1. Find the sum of the complement and supplement of a positive acute angle where five times the complement exceeds twice the supplement by 60°.

a) 265° b) 260° c) 255° d) 250° e) None of these

2. Bo goes on a trip. He does the first 80 miles in 10 hours. He does the remaining 70 miles in 6 hours. His average speed for the entire trip is X miles per MINUTE. Find X.

a) $\frac{3}{32}$ b) $\frac{5}{32}$ c) $\frac{7}{32}$ d) $\frac{9}{32}$ e) None of these

3. In triangle DEF, angle DEF is 17° and angle EFD is 59°. Find the size of the complement of the angle which is 36 degrees smaller than angle EDF.

a) 68° b) 58° c) 48° d) 38° e) None of these

4. Bo travels *m* miles in *H* hours. He then increased his speed by *P* miles per hour. Find the number of miles that he can go in *RH* hours at the new faster rate.

a) $m + P$ b) $mR + PR$ c) $mRH + HPR$ d) $mR + HPR$ e) None of these

5. A fair coin is tossed 4 times. Find the probability that the result will be exactly 3 heads and 1 tail.

a) $\frac{9}{16}$ b) $\frac{1}{2}$ c) $\frac{7}{16}$ d) $\frac{3}{8}$ e) None of these

6. Find $m + b$ where $y = mx + b$ is the equation of the straight line determined by the middle point of the segment from (7, -3) to (-11, 7.8) and the point where the lines $y = 2x - 6$ and $\frac{x}{7} - \frac{y}{6} = 1$ intersect.

a) -10 b) -10.1 c) -10.2 d) -10.3 e) None of these

7. The diagonal of a cube is $\sqrt{147}$. Find the total outside surface area.
a) 274 b) 284 c) 294 d) 343 e) None of these

8. The circumferences of 2 concentric circles differ by 485 inches. Find the number of inches in the width of the ring formed by these 2 circles. Round your answer to the nearest 0.001 inch.
a) 77.190 b) 77.191 c) 77.192 d) 77.193 e) None of these

9. Bo starts at point A and walks as indicated in the order given.
1) North 30 meters
2) East 20 meters
3) South *x* meters
4) East 10 meters
5) South *y* meters
6) East 12 meters
7) South *z* meters
8) West back to point A

Find the total distance traveled.
a) 150 m b) 148 m c) 146 m d) 144 m e) None of these

10. The segment AD is trisected by the points B and C. A = (-3, 5), B = (*a*, *b*), C = (*c*, *d*), and D = (7, –2). Find $a + b + c + d$.
a) 6.6 b) 6.7 c) 6.8 d) 6.9 e) None of these

11. Find the perimeter of a rectangle whose area is 48 and whose diagonal is 10.
a) 24 b) 25 c) 26 d) 27 e) None of these

12. Find $m + b$ where $y = mx + b$ is the straight line which is tangent to the circle $x^2 + y^2 = 10$ at the point (3, 1).
a) 6 b) 7 c) 8 d) 9 e) None of these

13. Give the base 10 representation of the number whose base 2 representation is 10101.
a) 20 b) 21 c) 22 d) 23 e) None of these

14. The sides of a triangle are 9, 12, and 14. The bisector of the largest angle of this triangle divides the opposite side into two parts. Find the product of these 2 parts.
a) 48.2 b) 48 c) 47.8 d) 47.6 e) None of these

15. Find the annual interest rate needed for money to triple in 10 years when compounded monthly. Round your answer to the nearest 0.0001 percent.
a) 11.0366% b) 11.0367% c) 11.0368% d) 11.0369% e) None of these

16. City A is located at 35° north latitude. Find the number of miles along the surface of the earth from City A to the equator. Assume the earth is a sphere with diameter 7911 miles and use $7\pi = 22$.
a) 2417.25 b) 2417 c) 2416.75 d) 2416.5 e) None of these

17. Find the product of the 2 values of *h* were one root of $2x^2 + 20x + h^2 = 13$ is four times the other root.
a) -52 b) -48 c) -45 d) -42 e) None of these

18. The left side of a triangle is 1 cm and the base is 2 cm. Find the length of the right side of this triangle if the angle formed by the left side and the base is 10°. Round your answer to the nearest 0.001 cm.
a) 1.030 cm b) 1.031 cm c) 1.032 cm d) 1.033 cm e) None of these

19. Find the equation of the line with a positive slope which is one of the 2 bisectors of the angles formed by the lines $3x + 4y + 10 = 0$ and $5x + 12y + 26 = 0$.

a) $y = 1.75x$ b) $y = 1.8x$ c) $y = 1.85x$ d) $y = 1.9x$ e) None of these

20. A 4-foot tall boy is walking away from a streetlamp at 5 ft/sec. The lamp is 18 ft above the street. Find the rate at which the tip of his shadow is moving when he is 20 ft from the lamp.

a) $\frac{46}{7}$ ft/sec b) $\frac{45}{7}$ ft/sec c) $\frac{44}{7}$ ft/sec d) $\frac{43}{7}$ ft/sec e) None of these

21. $y = x^3 - 6x^2 - 9x + 14$ has a local maximum point at (*a*, *f*), a point of inflection at (*b*, *g*), and a local minimum point at (*c*, *h*). Find $ac + b$.

a) 13 b) 1 c) -1 d) -13 e) None of these

22. Find the derivative of *y* with respect to *x* for the curve $3xy^2 - 2xy = 66$ at the point (2, -3).

a) .830 b) .825 c) .820 d) .815 e) None of these

23. A spherical balloon is inflated with gas at the rate of 5 cubic feet per minute. While being inflated, the balloon remains a perfect sphere. Find the instantaneous rate of change of the surface area of this balloon when the radius is 10 feet. Round your answer to the nearest 0.001 $ft^2 / minute$.

a) .973 ft^2 / min b) .975 ft^2 / min c) .977 ft^2 / min d) .979 ft^2 / min e) None of these

24. Find the sum of all values of *x* which satisfy the equation $2\csc(3x) + 4 = 0$ whenever $0 \le x < 360$, where all solutions are given in degrees.

a) 1230 b) 1240 c) 1250 d) 1260 e) None of these

Solutions

1) D
2) B
3) E
4) D
5) E
6) C
7) C
8) A
9) D
10) E
11) E
12) B
13) B
14) B
15) A
16) A
17) C
18) A
19) A
20) B
21) C
22) B
23) E
24) D