1. A factory hired 130 new workers during a year in which 27 workers retired and 57 workers left for other reasons. If there were 1000 workers at the end of the year, how many were there at the beginning of the year?

a) 951 b) 952 c) 953 d) 954 e) None of these

2. During the first year of operation the XYZ Corporation had a loss of \$14,250. In the 2nd year of operation, it broke even. For the 3rd and 4th years of operations, it had gains of \$18,180 and \$29,400. Find the net gain or loss over this 4 year period.

a) loss of \$33,430 b) gain of \$ 33,430
c) gain of \$33,330 d) gain of \$33,333 e) None of these

3. The angles of triangle ABC are A°, B°, and C°. Angle A is twice as large as angle B. Angle B is 4° larger than angle C. Find $\frac{2}{3}(5A - 3B - C)$.

a) $186.\overline{6}°$ b) $186.\overline{3}°$ c) $185.\overline{6}°$ d) $185.\overline{3}°$ e) None of these

4. If $\{x: a < x < b\}$ is the set of all real numbers which are NOT elements of the solution set of $|3x - 12| \geq 150$, find $b - a$.

a) 96 b) 97 c) 98 d) 99 e) None of these

5. Express .4 + .04 + .004 + .0004 + … as $\frac{a}{b}$ where a and b are two positive integers and the fraction $\frac{a}{b}$ is in lowest terms. Find $2b - 3a$.

a) 5 b) 6 c) 7 d) 8 e) None of these

6. From the equation $17 - y = 11 - x$, it can be determined that

a) $x > y$ b) $x < y$ c) $x \geq y$ d) $0 < x \leq y$ e) None of these

7. The vertex of the parabola $y = x^2 - 8x + 12$ is (a, b). Find $7a - 3b$.

a) 40 b) 41 c) 42 d) 43 e) None of these

8. Variables x and y vary inversely and $y = 4$ when $x = 12$. Find y when $x = 5$.

a) 9.2 b) 9.4 c) 9.6 d) 9.8 e) None of these

9. $0.4\overline{52}$ equals $\frac{N}{D}$ where N and D are positive integers and $\frac{N}{D}$ is in lowest terms. Find D – N.

a) 270 b) 271 c) 272 d) 273 e) None of these

10. The equation of the line through (1, -1) and (3, 3) is $\frac{x}{a} + \frac{y}{b} = 1$. Find $10a + b$.

a) 18 b) 16 c) 14 d) 12 e) None of these

11. Two-thirds of the teachers at FDR High School are women. Twelve of the men teachers are single. Three-fifths of the men teachers are married. Find the total number of teachers at FDRHS.

a) 84 b) 88 c) 90 d) 96 e) None of these

12. Quadrilateral ABCD is a square whose diagonals intersect at point E. Find the area of triangle CDE if EA = 8.

a) 16 b) 24 c) 32 d) 48 e) None of these

13. The ellipse $x^2 + 4y^2 = 25$ and the straight line x + 2y = 1 intersect at (*a*, *b*) and (*c*, *d*). Find *a* + *b* + *c* + *d*.

a) 2 b) 1.75 c) 1.5 d) 1.25 e) None of these

14. The ellipse $x^2 + 9y^2 = 4x - 54y - 49$ has center (*h*, *k*) with foci (*a*, *b*) and (*c*, *d*) where *a* > *b*. Find *a* + *c* + *h*.

a) 8 b) 10 c) 12 d) 14 e) None of these

15. The inverse of $f(x) = 3x + 6$ is $f^{-1}(x) = mx + b$. Find $12m - 10b$.

a) 22 b) 24 c) 26 d) 28 e) None of these

16. Find the sum of the first 1000 terms of the arithmetic sequence -475, -470, -465,-460, …

a) 2022500 b) 2022600 c) 2022700 d) 2022280 e) None of these

17. Eight cards are drawn without replacement from a standard deck of 52 cards. How many 8 card hands having 5 cards from 1 suit and 3 cards of another suit can be formed?

a) 4416980 b) 4416982 c) 4416984 d) 4416986 e) None of these

18. Find the number of distinct positive integers which are exact divisors of 12006.

a) 36 b) 48 c) 60 d) 72 e) None of these

19. The 3 roots of $x^3 + 64 = 0$ are *a*, *b*, and *c* where *a* is a real number. Find $b + c + bc - a$.

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

20. $Z = 2\cos 10° + 2i \sin 10°$ where $i^2 = -1$. If $Z^6 = a + bi$, find $b^2 - a^2$.

a) 512 b) 1024 c) 1728 d) 2048 e) None of these

21. Find $m - b$ where $y = mx + b$ is the line tangent to the parabola $y = x^2$ at the point (1, 1).

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

22. Evaluate $\left[\lim_{x \to 7} \frac{\sqrt{x+2} - 3}{x - 7}\right]^{-2}$.

a) 36 b) 40 c) 48 c) 54 e) None of these

23. A plane flying at a constant speed of 300 km/h passes over a ground radar station at an altitude of one kilometer. The plane climbs at an angle of 30° from the horizontal. Find the distance from the plane to the ground radar station exactly 1 minute later.

a) $\sqrt{20}$ km b) $\sqrt{20.5}$ km c) $\sqrt{21}$ km d) $\sqrt{21.5}$ km e) None of these

24. $Y = mx + b$ is the oblique asymptote to the graph of $y = x^3(x^2 + 3x - 10)^{-1}$. Find $5m - 3b$.

a) 13 b) 14 c) 15 d) 16 e) None of these

Solutions

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