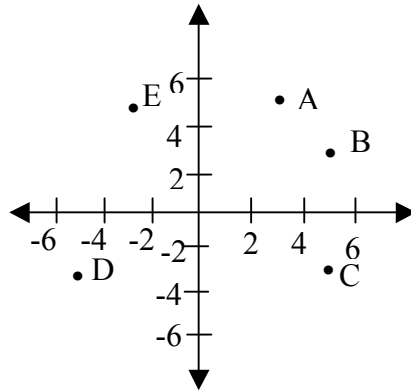1. Which point in the standard *(x, y)* coordinate plane below has the coordinates (-3,5)?

A.   *A*
B.   *B*
C.   *C*
D.   *D*
E.   *E*

2. A bag contains 4 red jellybeans, 5 green jellybeans, and 3 white jellybeans. If a jelly bean is selected at random from the bag, what is the probability that the jellybean selected is green?

F. $\dfrac{1}{12}$

G. $\dfrac{1}{5}$

H. $\dfrac{5}{23}$

J. $\dfrac{5}{12}$

K. $\dfrac{5}{7}$

3. The balance in Joan's savings account tripled during the year. Joan then withdrew $500, and the resulting balance was $100. What was the balance in the account before it tripled?

A. $200
B. $300
C. $400
D. $500
E. $600

4. For what value of x is the equation $2(x-6) + x = 18$ true?

F. 15
G. 10
H. 8
J. 4
K. 2

5. An earring manufacturing company has fixed costs of $10,000 per month and production costs of $0.60 for each pair of earrings it makes. If the company produces x pairs of earrings in a month, which of the following expressions represents the total of the company's monthly costs?

A. $10,000$x$
B. $10,000 + x$
C. $10,000$x$ + $0.60
D. $10,000 + 0.60x$
E. ($10,000 + $0.60) x

6. Anton went to Mexico during summer vacation with his Spanish class. He recorded the number of pesos he spent each day in a table, as shown below. What was the mean number of pesos he spent per day?

July	1	2	3	4	5
Pesos spent	250	100	150	100	400

F. 100
G. 150
H. 200
J. 220
K. 300

7. In $\triangle RST$, shown below, $\overline{RS} = \overline{RT}$, and the measure of $\angle R$ is 40°. What is the measure of $\angle S$?
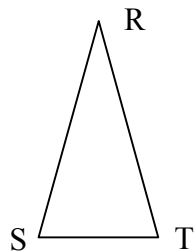
A. 20°
B. 40°
C. 50°
D. 70°
E. Cannot be determined from the given information

8. In the formula $d = rt$, d represents distance in miles, r represents average speed in miles per hour, and t represents time in hours. What is an automobile's average speed, in miles per hour, if it travels 60 miles in 1 ½ hours?

F. 30
G. 40
H. 60
J. 90
K. 120

9. $|3 - 2| - |1 - 4| = ?$

A. -4
B. -2
C. 2
D. 4
E. 10

10. If c, d, and f are nonzero real numbers and $cd = f$, which of the following equations for c must always be true?

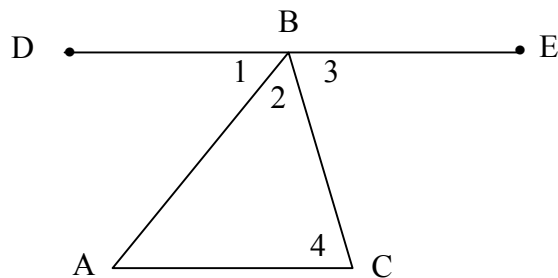F. $c = df$

G. $c = \dfrac{d}{f}$

H. $c = \dfrac{f}{d}$

J. $c = f - d$

K. $c = \sqrt{df}$

11. A cookie recipe calls for $\dfrac{2}{3}$ cup sugar to make 24 two-inch cookies. According to this recipe, how many cups of sugar should be used to make 60 two-inch cookies?

A. $\dfrac{5}{9}$

B. 1

C. $1\dfrac{1}{5}$

D. $1\dfrac{2}{3}$

E. $3\dfrac{1}{6}$

12. In the figure below, B is on $\overline{DE}$ and $\overline{DE} \parallel \overline{AC}$. Which of the following angle congruence's must hold?

F. $\angle 1 = \angle 2$
G. $\angle 1 = \angle 4$
H. $\angle 2 = \angle 3$
**J.** $\angle 2 = \angle 4$
K. $\angle 3 = \angle 4$

13. For what value of a is $x = 3$ a solution to the equation $x + 3 = ax + 9$?

A. 1.5
B. 1
C. -1
D. -1.5
E. -3

14. Quadrilateral *ABCD* has vertices (-2, -1), (4, -3), (5, 2), and (-1, 3) in the standard (*x, y*) coordinate plane. Suppose *ABCD* is translated 2 units to the left and 1 unit down, forming quadrilateral *A'B'C'D'*. Which of the following shows the coordinates of the vertices of *A'B'C'D'*?

F. (-4, -2), (2, -4), (3,1), (-3,2)
G. (-3, -3), (3, -5), (4,0), (-2,1)
H. (-2, -2), (4, -4), (5,1), (-1,2)
J. (0,0), (6, -2), (7,3), (1,4)
K. (4,2), (-8,6), (-10, -4), (2, -6)

15. In the figure below, *F* and *E* are points on $\overline{GD}$. What is the ratio of the area of square *ABEF* to the area of parallelogram *ACDG*?
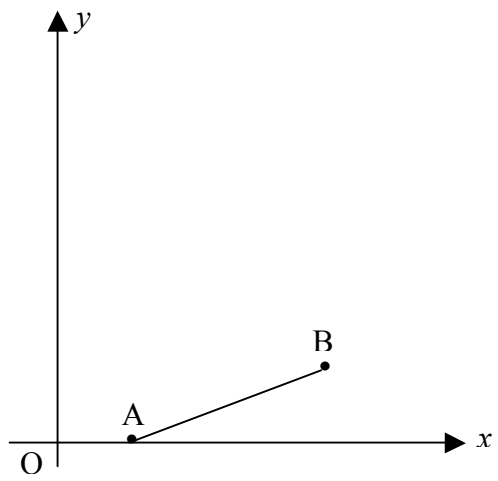
2 in   5 in

A   B   C

G   F   E   D
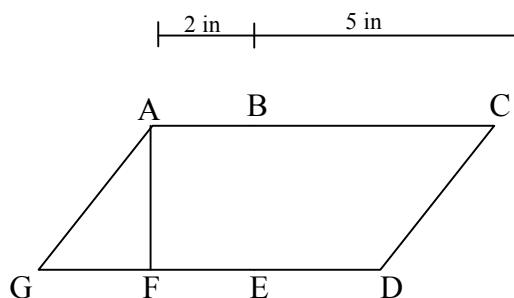
A. 1:14
B. 1:7
C. 7:1
D. 7:2
E. 2:7

16. When *a* = *b* and *c* = d, which of the following equations must be true?

F. $a + b = c + d$

G. $a + d = b + c$

H. $a + c = a + b$

J. $a - c = d - b$

K. $ad = cd$

17. The scales on both axes of the standard (*x, y*) coordinate plan below are the same. Of the following, which is the best estimate for the slope of $\overline{AB}$?
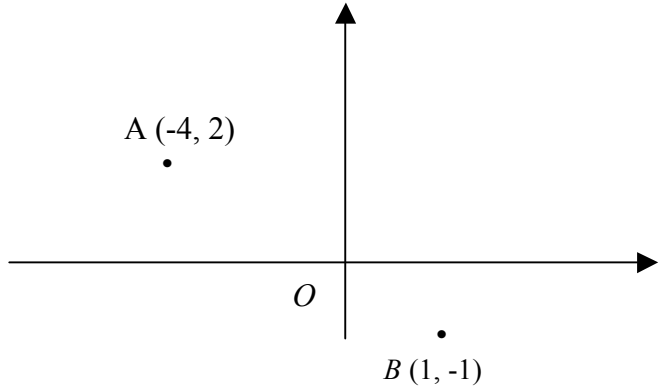
A. 4

B. $\dfrac{3}{4}$

C. $\dfrac{1}{4}$

D. $-\dfrac{1}{4}$

E. -4

18. A road map is drawn to scale so that 1.5 inches represents 90 miles. How many miles does 1.6 inches represent?

F. 91
G. 96
H. 99
J. 100
K. 106

19. In the standard (*x, y*) coordinate plane shown below, what is the distance in the *x* direction, in units, from point *A* to point *B?*
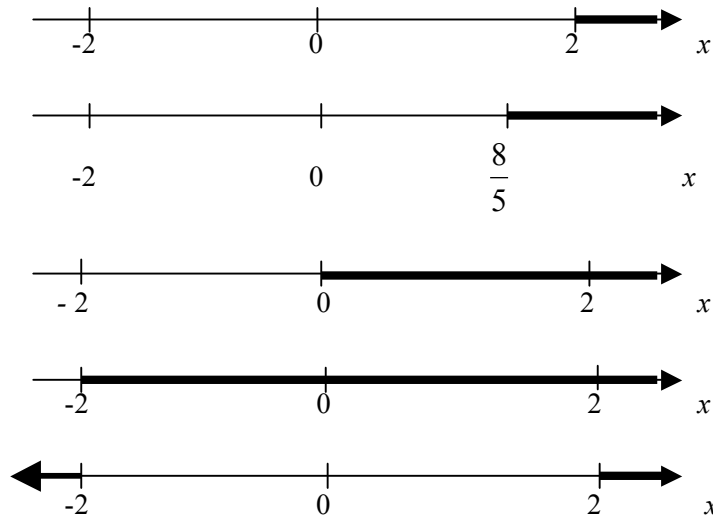

A (-4, 2)

O

B (1, -1)

A. 5
B. 4
C. 3
D. -3
E. -5

20. Which of the following is NOT a solution of $(x - 3)(x - 1)(x + 7) = 0$?

F. -7
G. -3
H. 1
J. 3
K. 7

21. Which of the following shows the solution set for the inequality $5x - 1 \geq 9$?

A.

$-2 \qquad 0 \qquad 2 \qquad x$

$-2 \qquad 0 \qquad \dfrac{8}{5} \qquad x$

$-2 \qquad 0 \qquad 2 \qquad x$

$-2 \qquad 0 \qquad 2 \qquad x$

$-2 \qquad 0 \qquad 2 \qquad x$

22. If $a = 10$, then which of the following represents 8,003?

F. $8a + 3$
G. $80a + 3$
H. $8a^2 + 3$
I. $8a^3 + 3$
J. $8a^4 + 3$

**23.** What is the value of b in the solution to the system of equation below?

$$3a - 2b = 21$$
$$a + 3b = -4$$

A. 17
B. 9
C. 5
D. -3
E. −5

24. Which of the following is an equivalent form of $x + x(x + x)$?

F. $4x$
G. $x^2 + 2x$
H. $2x^2 + x$
J. $4x^2$
K. x^4

25. To check the slope of a ramp, a building inspector places an overlay of the standard (x,y) coordinate plane on the construction blueprint so that the x-axis aligns with the horizontal on the blueprint. The line segment representing the side view of the ramp goes through the points (1,-3) and (14,2). What is the slope of the planned ramp?

A. $-\dfrac{1}{15}$

B. $-\dfrac{1}{13}$

C. $-\dfrac{1}{6}$

D. $\dfrac{5}{13}$

E. $\dfrac{13}{5}$

26. Due to inflation, a car that formerly sold for $15,000 now sells for 10% more. Which of the following calculations gives the current cost, in dollars, of the car?

F. $15,000 + 10$
G. $15,000 = 15,000(0.01)$
H. $15,000 + 15,000(0.10)$
J. $15,000 + 15,000(10)$
K. $15,000(0.10)$

27. In 3-dimensional space, the set of all points 12 units from the origin is:

A.   a circle
B.   a sphere
C.   a line
D.   a cylinder
E.   2 parallel planes

28. In the regular hexagon below, vertices *B, C,* and *D* are labeled; $\overline{OA}$ is perpendicular to $\overline{CD}$; *A* is the midpoint of $\overline{CD}$; and *O* is the midpoint of $\overline{BC}$. What is the degree measure of ∠ *AOC*?

F. 15°
G. 20°
H. 30°
J. 45°
K. 60°
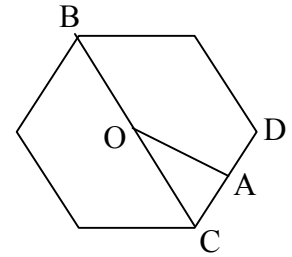
29. The number 0.0005 is 100 times as large as which of the following numbers?

A. 0.5
B. 0.05
C. 0.0005
D. 0.00005
E. 0.000005

30. The volume, *V,* of a sphere is determined by the formula $V = \dfrac{4\pi r^3}{3}$, where *r* is the radius of the sphere. What is the volume, in cubic centimeters, of a sphere with a diameter 6 centimeters long?

F. 36π
G. 72π
H. 108π
I. 144π
J. 288π

31. Which of the following is equal to $\dfrac{\dfrac{1}{2} - \dfrac{1}{3}}{\dfrac{1}{2} + \dfrac{1}{3}}$?

A. $-\dfrac{5}{1}$

B. $-\dfrac{1}{5}$

C. $\dfrac{1}{2}$

D. $\dfrac{1}{5}$

E. $\dfrac{1}{6}$

32. One neon sign flashes every 6 seconds. Another neon sign flashes every 8 seconds. If they flash together and you begin counting seconds, how many seconds after they flash together will they next flash together?

F. 48
G. 24
H. 14
J. 7
K. 2

**33.** If $\sqrt{2x} - 5 = 1$, then $x =$?

A. -8
B. 8
C. 9
D. 12
E. 18

34. A truck sprang a leak at the bottom of its radiator, which held 480 ounces of fluid when it started to leak, and started losing radiator fluid at a constant rate of 4 ounces per minute. Suppose that the radiator continued to leak at this constant rate and that the truck, traveling at 35 miles per hour, could continue traveling at this rate until its radiator was completely empty. In how many *miles* would the radiator be empty?

F. 13.7
G. 17.5
H. 35.0
J. 70.0
K. 120.0

35. Each of 3 lines crosses the other 2 lines, as shown below. Which of the following relationships, involving angle measures (in degrees), *must* be true?

$m\angle 4 + m\angle 10 = 180°$
$m\angle 2 + m\angle 7 + m\angle 12 = 180°$
$m\angle 2 + m\angle 7 + m\angle 10 = 180°$

A. I only
B. II only
C. III only
D. I and II only
E. I, II, and III
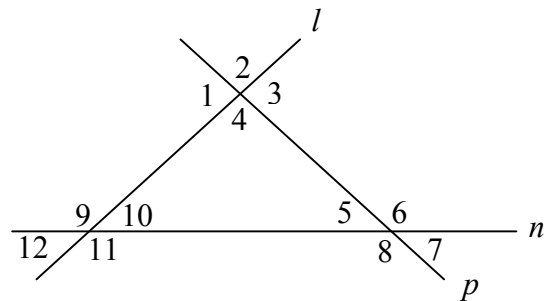
36. How many ordered pairs (x,y) of real numbers will satisfy the equation $2x - 5y = 6$?

F. 0
G. 1
H. 2
J. 3
K. Infinitely many

37. If Mark works steadily he can complete a task in x hours. What portion of the task remains if he works steadily for y hours, where y is any value less than x ?

A. $\dfrac{(x+y)}{x}$

B. $\dfrac{(y-x)}{x}$

C. $\dfrac{(x-y)}{(x+y)}$

D. $\dfrac{(x-y)}{y}$

E. $\dfrac{(x-y)}{x}$

38. If $a^2 - b^2 = 81$ and $a - b = 9$, then $a =$?

F. 12
G. 9
H. 3
J. -3
K. -9

39. For $y \ne 0$, $\dfrac{y^8}{y^2}$ is equivalent to:

A. 1
B. 4
C. y^3
D. y^4
E. y^6

40. The polygon below was a square with 12-inch sides before a triangle was cut off. What is the perimeter, in inches, of this polygon?

9 in

8 in

12 in
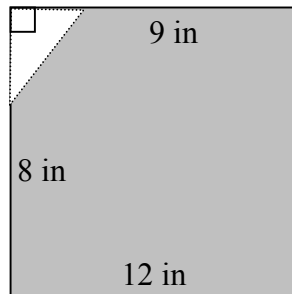
F.   41
G.   43
H.   46
J.   48
K.   53

41. A circle in the standard (x,y) coordinate plane has center $(2,-3)$ and radius 4 units. Which of the following equations represents this circle?
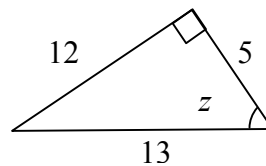
A. $(x - 2)^2 + (y+3)^2 = 4$
B. $(x +2)^2 - (y - 3)^2 = 4$
C. $(x + 2)^2 + (y - 3)^2 = 4$
D. $(x - 2)^2 + (y + 3)^2 = 16$
E. $(x + 2)^2 - (y - 3)^2 = 16$

42. In the figure below, a square is circumscribed about a circle with a 30-inch diameter. Points A, B, C, and D are in the midpoints of the square's sides. What is the total area, in square inches, of the shaded regions?

F.   450
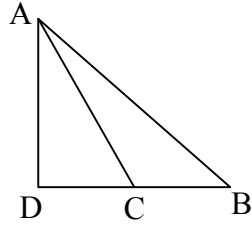G.   225
H.   177
J.   94
K.   97

43. For the triangle shown below, what is the value of $\tan z$?

12

5

z

13

A. $\dfrac{5}{12}$

B. $\dfrac{12}{5}$

C. $\dfrac{5}{13}$

D. $\dfrac{13}{5}$

E. $\dfrac{12}{13}$

44. In Δ *ABD* below, points *D, C,* and *B* are collinear, $\overline{AD}$ is perpendicular to $\overline{DB}$, and $\overline{AC}$ bisects ∠*DAB*. If the measure of ∠ *CBA* is 40°, what is the measure of ∠*ACB?*

F. 115°
G. 112.5°
H. 110°
J. 107.5°
K. 105°

45. You have enough material to build a fence 40 meters long. If you use it all to enclose a square region, how many square meters will you enclose?

A. 160
B. 100
C. 80
D. 40
E. 20

46. For what nonzero whole number *k* does the quadratic equation $x^2 + k^2x + 2k = 0$ have exactly 1 real solution for *x*?

F. -4
G. -2
H. 2
J. 4
K. 8

47. For all x > 3, $\dfrac{3x - x}{x + 3x - 18}$ =?

A. $\dfrac{-x}{x+6}$

B. $\dfrac{x}{x-6}$

C. $\dfrac{1}{x+6}$

D. $-\dfrac{1}{18}$

E. $\dfrac{1}{18}$

48. The pattern shown in abbreviated form below is composed of squares that are arranged horizontally and surrounded by 4 hexagons. All the squares are congruent, and all the hexagons are congruent. How may of these congruent hexagons will there be if the pattern is repeated until there are 20 squares?
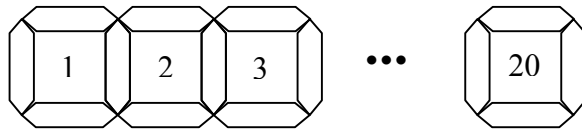
F. 44
G. 61
H. 70
J. 79
K. 80

49. If the circumference of a circle is $\dfrac{5}{2} \pi$ inches, how many inches long is its radius?

A. $\dfrac{2}{5}$

B. $\dfrac{4}{5}$

C. $\dfrac{5}{4}$

D. $\dfrac{\sqrt{5}}{2}$

E. $\sqrt{\dfrac{5}{2}}$

50. If the function f satisfies the equation $f(x + y) = f(x) + f(y)$ for every pair of real numbers x and y, what is (are) the possible value (s) of $f(0)$?

F. Any real number
G. Any positive real number
H. 0 and 1 only
J. 1 only
K. 0 only

51. The area of the trapezoid below is 16 square inches, the altitude is 2 inches, and the length of one base is 3 inches. What is the length, b, of the other base, in inches?

A. $2\dfrac{2}{3}$

B. 5

C. 11

D. 13

E. 15
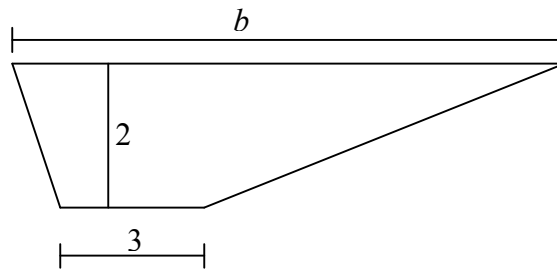
52. This year, 75% of the graduating class of Harriet Tubman High School had taken at least 8 math courses. Of the remaining class members, 60% had taken 6 or 7 math courses. What percent of the graduating class had taken fewer than 6 math courses?

F. 0%
G. 10%
H. 15%
J. 30%
K. 45%

53. Which of the following shaded regions is the graph in the standard (x, y) coordinate plane of the points that satisfy the inequality $|y| \le 10$?

A.

D.

B.

E.

C.
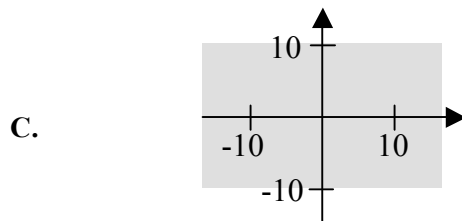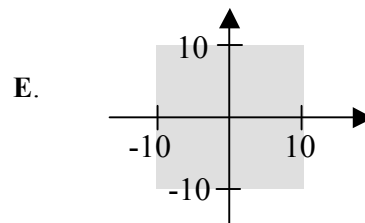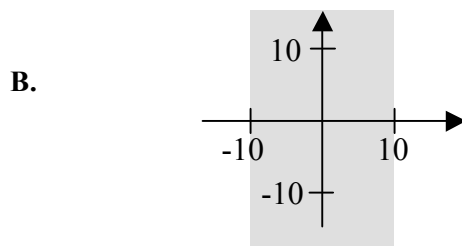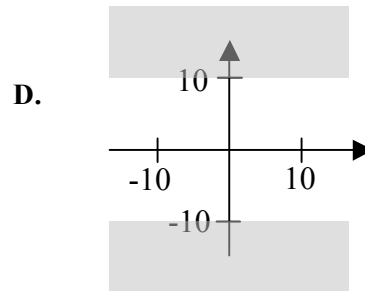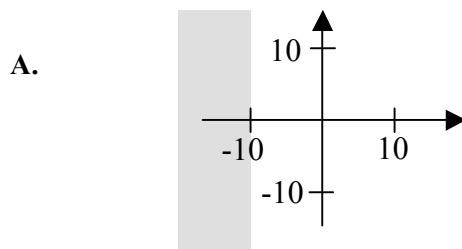
54. A standard sheet of paper ($8\frac{1}{2}$ inches wide by 11 inches long) is rolled up so that the 2 shorter edges just meet, forming a circular tube (cylinder) $8\frac{1}{2}$ inches high. How many inches in circumference is the tube?

F. 11

G. $\dfrac{11}{2}\pi$

H. 22π

J. $\dfrac{289}{4}\pi$

K. 121π

55. A baseball team played its first 20 games and won 12 of them. Then, the team went on a losing streak and lost its next 4 games. How many consecutive additional victories does the baseball team need in order to bring its winning percentage back team need in order to bring its winning percentage back to at least what it was just before this 4-game losing streak?

A. 2
B. 4
C. 6
D. 8
E. 12

56. Lines p and q intersect at point (1,3) in the standard (x, y) coordinate plane. Lines p and r intersect at (2.5). Which of the following is an equation for line p?

F. $y = 2x + 1$
G. $y = 2x + 2$
H. $y = 2x + 3$
I. $y = 2x + 5$
J. Cannot be determined from the given information

57. If $\sin a = \dfrac{3}{4}$, and a is the measure of an acute angle, then $\cos a = $? (Note: An acute angle has a degree measure from $0°$ to $90°$).

A. $\dfrac{1}{4}$

B. $\dfrac{4}{3}$

C. $\dfrac{\sqrt{3}}{2}$

D. $\dfrac{\sqrt{7}}{4}$

E. Cannot be determined from the given information.

58. The radio station WEST is erecting a new transmitting tower that is 280 feet tall. A support wire will be attached to the ground at point A and to the tower 250 feet up at point B, as shown below. The wire must be at least as long as $\overline{AB}$. Which of the following expresses the length of $\overline{AB}$, in feet?

F. $250 \cos 70°$

G. $250 \sin 70°$

H. $250 \tan 70°$

J. $\dfrac{250}{\cos 70°}$

K. $\dfrac{250}{\sin 70°}$
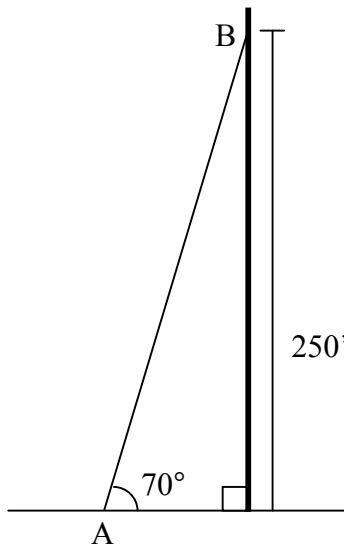
59. In an arithmetic series, the terms of the series are equally spread out. For example, in 1+ 5+9+13+17, consecutive terms are 4 apart. If the first term in an arithmetic series is 3, the last term is 136, and the sum is 1,390, what are the first 3 terms?

A.   3, 10, 17

B.   3, 23, 43

C. $3, 36\frac{1}{3}, 70$

D. $3, 69\frac{1}{2}, 136$

E.   3, 139, 1,251

60. Right triangle $\triangle ABC$ has angle measures a, $\boldsymbol{B}$, and Y degrees and side lengths a, b, and c inches, as illustrated below. Which of the following is true about the value of the product $\tan B \tan Y$?

F.   The value is 1

G.   The value is $\dfrac{b^2}{c^2}$

H.   The value is $\dfrac{b^2 c^2}{a^4}$

J.   The value is undefined

K.   The value cannot be determined from the given information.