

PAGE I

1. If $x = -5$, $y = 4$ and $A = x(x + y) - y(y - x)$, then the value of A is

- a) 31 b) 41 c) -31 d) -41 e) none of these

2. Simplifying $\left(\frac{2}{3} + \frac{1}{4}\right)\left(\frac{1}{3}\right)$ gives

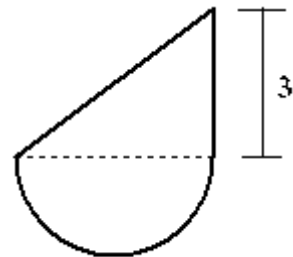
- a) $11/36$ b) $11/24$ c) $13/36$ d) $13/24$ e) none of these

3. If x and y satisfy the equations $x + 2y = 3$ and $2x - y = 7$, then $x + y =$

- a) $\frac{14}{6}$ b) $\frac{17}{5}$ c) $\frac{15}{7}$ d) $\frac{16}{5}$ e) none of these

4. A flower garden is in the shape of a semicircle surmounted by a right triangle, as shown in the figure. One leg of the triangle has length 3, as shown. If the diameter of the circle is 4, then the minimum length of fence needed to enclose the garden is

- a) $8 + 4\pi$ b) $7 + 4\pi$ c) $8 + 2\pi$
d) $7 + 2\pi$ e) none of these



5. Jane saved 25% of her \$1200 weekly income. Her husband saved 10% of his \$800 weekly income. What percent of their total income did the couple save?

- a) 22 b) 21 c) 25 d) 20 e) none of these

PAGE II

6. Amy and Mike start their hikes at the same point. Amy walks due south at 8 miles/hour, Mike walks due north at 2 miles/hour. In how many minutes will they be 21 miles apart?

- a) 2.1 b) 2.32 c) 126 d) 12.6 e) none of these

7. Find the sum of the three consecutive integers such that 7 times the first is equal to 6 times the third. (The sequence 4,5,6,7 is an example of consecutive integers.)

- a) 37 b) 39 c) 42 d) 43 e) none of these

8. In a computer language, a variable is denoted either by a single capital letter A through Z or by a capital letter followed by a single digit, A0,A1,...,Z9. How many different variables are there in this language?

- a) 286 b) 282 c) 284 d) 280 e) none of these

9. If $a^2 + b^2 = 100$, then $(2a)^2 + (2b)^2 =$

- a) 76 b) 71 c) 74 d) 82 e) none of these

10. How many of the following numbers become smaller when squared?

$\sqrt{2}$, $8/9$, -0.734 , $\sqrt{2}/2$, -1.234 , 0.1234

- a) 1 b) 3 c) 2 d) 0 e) none of these

PAGE III

11. Four fair coins are flipped. What is the probability that at least three of them come up heads?

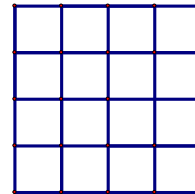
- a) $1/4$ b) $7/16$ c) $3/8$ d) $1/2$ e) none of these

12. In the addition problem to the right, each letter represents a digit. A digit is represented by only one letter, and a letter represents only one digit. Leading digits are not zero. The sum $A + B + C + D$ is

$$\begin{array}{r} A A A \\ B \\ \hline C D D C \end{array}$$

- a) 10 b) 11 c) 12 d) 13 e) none of these

13. A square with sides of length 4 inches is divided into 16 smaller squares with one inch sides. If S is the sum of the areas (in square inches) of all possible squares (of any size) in the figure, then $S =$

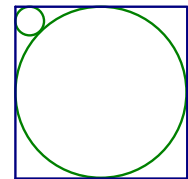


- a) 72 b) 88 c) 92 d) 104 e) none of these

14. Let p be a positive integer greater than 1. If p is divided by any of the eight integers 2 through 9, then the remainder is always 1. If p_s is the smallest p satisfying these conditions, then the sum of the digits of p_s is

- a) 10 b) 8 c) 11 d) 9 e) none of these

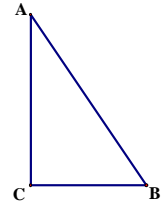
15. A large circle is tangent to each of the sides of a square. A small circle is tangent to the large circle and two sides of the square as shown. If the sides of the square have length 1, then the radius of the small circle is



- a) $(\sqrt{2} - 1)/4$ b) $(2 - \sqrt{2})/4$ c) $(3 - 2\sqrt{2})/2$
d) $(2 - \sqrt{2})/8$ e) none of these

PAGE IV

16. ABC is a right triangle with right angle at C . Joe walks from C to A and Sally walks from B to A , both walk at a constant speed. The travel time for both of them is numerically equal to $(AB/AC)^{3/2}$. If the distance CB is numerically equal to the sum of their two speeds, then what is their travel time?



- a) $(\sqrt{5} + \sqrt{2})^{3/2}$ b) $(\sqrt{5} + \sqrt{3})^{3/2}$ c) $(\sqrt{3} + \sqrt{2})^{3/2}$ d) $(\sqrt{5} - \sqrt{2})^{3/2}$
 e) none of these

17. Kim bought 17 pencils for 72 cents. (cheap pencils). Some pencils were red and the rest were blue. The number of each color bought and the price per pencil (in cents) were all integers. The blue pencils cost 1 cent more than the red ones. What was the product of the number of red pencils and the number of blue pencils that she bought?

- a) 52 b) 42 c) 60 d) 66 e) none of these

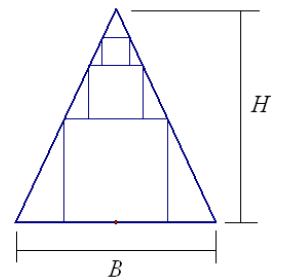
18. A triangle has three altitudes, one from each vertex to its opposite side. If the altitudes of a triangle are 12, 15 and 20, then its perimeter is

- a) 48 b) 72 c) 84 d) 60 e) none of these

19. Sally is given \$100 and must spend all of it to buy exactly 100 animals. The prices are as follows: Cows-\$10, Sheep-\$5, Pigs-\$2 and Chickens-50 cents. What is the maximum number of chickens that she could buy?

- a) 94 b) 90 c) 86 d) 84 e) none of these

20. An isosceles triangle with base B and height H is shown. A tower is inscribed in the triangle with an infinite sequence of squares. Three of these squares are shown. Each square has its top two of its vertices on the sides of the triangle. The base of the bottom square is on the base of the triangle and the bases of the remaining squares are on the top sides of the previous square. The top vertices of the squares lie on the two equal sides of the triangle. What is the sum of the areas of this infinite sequence of squares?



- a) $\frac{H^2 B}{2B + H}$ b) $\frac{H^2 B}{2H + B}$ c) $\frac{H B^2}{2B + H}$ d) $\frac{H B^2}{2H + B}$ e) none of these