1. Bo invested \$15000, part at 9¼ % simple interest and the remaining part at 11½ % simple interest. After one year the total interest earned was \$1623.75. How many dollars were invested at 9.25%?

a) 4400 b) 4500 c) 4600 d) 4700 e) None of these

2. Burger Barn sells 3 drinks for every 2 burgers. Drinks are \$.70 and burgers are \$1.30. If Burger Barn wants to take in as close to \$200 as possible, how many drinks must be sold? Assume the number of drinks and burgers sold must be positive integers.

a) 120 b) 123 c) 126 d) 129 e) None of these

3. Find the ratio of 10 kilometers to 4 miles. Assume 1 inch = 2.54 cm. Round the final answer to the nearest 0.0001.

a) 1.5531 b) 1.5532 c) 1.5533 d) 1.5534 e) None of these

4. You mix 30% acid solution with 50% acid solution to make 100 pints of 43% acid solution. How many pints of the 30% acid solution are needed?

a) 35 b) 45 c) 55 d) 65 e) None of these

5. Find $y - x$ whenever $\frac{2}{x} + \frac{3}{y} = 4$ and $\frac{5}{x} + \frac{6}{y} = 5$.

a) $\frac{11}{30}$ b) $\frac{13}{30}$ c) $\frac{17}{30}$ d) $\frac{19}{30}$ e) None of these

6. One plane leaves the airport at noon heading east at x mph. Another plane leaves the same airport heading west 30 minutes later at y mph. At 3 p.m., the two planes are 1800 miles apart. At 5 p.m., the two planes are 3100 miles apart. Find $x - y$.

a) 48 b) 49 c) 50 d) 51 e) None of these

7. All of the outside surfaces of a cylindrical tank are to be painted. The tank is 10 meters tall and the circular bases have a diameter of 15 meters. How many quarts of paint are needed if one quart will cover 10 m^2. Round answers to the nearest 0.001.

a) 82.468 b) 82.467 c) 82.466 d) 82.465 e) None of these

8. Each exterior angle of a regular 50-gon is $x°$. Each exterior angle of a regular 40-gon is $y°$. A regular 30-gon has d distinct diagonals. Find $10x+10y+d$.

a) 567 b) 568 c) 569 d) 570 e) None of these

9. Given: $f(x)=\frac{x+8}{x}$, $g(x)=x^3+5$, and $g(f(-5))=\frac{a}{b}$, where a and b are relatively prime positive integers. Find $a - b$.

a) 471 b) 472 c) 473 d) 474 e) None of these

10. A crew of 80 men can do a job in 24 days. If the contractor increases the work force by ½ and productivity is unchanged, how many days will be saved by adding the additional workers?

a) 7.8 b) 8.0 c) 8.2 d) 8.4 e) None of these

11. There are red, white, and blue marbles in a jar. The ratio of white to blue is 4:5. The ratio of red to white is 2:3. If the red and blue total 322, how many marbles are in the jar?

a) 490 b) 488 c) 486 d) 484 e) None of these

12. Find the volume of the sphere inscribed in a regular tetrahedron with total surface area $36\sqrt{3}$. Round to the nearest 0.0001 cubic unit.

a) 7.6952 b) 7.6953 c) 7.6954 d) 7.6955 e) None of these

13. If A men can do B jobs in C days, how long should it take D fewer men to do E jobs. Assume A>D.

a) $AB^{-1}CE(A-D)^{-1}$ days b) $ABCE^{-1}(A-D)^{-1}$ days

c) $A^{-1}BC^{-1}E(A-D)^{-1}$ days d) $AB^{-1}C^{-1}E(A-D)^{-1}$ days e) None of these

14. Find $12(m+b)$ where $y=mx+b$ is the equation of the line tangent to $(x-3)^2+(y+8)^2=169$ at the point (8, -20).

a) -273 b) -274 c) -275 d) -276 e) None of these

15. The hyperbola $16x^2=36y^2+1$ has asymptote $y=\pm mx$ and foci $\left(\pm\sqrt{\frac{a}{b}},0\right)$ where *a* and *b* are relatively prime positive integers and *m* > 0. Find $b-10a+12m$.

a) 22 b) 23 c) 24 d) 25 e) None of these

16. $\cos\left(Arc\tan\frac{15}{8}-Arc\sin\frac{7}{25}\right)=\frac{a}{b}$, where *a* and *b* are relatively prime positive integers. Find *b* – *a*.

a) 127 b) 128 c) 129 d) 130 e) None of these

17. The product of the 3 solutions of $2\sin x=1+\csc x$ on $0\le x<2\pi$ is $\frac{a}{b}\pi^3$ where *a* and *b* are relatively prime positive integers. Find *a* + *b*.

a) 146 b) 147 c) 148 d) 149 e) None of these

18. All of the points on the graph of $y=2x+3$ are rotated 90° counter clockwise with the origin as the center of each rotation. $y=mx+b$ is the equation of the new graph formed. Find *m* + *b*.

a) -5 b) -4 c) -3 d) -2 e) None of these

19. Find the area enclosed by $r = \cos 3\theta$.

a) $.2\pi$ b) $.25\pi$ c) $.3\pi$ d) $.\overline{3}\pi$ e) None of these

20. Find the length of the arc of $4x = y^2$ between the y-axis and the line containing the latus rectum. Round to the nearest .0001.

a) 4.5912 b) 4.5913 c) 4.5914 d) 4.5915 e) None of these

21. $\dfrac{d}{dx}\int_{x^2}^{17} \sqrt{\cos\theta}\, d\theta$

a) $2x\sqrt{\cos x}$ b) $2x\sqrt{\cos x^2}$ c) $-2x\sqrt{\cos x}$ d) $-2x\sqrt{\cos x^2}$ e) None of these

22. Find the area of the ellipse $\begin{cases} x = 5\cos\theta \\ y = 6\sin\theta \end{cases}$

a) 26π b) 27π c) 28π d) 29π e) None of these

23. Find the average value of $\cos x$ for $\dfrac{\pi}{3} \le x \le \dfrac{\pi}{2}$.

a) $\dfrac{1}{\pi}$ b) $\dfrac{1}{4}$

c) $3\pi^{-1}\left(2-\sqrt{3}\right)$ d) $\dfrac{2}{3\pi}$ e) None of these

24. Find the area between the curve $y = (x^2-1)(x^2+1)^{-1}$ and its horizontal asymptote.

a) π b) 1.5π c) 2π d) 2.5π e) None of these

Solutions

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