

BASIC ALGEBRA

1. If Lynn can type a page in p minutes, what piece of the page can she do in 5 minutes?

- A. $5/p$
- B. $p - 5$
- C. $p + 5$
- D. $p/5$
- E. $1 - p + 5$

2. If Sally can paint a house in 4 hours, and John can paint the same house in 6 hours, how long will it take for both of them to paint the house together?

- A. 2 hours and 24 minutes
- B. 3 hours and 12 minutes
- C. 3 hours and 44 minutes
- D. 4 hours and 10 minutes
- E. 4 hours and 33 minutes

3. Employees of a discount appliance store receive an additional 20% off of the lowest price on an item. If an employee purchases a dishwasher during a 15% off sale, how much will he pay if the dishwasher originally cost \$450?

- A. \$280.90
- B. \$287
- C. \$292.50
- D. \$306
- E. \$333.89

4. The sales price of a car is \$12,590, which is 20% off the original price. What is the original price?

- A. \$14,310.40
- B. \$14,990.90
- C. \$15,290.70
- D. \$15,737.50
- E. \$16,935.80

5. Solve the following equation for A : $2A/3 = 8 + 4A$

- A. -2.4
- B. 2.4
- C. 1.3
- D. -1.3
- E. 0

6. If Leah is 6 years older than Sue, and John is 5 years older than Leah, and the total of their ages is 41. Then how old is Sue?

- A. 8
- B. 10
- C. 14
- D. 19
- E. 21

7. Alfred wants to invest \$4,000 at 6% simple interest rate for 5 years. How much interest will he receive?

- A. \$240
- B. \$480
- C. \$720
- D. \$960
- E. \$1,200

8. Jim is able to sell a hand-carved statue for \$670 which was a 35% profit over his cost. How much did the statue originally cost him?

- A. \$496.30
- B. \$512.40
- C. \$555.40
- D. \$574.90
- E. \$588.20

9. The city council has decided to add a 0.3% tax on motel and hotel rooms. If a traveler spends the night in a motel room that costs \$55 before taxes, how much will the city receive in taxes from him?

- A. 10 cents
- B. 11 cents
- C. 15 cents
- D. 17 cents
- E. 21 cents

10. A student receives his grade report from a local community college, but the GPA is smudged. He took the following classes: a 2 hour credit art, a 3 hour credit history, a 4 hour credit science course, a 3 hour credit mathematics course, and a 1 hour science lab. He received a "B" in the art class, an "A" in the history class, a "C" in the science class, a "B" in the mathematics class, and an "A" in the science lab. What was his GPA if the letter grades are based on a 4 point scale? (A=4, B=3, C=2, D=1, F=0)

- A. 2.7
- B. 2.8
- C. 3.0
- D. 3.1
- E. 3.2

11. Simon arrived at work at 8:15 A.M. and left work at 10:30 P.M. If Simon gets paid by the hour at a rate of \$10 and time and $\frac{1}{2}$ for any hours worked over 8 in a day. How much did Simon get paid?

- A. \$120.25
- B. \$160.75
- C. \$173.75
- D. \$180
- E. \$182.50

12. Grace has 16 jellybeans in her pocket. She has 8 red ones, 4 green ones, and 4 blue ones. What is the minimum number of jellybeans she must take out of her pocket to ensure that she has one of each color?

- A. 4
- B. 8
- C. 12
- D. 13
- E. 16

13. If $r = 5z$ then $15z = 3y$, then $r =$

- A. y
- B. $2y$
- C. $5y$
- D. $10y$
- E. $15y$

14. If 300 jellybeans cost you x dollars. How many jellybeans can you purchase for 50 cents at the same rate?

- A. $150/x$
- B. $150x$
- C. $6x$
- D. $1500/x$
- E. $600x$

15. Lee worked 22 hours this week and made \$132. If she works 15 hours next week at the same pay rate, how much will she make?

- A. \$57
- B. \$90
- C. \$104
- D. \$112
- E. \$122

Advanced Algebra

1. If the average of three numbers is V . If one of the numbers is Z and another is Y , what is the remaining number?

- A. $ZY - V$
- B. $Z/V - 3 - Y$
- C. $Z/3 - V - Y$
- D. $3V - Z - Y$
- E. $V - Z - Y$

2. Two cyclists start biking from a trail's start 3 hours apart. The second cyclist travels at 10 miles per hour and starts 3 hours after the first cyclist who is traveling at 6 miles per hour. How much time will pass before the second cyclist catches up with the first from the time the second cyclist started biking?

- A. 2 hours
- B. $4\frac{1}{2}$ hours
- C. $5\frac{3}{4}$ hours
- D. 6 hours
- E. $7\frac{1}{2}$ hours

3. Jim can fill a pool carrying buckets of water in 30 minutes. Sue can do the same job in 45 minutes. Tony can do the same job in $1\frac{1}{2}$ hours. How quickly can all three fill the pool together?

- A. 12 minutes
- B. 15 minutes
- C. 21 minutes
- D. 23 minutes
- E. 28 minutes

4. Mary is reviewing her algebra quiz. She has determined that one of her solutions is incorrect. Which one is it?

- A. $2x + 5(x-1) = 9, x = 2$
- B. $p - 3(p-5) = 10, p = 2.5$
- C. $4y + 3y = 28, y = 4$
- D. $5w + 6w - 3w = 64, w = 8$
- E. $t - 2t - 3t = 32, t = 8$

5. What simple interest rate will Susan need to secure to make \$2,500 in interest on a \$10,000 principal over 5 years?

- A. 4%
- B. 5%
- C. 6%
- D. 7%
- E. 8%

6. Which of the following is not a rational number?

- A. -4
- B. $\frac{1}{5}$
- C. 0.8333333...
- D. 0.45
- E. $\sqrt{2}$

7. A study reported that in a random sampling of 100 women over the age of 35 showed that 8 of the women were married 2 or more times. Based on the study results, how many women in a group of 5,000 women over the age of 35 would likely be married 2 or more times?

- A. 55
- B. 150
- C. 200
- D. 400
- E. 600

8. John is traveling to a meeting that is 28 miles away. He needs to be there in 30 minutes. How fast does he need to go to make it to the meeting on time?

- A. 25 mph
- B. 37 mph
- C. 41 mph
- D. 49 mph
- E. 56 mph

9. If Steven can mix 20 drinks in 5 minutes, Sue can mix 20 drinks in 10 minutes, and Jack can mix 20 drinks in 15 minutes, how much time will it take all 3 of them working together to mix the 20 drinks?

- A. 2 minutes and 44 seconds
- B. 2 minutes and 58 seconds
- C. 3 minutes and 10 seconds
- D. 3 minutes and 26 seconds
- E. 4 minutes and 15 seconds

10. If Sam can do a job in 4 days that Lisa can do in 6 days and Tom can do in 2 days, how long would the job take if Sam, Lisa, and Tom worked together to complete it?

- A. 0.8 days
- B. 1.09 days
- C. 1.23 days
- D. 1.65 days
- E. 1.97 days

Answers and Explanations

Basic Algebra

- 1. A:** The following proportion may be written: $1/p = x/5$. Solving for the variable, x , gives $xp = 5$, where $x = 5/p$. So, Lynn can type $5/p$ pages, in 5 minutes.
- 2. A:** Sally can paint $1/4$ of the house in 1 hour. John can paint $1/6$ of the same house in 1 hour. In order to determine how long it will take them to paint the house, when working together, the following equation may be written: $1/4 x + 1/6 x = 1$. Solving for x gives $5/12 x = 1$, where $x = 2.4$ hours, or 2 hours, 24 minutes.
- 3. D:** Sale Price = $\$450 - 0.15(\$450) = \$382.50$, Employee Price = $\$382.50 - 0.2(\$382.50) = \$306$
- 4. D:** $\$12,590 = \text{Original Price} - 0.2(\text{Original Price}) = 0.8(\text{Original Price})$, Original Price = $\$12,590/0.8 = \$15,737.50$
- 5. A:** In order to solve for A , both sides of the equation may first be multiplied by 3. This is written as $3(2A/3) = 3(8+4A)$ or $2A = 24 + 12A$. Subtraction of $12A$ from both sides of the equation gives $-10A = 24$. Division by -10 gives $A = -2.4$.
- 6. A:** Three equations may initially be written to represent the given information. Since the sum of the three ages is 41, we may write, $l + s + j = 41$, where l represents Leah's age, s represents Sue's age, and j represents John's age. We also know that Leah is 6 years older than Sue, so we may write the equation, $l = s + 6$. Since John is 5 years older than Leah, we may also write the equation, $j = l + 5$. The expression for l , or $s + 6$, may be substituted into the equation, $j = l + 5$, giving $j = s + 6 + 5$, or $j = s + 11$. Now, the expressions for l and j may be substituted into the equation, representing the sum of their ages. Doing so gives: $s + 6 + s + s + 11 = 41$, or $3s = 24$, where $s = 8$. Thus, Sue is 8 years old.
- 7. E:** Simple interest is represented by the formula, $I = Prt$, where P represents the principal amount, r represents the interest rate, and t represents the time. Substituting $\$4,000$ for P , 0.06 for r , and 5 for t gives $I = (4000)(0.06)(5)$, or $I = 1,200$. So, he will receive $\$1,200$ in interest.

8. A: $\$670 = \text{Cost} + 0.35(\text{Cost}) = 1.35(\text{Cost})$, $\text{Cost} = \$670/1.35 = \496.30

9. D: The amount of taxes is equal to $\$55 \cdot 0.003$, or $\$0.165$. Rounding to the nearest cent gives 17 cents.

10. C: The GPA may be calculated by writing the expression, $((3 \cdot 2) + (4 \cdot 3) + (2 \cdot 4) + (3 \cdot 3) + (4 \cdot 1))/13$, which equals 3, or 3.0.

11. C: From 8:15 A.M. to 4:15 P.M., he gets paid \$10 per hour, with the total amount paid represented by the equation, $\$10 \cdot 8 = \80 . From 4:15 P.M. to 10:30 P.M., he gets paid \$15 per hour, with the total amount paid represented by the equation, $\$15 \cdot 6.25 = \93.75 . The sum of \$80 and \$93.75 is \$173.75, so he was paid \$173.75 for 14.25 hours of work.

12. D: If she removes 13 jellybeans from her pocket, she will have 3 jellybeans left, with each color represented. If she removes only 12 jellybeans, green or blue may not be represented.

13. A: The value of z may be determined by dividing both sides of the equation, $r = 5z$, by 5. Doing so gives $r/5 = z$. Substituting $r/5$ for the variable, z , in the equation, $15z = 3y$, gives $15(r/5) = 3y$. Solving for y gives $r = y$.

14. A: 50 cents is half of one dollar, thus the ratio is written as half of 300, or 150, to x . The equation representing this situation is $300/x \cdot 1/2 = 150/x$.

15. B: The following proportion may be used to determine how much Lee will make next week: $22/132 = 15/x$. Solving for x gives $x = 90$. Thus, she will make \$90 next week, if she works 15 hours.

Advanced Algebra

1. D: The average of the three numbers may be written as $(Z+Y+x)/3 = V$, where x represents the value of the third number. Solving for x will give the value of the remaining number. Multiplying both sides of the equation by 3 gives $Z + Y + x = 3V$. Subtraction of Z and Y , from both sides of the equation gives $x = 3V - Z - Y$. The value of the remaining number is $3V - Z - Y$.

2. B: The intersection of the graphs of the equations, $y = 6x$ and $y = 10x - 30$, represents the time (x) and distance (y), where the second cyclist catches up with the first cyclist. The point of intersection is $(7\frac{1}{2}, 45)$. Thus, after $7\frac{1}{2}$ hours from the time the first cyclist starts and $4\frac{1}{2}$ hours from the time the second cyclist starts, the second cyclist catches up with the first cyclist.

3. B: The amount of time it takes the three of them to fill the pool may be represented by the equation, $\frac{1}{30} + \frac{1}{45} + \frac{1}{90} = \frac{1}{t}$, where t represents the number of minutes. Solving for t gives $t = 15$. Thus, after 15 minutes, the three of them will fill the pool, when working together.

4. **E:** The correct solution is $t = -8$. When adding t to $-5t$, it looks like she forgot to include the negative sign on $4t$, which gave an incorrect solution of positive 8.
5. **B:** Simple interest is represented by the formula, $I = Prt$, where I represents the interest amount, P represents the principal, r represents the interest rate, and t represents the time. Substituting 2,500 for I , 10,000 for P , and 5 for t , gives the equation, $2,500 = 10,000(r)(5)$. Thus, $r = 0.05$, or 5%.
6. **E:** $\sqrt{2}$ has a decimal expansion that does not terminate or repeat (1.414213562...). Thus, it is an irrational number.
7. **D:** The following proportion may be used to solve the problem: $\frac{8}{100} = \frac{x}{5000}$. Solving for x gives $x = 400$. Thus, 400 women, out of the random sample of 5,000, will likely have been married 2 or more times.
8. **E:** The following equation may be used to find the speed at which he needs to travel: $28/x = 1/2$. Thus, $x = 56$. He needs to travel 56 mph, in order to make it to the meeting on time.
9. **A:** The amount of time it takes the three of them to mix the 20 drinks may be represented by the equation, $1/5 + 1/10 + 1/15 = 1/t$, where t represents the number of minutes. Solving for t gives $t = 30/11$, which equals 2.73 minutes. There are 60 seconds in a minute, so multiply 60 by 2.73 minutes to get 163.8 seconds. Divide that by 60, and it comes to approximately 2 minutes and 44 seconds.
10. **B:** The amount of time it will take the three of them to finish the job, when working together, may be modeled by the equation, $1/4 + 1/6 + 1/2 = 1/t$, where t represents the number of days. Solving for t gives $t = 12/11$, or 1.09. Thus, it will take the three of them 1.09 days to finish the job.