WS 4—Skills 11-15

Directions: For this section, solve each problem and decide which is the best of the choices given. Circle the corresponding capital letter. You may use any available space for scratchwork.

Notes:
1. The use of a calculator is permitted.
2. All numbers used are real numbers.
3. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.
4. Unless otherwise specified, the domain of any function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

1. For a linear function f, $f(0) = 2$ and $f(3) = 5$. If $k = f(5)$, what is the value of k?
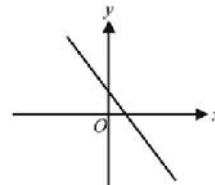   (A) 5
   (B) 6
   (C) 7
   (D) 8
   (E) 9

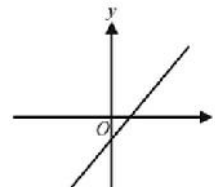| x	$f(x)$
0	a
1	12
2	b

2. The table above shows some values for the function f. If f is a linear function, what is the value of $a + b$?
   (A) 24
   (B) 36
   (C) 48
   (D) 60
   (E) It cannot be determined from the information given.

3. A linear function is given by $ax + by + c = 0$ and $a > 0$, $b < 0$, and $c > 0$. Which of the following graphs best represents the graph of the function?
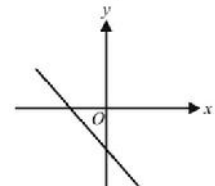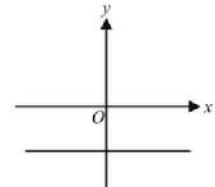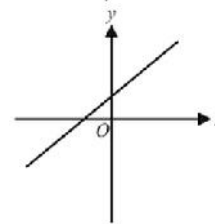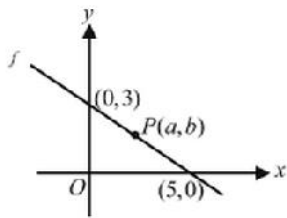
   (A)

   (B)

   (C)

   (D)

   (E)

4. If f is a linear function and $f(3) = 2$ and $f(5) = 6$, what is the y-intercept of the graph of f?
   (A) 4
   (B) 2
   (C) 0
   (D) –2
   (E) –4

5. If f is a linear function and $f(3) = -2$ and $f(4) = -4$, what is the x-intercept of the graph of f?
   (A) 3
   (B) 2.5
   (C) 2
   (D) 0
   (E) –1

Note: Figure not drawn to scale.

6. The figure above shows the graph of function f. If $b = 2a$, what is the value of a?
   (A) 2
   (B) $\dfrac{5}{2}$
   (C) $\dfrac{15}{13}$
   (D) $\dfrac{5}{4}$
   (E) $\dfrac{3}{2}$

t	$h(t)$
–1	6
0	4
1	2
2	0

7. The table above shows some values for the linear function h for selected values of t. Which of the following defines the function h?
   (A) $h(t) = 4 - t$
   (B) $h(t) = 4 - 2t$
   (C) $h(t) = 4 + 2t$
   (D) $h(t) = 4 + t$
   (E) $h(t) = 2 - 0.5t$

8. Fahrenheit (F) and Celsius (C) are related by $F = \dfrac{9}{5}C + 32$. If the Fahrenheit temperature increased by 27 degrees, what is the degree increase in Celsius temperature?
   (A) 15
   (B) 20
   (C) 32
   (D) 59
   (E) 81

9. In the formula $P = \dfrac{7}{12}Q + 60$, if P is increased by 35, then what is the increase in Q?
   (A) 35
   (B) 60
   (C) 80
   (D) 140
   (E) 160
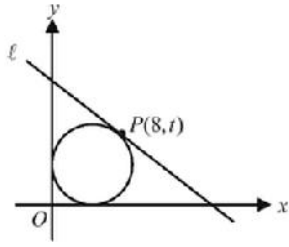
Note: Figure not drawn to scale.

10. In the figure above, a circle is tangent to line l, x-axis, and y-axis. If the radius of the circle is 5, what is the value of t?
    (A) 7
    (B) 8
    (C) 9
    (D) 10
    (E) 11

11. If the lengths of the sides of $\triangle ABC$ is 3, $x+3$, and 9, which of the following could be the value of x?
    (A) 1
   (B) 2
    (C) 3
    (D) 4
    (E) 9
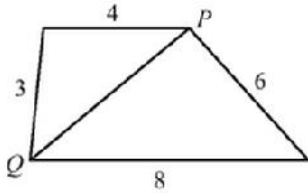
Note: Figure not drawn to scale.

12. In the figure above, which of the following could be the length of $\overline{PQ}$?
    (A) 12
    (B) 10
    (C) 8
    (D) 7
    (E) 6

13. Which of the following cannot be possible to construct a triangle with the given side lengths?
    (A) 6, 7, 11
    (B) 3, 6, 9
    (C) 28, 34, 39
    (D) 35, 120, 125
    (E) 40, 50, 60

14. If 11 marbles, each red or white in color, are lined up side by side in a single row so that no two adjacent marbles are red, what is the minimum number of white marbles required?
    (A) 3
    (B) 4
    (C) 5
    (D) 6
    (E) 7

15. In how many different ways can five students be arranged in a row?
    (A) 60
    (B) 80
    (C) 120
    (D) 160
    (E) 240

16. How many distinct arrangements of the letters of the word LETTER are possible that begins and ends with a T?
    (A) 3
    (B) 4
    (C) 5
    (D) 7
    (E) 8

17. A bag contains 8 white marbles, 8 blue marbles, 7 red marbles, and 6 yellow marbles. What is the least number of marbles that can be drawn from the bad so that 3 of the same color marbles will be drawn?
    (A) $\dfrac{1}{5}$

    (B) $\dfrac{2}{5}$

    (C) $\dfrac{1}{3}$

    (D) $\dfrac{2}{3}$

    (E) $\dfrac{3}{5}$

$\boxed{A}$ $\boxed{B}$ $\boxed{C}$ $\bigcirc$1 $\bigcirc$2 $\bigcirc$3

18. How many arrangements of two letters and two numbers can be formed using the numbers and letters above if each arrangement must start and end with a number, and no letter or number appears more than once in the arrangement?
(A) 360
(B) 120
(C) 36
(D) 18
(E) 12

16. If a fair die is thrown three times, what is the probability that a 5 comes up exactly two times?
(A) $\dfrac{5}{216}$
(B) $\dfrac{5}{72}$
(C) $\dfrac{1}{5}$
(D) $\dfrac{5}{24}$
(E) $\dfrac{1}{3}$
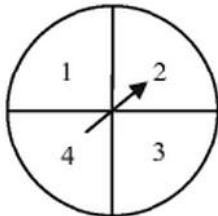
20. In the figure above, the arrow is spun twice on a wheel containing four equally likely regions numbered 1 through 4. What is the probability that the first digit spun is larger than the second?
(A) $\dfrac{1}{8}$
(B) $\dfrac{1}{4}$
(C) $\dfrac{3}{8}$
(D) $\dfrac{1}{2}$
(E) $\dfrac{5}{8}$

21. A jar contains four white marbles and two blue marbles, all the same size. A marble is drawn at random and not replaced. A second marble is then drawn from the jar. What is the probability that one white and one blue marble are drawn?
(A) $\dfrac{8}{15}$
(B) $\dfrac{4}{15}$
(C) $\dfrac{1}{3}$
(D) $\dfrac{1}{2}$
(E) $\dfrac{2}{3}$

22. If you have 12 people in a group and each person shakes everyone else's hand only once, how many handshakes take place?
(A) 132
(B) 112
(C) 88
(D) 66
(E) 36

23. At a party, everybody shakes hands with each other once. If there are 45 handshakes, how many people are there at the party?
(A) 9
(B) 10
(C) 11
(D) 12
(E) 13

24. If there are five lines on a plane surface, what is the greatest number of possible intersection points?
(A) 8
(B) 9
(C) 10
(D) 11
(E) 12

25. In the figure above, five points lie on the circle. If a line segment is formed between any two points, which of the following is the number of line segments?
    (A) 10
    (B) 9
    (C) 8
    (D) 7
    (E) 6

26. How many gallons of water must be added to 40 gallons of 10% alcohol solution to produce a 8% alcohol solution?
    (A) 5
    (B) 8
    (C) 10
    (D) 12
    (E) 20

27. How many gallons of a 20% salt solution must be added to 10 gallons of a 50% salt solution to produce a 30% salt solution?
    (A) 5 gallons
    (B) 10 gallons
    (C) 15 gallons
    (D) 20 gallons
    (E) 30 gallons

28. How many quarts of alcohol must be added to 10 quarts of a 25% alcohol solution to produce a 40% alcohol solution?
    (A) 2.5 quarts
    (B) 8 quarts
    (C) 10 quarts
    (D) 15 quarts
    (E) 20 quarts

29. How many gallons of acid must be added to G gallons of a k% acid solution to bring it up to an m% solution?
    (A) $\dfrac{G}{100-m}$
    (B) $\dfrac{Gm}{100-m}$
    (C) $\dfrac{G(m-k)}{100-m}$
    (D) $\dfrac{100-m}{G(m-k)}$
    (E) $\dfrac{G-m-k}{100-m}$

30. M gallons of a p% salt solution must be mixed up with G gallons of a q% salt solution to produce an r% solution. Which of the following best describes how to find the value of r?
    (A) $\dfrac{p+q}{M+G}=\dfrac{r}{100}$
    (B) $\dfrac{0.01p+0.01q}{M+G}=\dfrac{r}{100}$
    (C) $\dfrac{0.01p}{M}+\dfrac{0.01q}{G}=\dfrac{r}{100}$
    (D) $\dfrac{0.01M+0.01G}{M+G}=\dfrac{r}{100}$
    (E) $\dfrac{0.01pM+0.01qG}{M+G}=\dfrac{r}{100}$

Problem Number	Correct Answer	Skill Number
1	C	11
2	A	11
3	E	11
4	E	11
5	C	11
6	C	11
7	B	11
8	A	11
9	B	11
10	C	11
11	D	12
12	E	12
13	B	12
14	C	13
15	C	13
16	B	13
17	B	13
18	C	13
19	B	13
20	C	13
21	A	13
22	D	14
23	B	14
24	C	14
25	A	14
26	C	15
27	D	15
28	A	15
29	C	15
30	E	15