



American Book Company's

LOUISIANA 9TH GRADE
GLE REVIEW
IN
MATHEMATICS

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Chart of Standards

GLE	Chapter Number	Diagnostic Test Part 1 Question #	Diagnostic Test Part 2 Question #	Diagnostic Test Part 3 Question #
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10	11	7		
11	6, 8			1
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14	6, 8, 10, 11, 12	8		
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35	13	3		
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37	8, 11		2	2
38	10, 11, 12			
39	11			2
40	11			2

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GLE	Practice Test 1 Part 1 Question #	Practice Test 1 Part 2 Question #	Practice Test 1 Part 3 Question #	Practice Test 2 Part 1 Question #	Practice Test 2 Part 2 Question #	Practice Test 2 Part 3 Question #
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15		1			4	
16						2
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23	18	13				1
24	35	19			8	1
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32		16			20	
33		4			11	
34		6			10	
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Diagnostic Test

Part 1

This section is timed. You have 40 minutes to complete these 40 questions. You may use a calculator and the reference sheet on page x.

1. What kind of number is $-\frac{5}{7}$?

- A Odd
- B Whole
- C Rational
- D Irrational
- E Natural

GLE 1

2. Simplify the following expression:

$$2\sqrt{5} + 14\sqrt{5} =$$

- A $16\sqrt{25}$
- B $28\sqrt{5}$
- C $28\sqrt{25}$
- D $26\sqrt{10}$
- E $16\sqrt{5}$

GLE 6

3. If $f(x) = 7 - 6x$, then $f(-3) =$ _____.

- A -11
- B 1
- C 25
- D -3
- E 3

GLE 35

4. Alexandria wants to locate the midpoint of a line segment with endpoints $(-1, -2)$ and $(5, -4)$. What are the coordinates of the midpoint?

- A $(3, -3)$
- B $(-2.5, -3)$
- C $(2.5, -6)$
- D $(2, -3)$
- E $(2, -6)$

GLE 23

5. Andrea has 10 more jellybeans than her friend Chelsea, but Andrea has half as many as Rebecca. Which expression below best describes Rebecca's jelly beans?

- A $R = 2C + 20$
- B $R = C + 10$
- C $R = A + \frac{1}{2}C$
- D $R = 2A + 10$
- E $R = A + 20$

GLE 9

6. What is the best measure to use for the length of a piece of chalk?

- A millimeter
- B centimeter
- C meter
- D hectometer
- E kilometer

GLE 21

7. Mackia works for a cleaning company selling their products at door-to-door. She makes \$10 an hour plus \$25 for every product she sells. She works forty hours a week. If she were to write a function expressing the amount of pay she receives from her place of employment each week, what would the independent variable be?

- A the number of products she sells
- B the amount of money she makes
- C the forty hours a week she works
- D Mackia
- E the cleaning company

GLE 10

Part 2

This section is not timed, but you should be able to complete these 20 questions in 60 minutes. You may use a calculator and the reference sheet on page x.

1. A computer program simulated tossing three coins 500 times. The results are in the following table. Based on the computer simulation, what is the experimental probability of tossing two tails and a head?

HHH	60
HTH	66
HHT	62
THH	60
HTT	66
THT	56
TTH	74
TTT	56

- A $\frac{33}{250}$
 B $\frac{63}{125}$
 C $\frac{47}{125}$
 D $\frac{49}{125}$
 E $\frac{66}{125}$

GLE 30

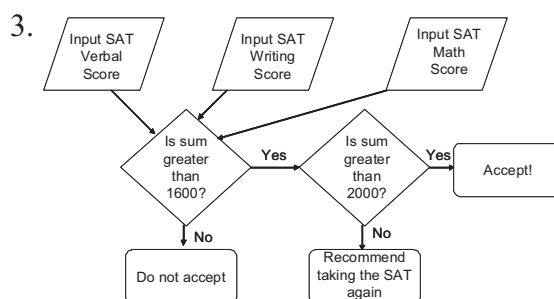
2. Jittery Java sells bags of coffee by the pound. The table below shows the price of Jittery Java's coffee.

Coffee (x)	Price (y)
2 lbs	\$4.50
3 lbs	\$7.50
4 lbs	\$10.50
5 lbs	\$13.50
6 lbs	\$16.50

Which equation best represents the data?

- A $y = 1.5x + 3$
 B $y = 3x - 1.5$
 C $y = 3x + 1.5$
 D $y = 3.5x$
 E $y = 1.5x - 3$

GLE 37



EJ applied to University of Louisiana. His SAT Verbal score was 800. His SAT Writing score was 690. His SAT Math score was 580. According to the flow chart, which will occur?

- A EJ will be accepted.
 B EJ will not be accepted.
 C EJ will take the SAT again.
 D EJ will apply again.
 E EJ will apply somewhere else.

GLE 34

4. Zandra went into a candy store to buy jelly beans. She wanted to choose 3 flavors from the 20 flavors they sold. How many combinations of 3 flavors could she make?

- A 3
 B 60
 C 1140
 D 6840
 E 12720

GLE 32

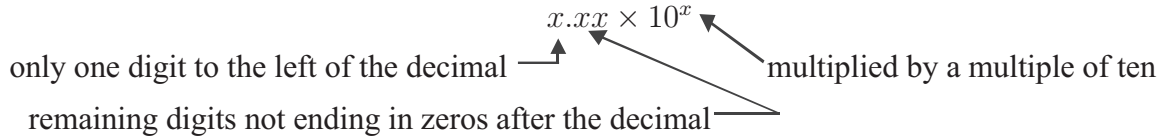
5. Simplify: $\sqrt{45} \times \sqrt{27}$

- A $3\sqrt{15}$
 B $\sqrt{72}$
 C $\sqrt{121}$
 D $9\sqrt{15}$
 E $2\sqrt{72}$

GLE 6

1.8 Scientific Notation

Mathematicians use **scientific notation** to express very large and very small numbers. **Scientific notation** expresses a number in the following form:



1.9 Using Scientific Notation for Large Numbers

Scientific notation simplifies very large numbers that have many zeros. For example, Pluto averages a distance of 5,900,000,000 kilometers from the sun. In scientific notation, a decimal is inserted after the first digit (5.): the rest of the digits are copied except for the zeros at the end (5.9), and the result is multiplied by 10^9 . The exponent equals the total number of digits in the original number minus 1 or the number of spaces the decimal point moved.

5,900,000,000 = 5.9×10^9 The following are more examples:

Example 19: $32,560,000,000 = 3.256 \times 10^{10}$ $5,060,000 = 5.06 \times 10^6$

decimal moves 10 spaces to the left \uparrow \uparrow decimal moves 6 spaces to the left

Convert the following numbers to scientific notation.

- | | | |
|----------------|---------------------|-------------------|
| 1. 10,200 = | 5. 29,010,000,000 = | 9. 38,900 = |
| 2. 7,413,000 = | 6. 22,300 = | 10. 520,700,000 = |
| 3. 8,056 = | 7. 6,920,000,000 = | 11. 71,390,000 = |
| 4. 328,000 = | 8. 90,430,000 = | 12. 1,033 = |

To convert a number written in scientific notation back to conventional form, reverse the steps.

Example 20: $4.02 \times 10^5 = 4.02000 = 402,000$ Move the decimal 5 spaces to the right and add zeros.

Convert the following numbers from scientific notation to conventional numbers.

- | | | | |
|---------------------------|----------------------------|-----------------------------|---------------------------|
| 13. $5.32 \times 10^7 =$ | 16. $4.132 \times 10^7 =$ | 19. $7.4 \times 10^3 =$ | 22. $4.109 \times 10^6 =$ |
| 14. $2.809 \times 10^9 =$ | 17. $9.07 \times 10^5 =$ | 20. $2.29 \times 10^{10} =$ | 23. $1.81 \times 10^5 =$ |
| 15. $8.0 \times 10^3 =$ | 18. $36.021 \times 10^9 =$ | 21. $7.09 \times 10^4 =$ | 24. $3.072 \times 10^8 =$ |

2.6 Dividing Roots

When dividing a number or a square root by another square root, you cannot leave the square root sign in the denominator (the bottom number) of a fraction. You must simplify the problem so that the square root is not in the denominator. Look at the examples below.

Example 13: $\frac{\sqrt{2}}{\sqrt{5}}$

Step 1: $\frac{\sqrt{2}}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} \leftarrow$ The fraction $\frac{\sqrt{5}}{\sqrt{5}}$ is equal to 1, and multiplying by 1 does not change the value of a number.

Step 2: $\frac{\sqrt{2 \times 5}}{5} = \frac{\sqrt{10}}{5}$ Multiply and simplify. Since $\sqrt{5} \times \sqrt{5}$ equals 5, you no longer have a square root in the denominator.

Example 14: $\frac{6\sqrt{2}}{2\sqrt{10}}$ In this problem, the numbers outside of the square root will also simplify.

Step 1: $\frac{6}{2} = 3$ so you have $\frac{3\sqrt{2}}{\sqrt{10}}$

Step 2: $\frac{3\sqrt{2}}{\sqrt{10}} \times \frac{\sqrt{10}}{\sqrt{10}} = \frac{3\sqrt{2 \times 10}}{10} = \frac{3\sqrt{20}}{10}$

Step 3: $\frac{3\sqrt{20}}{10}$ will further simplify because $\sqrt{20} = 2\sqrt{5}$, so you then have $\frac{3 \times 2\sqrt{5}}{10}$ which reduces to $\frac{3\sqrt{5}}{5}$.

Simplify the following division problems.

1. $\frac{4\sqrt{2}}{\sqrt{10}}$

5. $\frac{2\sqrt{18}}{\sqrt{7}}$

9. $\frac{\sqrt{32}}{\sqrt{30}}$

13. $\frac{5\sqrt{28}}{2\sqrt{4}}$

2. $\frac{12}{\sqrt{6}}$

6. $\frac{\sqrt{26}}{\sqrt{14}}$

10. $\frac{3\sqrt{10}}{\sqrt{32}}$

14. $\frac{36\sqrt{18}}{\sqrt{9}}$

3. $\frac{5\sqrt{12}}{3\sqrt{8}}$

7. $\frac{\sqrt{32}}{\sqrt{5}}$

11. $\frac{3\sqrt{21}}{2\sqrt{7}}$

15. $\frac{\sqrt{20}}{\sqrt{15}}$

4. $\frac{45\sqrt{12}}{5\sqrt{9}}$

8. $\frac{\sqrt{3}}{\sqrt{39}}$

12. $\frac{7\sqrt{18}}{4\sqrt{10}}$

4.4 Rational and Irrational Word Problems

1. Why are 8.3 and $8.\overline{33}$ not equal? Which is larger?
2. Scott checked the chance for snow this weekend from 4 sources. The newspaper predicted a 30% chance of snow, the Internet predicted a 1 in 4 chance, the weather channel predicted a 0.27 chance, and the radio said the chance of snow was $\frac{1}{3}$. Which source predicted the lowest chance of snow?
3. A surveyor measured the distance from one corner of a park to the other corner and found it to be $\sqrt{9462}$ miles. Between what two integers does this measurement lie?
4. The surveyor's assistant measured the same distance and found it to be $\sqrt{9458}$. *Approximately*, what is this distance to the nearest tenth?
5. The Junior Beta Club needs to raise \$1, 513.75 to go to a national convention. If they decide to sell candy bars at \$1.25 each, how many must they sell to meet their goal?
6. Dawn owns a candy store. On Monday, she sold 6.5 pounds of chocolate, 8.34 pounds of jelly beans, $4\frac{9}{10}$ pounds of sour snaps, and 5.64 pounds of yogurt-covered raisins. How many pounds of candy did she sell in total?
7. Kali gives her puppy a bath and uses 5.5 gallons of water. She takes out $3\frac{2}{3}$ gallons of the water. How much water does she have left?
8. Marlana is driving 355 miles to visit her parents. After 3.5 hours of driving, Marlana has gone $\frac{2}{3}$ of the trip. How far has Marlana gone?
9. Zeldrin bought a 20 pound bag of dog food for his mastiff, Hunter. On Monday, Hunter ate $1\frac{3}{4}$ lbs of food, Tuesday he ate $2\frac{1}{3}$ lbs of food, and Wednesday he ate $2\frac{3}{5}$. How much dog food is left in the bag?
10. The width of a soccer field is $\sqrt{523}$ yards. *Approximately*, what is this distance to the nearest tenth?

5.3 Understanding Algebra Word Problems

The biggest challenge to solving word problems is figuring out whether to add, subtract, multiply, or divide. Below is a list of key words and their meanings. This list does not include every situation you might see, but it includes the most common examples.

<u>Words Indicating Addition</u>	<u>Example</u>	<u>Add</u>
and	3 and 9	$3 + 9$
increased	The original price of \$14 increased by \$2.	$14 + 2$
more	7 coins and 3 more	$7 + 3$
more than	Josh has 15 points. Will has 3 more than Josh.	$15 + 3$
plus	2 baseballs plus 1 baseballs	$2 + 1$
sum	the sum of 4 and 2	$4 + 2$
total	the total of 9, 5, and 11	$9 + 5 + 11$

<u>Words Indicating Subtraction</u>	<u>Example</u>	<u>Subtract</u>
decreased	\$19 decreased by \$7	$19 - 7$
difference	the difference between 24 and 10	$24 - 10$
less	12 days less 5	$12 - 5$
less than	Jose completed 11 laps less than Mike's 15.	$*15 - 11$
left	Ray sold 22 out of 40 tickets. How many did he have left ?	$*40 - 22$
lower than	This month's rainfall is 3 inches lower than last month's rainfall of 9 inches.	$*9 - 3$
minus	8 minus 7	$8 - 7$

* In subtraction word problems, you cannot always subtract the numbers in the order that they appear in the problem. Sometimes the first number should be subtracted from the last. You must read each problem carefully.

<u>Words Indicating Multiplication</u>	<u>Example</u>	<u>Multiply</u>
triple	Her \$150 profit tripled in in a month.	150×3
half	Half of the \$800 collected went to charity.	$\frac{1}{2} \times 800$
product	the product of 5 and 11	5×11
times	Li scored 5 times as many points as Ted who only scored 3.	5×3
double	The bacteria doubled its original colony of 5,000 in just one day.	$2 \times 5,000$
twice	Ron has 8 CDs. Tom has twice as many.	2×8
<u>Words Indicating Division</u>	<u>Example</u>	<u>Divide</u>
divide into, by, or among	The group of 20 divided into 5 teams	$20 \div 5$ or $\frac{20}{5}$
quotient	the quotient of 36 and 4	$36 \div 4$ or $\frac{36}{4}$

6.4 Combining Like Terms

In algebra problems, separate **terms** by + and - signs. The expression $5x - 4 - 3x + 7$ has 4 terms: $5x$, 4 , $3x$, and 7 . Terms having the same variable can be combined (added or subtracted) to simplify the expression. $5x - 4 - 3x + 7$ simplifies to $2x + 3$.

$$\begin{array}{c}
 \swarrow \quad \searrow \quad \swarrow \quad \searrow \\
 5x - 4 - 3x + 7 = 2x + 3
 \end{array}$$

Simplify the following expressions.

1. $4x + 8x =$

8. $5 - 10t + 3 - 7t =$

15. $-d + 4 + 3d - 1 =$

2. $3y - 5y + 8 =$

9. $-2 + x - 4x + 8 =$

16. $-8 + 3h + 5 - h =$

3. $2 - 2x + 3 =$

10. $12b + 10 + 6b =$

17. $10x - 5x + 8 =$

4. $9a - 14 - a =$

11. $9h - h + 2 - 4 =$

18. $11 + 4z + z - 6 =$

5. $7w + 3w + 2 =$

12. $-3k + 8 - 4k =$

19. $11 + 7y - y - 2 =$

6. $-2x + x + 8x =$

13. $2a + 10a - 2 + a =$

20. $14p - 2 + p =$

7. $w - 4 + 5w =$

14. $2 + 9c - 12 =$

21. $15m + 2 - m + 3 =$

6.5 Solving Equations with Like Terms

When an equation has two or more like terms on the same side of the equation, combine like terms as the **first** step in solving the equation.

Example 5: $7x + 2x - 7 = 21 + 8$

Step 1: Combine like terms on both sides of the equation.

$$7x + 2x - 7 = 21 + 8$$

$$9x - 7 = 29$$

$$+7 \quad +7$$

Step 2: Solve the two-step algebra problem as explained previously.

$$9x \div 9 = 36 \div 9$$

$$x = 4$$

Solve the equations below combining like terms first.

1. $7w - 2w + 13 = -2$

5. $-3t + 5t - 7 = 9$

9. $-7 - 3x - x = 17$

2. $2x + 6 + x = 12 + 3$

6. $11d + d - 4d = 8$

10. $9 - 11p + 4p = 12 + 4$

3. $5 - 8y + 11y = -13 + 3$

7. $-7c - 4 - 4c = 6 + 12$

11. $8y + 4 - 5y = -17$

4. $-2 + 4a + 10a = -30$

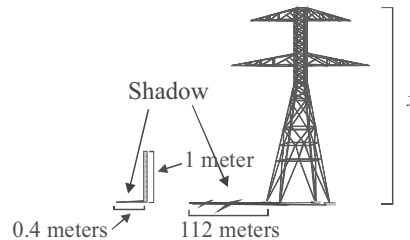
8. $14m - 9 - 5m = 9$

12. $-2a - 11 - 3a = 14$

7.3 Ratio and Proportion Word Problems

You can use ratios and proportions to solve problems.

Example 3: A stick one meter long is held perpendicular to the ground and casts a shadow 0.4 meters long. At the same time, an electrical tower casts a shadow 112 meters long. Use ratio and proportion to find the height of the tower.



Step 1: Set up a proportion using the numbers in the problem. Put the shadow lengths on one side of the equation and put the heights on the other side. The 1 meter height is paired with the 0.4 meter length, so let them both be top numbers. Let the unknown height be x .

$$\begin{array}{ccc} \text{shadow} & & \text{object} \\ \text{length} & & \text{height} \\ \hline 0.4 & = & 1 \\ 112 & & x \end{array}$$

Step 2: Solve the proportion as you did on page 82.

$$112 \times 1 = 112 \qquad 112 \div 0.4 = 280$$

Answer: The tower height is 280 meters.

Use ratio and proportion to solve the following problems.

- Rudolph can mow a lawn that measures 1,000 square feet in 3 hours. At that rate, how long would it take him to mow a lawn 4,500 square feet?
- Faye wants to know how tall her school building is. On a sunny day, she measures the shadow of the building to be 8 feet. At the same time she measures the shadow cast by a 4 foot statue to be 2 feet. How tall is her school building?
- Out of every 6 students surveyed, 1 listens to country music. At that rate, how many students in a school of 1,200 listen to country music?
- Bailey, a Labrador retriever, has a litter of 10 puppies. Four are black. At that rate, how many puppies in a litter of 5 would be black?
- According to the instructions on a bag of fertilizer, 5 pounds of fertilizer are needed for every 50 square feet of lawn. How many square feet will a 15-pound bag cover?
- A race car can travel 2 laps in 4 minutes. At this rate, how long will it take the race car to complete 250 laps?
- If it takes 8 cups of flour to make 4 loaves of bread, how many loaves of bread can you make from 40 cups of flour?
- If 4 pounds of jelly beans cost \$6.82, how much would 2 pounds cost?
- For the first 3 home football games, the concession stand sold a total of 600 hotdogs. If that ratio stays constant, how many hotdogs will sell for all 8 home games?

8.5 Inequality Word Problems

Inequality word problems involve staying under a limit or having a minimum goal one must meet.

Example 9: A contestant on a popular game show must earn a minimum of 800 points by answering a series of questions worth 40 points each per category in order to win the game. The contestant will answer questions from each of four categories. Her results for the first three categories are as follows: 160 points, 200 points, and 240 points. Write an inequality which describes how many points, (p), the contestant will need on the last category in order to win.

Step 1: Add to find out how many points she already has. $160 + 200 + 240 = 600$

Step 2: Subtract the points she already has from the minimum points she needs. $800 - 600 = 200$. She must get at least 200 points in the last category to win. If she gets more than 200 points, that is okay, too. To express the number of points she needs, use the following inequality statement:

$$p \geq 200 \quad \text{The points she needs must be greater than or equal to 200.}$$

Solve each of the following problems using inequalities and graph your answer on a number line.

1. Stella wants to place her money in a high interest money market account. However, she needs at least \$1,500 to open an account. Each month, she sets aside some of her earnings in a savings account. In January through June, she added the following amounts to her savings: \$145, \$203, \$210, \$120, \$102, and \$115. Write an inequality which describes the amount of money she can set aside in July to qualify for the money market account.
2. A high school band program will receive \$2,000 for selling \$12,000 worth of coupon books. Six band classes participate in the sales drive. Classes 1–5 collect the following amounts of money: \$2,400, \$2,800, \$1,500, \$2,320, and \$2,550. Write an inequality which describes the amount of money the sixth class must collect so that the band will receive \$2,000.
3. A small elevator has a maximum capacity of 1,200 pounds before the cable holding it in place snaps. Six people get on the elevator. Five of their weights follow: 120, 240, 150, 215, and 170. Write an inequality which describes the amount the sixth person can weigh without snapping the cable.
4. A small high school class of 9 students were told they would receive a pizza party if their class average was 90% or higher on the next exam. Students 1–8 scored the following on the exam: 84, 95, 99, 87, 92, 93, 100, and 98. Write an inequality which describes the score the ninth student must make for the class to qualify for the pizza party.
5. Raymond wants to spend his entire credit limit on his credit card. His credit limit is \$3,000. He purchases items costing \$750, \$1,120, \$42, \$159, \$8, and \$71. Write an inequality which describes the amounts Raymond can put on his credit card for his next purchases.

9.6 Removing Parentheses and Simplifying

In the following problem, you must multiply each set of parentheses by the numbers and variables outside the parentheses, and then add the polynomials to simplify the expressions.

Example 9: $9x(4x^4 - 7x + 8) - 3x(5x^4 + 3x - 9)$

Step 1: Multiply to remove the first set of parentheses.

$$9x(4x^4 - 7x + 8) = 36x^5 - 63x^2 + 72x$$

Step 2: Multiply to remove the second set of parentheses.

$$-3x(5x^4 + 3x - 9) = -15x^5 - 9x^2 + 27x$$

Step 3: Copy each polynomial in columns, making sure the terms with the same variable and exponent are under each other. Add to simplify.

$$\begin{array}{r} 36x^5 - 63x^2 + 72x \\ (+) -15x^5 - 9x^2 + 27x \\ \hline 21x^5 - 72x^2 + 99x \end{array}$$

Remove the parentheses and simplify the following problems.

1. $5t(t + 8) + 7t(4t^4 - 5t + 2)$

6. $7a(3a^4 + 3a + 2) - (-4a^4 + 7a - 5)$

2. $-7y(3y^4 - 7y + 3) - 6y(y^4 - 5y - 5)$

7. $3m(m + 8) + 9(5m^4 + m + 5)$

3. $-3(3x^4 + 5x) + 7x(x^4 + 3x + 4)$

8. $5c^4(-6c^4 - 3c + 4) - 8c(7c^3 + 4c)$

4. $4b(7b^4 - 9b - 2) - 3b(5b + 3)$

9. $-9w(-w + 2) - 5w(3w - 7)$

5. $9d^4(3d + 5) - 8d(3d^4 + 5d + 7)$

10. $6p(4p^4 - 5p - 6) + 3p(p^4 + 6p + 20)$

10.2 Graphing Linear Equations

In addition to graphing ordered pairs, the Cartesian plane can be used to graph the solution set for an equation. Any equation with two variables that are both to the first power is called a **linear equation**. The graph of a linear equation will always be a straight line.

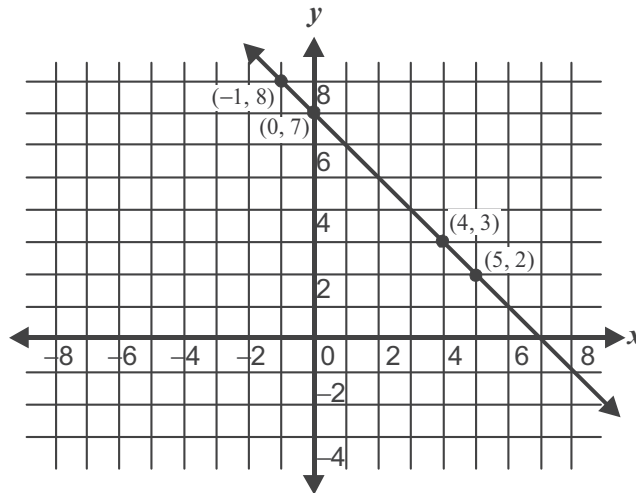
Example 2: Graph the solution set for $x + y = 7$.

Step 1: Make a list of some pairs of numbers that will work in the equation.

$$\begin{array}{l} x + y = 7 \\ 4 + 3 = 7 \quad (4, 3) \\ -1 + 8 = 7 \quad (-1, 8) \\ 5 + 2 = 7 \quad (5, 2) \\ 0 + 7 = 7 \quad 0, 7 \end{array} \left. \vphantom{\begin{array}{l} x + y = 7 \\ 4 + 3 = 7 \\ -1 + 8 = 7 \\ 5 + 2 = 7 \\ 0 + 7 = 7 \end{array}} \right\} \text{ordered pair solutions}$$

Step 2: Plot these points on a Cartesian plane.

Step 3: By passing a line through these points, we graph the solution set for $x + y = 7$. This means that every point on the line is a solution to the equation $x + y = 7$. For example, $(1, 6)$ is a solution; and therefore, the line passes through the point $(1, 6)$.



Make a table of solutions for each linear equation below. Then plot the ordered pair solutions on graph paper. Draw a line through the points. (If one of the points does not line up, you have made a mistake.)

1. $x + y = 5$

4. $x + 1 = y$

2. $y = x + 3$

5. $x - 6 = y$

3. $y = x - 1$

6. $x - y = -2$

Chapter 11 Review

- What is the equation of a line that is perpendicular to the line $3x + 2y = 6$ and passes through the point $(12, -15)$?
- What is the equation of a line that is parallel to the line $-5x + y = -4$ and passes through the point $(-1, 7)$?
- If you change the slope of the line $2x - y = 4$ to -1 , how will the graph of the line be affected?
- Paulo turns on the oven to preheat it. After one minute, the oven temperature is 250° . After 2 minutes, the oven temperature is 350° .

Oven Temperature

Minutes	Temperature
1	250°
2	350°

Assuming the oven temperature rises at a constant rate, write an equation that fits the data.

- Write an equation that fits the data given below. Assume the data is linear.

Plumber Charges per Hour

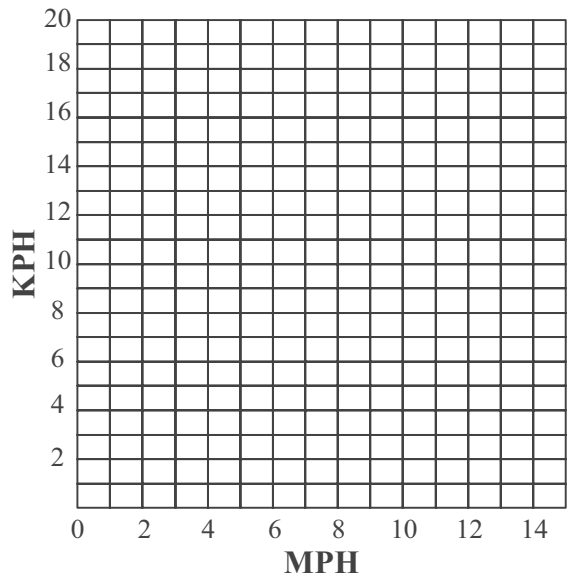
Hour	Charge
1	\$140
2	\$280

- What is the initial value in the data in question 5?
- What is the rate of change in the data in question 5?
- Rita graphs the function $y - 2x = 4$. Is the graph of the function $y = 2x - 1$ parallel to Rita's graph?

- The data given below show conversions between miles per hour and kilometers per hour. Based on this data, graph a conversion line on the Cartesian plane below.

Speed

MPH	KPH
2.5	4
7.5	12



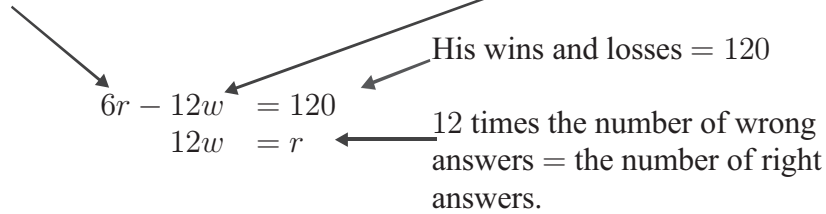
- What would be the approximate conversion of 11 mph to kph?
- What would be the approximate conversion of 8 kph to mph?
- A bicyclist travels 13 mph downhill. Approximately how many kph is the bicyclist traveling?
- What is the rate of change in question 9?
- Trent sells computers and other electronic devices for Computer Town. He receives \$400 per week and 25% of his total sales. Write a function that expresses Trent's weekly earnings. Identify the independent and dependent variables.

12.6 Solving Word Problems with Systems of Equations

Certain word problems can be solved using systems of equations.

Example 8: In a game show, Andre earns 6 points for every right answer and loses 12 points for every wrong answer. He has answered correctly 12 times as many as he has missed. His final score was 120. How many times did he answer correctly?

Step 1: Let r = number of right answers. Let w = number of wrong answers.
 We know 2 sets of information that can be made into equations with 2 variables.
 He earns +6 points for right answers and loses 12 points for wrong answers.



Step 2: Substitute the value for r ($12w$) in the first equation.

$$\begin{aligned} 6(12w) - 12w &= 120 \\ w &= 2 \end{aligned}$$

Step 3: Substitute the value for w back in the equation.

$$\begin{aligned} 6r - 12(2) &= 120 \\ r &= 24 \end{aligned}$$

Example 9: Ms. Sudberry bought pencils and stickers for her first grade class on two different days. The pencils and stickers cost the same each time she went to the store. How much did she pay for each pencil?

	Pencils	Stickers	Total Cost
Tuesday	30	40	\$47.50
Saturday	60	5	\$20.00

Step 1: Set up your two equations. Let the price of pencils equal x , and the price of stickers equal y .
 The amount of the pencils times the price of pencils (x) plus the amount of the stickers times the price of stickers (y) equals the total amount paid for both pencils and stickers.

Equation 1: $30x + 40y = \$47.50$

Equation 2: $60x + 5y = \$20.00$

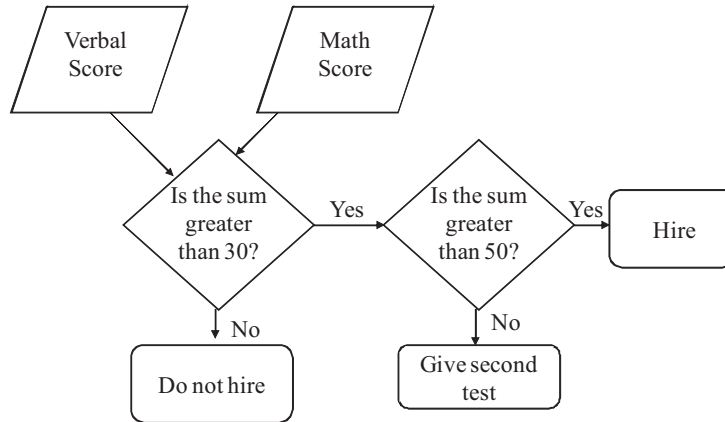
Step 2: Solve the equations by using one of the methods taught in this chapter. We will use the adding and subtracting method. First, multiply equation 1 by -2 , so x will have the same coefficient in each equation but with opposite signs.

$$-2(30x + 40y = \$47.50) = -60x - 80y = -\$95.00$$

13.7 Flow Charts

A flow chart is basically a graphical representation of a problem. A question is stated and steps are followed to arrive at a conclusion.

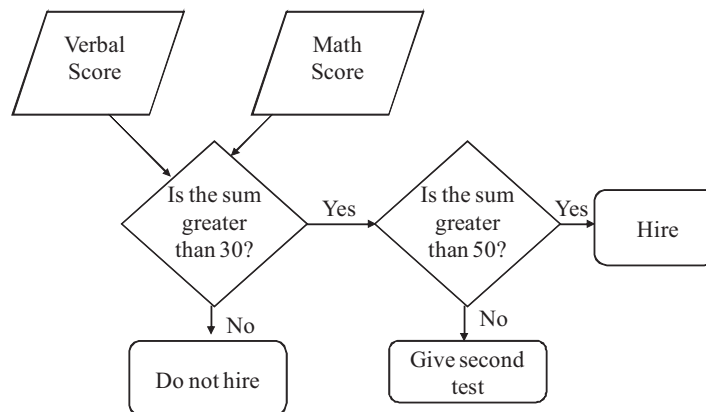
Example 11: Kathryn applied for a summer sales job at Lucky's. Her verbal score was 21, and her math score was 16. What does the flow chart tell us about Kathryn?



Step 1: First, add together Kathryn's scores.
 $21 + 16 = 37$

Step 2: Because Kathryn only received a 37, her score is greater than 30, but lower than 50. Following the flowchart, you see that she will have to take the test over again.

Use the figure below to answer questions 1 and 2.



1. Marple applied for a job at the local fast food restaurant. Her verbal score was 24 and her math score was 18. According to the flow chart, what is going to happen to Marple?
2. Sammi-Jo applied for the same job. Her verbal score was 9 and her math score was 42. What is going to happen to Sammi-Jo?

14.10 Relative Error

The **absolute error** is the absolute value of the difference between the exact value and the approximation. The **relative error** is the absolute error divided by the absolute value of the exact value.

$$\text{Absolute error} = |\text{exact value} - \text{approximation}| \quad \text{Relative error} = \frac{\text{absolute error}}{|\text{exact value}|}$$

Example 9: An atlas states that the distance between the cities of Reno and Elko is 290 miles and you estimate the distance between cities to be 300 miles. What is the relative error?

Step 1: First, find the absolute error.

$$\text{Absolute error} = |\text{exact value} - \text{approximation}| = |290 - 300| = |-10| = 10$$

Step 2: Find the relative error.

$$\text{Relative error} = \frac{\text{absolute error}}{|\text{exact value}|} = \frac{10}{290} = \frac{1}{29}$$

Complete the following table.

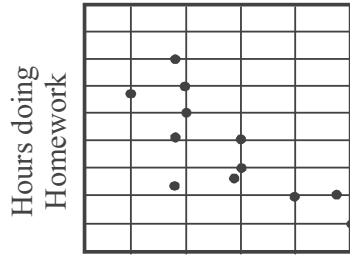
	Exact Measurement	Approximate Measurement	Absolute Error	Relative Error
1.	408 miles	400 miles	8 miles	$8 \div 408 = \frac{1}{51}$
2.	188 meters	200 meters		
3.	11.1 miles	10 miles		
4.	37 degrees	40 degrees		
5.	$\frac{5}{9}$ inch	$\frac{1}{2}$ inch		
6.	7.8 feet	8 feet		
7.	642 grams	650 grams		
8.	5.9 millimeters	6 millimeters		
9.	60 ounces	68 ounces		
10.	4,284 pounds	5,000 pounds		

15.10 Trends in Data

You've already learned how to recognize positive, negative, or no relationships from data. Now you will see and learn about **patterns**, **clusters**, and **outliers**.

Patterns can help you verbally express what you see in the relationship. If a graph has a positive relationship, then the pattern would be as one thing increases, the other increases. If the graph has a negative relationship, the pattern would state as one thing increases, the other decreases.

Example 11:

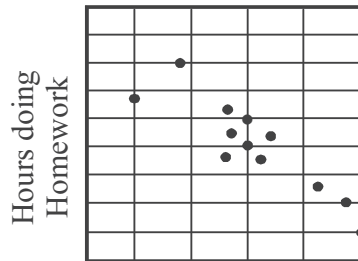


Hours Watching TV

As the number of hours spent watching TV goes up, the number of hours spent doing homework goes down. This shows a pattern. This data is also **linear**.

Clusters occur when all the data is grouped together in a certain area. There is no distinguishable pattern, just a bunch of centralized data.

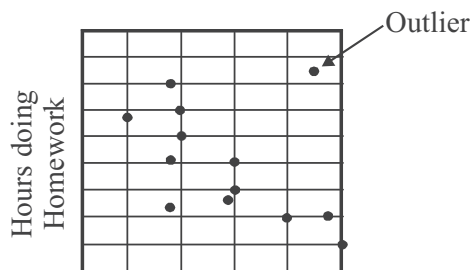
Example 12:



Hours Watching TV

Outliers are the random points on the graph that don't really fit. They are known as the extreme points. They can heavily influence the mean or the line of best fit (next section). Most of the time when computing information with data, outliers are excluded in order to limit their influence on the other data.

Example 13:



Hours Watching TV

16.10 More Combinations

Another kind of combination involves selection from several categories.

Example 12: At Joe’s Deli, you can choose from 4 kinds of bread, 5 meats, and 3 cheeses when you order a sandwich. How many different sandwiches can be made with Joe’s choices for breads, meats, and cheeses if you choose 1 kind of bread, 1 meat, and 1 cheese for each sandwich?

JOE’S SANDWICHES

<u>Breads</u>	<u>Meats</u>	<u>Cheeses</u>
White	Roast beef	Swiss
Pumpernickel	Corned beef	American
Light rye	Pastrami	Mozzarella
Whole wheat	Roast chicken	
	Roast turkey	

Solution: Multiply the number of choices in each category. There are 4 breads, 5 meats, and 3 cheeses, so $4 \times 5 \times 3 = 60$. There are 60 combinations of sandwiches.

Find the number of combinations that can be made in each of the problems below.

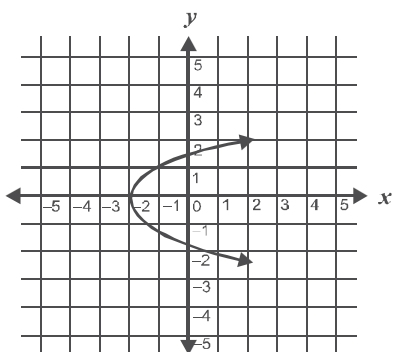
1. Drew has 10 pairs of socks, 5 shirts, and 3 pairs of tennis shoes. How many different outfit combinations can be made with Drew’s clothes?
2. Tyler has 5 baseball caps, 3 jackets, 5 pairs of jeans, and 2 pairs of sunglasses. How many combinations of the 4 items can he make?
3. Amber has 4 kinds of lipstick, 8 eye shadows, 3 kinds of lip liner, and 1 mascara. How many combinations can she use to make up her face?
4. Clarence’s dad is ordering a new car. He has a choice of 4 exterior colors, 2 interior colors, 2 kinds of seats, and 3 sound systems. How many combinations does he have to pick from?
5. A fast food restaurant has 6 kinds of sandwiches, 2 kinds of French fries, and 8 kinds of soft drinks. How many combinations of meals could you order if you ordered a sandwich, fries, and a drink?
6. In summer camp, Jake can choose from 5 outdoor activities, 2 indoor activities, and 3 water sports. He has to choose one of each. How many combinations of activities can he choose?
7. Ella won a contest at school and gets to choose one pencil and one pen from the school store and a pizza from the lunch room. There are 5 colors of pencils, 3 colors of pens, and 2 kinds of pizza. How many combinations of prize packages can she choose?

Practice Test 1

Part 1

This section is timed. You have 40 minutes to complete these 40 questions. You may use a calculator and the reference sheet on page 236.

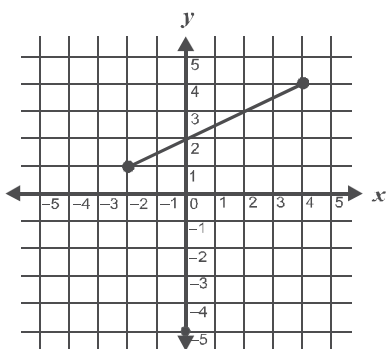
1. Does this graph represent a function?



- A yes, it passes the horizontal line test
- B yes, it passes the vertical line test
- C no, it fails the linear line test
- D no, it fails the horizontal line test
- E no, it fails the vertical line test

GLE 35

2. What is the range of the function?



- A $1 \leq x \leq 4$
- B $1 \leq y \leq 4$
- C $-2 \leq x \leq 0$
- D $-2 \leq y \leq 4$
- E $-2 \leq x \leq 4$

GLE 36

3. What is $2t - 4$ when $t = -4$?

- A 4
- B -4
- C -12
- D -8
- E 12

GLE 12

4. Which of the following measurements is most precise?

- A 2 lb
- B 40 lb
- C 7 oz
- D 0.7 lb
- E 5.1 oz

GLE 18

5. Simplify the following expression:

$$\frac{(-206) + 60 \cdot 4 + 15 \cdot (-2)}{2} =$$

- A 2
- B -2
- C 4
- D 8
- E -8

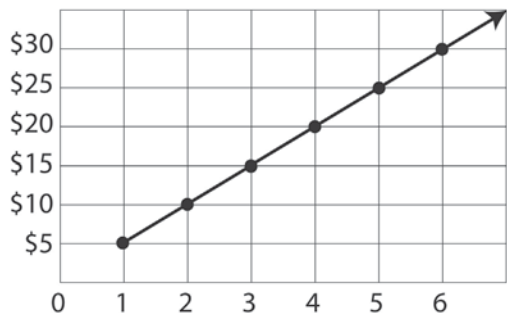
GLE 8

6. What happens to the graph of a line if the slope changes from -1 to 2 ?

- A The graph will move down 3 spaces.
- B The graph will move up 3 spaces.
- C The graph will slant downward towards the left instead of the right.
- D The graph will be less steep.
- E The graph will slant downward towards the right instead of the left.

GLE 40

36. The cost of books for the local bookstore are shown in the graph below, where the number of books is shown on the x -axis and the price is shown on the y -axis.

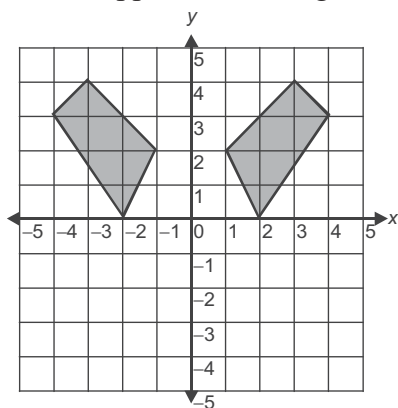


Which information from the graph will give a customer the rate of change for the cost of the books?

- A the slope
- B the origin
- C the x -intercept
- D the y -intercept
- E the change in cost

GLE 25

37. What happened to the figure below?



- A It was reflected over the y -axis.
- B It was dilated.
- C It was reflected over the x -axis.
- D It was translated 2 units to the right.
- E It was translated 2 units to the left.

GLE 26

38. Which of following is equivalent to $3y^2(9y^8)$?

- A $3y^{10}$
- B $3y^{16}$
- C $27y^{10}$
- D $27y^{16}$
- E $27y^{28}$

GLE 2

39. Lauren had a box of 48 candy bars to sell for a club fund-raiser. She sold half of the bars on her own, and her father sold half of the remaining bars at work. If no other bars were sold, what fraction of Lauren's original bars were sold?

- A $\frac{1}{3}$
- B $\frac{1}{4}$
- C $\frac{2}{3}$
- D $\frac{3}{4}$
- E 0

GLE 5

40. The local news reports that approximately 135,000 new jobs were created last year. The actual number of jobs created was most likely between

- A 135,000 and 140,000.
- B 135,000 and 137,000.
- C 132,000 and 135,000.
- D 130,000 and 140,000.
- E 130,000 and 135,000.

GLE 4

Practice Test 2

Part 1

This section is timed. You have 40 minutes to complete these 40 questions. You may use a calculator and the reference sheet on page 236.

1. Which of the following is not always a characteristic of a linear function?
- A The domain of a linear function is all real numbers.
 - B The slope of a linear function is a constant rate of change.
 - C The range of a linear function is all real numbers.
 - D The equation of a linear function contains a "y".
 - E A linear function is a straight line.

GLE 38

2. The chart below represents the population of the suburbs of a major city.

Suburb	Population
Winley	39,573
Averest	82,174
Kingsly	38,947
Bridges	41,050
Corkston	39,112
Langley	15,327
Skilsdale	37,441
Windorf	39,212
Elmhurst	40,992
Oakmont	37,621

Which suburbs represent outliers for the city?

- A Averest and Langley
- B Winley and Oakmont
- C Bridges and Corkston
- D Winley and Corkston
- E Averest and Oakmont

GLE 28

3. What is 8,127,010 written in scientific notation?

- A 8.1×10^6
- B 8.1×10^{-6}
- C 81.2701×10^5
- D 8.12701×10^{-6}
- E 8.12701×10^6

GLE 3

4. Which of the following statements is true concerning the graphs of the equations $f(x) = 2x + 4$ and $f(x) = -\frac{1}{2}x$?

- A The graphs of the equations are lines that are perpendicular to each other.
- B The graph of the line represented by the equation $f(x) = 2x + 4$ always remains above the x -axis, while the graph of the line represented by the equation $f(x) = -\frac{1}{2}x$ always remains below the x -axis.
- C The graphs of the equations are lines that are parallel to each other.
- D The graphs of the lines intersect each other at the point $(2, 0)$.
- E The graph of the line represented by the equation $f(x) = 2x + 4$ is translated four units down to become the graph of the line represented by the equation $f(x) = -\frac{1}{2}x$.

GLE 39

28. The length of Melanie's pencil measures 5 inches. Which irrational number could possibly be the length of this pencil?

- A $\sqrt{5}$
- B $\sqrt{10}$
- C $\sqrt{13}$
- D $\sqrt{26}$
- E $\sqrt{36}$

GLE 4

29. Milk is added proportionately to the flour to create more biscuit mix. What is the rate of change for this data?

Biscuit Mix	
Flour	Milk
2	0.5
6	1.5
10	2.5
14	3.5

- A $\frac{1}{2}$
- B $\frac{1}{3}$
- C $\frac{1}{4}$
- D 2
- E 4

GLE 25

30. Simplify the following expression:

$$\frac{17}{20} - \left(\frac{2}{5} + \frac{1}{4} \right)$$

- A $\frac{2}{5}$
- B $\frac{39}{100}$
- C $\frac{3}{20}$
- D $\frac{1}{5}$
- E $\frac{14}{11}$

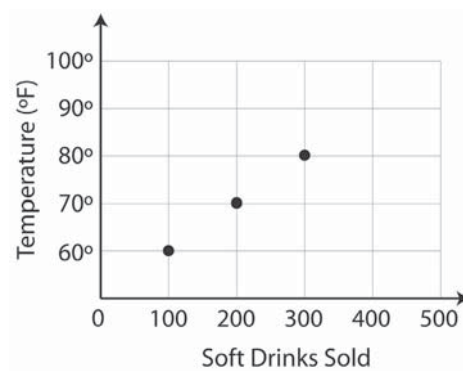
GLE 5

31. Five is multiplied by a number between 8 and 15. The answer has to be:

- A between 8 and 15
- B more than 100
- C between 40 and 75
- D between 0 and 40
- E less than 35

GLE 4

32. If this trend continues, how many soft drinks will be sold when the temperature reaches 100 degrees?



- A 400
- B 450
- C 500
- D 530
- E 550

GLE 28

33. Which box(es) contains the most rational numbers?

$\pi, \sqrt{17}$ $-\frac{3}{5}$	$-\sqrt{4}, 2^2$ 6	$\frac{5}{6}, \sqrt{49}$ 1.015	$\sqrt{16}, \sqrt{4}$ $\sqrt{3}$
Box P	Box Q	Box R	Box S

- A Box P
- B Boxes Q and R
- C Boxes R and S
- D Box S
- E Box R

GLE 1