1. Bo invested \$15000. Some of this money was invested at 9¼ % simple interest and the remaining funds were invested at 11½ % simple interest. After 1 year, the total interest was \$1623.75. How many dollars were invested at 9¼ %?

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

2. The sum of three positive numbers is 185. Find the first number if the third is four times the first and the second is 36 less then twice the third.

a) 17 b) 18 c) 19 d) 20 e) none of these

3. One plane leaves the airport at noon heading east at x mph. A second plane leaves 30 minutes later heading west at y mph. At 3:00 p.m. the 2 planes are 1800 miles apart. If at 5:00 p.m. the planes are 3100 miles apart, what is $x - y$?

a) 50 b) 60 c) 70 d) 80 e) none of these

4. The perimeter of a semicircular region (which includes the diameter as the base) is numerically equal to its area measured in cm². Find the number of cm in the radius of this semicircular region.

a) $\pi + 2$ b) $2 + \frac{2}{\pi}$ c) $\pi + 4$ d) $2 + \frac{4}{\pi}$ e) none of these

5. If the hands of a clock are correctly positioned, find the number of degrees in the acute angle formed by the hour hand and the minute hand at exactly 4:15 p.m.

a) 35 b) 36 c) 37 d) 38 e) none of these

6. If (a, b) is the unique solution of the system $\begin{cases} x + 4y = 10 \\ 2x + 8y = 22 \end{cases}$, find $ab - 3a + 4b$.

a) 12 b) 4
c) There is more than one solution d) There is no solution e) none of these

7. A can wash a car in 12 minutes, B can wash the car in 10 minutes, and C can wash the car in 6 minutes. How long should it take all 3 of them to wash the car if they work together in harmony and with maximum efficiency? Round the answer to the nearest second.

a) 168 sec b) 169 sec c) 170 sec d) 171 sec e) none of these

8. Find the number square units of area in a triangle whose vertices are (1, 1), (6, 5), and (4, 9).

a) 15 b) 15.5 c) 16 d) 16.5 e) none of these

9. If $xy\left(2y+\frac{y}{2}\right)\neq 0$, then $\left(2x+\frac{y}{2}\right)^{-1}\left[(2x)^{-1}+\left(\frac{y}{2}\right)^{-1}\right]$ equals

a) xy^{-1} b) $(xy)^{-1}$ c) $x^{-1}y$ d) 1 e) none of these

10. $\frac{2x^3-x^2-1}{x+1}=ax^2+bx+c+\frac{R}{x+1}$. Find $a-b+c-R$.

a) 11 b) 12 c) 13 d) 14 e) none of these

11. If $f(x)=\frac{x+3}{x}$ and $g(x)=x^2+2$, then $g(f(-4))=\frac{a}{b}$ where a and b are positive integers and $\frac{a}{b}$ is in lowest terms. Find $a-b$.

a) 19 b) 18 c) 17 d) 16 e) none of these

12. If the cube root of the fraction $\frac{a}{b}$ is k, then what is $\left(\frac{b}{a}\right)^{\frac{5}{9}}$ in terms of k?

a) $\frac{\sqrt[3]{k}}{k^2}$ b) k^5 c) $\frac{\sqrt[3]{k}}{k}$ d) $k\sqrt[3]{k}$ e) none of these

13. Of all possible rectangles having a perimeter of 300 feet, what is the number of square feet of area for those having the maximum area?

a) 2000 b) 2250 c) 4000 d) 5625 e) none of these

14. Find the number of degrees in the smallest angle of a triangle with sides 8, 10, and 12. Round the final answer to the nearest 0.001 degree.

a) 41.409 b) 41.410 c) 41.411 d) 41.412 e) none of these

15. Given square ABCD where point E is the middle point of side BC and point F is the middle point of side CD. Find the number of degrees in angle FAE. Round the answer to the nearest 0.001 degrees.

a) 36.866 b) 36.868 c) 36.870 36.872 e) none of these

16. Four consecutive terms of an arithmetic sequence are $a, x, b, 2x$. The ratio of b to a is

a) 4 b) 3 c) 2

d) $\frac{b}{a}$ is not a unique value e) none of these

17. $\text{Arctan}\frac{1}{3} - \text{Arctan}\frac{1}{13} = \text{Arctan}\sqrt{\frac{a}{b}}$ where a and b are integers and $\frac{a}{b}$ is in lowest terms. Find $a + b$.

a) 17 b) 16 c) 15 d) 14 e) none of these

18. Given a right triangle with legs 6 and 7. Find the least value of $a + b$ where a and b are positive integers and the circumference of the incircle is $\left(\sqrt{a} - \sqrt{b}\ \right)\pi$.

a) 255 b) 254 c) 253 d) 252 e) none of these

19. A ship going 10 mph sails north 2 miles and then turns east. Find the instantaneous rate of change of its distance from the starting point (in miles per hour) after sailing 30 minutes. Round your answer to the nearest 0.001.

a) 8.324 b) 8.323 c) 8.322 d) 8.321 e) none of these

20. A light is placed on the ground 30 feet from a building. A man 6 feet tall walks from the light directly towards the building at 5 ft/sec. Find the rate at which his shadow on the building is shortening (in ft/sec) when he is 15 ft from the building. Round the answer to the nearest 0.001 ft/sec.

a) 4.002 b) 4.003 c) 4.004 d) 4.005 e) none of these

21. A piece of wire 18 inches long is made into a circular arc with the ends 1 foot apart. Find the number of degrees in this circular arc. Round the final answer to 0.001 degree.

a) 171.402 b) 171.403 c) 171.404 d) 171.405 e) none of these

22. The equation of the line which is tangent to $4x^2 - 5y^2 = 16$ at the point (3, 2) is $y = mx + b$. Find 100m – 10b.

a) 106 b) 112 c) 118 d) 124 e) none of these

23. The relation *f* is defined by the equation $2xy^2 + 3y = 34$. Find the slope of the line which is tangent to the inverse of *f* at the point (-2, 5).

a) $\frac{33}{5}$ b) $\frac{35}{6}$ c) $\frac{37}{8}$ d) $\frac{33}{10}$ e) none of these

24. The horizontal and vertical asymptotes of $f(x) = \frac{2x^2}{x^2 + 5x - 6}$ are $x = a$, $x = b$, and $y = c$. Find abc.

a) -90 b) -36 c) -24 d) -12 e) none of these

Solutions:

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