1. If a and b are real numbers, the equation $3x - 5 + a = bx + 1$ has a unique solution x

(A) for all a and b (B) if a is not 2b (C) if a is not 6 (D) if b is not 0
(E) if b is not 3

2. Triangle I is equilateral with side A, perimeter P, area K, and circumradius R (radius of the circumscribed circle). Triangle II is equilateral with side a, perimeter p, area k, and circumradius r. If A is different from a, then:

(A) P:p = R:r only sometimes (B) P:p = R:r always
(C) P:p = K:k only sometimes (D) R:r = K:k always
(E) R:r = K:k only sometimes

3. Let $R = gS - 4$. When $S = 8$, $R = 16$. When $S = 10$, R is equal to:

(A) 11 (B) 14 (C) 20 (D) 21 (E) none of these

4. A store has 3 colors of appliances, almond, white, and black. The types and numbers of appliances are listed below.

	White	Almond	Black
Refrigerator	12	10	3
Washer	10	8	5
Dryer	11	11	4

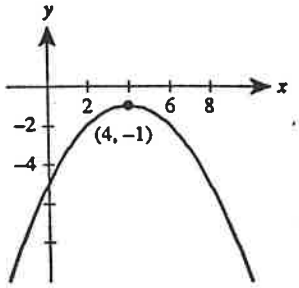
If an item is selected at random, what is the probability that it is not black?

(A) 31/37 (B) 29/37 (C) 23/37 (D) 25/37 (E) none of these

5. Find the maximum value of the function $P = 6x + 5y$ subject to the following constraints: $x \geq 0$, $y \geq 0$, $x + y \leq 76$, $x - 3y \geq 0$

(A) 380 (B) 437 (C) 456 (D) 519 (E) none of these

6. Match the correct equation that corresponds to the graph at the right.

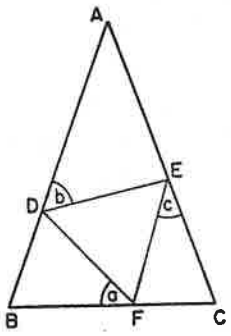


(A) $y = (-1/4)(x - 4)^2 - 1$
(B) $y = (-1/4)(x + 4)^2 - 1$
(C) $y = -(x - 1)^2 + 4$
(D) $y = -(x - 1)^2 - 4$
(E) None of these

7. If $\log_{2x} 216 = x$, where x is real, then x is:

(A) a non-square, non-cube integer (B) an irrational number
(C) a non-square, non-cube, non-integral rational number
(D) a perfect square (E) a perfect cube

8. In this diagram AB and AC are the equal sides of an isosceles triangle ABC, in which is inscribed an equilateral triangle DEF. Designate angle BFD by a, angle ADE by b, and angle FEC by c. Then:



(A) $2b = a + c$ (B) $2b = a - c$
(C) $2a = b - c$ (D) $2a = b + c$
(E) none of these

9. The formula $N = (8)(10^8)(x^{-3/2})$ gives, for a certain group, the number of individuals whose income exceeds x dollars. The lowest income, in dollars, of the wealthiest 800 individuals is at least :

(A) 10^4 (B) 10^6 (C) 10^8 (D) 10^{12} (E) 10^{16}

10. The pair of equations $3^{x+y} = 81$ and $81^{x-y} = 3$ has :

(A) no common solution (B) the solution $x = 2$, $y = 2$
(C) the solution $x = 2.5$, $y = 1.5$
(D) a common solution in positive and negative integers (E) none of these

11. The diagonal of square S is $a + b$. The perimeter of square S' which has twice the area of S is:

(A) $(a + b)^2$ (B) $\sqrt{2}(a + b)^2$ (C) $2(a + b)$ (D) $\sqrt{8}(a + b)$
(E) $4(a + b)$

12. Students are classified according to sex (male, female), grade level (freshman, sophomore) and hair color (blond, brunette, redhead). How many different classifications are possible?

(A) 8 (B) 7 (C) 12 (D) 10 (E) none of these

13. The radius R of a cylindrical box is 8 inches, the height H is 3 inches. The volume V is to be increased by the same positive amount in each of the following two situations:
1. Let R increase by x while H remains the same,
2. Let R be fixed while H increases by x.
This condition is satisfied by:

(A) no real value of x
(B) one integral value of x
(C) one rational, but not integral value of x.
(D) one irrational value of x
(E) two real values of x

14. Find the set of x values satisfying the inequality $|(1/3)(5 - x)| < 2$.

(A) $1 < x < 11$ (B) $-1 < x < 11$ (C) $x < 11$
(D) $x > 11$ (E) $|x| < 6$

15. Let m and n be any two odd numbers, with n less than m. The largest integer which divides all possible numbers of the form $m^2 - n^2$ is:

(A) 2 (B) 4 (C) 6 (D) 8 (E) 16

16. Let S be the sum of the interior angles of a polygon P for which each interior angle is 7.5 times the exterior angle at the same vertex. Then

(A) $S = 2660°$ and P may be regular
(B) $S = 2660°$ and P is not regular
(C) $S = 2700°$ and P is regular
(D) $S = 2700°$ and P is not regular
(E) $S = 2700°$ and P may or may not be regular

17. If 64 is divided into three parts proportional to 2, 4, and 6, the smallest part is:

(A) 16/3 (B) 11 (C) 32/3 (D) 5 (E) none of these

18. In solving the equation $\begin{vmatrix} 2x & 1 \\ x & x \end{vmatrix} = 3$ the outcome

(A) is satisfied for only 1 value of x (B) is satisfied for 2 values of x
(C) is satisfied for no values of x
(D) is satisfied for an infinite number of values of x
(E) is none of these

19. The number of circular pipes with an inside diameter of 1 inch which will carry the same amount of water (ignoring friction) as a pipe with an inside diameter of 6 inches is:

(A) 6π (B) 6 (C) 12 (D) 36 (E) 36π

20. In triangle ABC $AC = 24"$, $BC = 10"$, and $AB = 26"$. The radius of the inscribed circle is:

(A) 26 in (B) 4 in (C) 13 in (D) 8 in (E) none of these

21. From a group of boys and girls, 15 girls leave. There are then left two boys for each girl. After this 45 boys leave. There are then 5 girls for each boy. (This is the best ratio!!) The number of girls in the beginning was:

(A) 40 (B) 43 (C) 29 (D) 50 (E) None of these

22. The minimum value of $y = f(x) = x^2 + 2x - 4$ occurs at the point:

(A) (0, -4) (B) (1, -5) (C) (-1, 5) (D) (1, -1) (E) None of these

23. A merchant buys goods at 25% off the list price. She desires to mark the goods so that she can give a discount of 20% on the marked price and still clear a profit of 25% on the selling price. What percent of the list price must she mark the goods?

(A) 125% (B) 100% (C) 120% (D) 80% (E) 75%

24. If $y = \log_a x$, and $a > 1$, which of the following statements is incorrect?

(A) if $x = 1, y = 0$ (B) if $x = a, y = 1$
(C) if $x = -1$, y is imaginary (complex)
(D) if $0 < x < 1$, y is always less than 0 and decreases without limit as x approaches zero
(E) all of the above statements are correct

25. Given the series $2 + 1 + \frac{1}{2} + 1/4 + \ldots$. And the following five statements:
(1) the sum increases without limit
(2) the sum decreases without limit
(3) the difference between any term of the sequence and zero can be made less than any positive quantity no matter how small
(4) the difference between the sum an 4 can be made less than any positive quantity no matter how small
(5) the sum approaches a limit
Of these statements, the correct ones are:

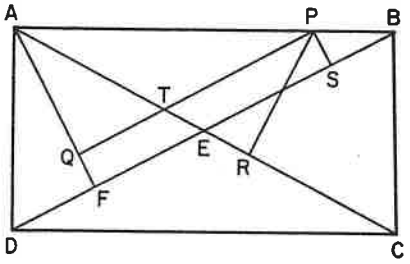
(A) only (3) and (4) (B) only (5) (C) only (2) and (4)
(D) only (2), (3), and (4) (E) only (4) and (5)

26. Using Gauss-Jordan elimination to solve the system below, the sum of the x, y, and z values for the common solution will be:

$$\begin{aligned} 3x + 2y + z &= 7 \\ x - y + z &= 6 \\ x + z &= 5 \end{aligned}$$

(A) 4 (B) 5 (C) 6 (D) 7 (E) 8

27. ABCD is a rectangle (see the accompanying diagram) with P any point on AB.
$PS \perp BD$, $PR \perp AC$, $AF \perp BD$, and $PQ \perp AF$.
Then PR + PS is equal to:



(A) PQ (B) AE (C) PT + AT (D) AF (E) EF

28. Find the 5th term in the expansion of $((1/3) + (2/3))^5$:

(A) 120/243 (B) 16/243 (C) 80/243 (D) 32/243 (E) none of these

29. If $(1/x) - (1/y) = 1/z$, then z equals:

(A) $y - x$ (B) $x - y$ (C) $(y - x)/(xy)$ (D) $(xy)/(y - x)$
(E) $(xy)/(x - y)$

30. A straight line joins the points (-1, 1), and (3, 9). Its x-intercept is:

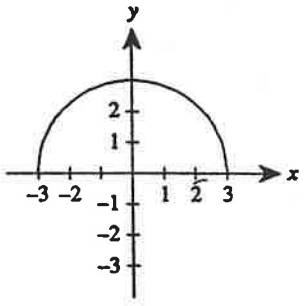
(A) -3/2 (B) -2/3 (C) 2/5 (D) 2 (E) 3

31. Match the equation with the graph.

(A) $y = \sqrt{9 - x^2}$ (B) $y = |x^2 - 9|$

(C) $y = \sqrt{x^2 - 9}$ (D) $y = (9 - x)^2$

(E) None of these



32. A club with x members is organized into four committees in accordance with these two rules: (1) Each member belongs to two and only two committees. (2) Each pair of committees has one and only one member in common. Then x :

(A) cannot be determined. (B) has a single value between 8 and 16
(C) has two values between 8 and 16 (D) has a single value between 4 and 8
(E) has two values between 4 and 8

33. Assume that the following three statements are true: I. All freshmen are human. II. All students are human. III. Some students think. Given the following four statements:
(1) All freshmen are students (2) Some humans think
(3) No freshmen think. (4) Some humans who think are not students.

Those which are logical consequences of I, II, and III are (is):

(A) 2 (B) 4 (C) 2, 3 (D) 2, 4 (E) 1, 2

34. It takes 5 seconds for a clock to strike 6 o'clock beginning at 6:00 o'clock precisely. If the strikings are uniformly spaced, how long, in seconds, does it take to strike 12 o'clock?

(A) 9.2 (B) 10 (C) 11 (D) 14.4 (E) None of these

35. If 2 is a solution of $x^3 + hx + 10 = 0$, then h equals:

(A) 10 (B) 9 (C) 2 (D) -2 (E) -9

36. Given the following six statements:

1.	All women are good drivers.	4.	All men are bad drivers.
2.	Some women are good drivers	5.	At least one man is a bad driver
3.	No men are good drivers	6.	All men are good drivers

The statement that negates statement (6) is

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

37. The number 2.5252525 . . . can be written as a fraction. When reduced to lowest terms the sum of the numerator and denominator of this fraction is:

(A) 7 (B) 29 (C) 141 (D) 349 (E) none of these

38. For a given value of k the product of the roots of $x^2 - 3kx + 2k^2 - 1 = 0$ is 7. The roots may be characterized as:

(A) integral and positive (B) integral and negative (C) rational, but not integral
(D) irrational (E) imaginary

39. The locus of the centers of all circles of given radius a, in the same plane, passing through a fixed point, is:

(A) a point (B) a straight line (C) two straight lines (D) a circle
(E) two circles

40. The polygon(s) formed by $y = 3x + 2$, $y = -3x + 2$, and $y = -2$ is (are):

(A) an equilateral triangle (B) an isosceles triangle (C) a right triangle
(D) a triangle and a trapezoid (E) a quadrilateral