Note: "e. None of these" is a choice for every question, if the answer is not given or there is a problem with the question.

1. A square has an area of 200 square centimeters. What is the length of the side of the square?
   a. 10 cm b. $10\sqrt{2}$ cm c. $10\sqrt{20}$ cm d. 20 cm

2. Solve for x: $\sqrt{2x-9} = 5$
   a. ±3 b. 17 c. 23 d. 14

3. How many divisors of 16000 are perfect squares?
   a. 8 b. 6 c. 14 d. 21

4. Simplify: $\frac{2\sqrt{5}+\sqrt{3}}{\sqrt{5}-2\sqrt{3}}$
   a. $\frac{-16+5\sqrt{15}}{7}$ b. $\frac{16-5\sqrt{5}}{7}$ c $\frac{16\sqrt{5}-5}{7}$ d. $\frac{-16-5\sqrt{15}}{7}$

5. Give the standard form of the equation of the line containing (-5, 4) and (5, -4).
   a. y = -4/5 x b. 5x + 4y = 0 c. 4x + 5y = 0 d. 4x – 5y = 0

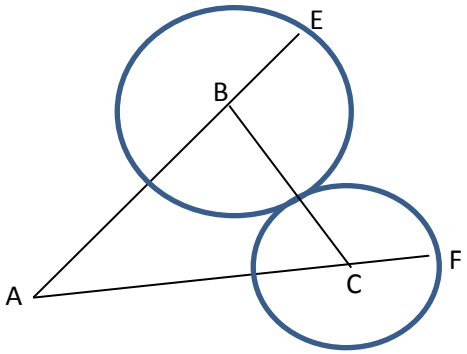
6. Jordan drew a circle on the coordinate plane. Yilan found the equation of the circle to be $(x-2)^2 + (y+3)^2 = 25$. Which point could be on the circle?
   a. (2, -3) b. (2,2) c. (5, 0) d. (0,5)

7. Find the value of x - y: $7x - 2y = -24$
   $2x - 7y = -6$
   a. 1/3 b. -1/3 c. 10/3 d. -10/3

8. In the figure, AB = 5, AC = 6, BC = 9, and AE = AF

   Circles B and F are tangent. Find the area of Circle B.

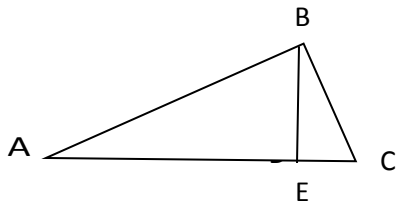
   a. 9π b. 5π c. 25π d. 16π



9. Korie and Elizabeth together bought a mixture of candy during a lunch trip to the mall. They each spent $5, but Korie's choice of candy was $6 per pound while Elizabeth's was $4.50 per pound. What was the total weight of candy purchased?

a. 35 oz. b. $1\ ^5/_6$ lb. c. $1\ ^{17}/_{18}$ lb. d. 42 oz.

10.



If m<A = 30°, $\overline{BD} \perp \overline{AC}$, m<C = 60°, and BC = 8, find the length of the altitude of triangle ABC.

a. $8\sqrt{3}$ b. 16 c. 4 d. $4\sqrt{3}$

11. Simplify: $\left(\sqrt{98}+3\sqrt{72}\right)\div\sqrt{50}$

a. $5\sqrt{2}$ b. 5 c. $20\sqrt{5}$ d. 4

12. Simplify: $\frac{3}{2x+6}+\frac{4}{6x+18}$

a. $\frac{18x+48}{8x+24}$ b. $\frac{7}{8(x+3)}$ c. $\frac{13}{6(x+3)}$ d. $\frac{5}{2(x+3)}$

13. Which of the numbers given has the greatest value?

a. π b. e c. i d. ϕ

14. Find the value of $\sqrt{2-\sqrt{2-\sqrt{2-\ldots}}}$

a. $-1/2$ b. $1, -2$ c. $\frac{-2+\sqrt{3}}{2}$ d. -1, 2

15. Find the sum of the coefficients in the expansion of $(2x - 4)^5$.

a. -32 b. 64 c. -128 d. 256

16. How far apart are the y-intercepts of the line with the equation y = 2x + 3 and the line that goes through the point (4,2) with a slope of -1?

a. 10 b. 3 c. 2 d. 5

17. If $a^2 + b^2 = 36$ and a + b = 12, find ab.

a. 108 b. 54 c. 180 d. 48

18.

$$\sum_{n=5}^{20} 3x + 4$$

a. 780 b. 729 c. 664 d. 632

19. Josh makes a gallon of lemonade that includes 80% lemon juice. Danny drinks 1 quart of it, so Josh adds a quart of water. Then Rance drinks a quart, so Josh adds a quart of pure lemon juice. What percentage of the gallon of lemonade is now lemon juice?

a. 50% b. 60% c. 70% d. 80%

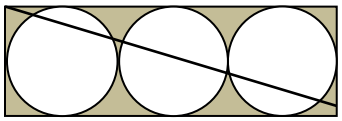
20. Find the vertex of the graph of $y = x^2 - 3x + 10$

a. (-3/2, 49/4) b. (-2/3, 5/2) c. (3/2, 31/4) d. (-2/3,-18/5)

21. When $(4^{20})(8^{10})$ is written as p^q where p is prime, find the value of pq.

a. 72 b. 320 c. 160 d. 140

22. The diagonal of the rectangle passes through the center of the second circle and has length 20. If the three circles are congruent and tangent, what is the diameter of one of the circles?



a. $2\sqrt{10}$ b. $\sqrt{42}$ c. $2\sqrt{15}$ d. $3\sqrt{13}$

23. Find the area of the region enclosed by the graphs of y = |x| - 5 and y = -|x| + 5.

a. 10 in^2 b. 15 in^2 c. 25 in^2 d. 50 in^2

24. If $(x - 4)^{x+4} = 1$, find the product of the possible value(s) of x.

a. 12 b. -6 c. 8 d. -20

25. If $x + \frac{1}{x} = 4$, what is $x^2 + \frac{1}{x^2}$?

a. 16 b. 20 c. 14 d. 12

Tiebreakers

1. Find the common fraction which represents the sum of the reciprocals of the positive integral factors of 15.

2. Nick leaves Huntsville at 6:35 AM as the engineer of a train traveling to Mobile at 80 mph. Brayden leaves Mobile at 8:00 AM driving her train to Huntsville along a parallel track at 95 mph. At the time they swoop past each other and wave out their windows to each other, which of them is closer to Huntsville?

3. $211_4 + 211_8 =$ _____$_2$