

**TMATYC - Basic Algebra Test - 2014**

1. Mary has to put 10.8 gallons of gasoline in her car to drive 345 miles and the gas costs \$3.25 per gallon. How much will the gasoline for her trip cost if she travels 1,587 miles assuming that her car continues to use gasoline at the same rate and the price of gasoline doesn't change?  
 A. \$49.68      B. \$373.75      C. \$76.30      D. \$161.46      E. \$45.21
2. If  $\frac{3}{4}$  of the people at the big game are supporters of the home team and 22% of those home team supporters are teenagers, what percentage of people at the big game are teenagers who support the home team?  
 A. 3.4%      B. 53%      C. 58.5%      D. 97%      E. 16.5%
3. Line  $n$  is perpendicular to Line  $p$ . Line  $p$  has slope  $m$ . Line  $n$  has  $y$ -intercept  $(0, b)$ . Which equation represents Line  $n$ ?  
 A.  $y - b = -\frac{1}{m}x$       B.  $y = mx + b$       C.  $y = -mx + b$       D.  $y = -m(x - b)$       E.  $y = -\frac{1}{m}(x - b)$
4. Jeremy is proposing the installation of a sprinkler system in his front yard as part of his landscaping improvement plan. To calculate the number of sprinklers he will need to purchase, he must first calculate how much grass each sprinkler will cover with water. If a sprinkler manufacturer claims that its sprinkler has a 15 foot radius spray head, what is the area (in square feet) of the circle that it will water in Jeremy's yard? Round to the nearest square foot.  
 A. 94      B. 47      C. 707      D. 177      E. 24
5. Solve  $\frac{Ax + By}{2} = Cz$  for  $y$   
 A.  $y = \frac{2Cz - Ax}{B}$       B.  $y = 2Cz - 2Ax - B$       C.  $y = \frac{2Cz}{Ax} - B$       D.  $y = \frac{2Cz + Ax}{B}$       E.  $y = \frac{Cz}{2} - \frac{Ax}{B}$
6. Harold has traveled 21,600 miles in air travel during the first six months of the year. He expects to continue to travel at a rate of 900 miles per week for several more weeks for work related events. If his expectations hold, in how many more days will Harold have traveled 29,700 miles for the year?  
 A. 9      B. 15      C. 33      D. 63      E. 75
7. Simplify:  $\frac{13 - \sqrt{9 + 16}}{|5 - 7|^3} - \frac{2}{7}(-7)$   
 A. 1      B. about 11.68      C. -6      D. 3      E. 4
8. Bonnie's Boutique is discounting all regularly priced merchandise by 35%. Which function computes the sale price of an item having a regular price of  $p$ ?  
 A.  $f(p) = 0.35p$       B.  $f(p) = 0.65p$       C.  $f(p) = p - 35$       D.  $f(p) = 1 - 65p$       E.  $f(p) = 0.75p$
9. Which of the following is true?  
 A.  $2^0 = 0$       B.  $\frac{8}{0} = 0$       C.  $2 + 7\sqrt{16} = 36$       D.  $4 - (-3)^2 = 13$       E.  $3(x - 5) = 6x - 3(x + 5)$
10. Let  $y = \frac{2x - 2}{x} \div \frac{4x - 4}{3x^2}$ . If  $x = -3$ , then  $y =$   
 A. -27      B. -18.5      C.  $-\frac{9}{2}$       D. 2.017      E. -9

11. A pea weighs as much as three crumbs. Five crumbs weigh as much as a pea and a kernel. A bean weighs as much as a pea and a crumb. If a kernel weighs 6 grams, how much does a bean weigh?  
A. 8 grams    B. 9 grams    C. 10 grams    D. 12 grams    E. 16 grams

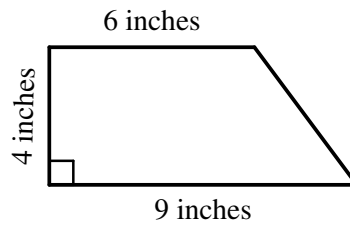
12. Consider the system of linear inequalities below.

$$\begin{aligned} -2x + 10 &\geq 4x - 5 \\ 3x + 14 &\geq -5x + 34 \end{aligned}$$

The solution set of this system can be described as:

- A. a line segment    B. a single ray    C. no solution    D. a single point    E. two rays
13. In which quadrant do the graphs of the equations  $4x + 3y - 1 = 0$  and  $5y = -3x - 13$  intersect?  
A. I    B. II    C. III    D. IV    E. None of the above
14. Consider the polynomial  $2x^2 - Cx + 12$ . If the roots of this polynomial are 1 and  $b$ , find  $b + C$   
A. 20    B. 7    C. 14    D. 4    E. 28
15. Ella volunteers her time to help fold campaign letters and stuff them in envelopes. She can prepare each envelope for mailing in 20 seconds. If she has 250 envelopes to prepare for mailing, what is the expression for the number of envelopes left to prepare with respect to the time,  $t$ , in minutes that Ella has been preparing envelopes?  
A.  $20t - 250$     B.  $3t + 250$     C.  $250 - 3t$     D.  $250 - 20t$     E.  $5t - 250$
16. Harvey Homeowner is draining his large rectangular aquarium so he can clean it. After steadily draining the aquarium for 6 minutes, the water remaining in the tank is 25 inches deep. Four minutes later, the depth of the water is 12 inches. How deep (in inches) was the water in the aquarium when Harvey began draining it?  
A. 40    B. 37.5    C. 43    D. 44.5    E. 64
17. Simplify completely:  $\left(\frac{a^2m^{-3}p^0}{4a^{-5}mp}\right)^{-2}$   
A.  $\frac{16m^4p^2}{a^6}$     B.  $\frac{a^{14}}{16m^8p^2}$     C.  $\frac{a^7}{16m^2}$     D.  $\frac{16m^8p^2}{a^{14}}$     E.  $\frac{16a^6p^2}{m^4}$
18. What is **false** concerning the line containing  $(-4, 3)$  and  $(2, -6)$ ?  
A. The line has  $y$ -intercept  $(0, -3)$   
B. The line is parallel to  $3x + 2y = 8$   
C. The line is perpendicular to  $3y - 2x = 3$   
D. The line contains the point  $(1, -\frac{9}{2})$   
E. The slope of the line is less than the  $x$ -intercept

19. Find the sum of the area (in square inches) and the perimeter (in inches) for the trapezoidal banner shown below.



- A. 74      B. 54      C. 53      D. 56      E. 48
20. Expand  $(ab - c)^2$   
 A.  $a^2b^2 - c^2$     B.  $a^2b^2 - 2abc + c^2$     C.  $a^2b^2 + c^2$     D.  $a^2b^2 + 2abc + c^2$     E.  $a^2b^2 - abc - c^2$
21. Michael is challenged to a basketball shooting competition. For every shot he makes he earns 20 points. For every shot he misses he loses 5 points. He gets a total of 20 attempted shots. If he ends the competition with 25 points, what is his ratio of made shots to missed shots?  
 A. 1:4      B. 1:3      C. 1:5      D. 4:1      E. 1:1
22. Find  $f(-3) \times f(2)$  where  $f(x) = 4x^2 - 2x + 1$   
 A. 559      B. -377      C. 33      D. -533      E. 157
23. Simplify  $\frac{(3.8 \times 10^4)(2.7 \times 10^{-2})}{(5 \times 10^{-4})(1.2 \times 10^3)}$ . Write answer in scientific notation.  
 A.  $17.1 \times 10^{-1}$       B.  $1.71 \times 10^3$       C.  $1.71 \times 10^4$       D.  $1.71 \times 10^5$       E.  $0.171 \times 10^3$
24. Find the domain of  $f(x) = \left| \frac{1}{6x^2 - x - 12} \right|$   
 A.  $\{x \mid x > 0, x \neq 4, x \neq -3\}$     B.  $\{x \mid x \neq \frac{3}{2}, x \neq -\frac{4}{3}\}$     C.  $\{x \mid x \neq 6, x \neq 12, x \neq 0\}$   
 D.  $\{x \mid x > 0\}$       E. all real numbers
25. Ronan and Darcy walk to the top of a building that is approximately 250 feet tall. Both boys have the exact same textbook with them. Ronan drops his book over the edge while Darcy throws his straight down at a rate of 36 feet per second. Using the fact that the height, in feet, above ground is given by the function  $h(t) = -16t^2 + v_0t + s_0$ , where  $v_0$  is the initial velocity (in ft/s) and  $s_0$  is the initial height (in ft), approximate how long (in seconds) Darcy's book will reach the ground before Ronan's book reaches the ground. Round your answer to the nearest hundredth of a second.  
 A. 1.28      B. 2.98      C. 3.95      D. 0.97      E. 5.23