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1. The product of the roots if the equation $x^2 + 3x - 4 = 0$ is

- a) -3 b) -4 c) 3 d) 4 e) none of these

2. If $a * b = a + b - ab$, then the value of $(4 * 2) * (3 * 3)$ is

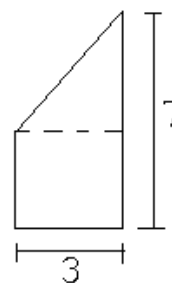
- a) -11 b) -12 c) 1 d) -1 e) none of these

3. Simplify $\frac{1}{3} + \frac{1}{4} + \frac{1}{6}$.

- a) $\frac{13}{72}$ b) $\frac{5}{6}$ c) $\frac{3}{4}$ d) $\frac{11}{24}$ e) none of these

4. A figure is composed of a square surmounted by a right triangle as shown. If the base of the figure is 3 and the height is 7, then the perimeter of the figure (shown with the solid lines) is

- a) 16 b) 18 c) 20 d) 22 e) none of these



5. If $x + y = 4$ and $2x - y = 5$, then the value of $y - x$ is

- a) 1 b) 2 c) -1 d) -2 e) none of these

6. The number of cents in d dimes and q quarters is

- a) $10d + \frac{1}{4}q$ b) $\frac{1}{10}d + \frac{1}{4}q$ c) $\frac{1}{10}d + \frac{1}{25}q$ d) $10d + 25q$ e) none of these

7. John took a trip and traveled 50 mph (miles per hour) for the first two hours and then 70 mph for the next three hours. His average speed for the trip, in mph, was

- a) 65 b) 60 c) 63 d) 64 e) none of these

8. Two small circles are tangent to a large circle and pass through the center of the large circle, as shown. The region interior to the large circle and exterior to the small circles is shaded. If the diameter of the large circle is 4 inches then the area of this shaded region, in square inches, is



- a) 2π b) π c) 3π d) 4π e) none of these

9. A simplified form of $\frac{\frac{1}{a+b} - \frac{1}{a-b}}{2}$ is

- a) $\frac{b}{b^2 - a^2}$ b) $\frac{a}{a^2 - b^2}$ c) $\frac{b}{a^2 - b^2}$ d) $\frac{a}{b^2 - a^2}$ e) none of these

10. The inequality $-x + 4 \leq -16$ is equivalent to

- a) $x \leq 20$ b) $x \geq -20$ c) $x \geq 20$ d) $x \geq -20$ e) none of these

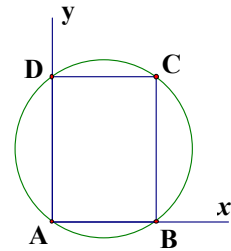
11. Sally's sock drawer contains 4 red, 6 green, 3 white and 4 blue ones. She reaches in and pulls out some at random. What is the least number of socks that she must select to be sure that she has chosen at least two of the same color?

- a) 8 b) 4 c) 11 d) 9 e) none of these

12. In the land of Oz the price P for mailing a package of weight W for a distance D is given by $P = AD + BW$, where A and B are constants. If $D = 100$ and $W = 4$, then $P = 115$. If $D = 80$ and $W = 5$, then $P = 110$. For Dorothy to mail a package of weight 7 for a distance 60 the price would be

- a) 105 b) 110 c) 115 d) 120 e) none of these

13. A circle circumscribes the rectangle $ABCD$ as shown. Vertex A is located at the origin of an (x,y) – coordinate system, vertex B is on the positive x – axis, vertex C is on the parabola $y = x^2$ and vertex D is on the positive y – axis. If the perimeter of the rectangle is 24 then the area of the circle is



- a) $75\pi/4$ b) $25\pi/2$ c) $85\pi/4$ d) $45\pi/2$ e) none of these

14. Joe has a total of \$200 in his two pockets. He removes one fourth of the money from his left pocket and puts it into his right pocket. He then takes \$20 from the left and adds it to the right. He now has the same amount in both pockets. Initially how many more dollars were in the left than in the right?

- a) 80 b) 120 c) 100 d) 90 e) none of these

15. Which of the numbers $(\frac{3}{2}, \frac{\pi}{2}, \sqrt{2}, \log_4 10, \sqrt[3]{4}, \log_3 2)$ is the smallest?

- a) $\frac{\pi}{2}$ b) $\sqrt[3]{4}$ c) $\log_3 2$ d) $\log_4 10$ e) none of these

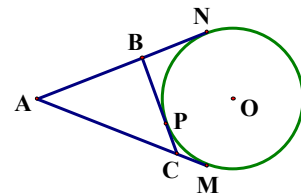
16. Two vertical poles of different heights stand on level ground, as shown but not to scale. Straight wires from the top of each pole to the base of the other pole cross at a point 24 feet above ground. If the shorter pole is 40 feet tall, then the height of the taller pole, in feet, is

- a) 48 b) 52 c) 56 d) 60 e) none of these

17. Two candles have equal lengths. One is consumed (uniformly) in 6 hours the other in 5 hours. If they are both lit at the same time, then how many hours after lighting will one be twice as long as the other?

- a) $15/4$ b) $25/8$ c) $29/7$ d) $25/7$ e) none of these

18. In the figure (not to scale) the line segments AN , AM and BC are tangent to a circle at points N , M , and P , respectively. The points B and C are on segments AN and AM , respectively. Angle BAC is 30 degrees and $\angle ABC$ is a right angle. If the length of AN is 12, then the area of triangle ABC is



- a) $12(\sqrt{3} - 1)$ b) $48(2\sqrt{3} - 3)$ c) $4(3 - \sqrt{3})$ d) $24(2 - \sqrt{3})$ e) none of these

19. Let L be a six digit (base ten) integer whose last digit is not 0, and let M be the number formed by moving this last digit to the front. For example, if $L = 354268$, then $M = 835426$. Find all possible L such that $L = 3M$. The sum of all the digits of all the possible L is

- a) 36 b) 72 c) 54 d) 48 e) none of these

20. Let $f(x) = x^4 + ax^3 + bx^2 + cx + d$. If the graph of $y = f(x)$ intersects the graph of $y = 2x - 1$ at $x = 1$, $x = 2$, and $x = 3$, then the value of $f(0) + f(4)$ is

- a) 30 b) 18 c) 14 d) 22 e) none of these