ACCUPLACER® CollegeBoard

NEXT-GENERATION

Quantitative Reasoning, Algebra, and Statistics

Sample Questions

The College Board

The College Board is a mission-driven not-for-profit organization that connects students to college success and opportunity. Founded in 1900, the College Board was created to expand access to higher education. Today, the membership association is made up of over 6,000 of the world's leading education institutions and is dedicated to promoting excellence and equity in education. Each year, the College Board helps more than seven million students prepare for a successful transition to college through programs and services in college readiness and college success — including the SAT® and the Advanced Placement Program®. The organization also serves the education community through research and advocacy on behalf of students, educators, and schools

For further information, visit **collegeboard.org**.

ACCUPLACER Quantitative Reasoning, Algebra, and Statistics Sample Questions

The Next-Generation Quantitative Reasoning, Algebra, and Statistics placement test is a computer adaptive assessment of test-takers' ability for selected mathematics content. Questions will focus on a range of topics including computing with rational numbers, applying ratios and proportional reasoning, creating linear expressions and equations, graphing and applying linear equations, understanding probability and set notation, and interpreting graphical displays. In addition, questions may assess a student's math ability via computational or fluency skills, conceptual understanding, or the capacity to apply mathematics presented in a context. All questions are multiple choice in format and appear discretely (stand alone) across the assessment. The following knowledge and skill categories are assessed:

- Rational numbers
- Ratio and proportional relationships
- Exponents
- Algebraic expressions
- Linear equations
- Linear applications
- Probability and sets
- Descriptive statistics
- Geometry concepts

© 2017 The College Board. College Board, ACCUPLACER, and the acorn logo are registered trademarks of the College Board.
00716-019

Sample Questions

Choose the best answer. If necessary, use the paper you were given.

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

   A. $5 \times r + s$
   B. $5 + r + s$
   C. $r + s \times 5$
   D. $(r + s) \times 5$

2. What is the solution to the equation $\frac{1}{2}x + \frac{3}{2}(x+1) - \frac{1}{4} = 5$?

   A. $\frac{5}{2}$

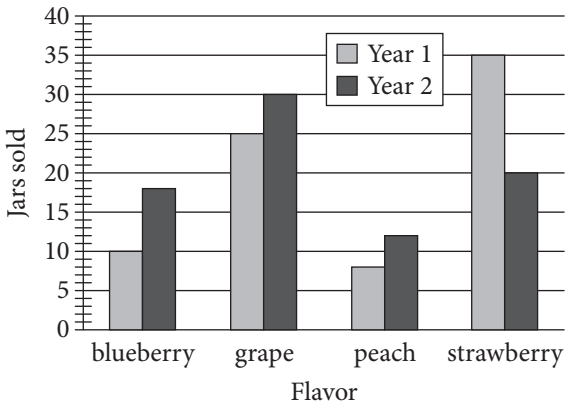
   B. $\frac{13}{8}$

   C. $\frac{15}{8}$

   D. $\frac{17}{8}$

3. What is the number of grams in 500 kilograms? (1 kilogram = 1,000 grams)

   A. 0.5
   B. 5,000
   C. 50,000
   D. 500,000

4. 

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

   A. Blueberry
   B. Grape
   C. Peach
   D. Strawberry

5. In the xy-plane, a line crosses the y-axis at the point (0, 3) and passes through the point (4, 5). Which of the following is an equation of the line?

   A. $y = \frac{1}{2}x + 3$

   B. $y = 2x + 3$

   C. $y = \frac{1}{2}x - 4$

   D. $y = 2x - 4$

6. The amount of money M, in dollars, Paul earns can be represented by the equation $M = 12.5h + 11$, where h is 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

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

   The table gives the population of the 5 largest countries in the European Union in the year 2014. Which of the following is closest to the mean population of these countries?

   A. 80.8 million
   B. 64.3 million
   C. 63.7 million
   D. 60.8 million

© 2017 The College Board.

8. Which of the following fractions is equivalent to $\frac{-6-(-9)}{8}$?

   A. $-\frac{3}{8}$

   B. $\frac{3}{8}$

   C. $-\frac{15}{8}$

   D. $\frac{15}{8}$

9. 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?

   A. 10 minutes
   B. 100 minutes
   C. 225 minutes
   D. 2,250 minutes

10. 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?

    A. 5 square inches
    B. 24 square inches
    C. 36 square inches
    D. 180 square inches

11. 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?

    A. $2\frac{2}{3}$

    B. 4

    C. $5\frac{1}{3}$

    D. 12

12. $4(x + 5) + 4x + 8$

    Which of the following is equivalent to the expression above?

    A. $4(2x + 7)$
    B. $8(x + 4)$
    C. $5x + 17$
    D. $8x + 13$

13. 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

14.

	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

    The table above 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?

    A. 0.16
    B. 0.36
    C. 0.40
    D. 0.67

15. Which of the following values is equivalent to 5^{-3}?

    A. $\frac{1}{15}$

    B. $\frac{1}{125}$

    C. –15

    D. –125

16. Which of the following expressions is equivalent to $(x^3 \cdot x^2)^5$?

    A. x^{10}
    B. x^{15}
    C. x^{25}
    D. x^{30}

© 2017 The College Board.

17. The elevation at the summit of Mount Whitney is 4,418 meters above sea level. Climbers begin 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)

A. 569 feet
B. 5,604 feet
C. 6,129 feet
D. 14,495 feet

18. $3x - 2y = 15$
$x = 3$

The two lines given by the equations above intersect in the xy-plane. What is the value of the y-coordinate of the point of intersection?

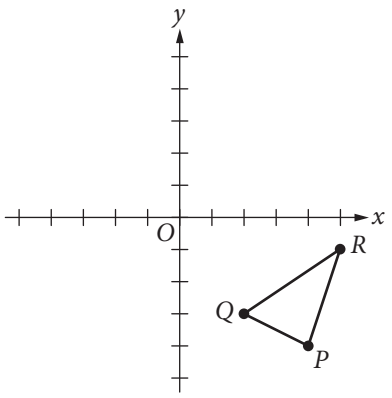
A. –7
B. –3
C. 3
D. 7

19. $L = \{0, 20, 40, 80, 100\}$
$M = \{5, 10, 15, 20, 25\}$
$N = \{10, 20, 30, 40, 50\}$

Sets L, M, and N are shown above. Which of the following sets represents $L \cup (M \cap N)$ (the union of L with the intersection of sets M and N)?

A. {0, 5, 10, 15, 20, 25, 30, 40, 50, 80, 100}
B. {0, 10, 20, 40, 80, 100}
C. {20, 40}
D. {20}

20.



Triangle PQR lies in the xy-plane, and the coordinates of vertex Q are (2, –3). 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'?

A. (–3, –2)
B. (3, –2)
C. (–2, 3)
D. (2, 3)

© 2017 The College Board.

Answer Key

1. D

2. C

3. D

4. A

5. A

6. D

7. C

8. B

9. B

10. A

11. C

12. A

13. D

14. C

15. B

16. C

17. C

18. B

19. B

20. D

© 2017 The College Board.

Rationales

1. **Choice D is correct.** The order of operations was used properly to write the expression. The sum of r and s in parentheses is found first, then multiplication is used to find the number that is 5 times the sum of r and s. Choice A is incorrect because this is the sum of s and 5 times as much as r. Choice B is incorrect because this is the sum of 5, r, and s. Choice C is incorrect because this is the sum of r and 5 times as much as s.

2. **Choice C is correct.** The equation $\frac{1}{2}x+\frac{3}{2}(x+1)-\frac{1}{4}=5$ can be rewritten as $\frac{1}{2}x+\frac{3}{2}x+\frac{3}{2}-\frac{1}{4}=5$, which simplifies to $2x=5+\frac{1}{4}-\frac{3}{2}=\frac{15}{4}$. Therefore, $x=\frac{15}{4}\div 2=\frac{15}{8}$. Choice A is incorrect because if x were equal to $\frac{5}{2}$, then $\frac{1}{2}x+\frac{3}{2}(x+1)-\frac{1}{4}$ would equal $\frac{1}{2}\left(\frac{5}{2}\right)+\frac{3}{2}\left(\frac{5}{2}+1\right)-\frac{1}{4}$, which is equal to $\frac{25}{4}$, not 5. Choice B is incorrect because if x were equal to $\frac{13}{8}$, then $\frac{1}{2}x+\frac{3}{2}(x+1)-\frac{1}{4}$ would equal $\frac{1}{2}\left(\frac{13}{8}\right)+\frac{3}{2}\left(\frac{13}{8}+1\right)-\frac{1}{4}$, which is equal to $\frac{9}{2}$, not 5. Choice D is incorrect because if x were equal to $\frac{17}{8}$, then $\frac{1}{2}x+\frac{3}{2}(x+1)-\frac{1}{4}$ would equal $\frac{1}{2}\left(\frac{17}{8}\right)+\frac{3}{2}\left(\frac{17}{8}+1\right)-\frac{1}{4}$, which is equal to $\frac{11}{2}$, not 5.

3. **Choice D is correct.** To convert from kilograms to grams, multiply $500\text{ kg}\times\frac{1{,}000\text{ g}}{1\text{ kg}}$, which results in $500{,}000$ grams. Choice A is incorrect because 0.5 is the number of kilograms in 500 grams. Choice B is incorrect because $5{,}000$ grams is equal to 5 kilograms, not 500 kilograms. Choice C is incorrect because $50{,}000$ grams is equal to 50 kilograms, not 500 kilograms.

4. **Choice A is correct.** The graph shows that he sold 10 jars of blueberry jam the first year and 18 the second year, for an increase of 8 jars. This is the largest increase of any of the flavors. Choice B is incorrect. This is the jam he sold the most of, but it is not the largest increase. Choice C is incorrect. He sold more peach jam the second year, but his sales increased by only 4, which is less than the increase for blueberry. Choice D is incorrect. He sold less strawberry jam the second year, not more.

5. **Choice A is correct.** An equation in the form $y=ax+b$ has a slope of a and a y-intercept of b. The line described has a y-intercept of 3 because it crosses the y-axis at $y=3$ and has a slope of $\frac{1}{2}$ because the value of y increases by 1 for every x increase of 2. Therefore, an equation of the line is $y=\frac{1}{2}x+3$. Choice B is incorrect. The line described does not have a slope of 2. Choice C is incorrect. The line described does not have a y-intercept of -4. Choice D is incorrect. The line described does not have a slope of 2 or a y-intercept of -4.

6. **Choice D is correct.** Paul earns $\$12.50$ per hour, so the number of hours, h, is multiplied by 12.5. Paul earns $\$11$ in addition to how much he works per hour, which is why it is added to the product $12.5h$ and is independent of how many hours Paul works. Choice A is incorrect because it is what 12.5 represents in the equation. Choice B is incorrect because it is what M stands for in the equation. Choice C is incorrect because substituting 1 into the equation gives $12.5+11=23.5$.

© 2017 The College Board.

7. **Choice C is correct.** To find the mean, find the total population of all 5 countries and divide by the total number of countries: $65.9 + 80.8 + 60.8 + 46.5 + 64.3 = 318.3$ and $318.3 \div 5 = 63.66$, which rounds to 63.7. The values in the table are given in millions, so the mean population is about 63.7 million. Choice A is incorrect. It is the maximum of the values given. Choice B is incorrect. It is the median population. Choice D is incorrect. It is the middle value in the table.

8. **Choice B is correct.** The fraction $\frac{-6-(-9)}{8} = \frac{-6+9}{8}$, which is equivalent to $\frac{3}{8}$. Choices A, C, and D are incorrect because they use incorrect order of operations and/or do not take into account that subtracting -9 is the same as adding 9.

9. **Choice B is correct.** The time it would take to fill the tub can be found by dividing the number of gallons the tub can hold by the rate the water runs from the pump. This is represented by $150 \text{ gallons} \div 1.5 \text{ gallons per minute} = 100$. Choice A is incorrect and may be the result of dividing 150 by 15. Choice C is incorrect and may be the result of multiplying 150 by 1.5. Choice D is incorrect and may be the result of multiplying 150 by 15.

10. **Choice A is correct.** Volume of a right rectangular prism is equal to the area of the base times the height. Since the height is known, divide the volume by height to find the area of the base. This is represented by $30 \div 6 = 5$. Choice B is incorrect because this is the result of subtracting 6 from 30 instead of dividing. Choice C is incorrect because this is the result of adding 6 to 30 instead of dividing. Choice D is incorrect because this is the result of multiplying 6 and 30 instead of dividing.

11. **Choice C is correct.** The ratio of water to flour is $\frac{2}{3}$. Since there were 8 cups of flour used, the expression $8 \times \frac{2}{3}$ can be used to determine the amount of water used, which is $5\frac{1}{3}$. Choice A is incorrect because this is the number of 3-cup "units" of flour that Jacoby used: $8 \div 3 = 2\frac{2}{3}$. Choice B is incorrect because this would be the amount of water necessary if 6 cups of flour were used, not 8. Choice D is incorrect because this results from using a ratio of 2 cups of flour to 3 cups of water.

12. **Choice A is correct.** The expression $4(x+5)+4x+8$ can be expanded to $4x+20+4x+8$, which is equivalent to $8x+28$. Since 4 can be factored from each term in this expression, it can be rewritten as $4(2x+7)$. Choice B is incorrect because it expands to $8x+32$, which is not equivalent to $4(x+5)+4x+8$. Choice C is incorrect because it is equivalent to $4+(x+5)+4x+8$ rather than $4(x+5)+4x+8$. Choice D is incorrect because the 4 was not distributed through the expression in parentheses properly.

13. **Choice D is correct.** Ninety minutes to complete 40 tasks is an average rate of 2.25 minutes per task (90 minutes ÷ 40 tasks). Multiplying this rate by 10 gives the average number of tasks Khalid completed every 10 minutes ($2.25 \times 10 = 22.5$). Choice A is incorrect and is most likely the result of incorrectly dividing 10 by 90. Choice B is incorrect because it is the average number of minutes it took Khalid to complete one task. Choice C is incorrect because it is equivalent to $90 \div 10$.

14. **Choice C is correct.** There are 8 voters who plan to vote "yes" on both issues. There are 20 voters who plan to vote "yes" on issue P. This is represented by $8 \div 20 = 0.4$. Choice A is incorrect. This is the probability that a voter plans to vote "yes" on both issues. Choice B is incorrect. This is the probability that a voter plans to vote "yes" on P, given that he or she plans to vote "yes" on Q. Choice D is incorrect. This is the number of voters who plan to vote "yes" on both issues divided by the number of voters who plan to vote "yes" on P and "no" on Q.

© 2017 The College Board.

15. **Choice B is correct.** The expression 5^{-3} can be rewritten as $\frac{1}{5^3}$, which is equal to $\frac{1}{5\times5\times5} = \frac{1}{125}$. Choices A, C, and D are incorrect because they are not equivalent to 5^{-3}. Choice A is the value of $\frac{1}{5\times3}$, choice C is the value of $5\times(-3)$, and choice D is the value of $(-5)^3$.

16. **Choice C is correct.** Using the rules of exponents, $(x^3 \cdot x^2)^5$ can be rewritten as $\left(x^{(3+2)}\right)^5 = \left(x^5\right)^5 = x^{5\times5} = x^{25}$. Choices A, B, and D are incorrect and may be the result of not following the proper rules of exponents.

17. **Choice C is correct.** The difference between the elevations is $4{,}418 - 2{,}550 = 1{,}868$ meters. Since each meter is 0.3048 of a foot, divide the change of elevation in meters by the conversion factor to find the number of feet ($1{,}868 \div 0.3048 \approx 6{,}129$). Choice A is incorrect. This is the result of multiplying by the conversion factor instead of dividing. Choice B is incorrect. This is the result of multiplying $1{,}868$ by 3 (perhaps figuring that there are 3 feet in a yard and a meter is similar to a yard). Choice D is incorrect. This is the elevation of the summit in feet.

18. **Choice B is correct.** Substituting 3 for x in the first equation gives $3(3) - 2y = 15$. This simplifies to $9 - 2y = 15$. Subtracting 9 from both sides of $9 - 2y = 15$ gives $-2y = 6$. Finally, dividing both sides of $-2y = 6$ by -2 gives $y = -3$. Choice A is incorrect because $3(3) - 2(-7)$ does not equal 15. Choice C is incorrect because $3(3) - 2(3)$ does not equal 15. Choice D is incorrect because $3(3) - 2(7)$ does not equal 15.

19. **Choice B is correct.** The intersection of sets M and N is all the numbers that appear in both of the sets, so $M \cap N = \{10, 20\}$. The union of this and L is all the numbers that are in this set or in set L, therefore $L \cup (M \cap N) = \{0, 10, 20, 40, 80, 100\}$. Choice A is incorrect. This is the union of all three sets given. Choice C is incorrect. This is $L \cap (M \cup N)$. Choice D is incorrect. This is the intersection of all three sets.

20. **Choice D is correct.** When triangle PQR is rotated $180°$ clockwise about the origin $(0, 0)$, point Q is translated from $(2, -3)$ to $(-2, 3)$ in the xy-plane. Then, after the triangle is reflected, or flipped, across the y-axis, point Q is translated from $(-2, 3)$ to $(2, 3)$. Choice A is incorrect because it represents the location of point Q' after only a reflection across the y-axis. Choice B is incorrect and may be the result of a misunderstanding of a rotation about the origin. Choice C is incorrect because it represents the location of point Q′ after only the rotation.

© 2017 The College Board.