Quantitative Reasoning, Algebra, and Statistics (QAS) ACCUPLACER REVIEW:
All items have solutions in the answer key that follows the problems. Click on a section title to jump to the corresponding answers, and vice-versa.

Problems

I. Rational Numbers

Evaluate and completely simplify each expression.

1. $\dfrac{-6-(-9)}{8}$
2. $\dfrac{8}{-3\sqrt{64}}$
3. $\dfrac{2(8-12)-11(4)}{5(-2)-3}$
4. $\dfrac{(-4)^2+2^3}{(-2)^3-4}$
5. $\dfrac{17-3^2+13}{4^2-3^2}$
6. $\dfrac{-5(3^2)+9\sqrt{4}-5}{6-5\sqrt[3]{-8}}$
7. $\dfrac{(5-(3-7))-2}{5^2-4^2\div 2}$
8. $\dfrac{-(4-(6-12)^2)}{((9\div 3)+4)^2+2^2}$
9. $\dfrac{-2(-5+3)}{2^3}-\dfrac{(-3^2+2)\cdot 3}{3-(-1)}$
10. $\dfrac{(-6+3)\cdot(-4)}{-5-1}-\dfrac{(-9+6)\cdot(-3)}{-4+3}$
11. Which of the following is equivalent to $|-11+4|$?

    (a) $-|11|+|4|$ (b) $-|11|-|4|$ (c) $|11|-|4|$ (d) $|11|+|4|$

12. $(-6-3)|-2-3|$
13. 5^{-3}
14. $\left(\dfrac{1}{2}\right)^{-4}$
15. $13\cdot 10^{-3}$
16. $0.4\div 10^{-2}$
17. $9^{1/2}$
18. $27^{2/3}$

II. Ratio and Proportional Relationships

1. There are 35 students in a certain class. 15 of the students are Psychology majors, and the rest are Sociology majors. What is the ratio of Psychology majors to Sociology majors in the class?
2. What is the number of grams in 500 kilograms? (1 kilogram = 1,000 grams)
3. It took Khalid 90 minutes to complete 40 tasks. Which of the following is an equivalent rate?

   (a) 10 tasks in 0.9 minutes
   (b) 10 tasks in 2.25 minutes
   (c) 10 tasks in 9 minutes
   (d) 10 tasks in 22.5 minutes

4. The elevation at the summit of Mount Whitney is 4,418 meters above sea level. Climbers began at a trailhead that has an elevation of 2,550 meters above sea level. What is the change in elevation, to the nearest foot, between the trailhead and the summit? (1 foot = 0.3048 meters)
5. At a certain store, the name brand peanut butter costs \$0.04 more per ounce than the store brand. If a 15-ounce jar of the name brand jar of peanut butter costs \$2.55, what is the cost per ounce of the store brand?
6. Ground coffee can be purchased in a 34-ounce container for \$9.52. What is the equivalent price per pound? (1 pound = 16 ounces)
7. Water runs from a pump at a rate of 1.5 gallons per minute. At this rate, how long would it take to fill a tub with a 150-gallon capacity?
8. Jacoby followed a recipe that requires 2 cups of water for every 3 cups of flour. If he used 8 cups of flour, how many cups of water did he use?
9. If the sales tax on a \$16.00 item is \$1.40, how much would the sales tax be on a \$120.00 item?
10. On a world globe, the distance between Rio De Janeiro and Hong Kong, two cities that are actually 17,615 kilometers apart, is 21.5 inches. The actual distance between Paris and Stockholm is 1,605 kilometers. How far apart are Paris and Stockholm on this globe?
11. If 6 pounds of grass seed covers 492 square feet, how many pounds of grass seed are needed to cover 5412 square feet?
12. The nutrition information on a box of cereal says that a 1/3 cup serving provides 120 calories. At that rate, find how many calories are in a 1/2 cup serving.

III. Exponents

Completely simplify each expression.

1. $(4x^3)^3$
2. $(x^3 \cdot x^2)^5$
3. $7k^2(-2k)^2(4k^5)$
4. $(-3x^5y^4)(-5xy^2)$
5. $(5s^5t^{-5})(-6s^{-2}t^4)$
6. $\dfrac{10x^2y^7}{5x^4y^3}$

7. $\dfrac{(3pq)^2q^2}{6p^2q^4}$
8. Expand: $(x+5)^2$
9. Expand: $\left(\dfrac{x}{3}-3y\right)^2$

IV. Algebraic Expressions

1. Which of the following expressions is 5 times as much as the sum of r and s?

   (a) $5 \cdot r + s$ (b) $5 + r + s$ (c) $r + s \cdot 5$ (d) $(r+s) \cdot 5$

2. Which of the following expressions is the 13 divided by the difference of x and y?

   (a) $13 \div x - y$ (b) $\dfrac{x-y}{13}$ (c) $\dfrac{13}{x-y}$ (d) $13 \div (x \div y)$

Completely simplify the following expressions.

3. $4(x+5)+4x+8$
4. $6m-(2m-4)$
5. $3(2y+1)-2(y-2)$
6. $8v-6(3v-1)+10(10v+3)$
7. $\dfrac{x}{3}+\dfrac{x-2}{3}+\dfrac{4x}{9}$
8. $\dfrac{2}{7}(4n+3)-\dfrac{1}{2}n$
9. $0.09x+0.13(x+300)$
10. $(2x^4-3x^2+x)+(4x^4+7x^2+6x)$
11. $(-3x^3-8x^2+4)-(x^3+7x^2-3)$
12. $(x^2-3x+7)-(2x^2-8x-4)$

V. Linear Equations

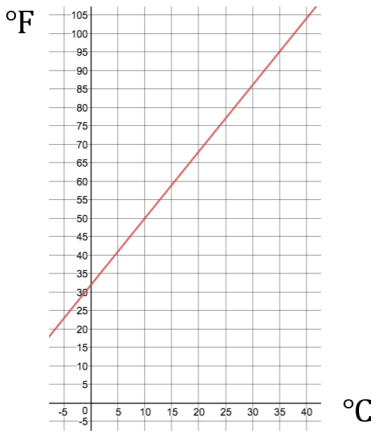
Solve the following equations and inequalities.

1. $4(3-x)+3(2-x)=6$
2. $2x+4-x=4x-5$
3. $6x-3(5x+2)=4(1-x)$
4. $5x-2[4x+3(x-1)]=8-3x$
5. $5(1-9x)+3(15x+4)=x$
6. $\dfrac{1}{2}x+\dfrac{3}{2}(x+1)-\dfrac{1}{4}=5$
7. $\dfrac{13}{6}x+\dfrac{5}{2}=\dfrac{x}{2}-2$

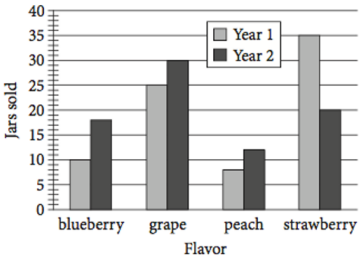
8. $\frac{3x}{2} + \frac{1}{6} = \frac{2x}{3} - \frac{2}{9}$
9. $\frac{3x}{4} + \frac{5x}{2} = 13$
10. $\frac{1}{5}(3x - 2) = \frac{3}{10}(x + 3) + 2$
11. $0.3x + 0.2(10 - x) = 0.15(30)$
12. $2x + 1 \geq 13$
13. $x - 2 < 4x + 6$
14. $4x + 3 < 5 - 2x$

VI. Linear Equations and Graphs

1. The graph below shows corresponding Celsius (°C) and Fahrenheit (°F) temperatures. When the temperature is 50(°F), what is the temperature in degrees Celsius (°C)?



2. Robert sells four different flavors of jam at an annual farmers market. The graph to the right shows the number of jars of each type of jam he sold at the market during the first two years. What flavor of jam had the greatest increase in number of jars sold from Year 1 to Year 2?



3. Which of the following points (x, y) lies on the graph of $4x - 2y = 12$?

   (a) $(1, 2)$ (b) $(1, -4)$ (c) $(-4, -2)$ (d) $(2, 1)$

4. In the $xy-$plane, a line has a slope of -3 and passes through the point $(1, 4)$. Write the equation of the line in slope-intercept $(y = mx + b)$ form.

5. In the $xy-$plane, a line crosses the $y-$axis at the point $(0, 3)$ and passes through the point $(4, 5)$. Write the equation of the line in slope-intercept $(y = mx + b)$ form.

6. In the $xy-$plane, a line passes through the points $(-2, 1)$ and $(3, -6)$. Write the equation of the line in slope-intercept $(y = mx + b)$ form.

7. The amount of money, M, in dollars, Paul earns can be represented by the equation $M = 12.5h + 11$, where h in the number of hours Paul works. Which of the following is the best interpretation of the number 11 in the equation?

   (a) The amount of money, in dollars, Paul earns each hour.

   (b) The total amount of money, in dollars, Paul earns after working for h hours.

   (c) The total amount of money, in dollars, Paul earns after working for one hour.

   (d) The amount of money, in dollars, Paul earns in addition to an hourly wage.

8. The cost to attend a concert is \$76 per ticket. In addition, a processing fee of \$5 per ticket is charged at the time of purchase. Which of the following represents the total cost, in dollars, of the concert for t tickets?

   (a) $76t + 5$ (b) $5t + 76$ (c) $81t$ (d) $380t$

9. The two lines given by the equations $3x - 2y = 15$ and $x = 3$ intersect in the $xy-$plane. What is the value of the $y-$coordinate of the point of intersection?

10. Suppose that one particular soccer field has a perimeter of 320 yards. Its length measures 40 yards more than its width. What is the width of this field?

11. Tickets to a concert at Lake Sumter Community College cost \$5 for General Admission or \$4 with a student ID. If 32 more student tickets were sold than general admission tickets and \$812 was collected, how many general admission tickets were sold?

12. The perimeter of a certain rectangle is 32 feet. If the length of the rectangle is 4 feet less than the width, find the area of the rectangle.

VII. Probability and Sets

1. The table at right shows a survey of 50 registered voters in a city. Each voter was asked whether they planned to vote "yes" or "no" on two different issues. If a voter who plans to vote "yes" on issue P is randomly selected, what is the probability that voter also plans to vote "yes" on issue Q?

	Plans to vote "yes" on issue Q	Plans to vote "no" on issue Q	Total
Plans to vote "yes" on issue P	8	12	20
Plans to vote "no" on issue P	14	16	30
Total	22	28	50

2. Suppose you draw one ball at random from a box that contains 4 red balls numbered 1, 2, 3, 4, and 3 green balls numbered 5, 6, 7. Find the probability that it is neither green nor odd.

3. Suppose you draw one ball at random from a box that contains 4 red balls numbered 1, 2, 3, 4, and 3 green balls numbered 5, 6, 7. If an even-numbered ball is selected, find the probability that it is green.

4. A bag contains 10 red marbles, 10 blue marbles, 10 yellow marbles, and 10 green marbles. What is the probability of randomly choosing 2 blue marbles, without replacement?

5. A bag contains 10 red marbles, 10 blue marbles, 10 yellow marbles, and 10 green marbles. What is the probability of randomly choosing 2 marbles of the same color, without replacement?

6. Sets L and M are given as: $L = \{0, 20, 40, 80, 100\}$ and $M = \{5, 10, 15, 20, 25\}$. Describe the set which represents $L \cap M$ (the intersection of L and M).

7. Sets L and M are given as: $L = \{0, 20, 40, 80, 100\}$ and $M = \{5, 10, 15, 20, 25\}$. Describe the set which represents $L \cup M$ (the union of L with M).

8. Sets L, M, and N are given as: $L = \{0, 20, 40, 80, 100\}$, $M = \{5, 10, 15, 20, 25\}$, and $N = \{10, 20, 30, 40, 50\}$. Describe the set which represents $L \cup (M \cap N)$ (the union of L with the intersection of M and N).

VIII. Descriptive Statistics

1. Find the mean of the data set $\{10, 7, 12, 3, 11, 7, 6\}$.

2. The mean of data set A is 3. If data set B is $\{1, 2, 4, 4, 7\}$, what is the difference between the mean of data set A and data set B?

3. Consider a set of three numbers x, y, and z, where $x < y < z$. If the mean is 50, and if $y = 30$, what is the smallest possible value of z?

4. The table gives the population of the 5 largest countries in the European Union in the year 2014. What is the mean population of these countries.

Country	Approximate population (millions)
France	65.9
Germany	80.8
Italy	60.8
Spain	46.5
United Kingdom	64.3

5. Find the range of the data set $\{10, 7, 12, 3, 11, 7, 6\}$.

6. Find the median of the data set $\{10, 7, 12, 3, 11, 7, 6\}$.

7. The box plot below summarizes a data set. Find the range of this data set.

IX. Geometry Concepts

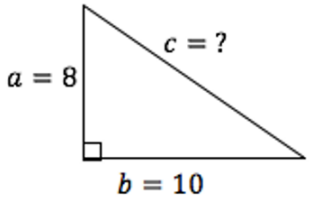
1. The volume of a right rectangular prism is found by multiplying the length of the base by the width of the base by the height of the prism. A right rectangular prism has a volume of 30 cubic inches. If the height of the prism is 6 inches, what is the area of the base of the prism?

2. The area of a triangular sail of a sailboat is 126 ft^2. The base of the sail is 12 ft. Find the height of the sail.

3. Find the area of the circle with diameter 12 cm.

4. A square chess board has perimeter 34 inches. What is the length of each side?

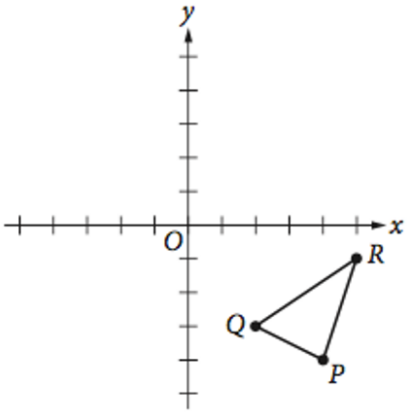
5. Use the Pythagorean Theorem to find the missing side length of the right triangle below.



6. What is the measure of a diagonal of a rectangle that has width 20 m and length 21 m?

7. What is the measure of a diagonal of a rectangle that has width w and length 4?

8. Triangle PQR lies in the $xy-$plane, and the coordinates of vertex Q are $(2, -3)$ (see figure below). Triangle PQR is rotated 180° clockwise about the origin and then reflected across the $y-$axis to produce triangle $P'Q'R'$, where vertex Q' corresponds to vertex Q of triangle PQR. What are the coordinates of Q'?



Answers

I. Rational Numbers

1. $\frac{3}{8}$
2. $-\frac{1}{3}$
3. 4
4. -2
5. 3
6. -2
7. $\frac{7}{17}$
8. $\frac{32}{53}$
9. $\frac{23}{4}$
10. 7
11. (c) $|11| - |4|$
12. -45
13. $\frac{1}{125}$
14. 16
15. 0.013
16. 40
17. 3
18. 9

II. Ratio and Proportional Relationships

1. 3 : 4 or $\frac{3}{4}$
2. 500,000 grams
3. (d) 10 tasks in 22.5 minutes
4. 6,129 feet
5. \$0.13 per ounce
6. \$4.48 per pound
7. 100 minutes

II. Ratio and Proportional Relationships (cont.)

8. $5\frac{1}{3}$ cups of water
9. \$10.50
10. Approximately 1.96 inches
11. 66 pounds
12. 180 calories

III. Exponents

1. $64x^9$
2. x^{25}
3. $112k^9$
4. $15x^6y^6$
5. $\frac{-30s^3}{t}$
6. $\frac{2y^4}{x^2}$
7. $\frac{3}{2}$
8. $x^2 + 10x + 25$
9. $\frac{x^2}{9} - 2xy + 9y^2$

IV. Algebraic Expressions

1. (d) $(r + s) \cdot 5$
2. (c) $\frac{13}{x - y}$
3. $8x + 28$
4. $4m + 4$
5. $4y + 7$
6. $90v + 36$
7. $\frac{10x - 6}{9}$
8. $\frac{9}{14}n + \frac{6}{7}$

IV. Algebraic Expressions (cont.)

9. $0.22x + 39$
10. $6x^4 + 4x^2 + 7x$
11. $-4x^3 - 15x^2 + 7$
12. $-x^2 + 5x + 11$

V. Linear Equations

1. $x = \frac{12}{7}$
2. $x = 3$
3. $x = -2$
4. $x = -\frac{1}{3}$
5. $x = 17$
6. $x = \frac{15}{8}$
7. $x = -\frac{27}{10}$
8. $x = -\frac{7}{15}$
9. $x = 4$
10. $x = 11$
11. $x = 25$
12. $x \geq 6$
13. $x > -\frac{8}{3}$
14. $x < \frac{1}{3}$

VI. Linear Applications and Graphs

1. 10°C
2. blueberry
3. (b) $(1, -4)$
4. $y = -3x + 7$
5. $y = \frac{1}{2}x + 3$
6. $y = -\frac{7}{5}x - \frac{9}{5}$

VI. Linear Applications and Graphs (cont.)

7. (d) The amount of money, in dollars, Paul earns in addition to an hourly wage.
8. (c) $81t$
9. $y = -3$
10. width = 60 yards
11. 76 general admission tickets
12. Area = 60 square feet

VII. Probability and Sets

1. $P = 0.4$
2. $P = \frac{2}{7}$
3. $P = \frac{1}{3}$
4. $P = \frac{3}{52}$
5. $P = \frac{3}{13}$
6. $L \cap M = \{20\}$
7. $L \cup M = \{0, 5, 10, 15, 20, 25, 40, 80, 100\}$
8. $L \cup (M \cap N) = \{0, 10, 20, 40, 80, 100\}$

VIII. Descriptive Statistics

1. mean = 8
2. 0.6
3. $z = 91$
4. 63.66 million
5. range = 9
6. median = 7
7. range = 20

IX. Geometry Concepts

1. Area of the base = 5 square inches
2. 21 feet
3. Area = 36π cm^2 $\approx$ 113.097 cm^2
4. 8.5 inches
5. $c = \sqrt{8^2 + 10^2} \approx 12.8$
6. Diagonal = 29 m
7. Diagonal = $\sqrt{w^2 + 16}$
8. $(2, 3)$