

1. A exceeds B by 34 and their sum is 180 less than four times B. Find $A + B$.
a) 242 b) 244 c) 246 d) 248 e) None of these
2. Find the SUM of 3 consecutive integers where three times the smallest is equal to the middle number plus the largest.
a) 13 b) 14 c) 15 d) 16 e) None of these
3. A square and a rectangle have the same area. The rectangle is 4 ft narrower and 5 ft longer than the square. Find the perimeter of the rectangle.
a) 81 b) 82 c) 83 d) 84 e) None of these
4. Find the circumference of the circle with center at (5, 2) and tangent to the line $4y + 4 = -3(x - 10)$ at the point (13, -4). Round your answer to the nearest 0.001.
a) 56.549 b) 59.690 c) 62.832 d) 65.974 e) None of these
5. A messenger traveling at 65 mph pursues a truck which has a head start of 2 hours and overtakes the truck in 3 hours. Find the speed of the truck.
a) 45 mph b) 43 mph c) 41 mph d) 39 mph e) None of these
6. The lines $5x - 6y = 7$ and $8x - 9y = 10$ intersect at (a, b) . Put $|ab| = \frac{c}{d}$ in lowest terms and find $c + d$.
a) 2 b) 4 c) 6 d) 8 e) None of these

7. Find the length of a side of an equilateral triangle whose altitude is 2 ft shorter than a side. Round the final answer to the nearest 0.001 foot.

- a) 14.920 ft b) 14.924 ft c) 14.928 ft d) 14.932 ft e) None of these

8. Find the number of square inches in the area of an isosceles trapezoid with sides 10 in, 10 in, 10 in, and perimeter 50 in.

- a) $75\sqrt{3}$ b) $72\sqrt{3}$ c) $70\sqrt{3}$ d) $68\sqrt{3}$ e) None of these

9. The graph of $y = f(x)$ is subjected to a 90° rotation counterclockwise with the origin as the center of the rotation. The new graph has equation

- a) $x = -f(-y)$ b) $x = f(-y)$ c) $x = -f(y)$ d) $y = f(-x)$ e) None of these

10. Find the sum of the digits of a three digit number which is 31 times the sum of the digits and where the units digit is half the sum of the other two digits. If the digits are reversed, the new number is 99 more than the original number.

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

11. Write $\left[\left(\frac{a^{-\frac{1}{3}}b^{\frac{2}{3}}}{a^{\frac{5}{3}}b^{\frac{1}{3}}} \right)^{-1} \div \frac{a^{-\frac{4}{3}}}{b^{\frac{5}{3}}} \right]^{-2}$ in the form $a^x b^y$. Find xy .

- a) $17.\overline{5}$ b) $17.\overline{6}$ c) $17.\overline{7}$ d) $17.\overline{8}$ e) None of these

12. A doghouse has a regular hexagonal base with perimeter 6 yards. The dog is tethered to a vertex of the base with a 2 yard rope. Find the number square yards of area outside the doghouse that the dog can reach.

- a) 0.6π b) 2π c) 2.6π d) 3π e) None of these

13. Find the length of the latus rectum of the parabola $x + \frac{(y+1)^2}{4} = 1$.

- a) 2 b) 4 c) 6 d) 8 e) None of these

14. Suppose that $4^a = 5$, $5^b = 6$, $6^c = 7$, and $7^d = 8$. Find $abcd$.

- a) $\frac{3}{2}$ b) $\frac{5}{3}$ c) 2 d) $\frac{7}{3}$ e) None of these

15. A regular octagon ABCDEFGH has perimeter 16. Find the area of triangle ADG.

- a) $4 + \sqrt{8}$ b) $6 + \sqrt{2}$ c) $4 + \sqrt{18}$ d) $3 + \sqrt{32}$ e) None of these

16. The square of a planet's time of revolution (in years) varies as the cube of its average distance from the sun. Earth and Mercury are 91 million and 35 million miles from the sun, respectively. Find the time in years for Mercury's revolution. Round to the nearest 0.01 years.

- a) .23 years b) .24 years c) .25 years d) .26 years e) None of these

17. A railway engine can go 40 mph without any wagons attached. Its maximum speed is diminished by a quantity which varies as the square root of the number of wagons attached. With 9 wagons, its maximum speed is 32 mph. Find the greatest number of wagons which this engine can move.

- a) 225 b) 224 c) 223 d) 222 e) None of these

18. A farmer buys 20 animals consisting of dogs, cats, and pigs. The cost of the animals were \$5, \$3, and \$17, respectively. How many pigs did he buy if he spent a total of \$198?

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

19. Find the number of cubic inches in the volume of a regular tetrahedron whose 6 edges are all 10 in long. Round the final answer to the nearest 0.001 cubic inch.

- a) 117.851 b) 117.853 c) 117.855 d) 117.857 e) None of these

20. How many ways can 6 students sit in 6 chairs in a row if two of the students refuse to sit next to each other?

- a) 600 b) 540 c) 480 d) 420 e) None of these

21. If a and b are 2 the real values of k for which $kx - y = 5$ and $x^2 + y^2 = 16$ are tangent, find $|ab|$.

- a) $\frac{7}{16}$ b) $\frac{1}{2}$ c) $\frac{9}{16}$ d) $\frac{5}{8}$ e) None of these

22. Find the area of the largest isosceles triangle that can inscribed in a circle with area 10π .

- a) $7.5\sqrt{3}$ b) $7\sqrt{3}$ c) $6.5\sqrt{3}$ d) $6\sqrt{3}$ e) None of these

23. The area bounded by the parabola $y^2 = 4x$ and its latus rectum revolves about the directrix. Find the volume generated.

- a) $8.5\bar{3}\pi$ b) $8.\bar{6}\pi$ c) $8.7\bar{3}\pi$ d) $8.\bar{8}\pi$ e) None of these

24. Find the average value of the function $f(x) = x^{\frac{1}{2}}$ on the interval $4 \leq x \leq 9$.

- a) $\frac{12}{5}$ b) $\frac{38}{15}$ c) $\frac{13}{5}$ d) $\frac{8}{3}$ e) None of these

Solutions

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