10$
The numbers are 4 and 6.

54. a. $10 \div 2\frac{1}{4} = \frac{10}{1} \div \frac{9}{4} = \frac{10}{1} \cdot \frac{4}{9} = \frac{40}{9} = 4\frac{4}{9}$

The theater can show 4 complete shows. The remaining time, "$\frac{4}{9}$" of a show, can be used for advertising. Since each show lasts $2\frac{1}{4}$ hours, we get $2\frac{1}{4} \cdot \frac{4}{9} = \frac{9}{4} \cdot \frac{4}{9} = 1$

The theater for advertising. has 1 hour, or 15 minutes per show, available for advertising.

b. $12 \div 1\frac{3}{4} = \frac{12}{1} \div \frac{7}{4} = \frac{12}{1} \cdot \frac{4}{7} = \frac{48}{7} = 6\frac{6}{7}$

The theater can show 6 complete shows. To add another show, the theater needs to hire workers for an additional "$\frac{1}{7}$" of a show. Since each show is $1\frac{3}{4}$ hours, we get $1\frac{3}{4} \cdot \frac{1}{7} = \frac{7}{4} \cdot \frac{1}{7} = \frac{7}{28} = \frac{1}{4}$.

The theater needs to hire workers for an additional 15 minutes (1/4 hour).

1.3 Exercises

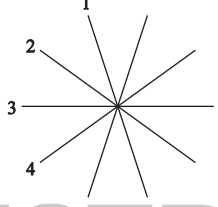
1. The output is 5 times the input, that is $y = 5x$.
When the input is 100, the output is $y = 5(100) = 500$.

2. The output is 7 times the input, that is $y = 7x$.
When the input is 100, the output is $y = 7(100) = 700$.

3. The output is two less than the input, that is $y = x - 2$.
When the input is 100, the output is $y = 100 - 2 = 98$.

4. The output is three less than the input, that is $y = x - 3$.
When the input is 100, the output is $y = 100 - 3 = 97$.

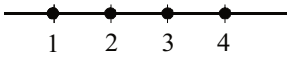
5.



Lines	Regions
1	2
2	4
3	6
4	8
5	10
10	20

Each line adds 2 more regions.

6.



Dots	Line Segments
1	2
2	3
3	4
4	5
10	11

Each dot adds one more segment.

7. The number of panels is 4 times the number of pens: $4 \cdot 10 = 40$

8. The number of panels is 3 times the number of pens: $3 \cdot 10 = 30$

9. $\frac{3}{4} \cdot \frac{1}{2} = \frac{3 \cdot 1}{4 \cdot 2} = \frac{3}{8} = 0.375$

10. $5 \div \frac{1}{2} = 5 \cdot \frac{2}{1} = 10$

11. $\frac{1}{3} + \frac{1}{2} = \frac{2}{6} + \frac{3}{6} = \frac{5}{6} \approx 0.833$

12. $\frac{3}{4} - \frac{1}{3} = \frac{9}{12} - \frac{4}{12} = \frac{5}{12} \approx 0.417$

13. $5 \div \frac{2}{15} = \frac{5}{1} \cdot \frac{15}{2} = \frac{75}{2} = 37\frac{1}{2} = 37.5$

14. $0.25 + \frac{3}{4} = 0.25 + 0.75 = 1$

15. $\frac{3}{5} \cdot \frac{4}{9} = \frac{3 \cdot 4}{5 \cdot 9} = \frac{12}{45} = \frac{4}{15} \approx 0.267$

16. $\frac{7}{5}-\frac{3}{4}=\frac{28}{20}-\frac{15}{20}=\frac{13}{20}=0.65$

17. $2\frac{2}{3}-1\frac{1}{4}=\frac{8}{3}-\frac{5}{4}=\frac{32}{12}-\frac{15}{12}=\frac{17}{12}$

$=1\frac{5}{12}\approx 1.417$

18. $2\frac{2}{3}\cdot 1\frac{1}{4}=\frac{8}{3}\cdot\frac{5}{4}=\frac{2\cdot 4\cdot 5}{3\cdot 4}=\frac{10}{3}=3\frac{1}{3}\approx 3.333$

19. $2\frac{2}{3}\div 1\frac{1}{4}=\frac{8}{3}\div\frac{5}{4}=\frac{8}{3}\cdot\frac{4}{5}=\frac{32}{15}=2\frac{2}{15}\approx 2.133$

20. $2\frac{2}{3}+1\frac{1}{4}=\frac{8}{3}+\frac{5}{4}=\frac{32}{12}+\frac{15}{12}=\frac{47}{12}=3\frac{11}{12}\approx 3.917$

21. $\frac{4}{5}-\frac{1}{3}=\frac{12}{15}-\frac{5}{15}=\frac{7}{15}\approx 0.467$

22. $\frac{5}{6}\cdot\frac{3}{4}=\frac{5\cdot 3}{6\cdot 4}=\frac{15}{24}=\frac{5}{8}=0.625$

23. $1\frac{1}{2}+2\frac{1}{4}=\frac{3}{2}+\frac{9}{4}=\frac{6}{4}+\frac{9}{4}=\frac{15}{4}=3\frac{3}{4}=3.75$

24. $1\frac{1}{2}\div 2\frac{1}{4}=\frac{3}{2}\div\frac{9}{4}=\frac{3}{2}\cdot\frac{4}{9}=\frac{12}{18}=\frac{2}{3}\approx 0.667$

25. $1\frac{1}{2}+2\frac{1}{2}=\frac{3}{2}+\frac{5}{2}=\frac{8}{2}=4$

26. $1\frac{1}{4}\cdot 8=\frac{5}{4}\cdot\frac{8}{1}=\frac{40}{4}=10$

27. $1\frac{1}{4}-\frac{3}{8}=\frac{5}{4}-\frac{3}{8}=\frac{10}{8}-\frac{3}{8}=\frac{7}{8}=0.875$

28. $1\frac{1}{2}\div 2\frac{1}{2}=\frac{3}{2}\div\frac{5}{2}=\frac{3}{2}\cdot\frac{2}{5}=\frac{3}{5}=0.6$

29. a. $2\pi r$; 2 and π are both constants and numerical coefficients, r is a variable.

b. $1.5x$; 1.5 is a constant and a numerical coefficient, and x is a variable.

c. $-4n+3$; -4 is a constant and a numerical coefficient, 3 is a constant, and n is a variable.

d. x^2-9; The implied 1 (before the x^2) is a constant and numerical coefficient, -9 is a constant, and x is a variable.

30. a. πd; π is both a constant and numerical coefficient, d is a variable.

b. $\frac{x}{2}$; $\frac{1}{2}$ is a constant and a numerical coefficient, and x is a variable.

c. x^2-4; the implied 1 (before the x^2) is a constant and numerical coefficient, -4 is a constant, and x is a variable.

d. $-2n-1$; -2 is a constant and numerical coefficient, -1 is a constant, and n is a variable.

31. Answers may vary. For example: An expression does not contain an equal sign. "Life is good" is an expression.

32. Answers may vary. For example: In the expression: x + 23, 23 is a constant. I have a constant sense of peace.

33. Answers may vary. For example: In the expression: x + 23, x is a variable. The weather is variable today.

34. Answers may vary. For example: An arithmetic sequence has a pattern. There is a pattern on a checkerboard.

35. a. $3\cdot n$ or $3n$

b. $8\div n$ or $\frac{8}{n}$

c. $n-4$

d. $n\div 5$ or $\frac{n}{5}$

e. $15\cdot \$n=\$15n$ or 15n

36. a. $4-n$

b. $n\div 8$ or $\frac{n}{8}$

c. $n\cdot 3$ or $3n$

d. $3+n$

e. $\$89\cdot n=\$89n$

37. a. $3+2\cdot n=3+2n$

b. $4-3\cdot n=4-3n$

c. $7\cdot n+4=7n+4$

d. $n\cdot n=n^2$

e. $n\cdot \$0.79=\$0.79n$

38. a. $(n\div 3)-2$ or $\frac{n}{3}-2$

b. $3\cdot n-2=3n-2$

c. $2\cdot n+2=2n+2$

d. $7\cdot\frac{n}{2}=\frac{7n}{2}$

e. 2.5n where n is dollars per yard

39. a. $\frac{4}{n}=10$

b. $3.1=n+2$

c. $6n=2.4$

d. $15=18.5-n$

40. a. $4n=28$

b. $\frac{n}{4}=8$

c. $6+n=14$

d. $n-5=12.5$

41. a. $8=\frac{8}{1}$

b. Let p = profit, s = sales price, c = cost; $p=s-c$

c. Let P = perimeter, L = length; $P=4L$

d. Let c = cost, p = price, t = amount of tax; $c=p+t$

42. a. Let L = length, W = width, A = area; $LW=A$

b. Let c = change, e = ending time, b = beginning time; $c=e-b$

c. Let L = length, W = width, P = perimeter $L+W=0.5P$ or $L+W=\frac{1}{2}P$

d. Let A = average, s = number of successes, t = number of tries; $A=\frac{s}{t}$

43. Written response.
Unless we define the input set otherwise, because x is a variable, it may represent a positive or negative number, or zero.

44. Written response.
The negative sign merely tells us to "take the opposite of the value of the variable". Thus, $-x$ is a positive number if x is negative, a negative number if x is positive, and zero if x is zero.

45. a. equation

b. expression, not an equation

c. equation (identity)

d. equation ; false statement because $5-1=4$

e. expression, not an equation

f. equation

46. a. equation

b. equation

c. equation (identity)

d. expression, not an equation

e. equation ; false statement because $9-3=6$

f. equation

47. The single variable generally goes on the left.

48. Rational numbers are the set of numbers that can be written as a quotient of two integers, so long as we do not divide by zero.

49. a. subtraction

b. addition

c. division

d. division

50. a. multiplication

b. division

51. a. the hour after math class

b. calculator, six-inch ruler marked with centimeters, graph paper

c. between classes and for the hour after your last class

d. losing time and wasting gas if driving

e. Learn from your textbook under prepare for the "Next Day's Class" on page 000. For example: skim the textbook section first, read objectives, list unfamiliar words and identify new skills or concepts, read through steps in several examples, etc…

f. record, reduce, recite, reflect, review

52. a. $2+1=3$ and $3=2+1$, true

b. $4=4$, true

c. 2 and ½, true

d. 1 and 1 makes it true but 3 is not equal to $\frac{1}{3}$, sometimes true

e. $2=3-1$, $3-1=1+1$, so $2=1+1$, true

f. $2-3\neq 3-2$, false

g. $2+3=3+2$, true

h. 4 is the opposite of -4 and -4 is the opposite of 4, true

i. -2 is the opposite of 2, 2 is the opposite of -2, but -2 is NOT the opposite of -2, false

j. $\frac{6}{5}\neq\frac{5}{6}$, false

1.4 Exercises

1.

Input, n	Output, A
1	4
2	7
3	10
4	13
50	151
100	301

The output is one more than three times the input. That is, $A=3n+1$.

2.

Input, n	Output, A
1	3
2	5
3	7
4	9
50	101
100	201

The output is one more than two times the input. That is, $A=2n+1$.

3.

Input, n	Output, A
1	7
2	11
3	15
4	19
50	203
100	403

The output is three more than four times the input. That is, $A=4n+3$.

4.

Input, n	Output, A
1	3
2	6
3	9
4	12
50	150
100	300

The output is three times the input. That is, $A=3n$.

5.

Input, n	Output, P
1	10
2	12
3	14
4	16
50	108
100	208

The output is eight more than two times the input. That is, $P=2n+8$.

6.

Input, n	Output, P
1	8
2	10
3	12
4	14
50	106
100	206

The output is six more than two times the input. That is, $P = 2n + 6$.

7.

Input, n	Output, P
1	12
2	14
3	16
4	18
50	110
100	210

The output is ten more than two times the input. That is, $P = 2n + 10$.

8.

Input, n	Output, P
1	8
2	10
3	12
4	14
50	106
100	206

The output is six more than two times the input. That is, $P = 2n + 6$.

9. Rule: $D = 55t$

Input, t	Output, D
1	$55(1) = 55$
2	$55(2) = 110$
3	$55(3) = 165$
4	$55(4) = 220$
5	$55(5) = 275$
t	$55(t) = 55t$

10. Rule: $C = 0.86n$

Input, n	Output, C
1	$\$0.86(1) = \$0.86$
2	$\$0.86(2) = \$1.72$
3	$\$0.86(3) = \$2.58$
4	$\$0.86(4) = \$3.44$
5	$\$0.86(5) = \$4.30$
n	$\$0.86(n) = \$0.86n$

11. Rule: $I = \$250 + \$75n$

Input,	Output, I
1	$\$250 + \$75(1) = \$325$
2	$\$250 + \$75(2) = \$400$
3	$\$250 + \$75(3) = \$475$
4	$\$250 + \$75(4) = \$550$
5	$\$250 + \$75(5) = \$625$
n	$\$250 + \$75(n) = \$250 + \$75n$

12. Rule: $C = \$1590 + \$200d$

Input, n	Output, C
1	$\$1590 + \$200(1) = \$1790$
2	$\$1590 + \$200(2) = \$1990$
3	$\$1590 + \$200(3) = \$2190$
4	$\$1590 + \$200(4) = \$2390$
5	$\$1590 + \$200(5) = \$2590$
d	$\$1590 + \$200(d) = \$1590 + \$200d$

13. Let $x = \text{input}$; $\text{ouput} = 4x + 2$

Input	Output
1	$4(1) + 2 = 6$
2	$4(2) + 2 = 10$
3	$4(3) + 2 = 14$
4	$4(4) + 2 = 18$
5	$4(5) + 2 = 22$

14. Let $x = \text{input}$; ouput $= x^2 + 1$

Input	Output
1	$(1)^2 + 1 = 2$
2	$(2)^2 + 1 = 5$
3	$(3)^2 + 1 = 10$
4	$(4)^2 + 1 = 17$
5	$(5)^2 + 1 = 26$

15. a. The output is ten less the quotient of the input and five.

b. The area of a circle is pi times one fourth the diameter times itself.

c. The circumference of a circle is pi times twice the radius.

d. The surface area of a box is twice the product of the length and width plus twice the product of the height and length plus twice the product of the height and width.

16. a. The output is ten less than the quotient of five and the input.

b. The area of a circle is the product of pi and the diameter times itself, all divided by four.

c. The circumference of a circle is the product of pi and the length of the diameter.

d. The volume of a box is the product of the length, width, and height.

17. a. Let n be the input and S be the output.

$S = 6 \cdot n \cdot n$

$S = 6n^2$

b. Let n be the input; $n + (-n) = 0$

c. Let n be the input; $n \cdot \frac{1}{n} = 1$

d. Let r be the input and d be the output.

$d = 2 \cdot r$

$d = 2r$

18. a. Let the inputs be the base, b, and the height, h. The output is the area, A.

$A = bh$

b. $\frac{a}{b} \cdot \frac{b}{a} = 1$

c. Let n be the input number; $0 \cdot n = 0$

d. $1 \cdot n = n$

19. a. The area, A, of a triangle is the base, b, times half the height, h.

b. The area, A, of a triangle is half the base, b, times the height, h.

c. The area, A, of a triangle is half the product of the base, b, and the height, h.

d. The area, A, of a triangle is the product of the base, b, and the height, h, divided by two.

20. The variable is usually the first letter of a word. Use upper-case variables for area, circumference, surface area, and volume. Use lower-case variables for length, height, width, base, radius, and diameter.

21. a. $15\% = \frac{15}{100} = 0.15$

$15\% = \frac{15}{100} = \frac{3}{20}$

b. $0.5\% = \frac{0.5}{100} = \frac{0.5 \times 10}{100 \times 10} = \frac{5}{1000}$

$= 0.005$

$0.5\% = \frac{0.5}{100} = \frac{0.5 \times 2}{100 \times 2} = \frac{1}{200}$

c. $48\% = \frac{48}{100} = 0.48$

$48\% = \frac{48}{100} = \frac{12}{25}$

d. $250\% = \frac{250}{100} = 2.5$

$250\% = \frac{250}{100} = \frac{5}{2}$ or $2\frac{1}{2}$

22. **a.** $20\% = \frac{20}{100} = 0.2$

$20\% = \frac{20}{100} = \frac{1}{5}$

b. $45\% = \frac{45}{100} = 0.45$

$45\% = \frac{45}{100} = \frac{9}{20}$

c. $0.2\% = \frac{0.2}{100} \cdot \frac{10}{10} = \frac{2}{1000} = 0.002$

$0.2\% = \frac{0.2}{100} \cdot \frac{5}{5} = \frac{1}{500}$

d. $112\% = \frac{112}{100} = 1.12$

$112\% = \frac{112}{100} = \frac{28}{25}$ or $1\frac{3}{25}$

23. $100\% = \frac{100}{100} = 1$

$100\% = \frac{100}{100} = 1.00$

24. $1 = 1.00 = 100\%$

25. $45\% = \frac{45}{100} = \frac{9}{20}$

$45\% = \frac{45}{100} = 0.45$

26. $5\% = \frac{5}{100} = \frac{1}{20}$

$5\% = \frac{5}{100} = 0.05$

27. 0.0316, 0.0325, 0.0351, 0.0135, 0.0125, 0.0026

28. 0.0026, 0.0140, 0.0226, 0.0157, 0.0120, 0.0095

29. 0.1220, 0.1270, 0.1395, 0.0920, 0.0870, 0.0845

30. 0.0970, 0.1170, 0.1470, 0.1170, 0.0945, 0.0770

31. **a.** $0.9 = \frac{90}{100} = 90\%$

b. $\frac{2}{3} = \frac{2}{3} \cdot \frac{33\frac{1}{3}}{33\frac{1}{3}} = \frac{66\frac{2}{3}}{100} = 66\frac{2}{3}\%$

c. $0.5 = \frac{50}{100} = 50\%$

d. $4.9 = \frac{490}{100} = 490\%$

e. $6\frac{1}{4} = \frac{25}{4} = \frac{625}{100} = 625\%$

f. $9 = 9.00 = \frac{900}{100} = 900\%$

32. **a.** $0.6 = \frac{60}{100} = 60\%$

b. $\frac{1}{6} = \frac{1}{6} \cdot \frac{16\frac{2}{3}}{16\frac{2}{3}} = \frac{16\frac{2}{3}}{100} = 16\frac{2}{3}\%$

c. $0.25 = \frac{25}{100} = 25\%$

d. $0.7 = \frac{70}{100} = 70\%$

e. $2\frac{1}{2} = \frac{5}{2} = \frac{250}{100} = 250\%$

f. $6 = 6.00 = \frac{600}{100} = 600\%$

33. **a.** $1.5 = \frac{150}{100} = 150\%$

b. $\frac{3}{4} = \frac{75}{100} = 75\%$

c. $0.36 = \frac{36}{100} = 36\%$

d. $5.6 = \frac{560}{100} = 560\%$

e. $2.25 = \frac{225}{100} = 225\%$

f. $15 = 15.00 = \frac{1500}{100} = 1500\%$

34. a. $0.3 = \frac{30}{100} = 30\%$

b. $\frac{3}{5} = \frac{60}{100} = 60\%$

c. $0.06 = \frac{6}{100} = 6\%$

d. $0.8 = \frac{80}{100} = 80\%$

e. $0.15 = \frac{15}{100} = 15\%$

f. $5 = 5.00 = \frac{500}{100} = 500\%$

35. a. $35\%\text{ of } n = \frac{35}{100} \cdot n = 0.35n$

b. $10\%\text{ of } x = \frac{10}{100} \cdot x = 0.10x$

c. $87\frac{1}{2}\%\text{ of } n = \frac{87.5}{100} \cdot n = 0.875n$

d. $37\frac{1}{2}\%\text{ of } x = \frac{37.5}{100} \cdot x = 0.375x$

e. $\frac{1}{2}\%\text{ of } n = \frac{0.5}{100} \cdot n = 0.005n$

f. $108\%\text{ of } x = \frac{108}{100} \cdot x = 1.08x$

36. a. $25\%\text{ of } x = \frac{25}{100} \cdot x = 0.25x$

b. $15\%\text{ of } n = \frac{15}{100} \cdot n = 0.15n$

c. $6\frac{1}{2}\%\text{ of } x = \frac{6.5}{100} \cdot x = 0.065x$

d. $150\%\text{ of } n = \frac{150}{100} \cdot n = 1.50n$

e. $2\frac{1}{4}\%\text{ of } x = \frac{2.25}{100} \cdot x = 0.0225x$

f. $12\frac{1}{2}\%\text{ of } n = \frac{12.5}{100} \cdot n = 0.125n$

37. a. $1.5\%\text{ of } m = \frac{1.5}{100} \cdot m = 0.015m$

b. $100\%\text{ of } m - 1.5\%\text{ of } m = m - 0.015m$
$= 0.985m$

c. $1\%\text{ of } m = \frac{1}{100} \cdot m = 0.01m$

d. $100\%\text{ of } m - 1\%\text{ of } m = m - 0.01m$
$= 0.99m$

e. Answers will vary. For example: Write an expression for the bone mass lost by an astronaut in two months. The answer is $1.5\%\text{ of } 1.5\%\text{ of } m = 0.15 \cdot 0.15 \cdot m = 0.0225m$

38. a. y = \$5; y = 0.04n

b. \$5

c. \$80

d. \$6.004 and the bank rounds to \$6.01

e. \$20.024 and the bank rounds to \$20.03

f. Transfer fee equals balance transferred, \$5.

g. For \$125 the fee is \$5, for \$125.01 the fee is 4% of the \$125.01 or \$5.0004 which the bank rounds to \$5.01. \$125 is the number that when multiplied by 4% gives the flat fee, \$5.

39. Rule: 2 chairs are needed for the ends of the configuration, and 3 additional chairs for each table. That is, $y = 3n + 2$.

Tables	Chairs
2	$3(2) + 2 = 8$
4	$3(4) + 2 = 14$
n	$3(n) + 2 = 3n + 2$
10	$3(10) + 2 = 32$

40. Rule: output = 2 more than twice the input. That is, $y = 2n + 2$.

Tables, n	Chairs, y
4	$2(4) + 2 = 10$
n	$2(n) + 2 = 2n + 2$
20	$2(20) + 2 = 42$

41. Rule: Multiply the number of pairs by 3 and add 2 to get the total panels. That is, $t = 3n + 2$ where n = number of pairs of booths and t = total panels.

Pairs of Booths, n	Panels, t
1	5
3	8
3	11
4	14
5	17
20	62
N	$3(n)+2 = 3n+2$

42. Rule: First pair of pens needs 7 panels, each subsequent pair requires an additional 5 panels. The number of panels is two more than five times the number of pairs. That is, $y = 5x + 2$

Pairs of Pens, x	Panels, y
4	$5(4)+2 = 22$
x	$5(x)+2 = 5x+2$
10	$5(10)+2 = 52$
25	$5(25)+2 = 127$

43. Rule: output = input + 2, if input is even and twice the input if the input is odd.

Input	Output
0	$0+2 = 2$
1	$2(1) = 2$
2	$2+2 = 4$
3	$2(3) = 6$
4	$4+2 = 6$
5	$2(5) = 10$
6	$6+2 = 8$
7	$2(7) = 14$
8	$8+2 = 10$

44. Rule: output = 5 if input is even and twice the input if the input is odd.

Input	Output
0	5
1	$2(1) = 2$
2	5
3	$2(3) = 6$
4	5
5	$2(5) = 10$
6	5
7	$2(7) = 14$
8	5

45. Written response – answers may vary. Equations need an equal sign. Perhaps write "… successfully calculated answers to expressions with reversed terms such as $59-13$ and $13-59$".

46. Written response – answers may vary. Figure 13 has one more square in each pattern than Exercise 1. When the extra square is removed from Figure 13, two lengths of perimeter are taken away yet two new ones are exposed so the perimeter is not changed. Placing still another square into each corner of the shapes in Figure 13 to make complete rectangles will result in the same perimeter pattern.

47. a. $24.9\% - 21.65\% = 3.25\%$

b. Penalty APR: $26.15\% + 3.25\% = 29.4\%$

$29.99\% - 29.4\% = 0.59\%$; which is lower

c. $17.24\% - 3.25\% = 13.99\%$
$21.24\% - 3.25\% = 17.99\%$

d. $20.99\% + 3.25\% = 24.24\%$
$26.99\% + 3.25\% = 30.24\%$

However, 30.24% is greater than 29.99% so the penalty APR was 29.99%

e. Answers vary depending on current prime rate.

48. a. $0.03(800) = 24$
The transfer fee is \$24.

b. $(824)(0.039)\left(\frac{1}{12}\right) \approx 2.68$
The interest for 1 month is \$2.68.

c. $(0.04)(824) = 32.96 > 30$
The minimum payment is \$32.96.

d. $824 + 2.68 - 32.96 = 793.72$
Your new balance is \$793.72.

e. $32.96 + 24 + 2.68 = 59.64$
$824 + 2.68 - 59.64 = 767.04$
Your payment would be \$59.64 and your remaining balance would be \$767.04.

f. $\frac{750}{30} = 25$; the balance will be paid in 25 months.

g. $824(0.159)\left(\frac{1}{12}\right) = 10.92$
$39 + 10.92 + 32.96 = 82.88$
The interest due will be \$10.92. The total for the late fee plus interest plus minimum payment is \$82.88.

h. The late payment fee and interest add to more than the payment, so the outstanding balance rises.

1.5 Exercises

1. $A(-2,2)$, $B(-5,0)$, $C(-3,-4)$, $D(0,-2)$, $E(4,-4)$, $F(2,-6)$, $G(4,0)$, $H(4,6)$, $I(0,5)$

2. $A(2,4)$, $B(0,2)$, $C(-2,0)$, $D(-6,-2)$, $E(-4,-6)$, $F(0,-6)$, $G(2,-4)$, $H(4,-2)$, $I(5,0)$

3. a. Quadrant 2 (x is negative and y is positive)

b. Quadrant 4 (x is positive and y is negative)

c. Quadrant 3 (both x and y are negative)

d. Quadrant 3 (both x and y are negative)

4. a. Quadrant 4 (x is positive and y is negative)

b. Quadrant 2 (x is negative and y is positive)

c. Quadrant 3 (both x and y are negative)

d. Quadrant 4 (x is positive and y is negative)

5. a. vertical (x = 0)

b. vertical (x = 0)

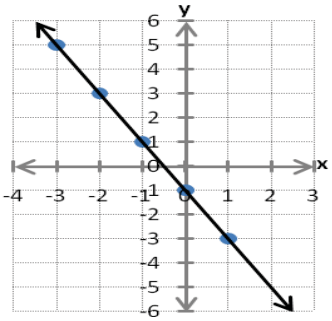
c. horizontal (y = 0)

6. a. vertical (x = 0)

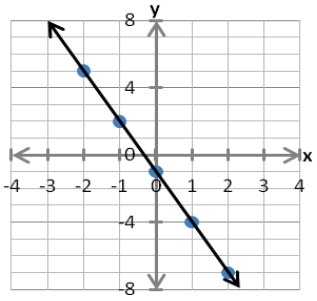
b. horizontal (y = 0)

c. horizontal (y = 0)

7.



8.



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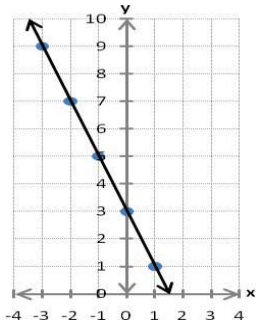

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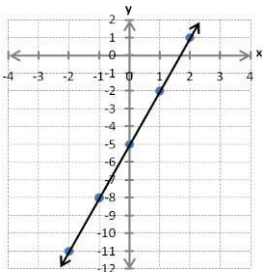
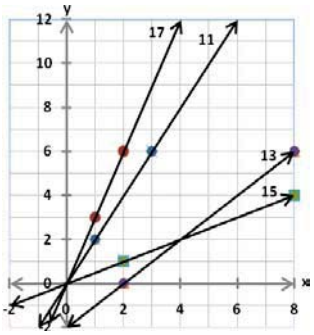
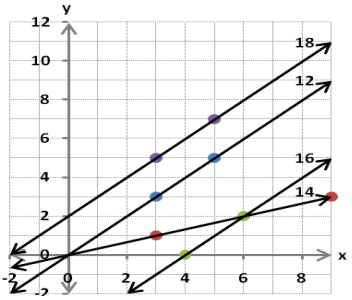


11.-17. odd



12.-18. even



Additional ordered pairs (points) will vary.

11. Rule: $y = 2x$

Additional ordered pairs: $(-1,-2)$, $(2,4)$

12. Rule: $y = x$

Additional ordered pairs: $(-1,-1)$, $(1,1)$

13. Rule: $y = x - 2$

Additional ordered pairs: $(-2,-4)$, $(0,-2)$

14. Rule: $y = \frac{1}{3}x$

Additional ordered pairs: $(-3,-1)$, $(6,2)$

15. Rule: $y = \frac{1}{2}x$

Additional ordered pairs: $(-2,-1)$, $(4,2)$

16. Rule: $y = x - 4$

Additional ordered pairs: $(-2,-6)$, $(0,-4)$

17. Rule: $y = 3x$

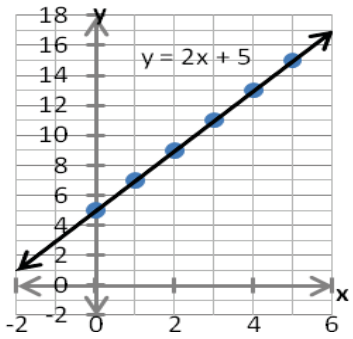
Additional ordered pairs: $(-1,-3)$, $(3,9)$

18. Rule: $y = x + 2$

Additional ordered pairs: $(-4,2)$, $(2,4)$

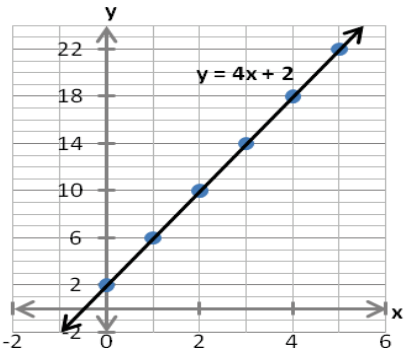
19.

Input, x	Output, $y = 2x + 5$
0	$2(0) + 5 = 5$
1	$2(1) + 5 = 7$
2	$2(2) + 5 = 9$
3	$2(3) + 5 = 11$
4	$2(4) + 5 = 13$
5	$2(5) + 5 = 15$



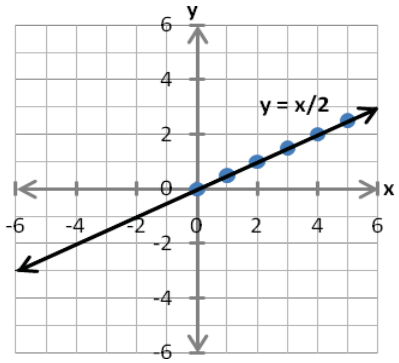
20.

Input, x	Output, $y = 4x + 2$
0	$4(0) + 2 = 2$
1	$4(1) + 2 = 6$
2	$4(2) + 2 = 10$
3	$4(3) + 2 = 14$
4	$4(4) + 2 = 18$
5	$4(5) + 2 = 22$



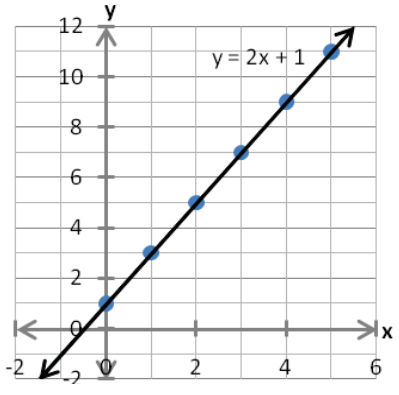
21.

Input, x	Output, $y = \frac{1}{2}x$
0	$\frac{1}{2}(0) = 0$
1	$\frac{1}{2}(1) = \frac{1}{2}$ or 0.5
2	$\frac{1}{2}(2) = 1$
3	$\frac{1}{2}(3) = \frac{3}{2}$ or 1.5
4	$\frac{1}{2}(4) = 2$
5	$\frac{1}{2}(5) = \frac{5}{2}$ or 2.5



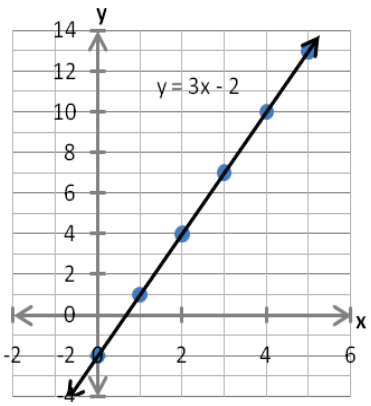
22.

Input, x	Output, $y = 2x + 1$
0	$2(0) + 1 = 1$
1	$2(1) + 1 = 3$
2	$2(2) + 1 = 5$
3	$2(3) + 1 = 7$
4	$2(4) + 1 = 9$
5	$2(5) + 1 = 11$



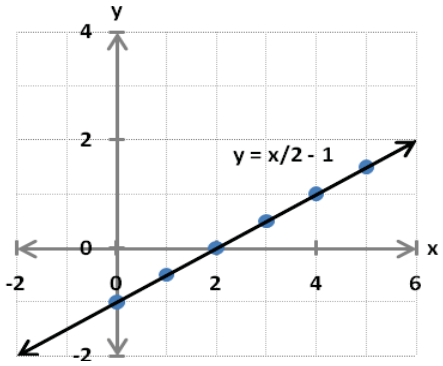
23.

Input, x	Output, $y = 3x - 2$
0	$3(0) - 2 = -2$
1	$3(1) - 2 = 1$
2	$3(2) - 2 = 4$
3	$3(3) - 2 = 7$
4	$3(4) - 2 = 10$
5	$3(5) - 2 = 13$



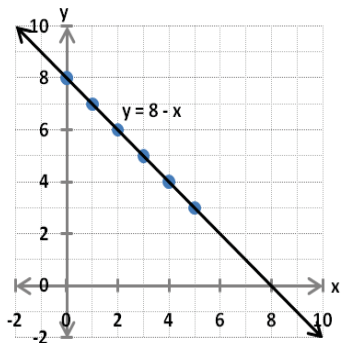
24.

Input, x	Output, $y = \frac{1}{2}x - 1$
0	$\frac{1}{2}(0) - 1 = -1$
1	$\frac{1}{2}(1) - 1 = -\frac{1}{2}$ or - 0.5
2	$\frac{1}{2}(2) - 1 = 0$
3	$\frac{1}{2}(3) - 1 = \frac{1}{2}$ or 0.5
4	$\frac{1}{2}(4) - 1 = 1$
5	$\frac{1}{2}(5) - 1 = \frac{3}{2}$ or 1.5



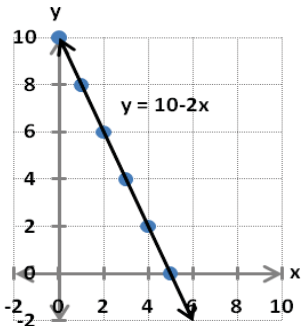
25.

Input, x	Output, $y = 8 - x$
0	$8 - 0 = 8$
1	$8 - 1 = 7$
2	$8 - 2 = 6$
3	$8 - 3 = 5$
4	$8 - 4 = 4$
5	$8 - 5 = 3$



26.

Input, x	Output, $y = 10 - 2x$
0	$10 - 2(0) = 10$
1	$10 - 2(1) = 8$
2	$10 - 2(2) = 6$
3	$10 - 2(3) = 4$
4	$10 - 2(4) = 2$
5	$10 - 2(5) = 0$



27. a. 25

b. 5

c. Answers will vary. For example, have a scale of 0.5, but start at 20 with a break in the graph (//) between 0 and 20.

d. Answers will vary. For example, have a scale of 1, but start at 6.7 with a break in the graph (//) between 0 and 6.7.

28. a. \$40 or \$50

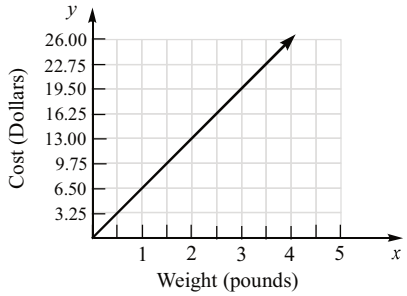
b. Answers will vary. For example, have a scale of \$2, but start at \$30 with a break in the graph (//) between \$0 and \$30.

c. Answers will vary. For example, have a scale of 0.2, but start at 11.6 with a break in the graph (//) between 0 and 11.6.

d. 100

29. a.

Input x lbs.	Output y dollars
0	$6.50(0) = 0$
1	$6.50(1) = 6.50$
2	$6.50(2) = 13.00$
3	$6.50(3) = 19.50$
4	$6.50(4) = 26.00$



b. From the graph we estimate the cost to be about \$16.25. Using the price per pound we get: \$6.50(2.5) = \$16.25.

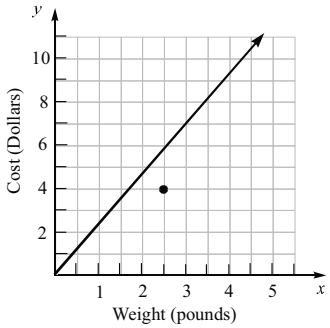
From the graph we estimate the cost to be about \$11.25. Using the price per pound we get: \$6.50(1.75) = \$11.38.

From the graph we estimate the cost to be about \$21. Using the price per pound we get: \$6.50(3.25) = \$21.13

c. Packaged nuts are a better deal; the data point is below the line on the graph. 1.5 pounds of bulk nuts would cost \$9.75

30. a.

Input x lbs.	Output y dollars
0	$2.29(0) = 0$
1	$2.29(1) = 2.29$
2	$2.29(2) = 4.58$
3	$2.29(3) = 6.87$
4	$2.29(4) = 9.16$



b. From the graph we estimate the cost to be about \$5.80. Using the price per pound we get: \$2.29(2.5) = \$5.73

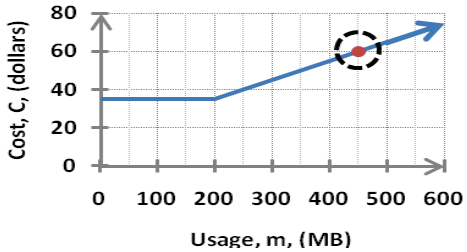
From the graph we estimate the cost to be about \$4.00. Using the price per pound we get: \$2.29(1.75) = \$4.01.

From the graph we estimate the cost to be about \$7.50. Using the price per pound we get: \$2.29(3.25) = \$7.44.

c. Packaged candy is a better deal; the data point is below the line on the graph. 2.5 pound of bulk candy would cost \$5.73.

31. a.

Input, m	Output, C
0	\$35
100	\$35
200	\$35
300	$\$35 + \$0.10(300 - 200) = \$45$
400	$\$35 + \$0.10(400 - 200) = \$55$
500	$\$35 + \$0.10(500 - 200) = \$65$
600	$\$35 + \$0.10(600 - 200) = \$75$

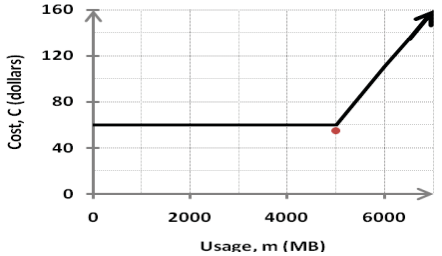


b. \$35, \$35, \$40

c. Refer to the point circled on the graph. This point occurs at a usage level of 450 MB and cost \$60 or (450, \$60). The user should think about buying the higher plan when using more than 450MB.

32. a.

Input,	Output, C
4000	\$60
4500	\$60
5000	\$60
5500	$\$60 + \$0.05(5500 - 5000) = \$85$
6000	$\$60 + \$0.05(6000 - 5000) = \$110$
6500	$\$60 + \$0.05(6500 - 5000) = \$135$
7000	$\$60 + \$0.05(7000 - 5000) = \$160$

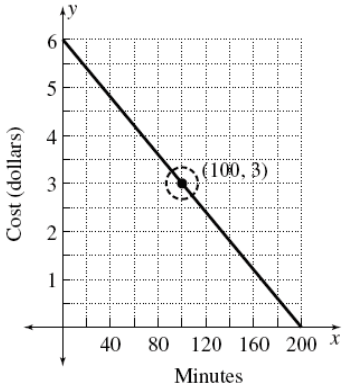


b. \$60, \$60, \$85

c. Yes because the point is below the graph indicating that it is a lower cost.

33. a.

Input Minutes	Value Remaining (\$)
0	$\$6 - \$0.03(0) = \$6.00$
40	$\$6 - \$0.03(40) = \$4.80$
80	$\$6 - \$0.03(80) = \$3.60$
120	$\$6 - \$0.03(120) = \$2.40$
160	$\$6 - \$0.03(160) = \$1.20$
200	$\$6 - \$0.03(200) = \$0$



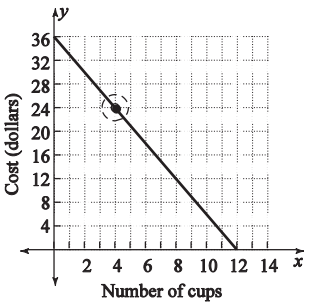
b. See the point circled on the graph.

c. In (0, 6), \$6 is the value of the card after talking zero minutes

d. In (200, 0), 200 is the total minutes of phone time used on the card at \$0.03 per minute. After 200 minutes, the value of the card is zero.

34. a.

Input cups	Value Remaining dollars (\$)
0	\$36 – \$3(0) = \$36
2	\$36 – \$3(2) = \$30
4	\$36 – \$3(4) = \$24
6	\$36 – \$3(6) = \$18
8	\$36 – \$3(8) = \$12
10	\$36 – \$3(10) = \$6
12	\$36 – \$3(12) = \$0



b. See the graph; \$24.00 remains

c. It tells the original price of the certificate, before it has been used. \$36 is the original value of the certificate.

d. It tells how many cups of coffee the certificate will buy. After 12 cups of coffee, the value of the certificate is \$0.

35. a. $(1,15.5)$, $(2,15.75)$, $(3,15.25)$, $(4,15.25)$, $(5,15)$, $(6,15.25)$, $(7,16)$, $(8,15.5)$, $(9,15.75)$, $(10,16)$, $(11,15.75)$, $(12,16)$, $(13,16.5)$, $(14,16.75)$, $(15,16.5)$

b. The highest price is \$16.75 on day 14.

c. The lowest price is \$15 on day 5.

d. The prices are increasing slightly.

36. a. $(1,8.5)$, $(2,9)$, $(3,8.5)$, $(4,8.25)$, $(5,8.25)$, $(6,8.5)$, $(7,8)$, $(8,7.75)$, $(9,8.5)$, $(10,8.25)$, $(11,8)$, $(12,7.5)$, $(13,7.75)$, $(14,8)$, $(15,7.5)$

b. The highest price is \$9 on day 2.

c. The lowest price is \$7.50 on days 12 and day 15.

d. The prices are falling slightly.

37. a. 25 to 34**;** 35 to 44

b. \$57,386; \$28,305

c. Each group of 10 years has a column with width representing 10 years.

d. \$51,000; \$62,000; No, it is an \$11,000 difference in income between the two age groups that include 34 and 35.

38. a. E(1000, 40)

b. \$2500 is the credit limit.

c. \$100, point I

d. \$2250 at H

e. The rule changes from $y = \$10$ to $y = 0.04x$.

f. No, the advance can be any amount above \$0 and less than or equal to \$250.

g. A and B; \$10 fee for \$10 cash advance; The \$10 fee plus \$10 cash advance requires \$20 to be paid back. That is 100% interest on \$10 for a month!

39. Locate the first number on the horizontal axis and draw a vertical line through it; then locate the second number on the vertical axis and draw a horizontal line through it. The point is the intersection of the two lines.

40. From the ordered pair (x, y), trace vertically to the horizontal axis to find x and trace horizontally to the vertical axis to find y.

41. Look at the signs:

	Q I	Q II	Q III	Q IV
(x, y)	$(+,+)$	$(-,+)$	$(-,-)$	$(+,-)$

42. Points on the horizontal axis have ordered pairs whose second coordinate is zero. Points on the vertical axis have ordered pairs whose first coordinate is zero.

43. When possible, read x (inputs) and y (outputs) where the graph crosses intersections in the grid lines.

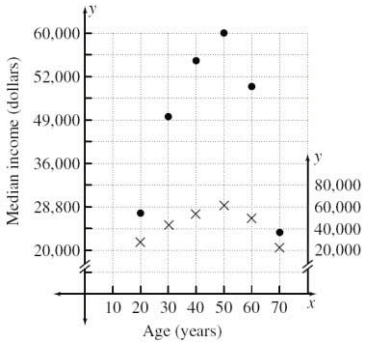
44. The order in which the numbers are written makes a difference.

45. Inputs are natural numbers (days); outputs are positive decimals.

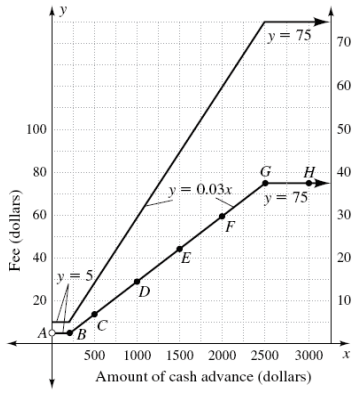
46. Written response. An advantage of this approach is that it saves vertical space and cuts empty space (or 'white space'). A disadvantage is that it distorts heights and may mislead the casual reader.

47. The input variable goes on the horizontal axis. The output variable goes on the vertical axis.

48. Written response. The points are moved together vertically, and outputs are difficult to read. At a glance, the incomes look relatively close together.



49. The graph is stretched vertically and takes up more space on the page. The graph for $y = 0.03x$ appears much steeper.



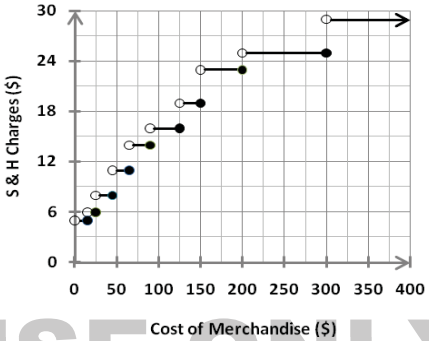
50. a. A is 2 left of and 2 below $(2,0)$
change in $x = -2$, change in $y = -2$
$2+(-2)=0,\ 0+(-2)=-2$
A = $(0,-2)$
B is 5 left of $(2,0)$
change in $x = -5$, change in $y = 0$
$2+(-5)=-3,\ 0+0=0$
B = $(-3,0)$

b. A is 2 right of and 3 below $(0,-2)$
change in $x = 2$, change in $y = -3$
$0+2=2,\quad -2+(-3)=-5$
A = $(2,\ -5)$
B is 2 left of and 3 below $(0,-2)$
change in $x = -2$, change in $y = -3$
$0+(-2)=-2,\quad -2+(-3)=-5$
B = $(-2,\ -5)$

c. A is 2 right of and 1 above $(4,0)$
change in $x = 2$, change in $y = 1$
$4+2=6,\ 0+1=1$
A = $(6,1)$
B is 2 below $(4,0)$
change in $x = 0$, change in $y = -2$
$4+0=4,\ 0+(-2)=-2$
B = $(4,-2)$

d. A is 1 right of and 1 above (2, 3)
change in $x = 1$, change in $y = 1$
$2 + 1 = 3,\ 3 + 1 = 4$
A = (3, 4)
B is 3 right of and 1 below (2, 3)
change in $x = 3$, change in $y = -1$
$2+3=5,\quad 3+(-1)=2$
B = (5, 2)

51. a.



b. Instead of having a connected line, this graph at the left end of each step rises in steps with a circle.

c. $4.95

d. Somewhere between $15.01 and $25.00

e. $18.95

f. From $150 to $150.01 the cost jumps $4 and again from $300 to $300.01.

g. The amount of change in S & H cost differs from one group to another.

h. The amount of money within the order-subtotal groups differs.

Chapter 1 Review Exercises

1. a. You have time after class to reach the bus stop before 3:15.

b. Write the 8 first and subtract 5.

c. Write the 12 first and divide by 8.

d. Your bicycle is in good working condition.

2. a. length is twice the width

b. the sum of the angles is 180^o

c. starts at 4:45 pm

d. 8-foot sections

3. a. Denominator

b. Numerator

c. Numerator

d. Denominator

e. Numerator

f. Denominator

g. Denominator

4. a. real, rational

b. real, rational, integer, whole number

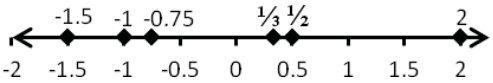
c. real, rational

d. real, rational

e. real, rational

f. real, rational, integer

5.



6. a. True

b. True

c. False. Zero is added to the set of natural numbers to make the set of whole numbers.

d. False. 3 divided by 4 is not an integer.

7. a. multiplication

b. division real, rational

c. subtraction

d. addition

8. a. 3 is the numerical coefficient since it is a constant that multiplies the variable.

b. 4 is the constant.

c. x is the variable.

9. a. Four less than three times the input.

b. Three more than the input times itself.

c. The input divided by three.

10. a. $5-n$

b. $3.5n=105$

c. $n+7$ or $7+n$

d. $\frac{6}{n}=30$

e. An equation contains a verb (such as *is*) indicating where the equal sign goes. The statement of an equation is a sentence which ends in a period. An expression statement has no period because it is not a complete sentence.

11. a. $y=2x+4$

b. $y=5-x^2$

c. $y=\frac{15}{100}\cdot x$ or $y=0.15x$

d. $y=\frac{5}{100}\cdot x$ or $y=0.05x$

e. $\frac{8.5}{100}\cdot x$ or $0.085x$

12. $0\cdot n=a$; this is false since $0\cdot n=0$ and we assumed that $a\neq 0$. That is, a cannot be both zero & nonzero. This is why division by 0 is not defined.

13.

Input	Output
0	$0 \div 2 = 0$
1	$1 \div 2 = 0.5$
2	$2 \div 2 = 1$
3	$3 \div 2 = 1.5$
4	$4 \div 2 = 2$
5	$5 \div 2 = 2.5$
6	$6 \div 2 = 3$

Rule: $y = \frac{1}{2}x$

14.

Input	Output
0	$0 + 4 = 4$
1	$1 + 4 = 5$
2	$2 + 4 = 6$
3	$3 + 4 = 7$
4	$4 + 4 = 8$
5	$5 + 4 = 9$
6	$6 + 4 = 10$

Rule: $y = x + 4$

15.

Input	Output
0	$2(0) = 0$
1	4
2	$2(2) = 4$
3	4
4	$2(4) = 8$
5	4
6	$2(6) = 12$

Rule: $y = 2x$ if x is even and $y = 4$ if x is odd.

16.

Input	Output
0	5
1	$1 - 2 = -1$
2	5
3	$3 - 2 = 1$
4	5
5	$5 - 2 = 3$
6	5

Rule: $y = 5$ if x is even and $y = x - 2$ if x is odd.

17.

Kilowatt Hours, h	Cost (dollars)
10	$\$5.50 + \$0.20(10) = \$7.50$
20	$\$5.50 + \$0.20(20) = \$9.50$
50	$\$5.50 + \$0.20(50) = \$15.50$
h	$\$5.50 + \$0.20h$

18.

Pounds of Rice, n	Cost (dollars)
1	$\$0.89(1) - \$0.10 = \$0.79$
2	$\$0.89(2) - \$0.10 = \$1.68$
5	$\$0.89(5) - \$0.10 = \$4.35$
n	$\$0.89n - \$0.10$

19.

Input, x	Output, A
1	5
2	9
3	13

Input, x	Output, A	Ordered Pair
5	21	$(5, 21)$
50	201	$(50, 201)$
100	401	$(100, 401)$

Rule: The area, A, is 1 more than 4 times the design position, x. That is, $A = 4x + 1$.

20.

Input, x	Output, p
1	12
2	14
3	16

Input, x	Output, p	Ordered Pair
5	20	$(5, 20)$
50	110	$(50, 110)$
100	210	$(100, 210)$

Rule: The perimeter, p, is 10 more than 2 times the design position, x. That is, $p = 2x + 10$.

21. a. $\frac{5}{8}-\frac{1}{6}=\frac{15}{24}-\frac{4}{24}=\frac{15-4}{24}=\frac{11}{24}$

b. $\frac{4}{10}-\frac{3}{15}=\frac{12}{30}-\frac{6}{30}=\frac{12-6}{30}=\frac{6}{30}=\frac{1}{5}$

c. $1\frac{3}{5}+4\frac{2}{3}=\frac{8}{5}+\frac{14}{3}=\frac{24+70}{15}=\frac{94}{15}=6\frac{4}{15}$

d. $3\frac{1}{2}-2\frac{1}{8}=\frac{28-17}{8}=\frac{11}{8}=1\frac{3}{8}$

e. $2\frac{1}{2}\cdot 3\frac{1}{4}=\frac{5}{2}\cdot\frac{13}{4}=\frac{65}{8}=8\frac{1}{8}$

f. $\frac{3}{10}\div\frac{4}{5}=\frac{3}{10}\cdot\frac{5}{4}=\frac{3\cdot 5}{2\cdot 5\cdot 4}=\frac{3}{8}$

22. a. $\frac{5}{6}+\frac{3}{8}=\frac{20}{24}+\frac{9}{24}=\frac{29}{24}=1\frac{5}{24}$

$\frac{5}{6}-\frac{3}{8}=\frac{20}{24}-\frac{9}{24}=\frac{11}{24}$

$\frac{5}{6}\cdot\frac{3}{8}=\frac{15}{48}=\frac{5}{16}$

$\frac{5}{6}\div\frac{3}{8}=\frac{5}{6}\cdot\frac{8}{3}=\frac{40}{18}=\frac{20}{9}=2\frac{2}{9}$

b. $2\frac{1}{6}+1\frac{3}{4}=\frac{13}{6}+\frac{7}{4}=\frac{26}{12}+\frac{21}{12}=\frac{47}{12}=3\frac{11}{12}$

$2\frac{1}{6}-1\frac{3}{4}=\frac{26}{12}-\frac{21}{12}=\frac{5}{12}$

$2\frac{1}{6}\cdot 1\frac{3}{4}=\frac{13}{6}\cdot\frac{7}{4}=\frac{91}{24}=3\frac{19}{24}$

$2\frac{1}{6}\div 1\frac{3}{4}=\frac{13}{6}\div\frac{7}{4}=\frac{13}{6}\cdot\frac{4}{7}=\frac{52}{42}=\frac{26}{21}=1\frac{5}{21}$

23. a. $\frac{91}{9}\cdot 1=\frac{91}{9}\cdot\frac{10}{10}=\frac{910}{90}$

$\frac{91}{10}\cdot 1=\frac{91}{10}\cdot\frac{9}{9}=\frac{819}{90}$

The first is larger by $\frac{910}{90}-\frac{819}{90}=\frac{91}{90}$

b. $\frac{1}{3}\cdot 1=\frac{1}{3}\cdot\frac{100}{100}=\frac{100}{300}$

$0.34=\frac{34}{100}=\frac{34}{100}\cdot 1=\frac{34}{100}\cdot\frac{3}{3}=\frac{102}{300}$

The second is larger by

$\frac{102}{300}-\frac{100}{300}=\frac{2}{300}=\frac{1}{150}$

24. a. $\frac{3}{4}=\frac{75}{100}=0.75$

$\frac{3}{4}=\frac{75}{100}=75\%$

b. $\frac{7}{8}=\frac{7\cdot 12.5}{8\cdot 12.5}=\frac{87.5}{100}=0.875$

$\frac{7}{8}=\frac{87.5}{100}=87.5\%$

c. $\frac{3}{20}=\frac{15}{100}=0.15$

$\frac{3}{20}=\frac{15}{100}=15\%$

d. $\frac{4}{25}=\frac{16}{100}=0.16$

$\frac{4}{25}=\frac{16}{100}=16\%$

e. $\frac{8}{5}=\frac{160}{100}=1.60$

$\frac{8}{5}=\frac{160}{100}=160\%$

f. $\frac{23}{10}=\frac{230}{100}=2.30$

$\frac{23}{10}=\frac{230}{100}=230\%$

25. a. $0.25=\frac{25}{100}=\frac{1}{4}$

$0.25=\frac{25}{100}=25\%$

b. $0.35=\frac{35}{100}=\frac{7}{20}$

$0.35=\frac{35}{100}=35\%$

c. $0.28=\frac{28}{100}=\frac{7}{25}$

$0.28=\frac{28}{100}=28\%$

d. $0.375=\frac{375}{1000}=\frac{3}{8}$

$0.375=\frac{37.5}{100}=37.5\%$

e. $0.004=\frac{4}{1000}=\frac{1}{250}$

$0.004=\frac{0.4}{100}=0.4\%$

f. $1.2 = \frac{12}{10} = \frac{6}{5}$

$1.2 = \frac{120}{100} = 120\%$

26. a. $48\% = \frac{48}{100} = \frac{12}{25}$

$48\% = \frac{48}{100} = 0.48$

b. $125\% = \frac{125}{100} = \frac{5}{4}$

$125\% = \frac{125}{100} = 1.25$

c. $12.5\% = \frac{12.5}{100} = \frac{1}{8}$

$12.5\% = \frac{12.5}{100} = \frac{125}{1000} = 0.125$

d. $33\frac{1}{3}\% = \frac{33\frac{1}{3}}{100} = \frac{1}{3}$

$33\frac{1}{3}\% = 0.3333...$

e. $66\frac{2}{3}\% = \frac{66\frac{2}{3}}{100} = \frac{2}{3}$

$66\frac{2}{3}\% = 0.6666....$

f. $4.8\% = \frac{4.8}{100} = \frac{48}{1000} = \frac{6}{125}$

$4.8\% = \frac{48}{1000} = 0.048$

27. a. $10\% \text{ of } 360 = 0.1(360) = 36$

b. $20\% \text{ of } 360 = 0.2(360) = 72$

c. $50\% \text{ of } 360 = 0.5(360) = 180$

d. $25\% \text{ of } 360 = 0.25(360) = 90$

e. $3\% \text{ of } 360 = 0.03(360) = 10.8$

f. $0.5\% \text{ of } 360 = 0.005(360) = 1.8$

28. a. \$65 is between \$0 and \$149.99 so there is a 5% discount.

$0.05(65) = 3.25$

The discount is \$3.25.

b. \$145 is between \$0 and \$149.99 so there is a 5% discount.

$0.05(145) = 7.25$

The discount is \$7.25.

c. \$250 is between \$150 and \$499.99 so there is a 6% discount.

$0.06(250) = 15$

The discount is \$15.00.

d. \$500 receives a discount of \$50 or 8%, whichever is greater.

$0.08(500) = 40$

The discount is \$50.00.

e. \$550 is over \$500 so the discount is \$50 or 8%, whichever is greater.

$0.08(550) = 44$

The discount is \$50.00.

f. \$700 is over \$500 so the discount is \$50 or 8%, whichever is greater.

$0.08(700) = 56$

The discount is \$56.00.

29.

Total Purchase, x	Rule for Discount, y
\$0 to \$149.99	$y = 0.05x$
\$150 to \$499.99	$y = 0.06x$
\$500 and over	$y = 0.08x$, or \$50, whichever is greater.

30. a. Since \$80 is between \$50 and \$176, a late fee of \$3 will be assessed.

b. Since \$176 is between \$50 and \$176 (not over \$176), a late fee of \$3 will be assessed.

c. Since \$177 is over \$176, a late fee of 1.7%, will be assessed.

$0.017(177) = 3.009$

A late fee of \$3.01 will be assessed.

d. Since \$200 is over \$176, a late fee of 1.7%, will be assessed.

$0.017(200) = 3.40$

A late fee of \$3.40 will be assessed.

31. a. Quadrant 2

b. y-axis

c. origin

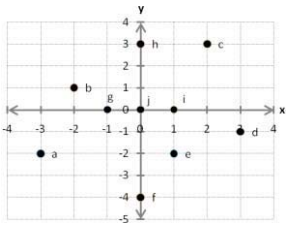
d. $(4, 0)$

e. $(3, -2)$

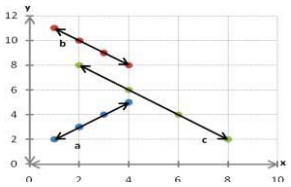
f. $(0, -3)$

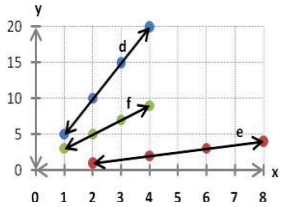
g. $(-3, -2)$

32. a.-j.



33.





34. a. $(0, 1)$; $y = x + 1$

b. $(0, 12)$; $x + y = 12$

c. $(0, 10)$; $y = 10 - x$

d. $(0, 0)$; $y = 5x$

e. $(0, 0)$; $y = \frac{1}{2}x$

f. $(0, 1)$; $y = 2x + 1$

35. Let x be the input and y be the output.

a. $y = x + 1$

b. $y = 12 - x$

c. $y = 10 - x$

d. $y = 5x$

e. $y = \frac{x}{2}$

f. $y = 2x + 1$

36. a. Answers will vary but both coordinates must be positive. For example: $(3, 4)$.

b. Answers will vary but both coordinates must be negative. For example: $(-2, -3)$.

c. Answers will vary but the x-coordinate must be negative and the y-coordinate must be positive. For example: $\left(-\frac{2}{3}, 1\frac{1}{2}\right)$.

d. Answers will vary but the x-coordinate must be positive and the y-coordinate must be negative. For example: $\left(1\frac{1}{2}, -2\frac{3}{4}\right)$.

37. a.

Days	Estimated Weight Loss (lb)
10	1
20	4
30	9
40	16

b. Between days 0 and 10, 1 pound was lost; between days 10 and 20, $4 - 1 = 3$ pounds were lost; between days 20 and 30, $9 - 4 = 5$ pounds were lost; between days 30 and 40, $16 - 9 = 7$ pounds were lost.

c. Answers may vary. The weight loss started slowly but increased as the days went by.

38. a.

Days	Estimated Weight Loss (lb)
10	$5\frac{1}{2}$
20	$7\frac{1}{2}$
30	$9\frac{1}{2}$
40	11

b. Between days 0 and 10, $5\frac{1}{2}$ pounds were lost; between days 10 and 20, $7\frac{1}{2} - 5\frac{1}{2} = 2$ pounds were lost; between days 20 and 30, $9\frac{1}{2} - 7\frac{1}{2} = 2$ pounds were lost; between days 30 and 40, $11 - 9\frac{1}{2} = 1\frac{1}{2}$ pounds were lost.

c. Answers may vary. The weight loss started quickly but decreased as the days went by.

39. a.

Days	Estimated Weight Loss (lb)
10	3
20	6
30	9
40	12

b. Between days 0 and 10, 3 pounds were lost; between days 10 and 20, $6 - 3 = 3$ pounds were lost; between days 20 and 30, $9 - 6 = 3$ pounds were lost; between days 30 and 40, $12 - 9 = 3$ pounds were lost.

c. The weight loss was a constant 3 pounds every 10 days.

40. The input variable, x, goes on the horizontal axis, and the letters i, x, and h are respectively earlier in the alphabet than the letters o (for output variable), y, and v (for vertical axis).

41. a. 0 to 40,000 in steps of 4,000

b. \$6.75 to \$8.50 in steps of \$0.25.

c. 94 to 108 in steps of 2.

d. 1975 to 2025 in steps of 5.

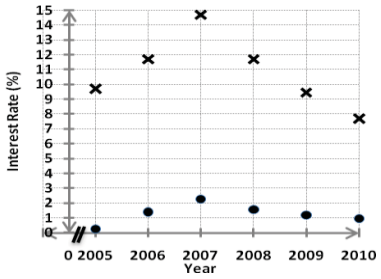
e. \$13,000 to \$40,000 in steps of \$3000.

42. a. Start at 0, place a double slash, then write 2005 to 2010 in steps of 1 year.

b. 0 to 2.4 in steps of 0.2.

c. 6 to15 in steps of 0.5 or 1.

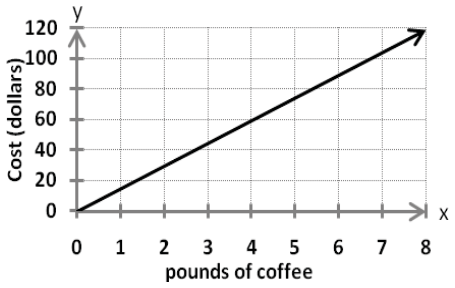
d.



e. They go up and down together but the differences in percents vary, 6.75% to 12.44%. Credit card rates go higher faster than savings interest.

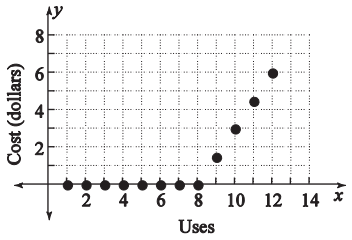
43.

Input (pounds)	Output (dollars)
0	$\$14.85(0) = \$0$
1	$\$14.85(1) = \$14.85$
2	$\$14.85(2) = \$29.70$
3	$\$14.85(3) = \$44.55$
4	$\$14.85(4) = \$59.50$
5	$\$14.85(5) = \$74.25$
6	$\$14.85(6) = \$89.10$
7	$\$14.85(7) = \$103.95$
8	$\$14.85(8) = \$118.80$



44.

Uses	Cost (\$)
1 - 8	0
9	$\$1.50(9-8) = \$1.50$
10	$\$1.50(10-8) = \$3.00$
11	$\$1.50(11-8) = \$4.50$
12	$\$1.50(12-8) = \$6.00$

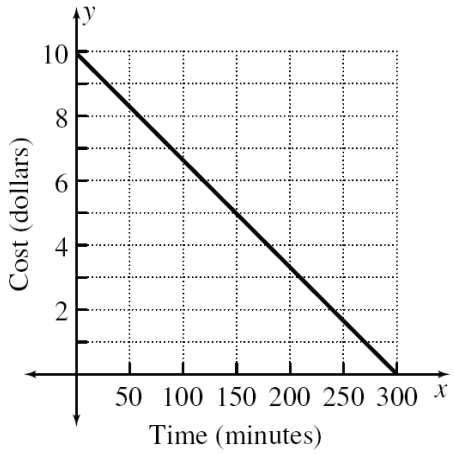


45. a.
$$\frac{\$9.99}{300} = \frac{(9.99)(100)}{300} \text{ cents}$$
$$= \frac{999}{300} \text{ cents}$$
$$= 3\frac{1}{3} \text{ cents} \approx 3.33 \text{ cents}$$

Each minute costs $3\frac{1}{3}$ cents, or about 3.33 cents.

b.

Input (min)	Output: Value (dollars)
0	$\$9.99 - \$0.0333(0) = \$9.99$
50	$\$9.99 - \$0.0333(50) = \$8.325$
100	$\$9.99 - \$0.0333(100) = \$6.66$
150	$\$9.99 - \$0.0333(150) = \$4.995$
200	$\$9.99 - \$0.0333(200) = \$3.33$
250	$\$9.99 - \$0.0333(250) = \$1.665$
300	$\$9.99 - \$0.0333(300) = \$0$



46. It is possible to have partial pounds so Exercise 43 is connected. It is not possible to have partial uses of ATM machine so Exercise 44 is not connected. If calls are rounded to a full minute with use then there would be 300 dots in Exercise 45 (which might look connected). If partial minute calls are billed then connect the dots.

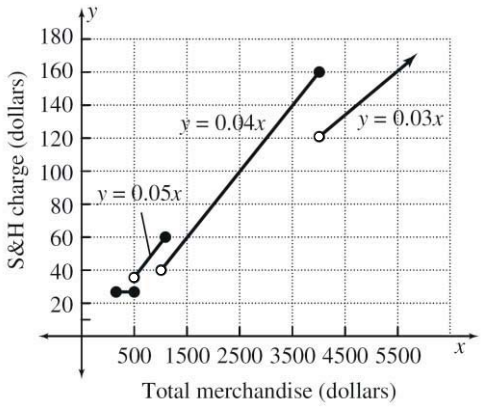
47. a. A is 5 units to the right and on the same vertical level as the point (2, 3); thus A is the point (2+5, 3+0) = (7, 3).

B is on the same horizontal level and 3 units below the point (2, 3); thus B is the point (2+0, 3-3) = (2,0).

b. A is on the same horizontal level and 3 units above the point $(-2,-3)$; thus A is the point $(-2+0,-3+3)=(-2,0)$.

B is 5 units to the right and 3 units above the point $(-2,-3)$; thus B is the point $(-2+5,-3+3)=(3,0)$.

48. Test the endpoints of each interval because that will change percents into dollars. At the endpoints of some groupings, the S&H charge is higher than the S&H charge at the beginning of the next group. Buying a small item to move into a higher merchandise total category can actually save money.



Chapter 1 Test

1. Answers may vary. Possible answers: Material on the test will be similar to the chapter exercises and chapter review; the test will cover the entire chapter; the number of questions from each section will be about the same.

2. Answers may vary. Possible answers: The test has a time limit; students must work on their own; the test has the same weight towards the final grade as other chapter tests.

3. difference

4. set

5. integers

6. Label *a* identifies the origin, label *b* identifies the vertical (or y) axis, label *c* identifies the horizontal (or x) axis, and label *d* identifies Quadrant 3.

7. $e(-4,4)$, $f(2,-3)$, $g(0,-5)$, and $h(-2,-7)$

8. In this chapter, parentheses have been used to group information, to show multiplication, and to write an ordered pair.

9.

Input	Output
0	$0 \div 2 = 0$
1	$2(1) = 2$
2	$2 \div 2 = 1$
3	$2(3) = 6$
4	$4 \div 2 = 2$
5	$2(5) = 10$
6	$6 \div 2 = 3$
7	$2(7) = 14$
8	$8 \div 2 = 4$

10. $\frac{5}{8}+\frac{1}{6}=\frac{15}{24}+\frac{4}{24}=\frac{19}{24}$

$\frac{5}{8}-\frac{1}{6}=\frac{15}{24}-\frac{4}{24}=\frac{11}{24}$

11. $1\frac{1}{9}\cdot 1\frac{5}{12}=\frac{10}{9}\cdot\frac{17}{12}$

$$=\frac{\cancel{2}\cdot 5\cdot 17}{9\cdot\cancel{2}\cdot 6}$$

$$=\frac{85}{54}$$

$$=1\frac{31}{54}$$

$$1\frac{1}{9}\div 1\frac{5}{12}=\frac{10}{9}\div\frac{17}{12}$$

$$=\frac{10}{9}\cdot\frac{12}{17}$$

$$=\frac{2\cdot 5\cdot 4\cdot\cancel{3}}{\cancel{3}\cdot 3\cdot 17}$$

$$=\frac{40}{51}$$

12. $\frac{16}{25}=\frac{64}{100}=0.64$

$\frac{16}{25}=\frac{64}{100}=64\%$

13. $4.2=\frac{420}{100}=\frac{21}{5}$

$4.2=\frac{420}{100}=420\%$

14. $9\%\text{ of }35=0.09(35)=3.15$

15. a. Let n be the number; $0.15n$

b. Let n be the number; $0.0025n$

c. Let n be the number; $\frac{3}{\frac{1}{2}n}$, $\frac{3}{0.5n}$, $\frac{3}{\frac{n}{2}}$

16. $\frac{3}{\frac{1}{2}n}$, $\frac{3}{0.5n}$, $\frac{3}{\frac{n}{2}}$, 3/n/2; the decimal in the denominator is the simplest appearing fraction; 3/n/2 could be interpreted two different ways: $\frac{3}{n}\div 2$ (wrong) or $3\div\frac{n}{2}$ (correct)

17. a. Let y be the output and n be the number; $y = 6 - n$.

b. Let s be the sales tax and p be the price; $s = 0.085p$

18. a. 1918 to 1940 in steps of 2; The difference is 21, which gives about 2 when divided by 10.

b. 1.85 to 2.15 in steps of 0.03; The difference is 0.3 which gives 0.03 when divided by 10.

19.

x	y
5	20
100	400
n	$4n$

The output is four times the input. That is, $y = 4x$.

20. a. No; this describes the rule $y = x^2$.

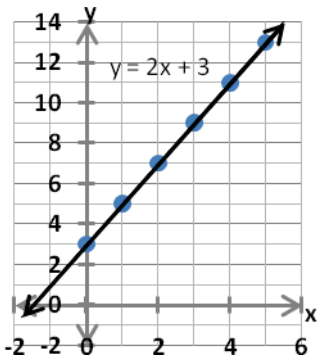
b. Yes; the perimeter of a square is four times the length of a side.

c. No; this describes the rule $y = \frac{x}{4}$.

d. Yes; the number of quarters is 4 times the number of dollars.

21.

Input, x	Output, $y = 2x + 3$
0	$2(0)+3=3$
1	$2(1)+3=5$
2	$2(2)+3=7$
3	$2(3)+3=9$
4	$2(4)+3=11$
5	$2(5)+3=13$

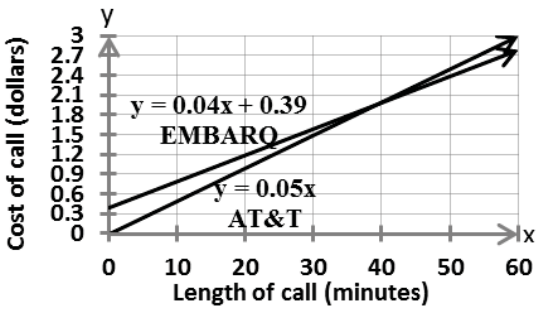


22. a. Minutes go on the x-axis and total cost (in dollars) goes on the y-axis. An equation for the cost of a call would be $y = 0.04x + 0.39$

b. Answers may vary. Consider that the minimum cost is \$0.43 (cost of call plus cost for 1 minute) and that the number of minutes goes from 0 to 60.

c.

Input (minutes)	Output: Cost (dollars)
0	$\$0.04(0) + \$0.39 = \$0.39$
10	$\$0.04(10) + \$0.39 = \$0.79$
20	$\$0.04(20) + \$0.39 = \$1.19$
30	$\$0.04(30) + \$0.39 = \$1.59$
40	$\$0.04(40) + \$0.39 = \$1.99$
50	$\$0.04(50) + \$0.39 = \$2.39$
60	$\$0.04(60) + \$0.39 = \$2.79$



d. Each minute will cost an additional \$0.01 with AT&T, but there is no fixed cost for a call. Therefore, at 39 minutes, the additional per minute charge for AT&T is equivalent to the fixed charge for EMBARQ.

Above 39 minutes, the graph for EMBARQ is below the graph for AT&T which means EMBARQ is a better deal for calls longer than 39 minutes.

Chapter 2

2.1 Exercises

1. $+4+(-3)=1$
$-3+(+4)=1$
net charge = 1

2. $+3+(-3)=0$
$-3+3=0$
net charge = 0

3. $+5+(-5)=0$
$-5+(+5)=0$
net charge = 0

4. $+8+(-4)=4$
$-4+8=4$
net charge = 4

5. $+5+(-7)=-2$
$-7+(+5)=-2$
net charge = -2

6. $+3+(-8)=-5$
$-8+3=-5$
net charge = -5

7. a. $-5+(-2)=-7$

b. $+3+(-3)=0$

c. $5+(-12)=-7$

8. a. $-3+(+3)=0$

b. $-4+(-7)=-11$

c. $-12+(+8)=-4$

9. a. $-3+(+2)=-1$

b. $+6+(-4)=2$

c. $-14+(-6)=-20$

10. a. $+3+(-5)=-2$

b. $-4+(-3)=-7$

c. $-13+(+6)=-7$

11. a. $-8+(-17)=-25$

b. $-9+(+16)=7$

c. $24+(-8)=16$

12. a. $-7+(+23)=16$

b. $12+(-19)=-7$

c. $-22+(-9)=-31$

13. a. -5

b. $\frac{1}{2}$

c. -0.4

d. $-x$

e. $2x$

14. a. 5

b. $-\frac{2}{3}$

c. -2.5

d. $-3x$

e. ab

15. a. $-|7|=-1\cdot|7|=-1\cdot 7=-7$

b. $-|-8|=-1\cdot|-8|=-1\cdot 8=-8$

c. $-(-3)=-1\cdot(-3)=3$

d. $|-7|=7$

16. a. $-(-6)=-1\cdot(-6)=6$

b. $-|4|=-1\cdot|4|=-1\cdot 4=-4$

c. $|-(-2)|=|-1\cdot(-2)|=|2|=2$

d. $-|-5|=-1\cdot|-5|=-1\cdot 5=-5$

17. a. $|-4|=4$

b. $|5|=5$

c. $|4-9|=|-5|=5$

d. $-|2+5|=-|7|=-1\cdot 7=-7$

18. a. $|7|=7$

b. $|-6|=6$

c. $|3-9|=|-6|=6$

d. $-|3+4|=-|7|=-7$