1. Points A, B, and C are collinear with point B between points A and C. Points D and E are both above line AB. Angle DBE is twice the size of angle DBA. Angle EBC is three times the size of angle DBA. Find the size of angle DBC.
a) 110^o b) 120^o c) 135^o d) 150^o e) none of these

2. Person A departed point X at 8 a.m. and arrived at point Y 5 hours later at 1 p.m. Person B departed point X at 8 a.m. and arrived at point Y that same day at 2 p.m. If A's average speed as 10 mph faster than B's average speed, find the number of miles from point X to point Y.
a) 280 b) 300 c) 320 d) 340 e) none of these

3. A motorboat takes 3 hours to go 45 miles upstream at full throttle. It takes 2 hours to go 50 miles downstream at full throttle with the current flowing at the same speed for both events. How long should it take to go 5 miles on a lake (with no current) at full throttle?
a) 15 minutes b) 16 minutes c) 18 minutes d) 20 minutes e) none of these

4. Every dollar of a particular sum of money was used to pay all the full-time and part-time employees. The amount used to pay full timers was 150% of the amount used to pay part-time employees. If \$150,000 of this sum was NOT used to the full timers, find the number of dollars in this sum.
a) \$360,000 b) \$365,000 c) \$370,000 d) \$375,000 e) none of these

5. The ratio of two positive numbers is 8 to 5. The difference of the two numbers is 24. Find $\frac{1}{8}$ of the larger number diminished by $\frac{1}{4}$ of the smaller number.
a) 2 b) -2 c) 3 d) -3 e) none of these

6. Find the positive difference of two numbers such that when the first is added to twice the second the result is 21 but when the second is added to twice the first the result is 18.
a) 3 b) 4 c) 5 d) 6 e) none of these

7. Find the area of the circle that is circumscribed about a right triangle with hypotenuse 50 cm and one leg 48 cm. Use $\pi = \frac{355}{113}$ and round the final answer to the nearest 0.001 cm.

a) 1963.94 cm^2 b) 1963.496 cm^2 c) 1963.498 cm^2 d) 1963.500 cm^2 e) none of these

8. In triangle ABC, angle ABC is 60º and angle BCA is 90º. Find AC when AB is $\sqrt{8}$ cm.

a) 2 b) $\sqrt{3}$ c) $\sqrt{6}$ d) $2\sqrt{3}$ e) none of these

9. Find the smallest angle of a triangle whose sides are 8, 15, and 17. Round the final answer to the nearest 0.001 degree.

a) 28.071 º b) 28.072º c) 28.073º d) 28.074º e) none of these

10. It is now 6 p.m. Give the exact time of the very next time that the hands of the clock will be pointing in opposite directions.

a) 7:04 p.m. b) 7:04 $\frac{8}{11}$ p.m. c) 7:05 $\frac{5}{11}$ p.m. d) 7:05 $\frac{6}{11}$ p.m. e) none of these

11. In triangle ABC the inscribed circle is tangent to sides AB, AC, and CB at points D, E, and F, respectively. CE = x, DA = x + 2, and BF = x + 3. The perimeter of triangle ABC is 52. Find the length of the longest side of triangle ABC.

a) 19 b) 20 c) 21 d) 22 e) none of these

12. In right triangle ABC, the altitude drawn from the vertex of the 90 degree angle to the hypotenuse divides the hypotenuse into two pieces of length 4 and 9. Find the area of triangle ABC.

a) 39 b) 42 c) 48 d) 54 e) none of these

13. The domain and range of $f(x) = \dfrac{\ln(x-2)}{\sqrt{16-x^2}}$ are both subsets of the set of real numbers. Find the domain of *f*.

a) $-\infty < x < \infty$ b) $x > 2$ c) $-4 < x < 4$ d) $2 < x < 4$ e) none of these

14. Find the sum of all of the positive integers that are exact divisors of 1729.

a) 2236 b) 2240 c) 2244 d) 2248 e) none of these

15. Find $m + b$ where $y = mx + b$ is the equation of the line which is tangent to the circle $x^2 + y^2 = 169$ at the point (-5, 12).

a) $\dfrac{85}{6}$ b) $\dfrac{43}{3}$ c) $\dfrac{87}{6}$ d) $\dfrac{44}{3}$ e) none of these

16. Find the positive value of $x + 1$ where $\log_3(x+6) + \log_3(x-4) = 5$

a) $\sqrt{265}$ b) $\sqrt{266}$ c) $\sqrt{267}$ d) $\sqrt{268}$ e) none of these

17. In triangle ABC, line segment AD is the altitude from vertex A to side BC. The coordinates of A, B, and C are (-3, 4), (-7, -4), and (5, 2), respectively. Find the SUM of the coordinates of point D.

a) $-\dfrac{7}{5}$ b) $-\dfrac{6}{5}$ c) -1 d) $-\dfrac{4}{5}$ e) none of these

18. The foci of $25x^2 + 16y^2 = 400$ are the points

a) $\left(\pm\sqrt{11}, 0\right)$ b) $(\pm 3, 0)$ c) $\left(0, \pm\sqrt{11}\right)$ d) $(0, \pm 3)$ e) none of these

19. The hyperbola $9x^2 + 4y^2 = 36$ has vertices $(\pm h, 0)$ and asymptotes $y = \pm mx$. M and h are both positive. Find *mh*.

a) 2.4 b) 2.6 c) 2.8 d) 3 e) none of these

20. The solution set for $\tan 3\theta = -\frac{1}{\sqrt{3}}$ over the domain $0° \le \theta < 360°$ is $\{a°, b°, c°, d°, e°, f°\}$ where $a < b < c < d < e < f$. Find $f - a$.

a) 315 b) 300 c) 270 d) 240 e) none of these

21. $f(x) = 2x^3 - 4x^2 + 10x - 9$ and $f^{-1} = g$. Find $g'(-9)$.

a) $-\frac{1}{9}$ b) $-\frac{1}{10}$ c) $\frac{1}{9}$ d) $\frac{1}{10}$ e) none of these

22. Find the average value of the function $f(x) = x^2$ on the interval $1 \le x \le 3$.

a) $\frac{13}{3}$ b) $\frac{14}{3}$ c) 5 d) $\frac{16}{3}$ e) none of these

23. Find the area bounded by the parabola $y^2 = x$ and the line $x + y = 2$.

a) 4 b) 4.5 c) 5 d) 5.5 e) none of these

24. The minimum value of the slope of the curve $y = x^5 + x^3 - 2x$ is

a) 0 b) 2 c) 6 d) -2 e) none of these

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