PLUGGING IN AND PITA DRILL 1

Easy

2. If $\frac{3n}{4} - 7 = 2$, then $n =$

F. –9

G. $-\frac{7}{3}$

H. $\frac{7}{3}$

J. 9

K. 12

5. Points *A, B,* and *C* lie on a line in that order, as shown below. The ratio of the length of $\overline{AB}$ to the length of $\overline{AC}$ is 7 to 10. What is the ratio of the length of $\overline{AB}$ to the length of $\overline{BC}$, if it can be determined?

A. 3:7
B. 3:17
C. 7:3
D. 7:17
E. Cannot be determined from the given information

6. Liz rented a car for a business trip with a rental agreement that included a $20.00 charge for the first 100 miles she drove, plus a fee of $0.30 for each additional mile over 100 miles. When Liz received the bill for her rental car, she was charged $57.50 for the miles she drove. How many miles did Liz drive on her business trip?

F. 175
G. 225
H. 325
J. 430
K. 515

9. Which of the following expressions is equivalent to $(3x^2 - 2x + 4) + (2x - 1) - (x^2 - 3x + 2)$?

A. $x^2 - 2x + 3$
B. $x^2 + 2x - 1$
C. $2x^2 - 3x - 5$
D. $2x^2 - 3x - 1$
E. $2x^2 + 3x + 1$

11. If b is a positive integer greater than 1, what is the smallest integer value of a for which there exists a value of b such that $\sqrt{a - b^2} > 0$?

A. 5
B. 16
C. 25
D. 36
E. 49

14. The following statements are true of the players of a game that uses cards numbered 1–10.

I. George has none of the same cards as Ian.
II. George has all the cards that Fiona has.
III. Ian has all the cards that Hailey has.

Which of the following statements *must* be true?

F. George has none of the cards that Fiona has.
G. Hailey has none of the cards that Fiona has.
H. George has all the cards that Hailey has.
J. Ian has all the cards that George has.
K. Hailey has all the cards that Fiona has.

15. When the lines $4x - y = 4$ and $x + 4y = 18$ are graphed in the standard (x,y) coordinate plane, which of the following (x,y) pairs represents the point of intersection?

A. (–2,5)
B. (0,4.5)
C. (2,4)
D. (4,3.5)
E. (6,3)

16. Which of the following expressions is equivalent to $\frac{p^2 - 3p}{2p} + \frac{1}{p^2}$?

F. $\frac{p^2 - 3p + 1}{2p^3}$

G. $\frac{2p^2}{p^3 - 3p^2 + 2}$

H. $\frac{p^3 - 3p^2 + 2}{2p^2}$

J. $\frac{p - 3p^2}{p^3 + 4}$

K. $\frac{2 - p^2}{p^2 + p - 2}$

18. Amethyst's route to work is 48 miles long. Along the way, she stops for coffee and notices that the ratio of the number of miles she's driven so far to the number of miles left to go is 3:1. How many miles does she have left to drive?

F. 6
G. 12
H. 24
J. 30
K. 36

20. The students in a math class are asked to determine the equation of an unknown linear function, *f*. The teacher tells the class that the output of the function is 7 when the input is 4. The teacher also says that the output of the function is 28 when the input is 16. Which of the following equations correctly expresses the function *f,* where x is the input and $f(x)$ is the output?

F. $f(x) = \frac{4}{7}x + \frac{33}{7}$

G. $f(x) = x + 3$

H. $f(x) = x + 12$

J. $f(x) = \frac{4}{7}x$

K. $f(x) = \frac{7}{4}x$

Medium

21. In a dog park on a Sunday morning, all dogs belonged to exactly 1 of 3 groups: hounds, terriers, or mixed breed dogs. There were 27 dogs in the park. There were 6 fewer hounds than terriers and 9 fewer terriers than mixed breed dogs. How many mixed breed dogs were in the park that morning?

A. 8
B. 9
C. 10
D. 17
E. 19

23. If $\frac{w - 1}{2} = z$ and $\frac{w + z}{2} = 11$, then which of the following is equivalent to z ?

A. 5
B. 7
C. 11
D. 13
E. 15

24. A salesman earns $600 per week in base salary. For each successful sale, he receives $125 in commission. Which of the following represents the amount of money, in dollars, the salesman earns in a given week in which he makes s successful sales?

F. $725s$
G. $125s - 600$
H. $600s + 125$
J. $600 - 125s$
K. $600 + 125s$

27. The expression $(n^2 - 6n + 5)(n + 4)$ is equivalent to:

A. $n^3 - 2n^2 - 19n + 20$
B. $n^3 - n^2 + 9n + 20$
C. $n^3 - 2n^2 - 7n + 20$
D. $n^3 + 2n^2 - 24n + 20$
E. $n^3 - 2n^2 - 29n + 20$

28. Tim draws a parallelogram whose height is 2 times its base. If the area of the parallelogram is 18 square inches, how long is the base, in inches?

(Note: The area of a parallelogram is given by the equation $A = bh$, where b is the base and h is the height.)

F. 3
G. 4
H. 6
J. 9
K. 10

30. If $|2n + 6| = |3n + 4|$, then what are the possible values of n ?

F. 0 and 2
G. 0 and –2
H. –2 and 2
J. 2 only
K. –2 only

32. If $f(a) = a^2 + 3$ and $g(a) = 3a - 1$, which of the following is an expression for $g(f(a))$?

F. $a^2 + 3a + 2$
G. $3a^2 - 3$
H. $-a^2 + 3a - 2$
J. $3a^2 + 9a - 3$
K. $3a^2 + 8$

33. If $\sqrt[3]{343} - \sqrt[3]{a} = \sqrt[3]{27}$, what is the value of a ?

A. 4
B. 7
C. 16
D. 49
E. 64

37. Which of the following expressions is equivalent to $(y - 4)^{-50}$?

A. $-50y + 200$

B. $-y^{50} + 4^{50}$

C. $\dfrac{1}{(-4y)^{50}}$

D. $\dfrac{1}{(y-4)^{50}}$

E. $\dfrac{1}{y^{50}} - \dfrac{1}{4^{50}}$

40. In a professional sports league consisting of x teams, y represents the number of teams that qualify for the playoffs in a given season. Which of the following could be used to determine the fraction of teams that does NOT make the playoffs in a given season?

F. $\dfrac{x-y}{x}$

G. $\dfrac{y-x}{x}$

H. $\dfrac{y}{x}$

J. $\dfrac{x-y}{y}$

K. $\dfrac{x+y}{x}$

Hard

41. For positive real numbers x, y, and z such that $3x = 4y$ and $\dfrac{2}{3}y = \dfrac{1}{3}z$, which of the following inequalities is true?

A. $x < y < z$
B. $x < z < y$
C. $y < x < z$
D. $y < z < x$
E. $z < y < x$

45. Which of the following gives the solution set for $\sqrt[3]{(n^2 - 6n)} = 3$?

A. $\{3\}$
B. $\{2 \pm \sqrt{3}\}$
C. $\{-3, 9\}$
D. $\{3, -9\}$
E. $\{27\}$

46. If $x > y$, then $-|y - x|$ is equivalent to which of the following?

F. $\sqrt{y - x}$
G. $x - y$
H. $|y - x|$
J. $-(x - y)$
K. $|x - y|$

47. What is the least possible integer value of $a + b$, if $6 < b < a$?

A. 9
B. 11
C. 13
D. 14
E. 15

48. If $-1 < x < 0$, then which of the following must be true?

F. $0^x > 0$

G. $-\dfrac{1}{x} > 1$

H. $x + \dfrac{1}{x} = 0$

J. $\dfrac{1}{x} > 0$

K. $x^0 < 0$

49. If n is a real number, then what is the solution to the equation $27^{2n} = 81^{(n+1)}$?

A. $n = 0$
B. $n = 1$
C. $n = 2$
D. $n = 3$
E. $n = 4$

52. On her first 6 rounds of golf this season, Mary has an average of s strokes per round. If Mary wants to decrease her average strokes per round to $s - 3$ strokes, how many fewer strokes than s must she take during the 7th round?

F. 3
G. 7
H. 18
J. 21
K. 25

54. Set A contains 12 distinct values. Set B contains 13 distinct values: the 12 values in Set A and a value that is lower than any value in Set A. Which of the following statements is true about the values of the mean and median for Set B as compared to those of Set A ?

F. The mean and median of Set B will be equal to those of Set A.
G. The mean and median of Set B will be less than those of Set A.
H. The mean of Set B will be less than the mean of Set A; the medians of the two sets will be equal.
J. The median of Set B will be less than the median of Set A; the means of the two sets will be equal.
K. Using the given information, the means and medians of Set B and Set A cannot be compared.

55. Which of the following is an irrational value of n that is a solution to the equation $|n^2 - 30| - 6 = 0$?

A. $\sqrt{6}$
B. 6
C. $2\sqrt{6}$
D. $3\sqrt{6}$
E. $4\sqrt{6}$

59. Consider all pairs of positive integers a and b whose sum is 6. For how many values of a does $a^b = b^a$?

A. None
B. 1
C. 2
D. 3
E. 6