

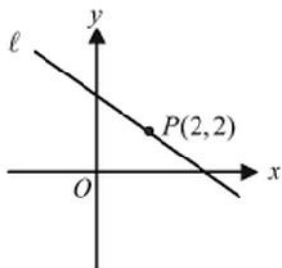
# WS 5—Skills 16-20

**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. If  $f$  is a linear function and if  $f(3) = 6$  and  $f(5) = 12$ , what is the slope of the graph of  $f$ ?  
 (A) 2  
 (B) 3  
 (C)  $-2$   
 (D)  $-3$   
 (E)  $-4$



Note: Figure not drawn to scale.

2. In the figure above, line  $\ell$  passes through point  $P$  and has a slope of  $-\frac{1}{2}$ . What is the  $y$ -intercept of line  $\ell$ ?  
 (A) 6  
 (B) 4  
 (C) 3  
 (D) 2  
 (E) 1

$x$	$f(x)$
2	5
4	$a$
8	23

3. The table above gives values of the linear function  $f$  for selected values of  $x$ . What is the value of  $a$ ?  
 (A) 11  
 (B) 14  
 (C) 15  
 (D) 16  
 (E) 18

$t$	$h(t)$
2	$a$
5	6
8	$b$

4. The table above shows some values for the linear function  $h$  for selected values of  $t$ . What is the value of  $a + b$ ?  
 (A) 8  
 (B) 10  
 (C) 12  
 (D) 18  
 (E) 24

$x$	-1	1	0	2
$k(x)$	-0.5	-1.5	-1	-2

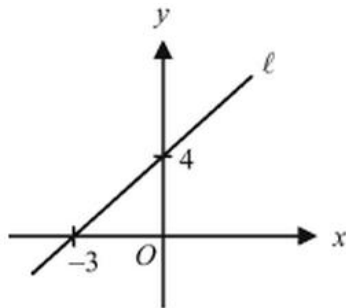
5. The table above gives values of the linear function  $k$  for selected values of  $x$ . Which of the following defines  $k$ ?

- (A)  $k(x) = 2x - 1$   
 (B)  $k(x) = -\frac{1}{2}x + 1$   
 (C)  $k(x) = -\frac{1}{2}x - 1$   
 (D)  $k(x) = -x - 1$   
 (E)  $k(x) = -2x - 1$

6. Let the function  $F$  be defined by  $F = \frac{9}{5}C + 32$ .

If  $C$  is increased by 20, how much of an increase in  $F$  will there be?

- (A) 68  
 (B) 36  
 (C) 25  
 (D) 20  
 (E) 10



Note: Figure not drawn to scale.

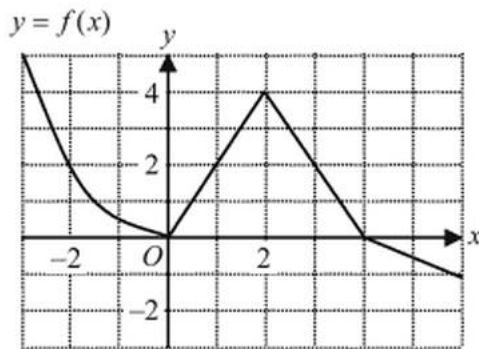
7. In the figure above, a point  $P(42, m)$  lies on the line  $\ell$ . What is the value of  $m$ ?

- (A) 39  
 (B) 42  
 (C) 45  
 (D) 52  
 (E) 60

8. Let a positive integer  $n$  be defined by  $n = p^2 \times q^4$ , where  $p$  and  $q$  are distinct prime numbers. How many factors does the number  $n$  have?  
 (A) 6  
 (B) 8  
 (C) 12  
 (D) 15  
 (E) 20
9. Let a positive integer  $k$  be defined by  $k = 24p^2$ , where  $p$  is a prime number greater than 5. How many factors does the number  $k$  have?  
 (A) 8  
 (B) 16  
 (C) 24  
 (D) 32  
 (E) It cannot be determined from the information given.
10. When two positive integers 12 and 24 are multiplied, how many factors does the resulting number have?  
 (A) 18  
 (B) 16  
 (C) 12  
 (D) 9  
 (E) 6
11. The function  $g$  is defined by  $g(x) = 3f(x) - k$ , and the function  $f$  is defined by  $f(x) = 5x + 3$ . If  $g(2) = 25$ , what is the value of  $k$ ?  
 (A) 18  
 (B) 14  
 (C) 12  
 (D) 10  
 (E) 8

12. The function  $g$  is defined by  $g(x) = 2f(x) - 3$ , and the function  $f$  is defined by  $f(x) = ax + b$ . If  $g(1) = 3$  and  $g(3) = 5$ , what is the value of  $b$ ?

(A)  $\frac{1}{2}$   
 (B)  $\frac{3}{2}$   
 (C)  $\frac{5}{2}$   
 (D)  $\frac{7}{2}$   
 (E) 4



13. The figure above shows the graph of  $y = f(x)$  for  $-3 \leq x \leq 6$ . If the function  $g$  is defined by  $g(x) = 3f(x) - 1$ , how many values of  $k$  are there in the function  $g(k) = 8$ ?
- (A) None  
 (B) One  
 (C) Two  
 (D) Three  
 (E) Four
14. What is the sum of 11 consecutive integers if the middle one is 30?
- (A) 60  
 (B) 120  
 (C) 330  
 (D) 660  
 (E) 990

15. If the median of a list of 99 consecutive integers is 80, what is the greatest integer in the list?
- (A) 99  
 (B) 128  
 (C) 129  
 (D) 157  
 (E) 179
16. The median of a list of 10 consecutive even integers is 77. What is the sum of the integers?
- (A) 700  
 (B) 770  
 (C) 780  
 (D) 800  
 (E) 870
17. If the median of a list of 30 consecutive odd integers is 120, what is the greatest integer in the list?
- (A) 145  
 (B) 147  
 (C) 149  
 (D) 151  
 (E) 167
18. If  $k(a - b) = a - b$ , which of the following could be true?
- I.  $k = 1$   
 II.  $a = 2$  and  $b = 2$   
 III.  $a = b$
- (A) I only  
 (B) II only  
 (C) III only  
 (D) I and III only  
 (E) I, II, and III
19. For real numbers  $a$  and  $b$ ,  $\sqrt{a - b} = \sqrt{a + b}$ , where  $a > b$ . Which of the following must be true?
- I.  $b = 0$   
 II.  $a > 0$   
 III.  $a = 0$
- (A) I only  
 (B) II only  
 (C) III only  
 (D) I and II only  
 (E) I and III only

20. If  $a^2 + b^2 = 2ab$ , which of the following must be true?
- I.  $a = 1$
  - II.  $a = b$
  - III.  $a = 0$  and  $b = 0$
- (A) I only  
(B) II only  
(C) III only  
(D) I and II only  
(E) II and III only
21. If  $\sqrt{a+b} = \sqrt{a} + \sqrt{b}$ , where  $a$  and  $b$  are non-negative numbers, which of the following must be true?
- I.  $a = 0$
  - II.  $b = 0$
  - III.  $ab = 0$
- (A) I only  
(B) II only  
(C) III only  
(D) I and II only  
(E) I, II, and III
22. If  $(k-2)(x-y) = (x-y)$ , which of the following could be true?
- I.  $k = 2$
  - II.  $x = y$
  - III.  $k = 3$
- (A) I only  
(B) II only  
(C) III only  
(D) I and II only  
(E) II and III only
23. If  $\sqrt{a^2 + b^2} = a - b$ , where  $a$  is positive, which of the following must be true?
- (A)  $a = 0$   
(B)  $b = 0$   
(C)  $ab > 0$   
(D)  $a = 1$   
(E)  $a - b = 1$

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