

**Note: “e. None of these answers” is a choice for all questions.**

1. What is the product of the two values for which  $(x+2)^2 = 25$ ?  
a. -14                      b. 21                      c. -21                      d. 14
2. Justin found the measure of the acute angle formed by the hour hand and the minute hand on a clock at 4:14 p.m. He said it was...  
a.  $34^\circ$                       b.  $48^\circ$                       c.  $26^\circ$                       d.  $43^\circ$
3. Amanda and Aidan are walking along the monster coordinate plane they created out of the football field. Amanda travels along the line  $3x + y = -9$  while Aidan's path is  $y = -5x + 11$ . At what point will they try to occupy the same spot?  
a. (7,3)                      b. (13,-30)                      c. (10,-39)                      d. (-11,24)
4. Solve for x:  $\frac{5}{x-3} = \frac{3}{2x+8}$   
a. 7                      b. 14                      c. -14                      d. -7
5. If *Andrew* is the coefficient of the  $x$  term in the expansion of  $(3 - 2x)^4$  and *Ben* is the coefficient of the  $x^3$  term, what is *Andrew* – *Ben*?  
a. -120                      b. -432                      c. -312                      d. -240
6. Evalynne drew two concentric squares, each with their vertices on the  $x$  and  $y$  axes. The distance from the origin to the vertices was 9 for one square and 12 for the other. What is the area of the region inside the larger square but outside the smaller one?  
a. 162                      b. 126                      c.  $252\sqrt{2}$                       d. 450
7. Reese found  $n$ , the remainder when  $3x^3 - x^2 - 9x - 5$  is divided by  $(x-2)$ . If  $(n,n)$  is a point on the coordinate plane, what is the length of the segment connecting  $(n,n)$  to the origin?  
a. -6                      b.  $-3\sqrt{6}$                       c.  $6\sqrt{3}$                       d.  $3\sqrt{2}$
8. Debbie decided that since there were 29 algebra team members, she would find the twenty-ninth digit in the decimal expansion of  $\frac{1}{14}$ . What did she find it to be?  
a. 7                      b. 4                      c. 2                      d. 8
9. Simplify completely:

$$\frac{x^2 - 9x + 20}{x^4 - 2x^3 - 15x^2} \div \frac{x^2 - 16}{x^3 + 7x^2 + 12x^1}$$

- a.  $x$                       b.  $\frac{x+3}{x+4}$                       c.  $\frac{x+4}{x-4}$                       d.  $\frac{1}{x}$

10. Ollie found the slope-intercept form of the line perpendicular to  $2x + 3y = 12$  which passes through the point  $(1,0)$ . Which equation is it?
- a.  $3x + 2y = 6$       b.  $2y = 3x - 3$       c.  $y = \frac{2}{3}x - \frac{2}{3}$       d.  $y = \frac{3}{2}x - \frac{3}{2}$
11. Anastasia rowed on the Cahaba from the concrete plant to Caldwell Mill and back again. On the upstream leg she went 3 mph; downstream she could go 8 mph. Find the difference between the rate of the river current and her rowing speed in still water.
- a.  $2\frac{1}{2}$       b.  $3\frac{1}{2}$       c.  $5\frac{1}{2}$       d. 3
12. Lauryn invested \$15,000 in two different savings bonds, one paying 2% interest and the other paying 3% interest. The interest earned with the 3% bond at the end of one year is \$150 more than the interest earned with the 2% bond. How much was invested at 3%?
- a. \$15,000      b. \$10,000      c. \$9,000      d. \$6,000
13. Shezhan can fill a room with Skittles in 3 hours; Rory can fill the same room in 2 hours; Manish can eat the Skittles from it in 4 hours! If the room is half-full when they all start working together, how long will it take them to fill the room?
- a.  $\frac{12}{7}$  hours      b.  $\frac{7}{12}$  hours      c.  $\frac{6}{7}$  hours      d.  $\frac{7}{6}$  hours
14. The 600 students at Erdo Middle School are divided into three groups of equal size for lunch. Each group has lunch at a different time. The students are randomly assigned to one of the three lunch groups. What is the probability that Jimmy, Joey, and David will be assigned to the same lunch group?
- a.  $\frac{1}{27}$       b.  $\frac{1}{9}$       c.  $\frac{1}{8}$       d.  $\frac{1}{6}$
15. Mrs. Elliott is twice the age of her son Hunter. Ten years ago she was one year less than three times as old as Hunter. Find the sum of their ages now.
- a. 75      b. 63      c. 57      d. 36
16. Kristin drops a ball from a height of 19 feet. The ball bounces straight back up half the distance then down and back up half that distance and so on. When the top of its bounce is less than 1.5 feet from the floor, what is the total distance it has traveled?
- a. 43.56 feet      b.  $49\frac{5}{8}$  feet      c.  $53\frac{7}{16}$  feet      d.  $61\frac{5}{6}$  feet
17. Find the value of x:  $2 \log_x 25 = 4$ .
- a. 2      b.  $\sqrt{5}$       c. 4      d. 5
18. Simplify:  $\frac{3x^2+10x-8}{2-\frac{3}{1-\frac{x}{x-2}}}$
- a.  $3x - 2$       b.  $x + 4$       c.  $2x + 8$       d.  $\frac{2}{3}x - 1$

19. For  $g(x) = \frac{x}{x-2}$  and its inverse  $g^{-1}(x)$ , name the restrictions on the domain.
- a.  $x \neq 2$                       b.  $x \neq 2, 0$                       c.  $x \neq 2, 1$                       d.  $x \neq 2, 0, 1, -1$
20. Aiden created a sequence 2014, 2015, 2016, 2013, . . . , where each term after the third is found by subtracting the previous term from the sum of the two terms that precede it. Find the value of the 2015<sup>th</sup> term of Aiden's sequence.
- a. 2014                      b. 4028                      c. 2015                      d. 4027
21. If  $\frac{1}{x^2} + x^2 = 4$ , what is the value of  $\frac{1}{x^6} + x^6$  ?
- a. 64                      b. 50                      c. 28                      d. 52
22. Zac needs to fence some property. The fence will be in the shape of a right triangle with sides in the ratio of 3:4:5. Zac has 320 feet of fencing and will need to use at least half of it. Which range describes the length of the shortest side?
- a. less than 40 feet      b. 40 to 80 feet                      c. 85 to 120 feet                      d. 35 to 170 feet
23. Find the sum of the solutions to  $\sqrt[3]{x^3 - x^2 - 10} = x - 1$ .
- a.  $-\frac{3}{2}$                       b.  $\frac{3}{2}$                       c. 4.5                      d. -4.5
24. The graph of line **p** contains points (3,0) and (0,-6). The graph of line **q** has a slope of 1 and contains the origin. What are the coordinates of the intersection of **p** and **q**?
- a. (0, -6)                      b. (3, 3)                      c. (-2, -2)                      d. (-3, 6)
25. Hannah and Shiori run in opposite directions on a circular track, starting at diametrically opposite points. They first meet after Hannah has run 100 meters. They next meet after Shiori has run 150 meters more. Each girl runs at a constant speed. What is the length of the track in meters?
- a. 250                      b. 300                      c. 350                      d. 400

Tie-Breakers:

- Which of the ten digits is the last to appear in the units' position in the Fibonacci sequence?
- Eric has a \$10 bill which he wants changed into dimes and quarters, with at least one of each coin being used. In how many ways can this be done?
- Find the number of minutes in April.