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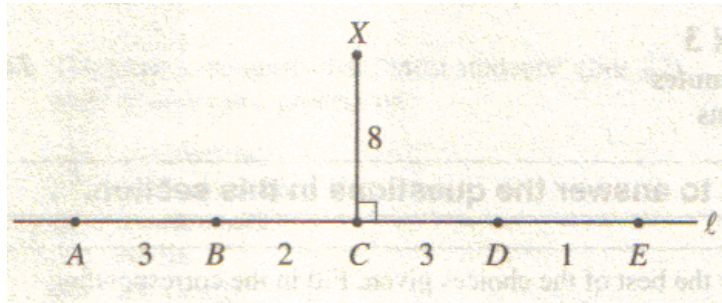
Online Homework

Focused Exercises for Math SAT

Skill Set 19: Line Segments

Many of the problems in this exercise set came from The College Board, writers of the SAT exam.

1.



Note: Figure not drawn to scale.

In the figure above, \overline{XC} is perpendicular to ℓ . Which of the following line segments (not shown) has the greatest length?

- (A) \overline{XA}
- (B) \overline{XB}
- (C) \overline{XC}
- (D) \overline{XD}
- (E) \overline{XE}

2. If Y is the midpoint of \overline{XZ} , which of the following must be true?

I. $YZ = \frac{1}{2} XZ$

II. $\frac{1}{2} XZ = 2XY$

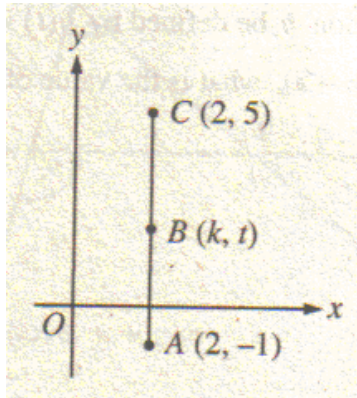
III. $2XY = XZ$

- (A) I only
- (B) II only
- (C) III only
- (D) I and II
- (E) I and III

3. Five points, $A, B, C, D,$ and $E,$ lie on a line, not necessarily in that order. \overline{AB} has a length of 24. Point C is the midpoint of \overline{AB} , and point D is the midpoint of \overline{AC} . If the distance between D and E is 5, what is one possible distance between A and E ?

4. The three distinct points P , Q , and R lie on a line ℓ ; the four distinct points S , T , U , and V lie on a different line that is parallel to line ℓ . What is the total number of different lines that can be drawn so that each line contains exactly two of the seven points?
5. Five distinct points lie in a plane such that 3 of the points are on line ℓ and 3 of the points are on a different line, m . What is the total number of lines that can be drawn so that each line passes through exactly 2 of these 5 points?
- (A) Two
(B) Four
(C) Five
(D) Six
(E) Ten

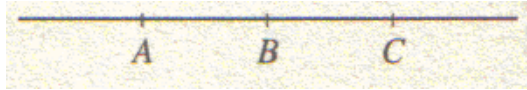
6.



Point B is the midpoint of \overline{AC} in the figure above. What is the value of t ?

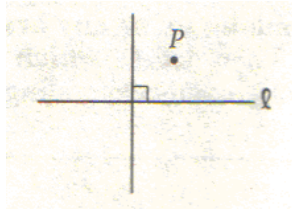
- (A) 1
(B) 1.5
(C) 2
(D) 2.5
(E) 3

7.

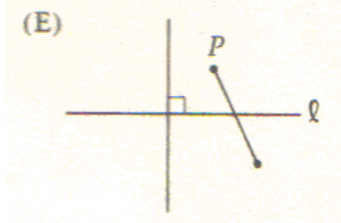
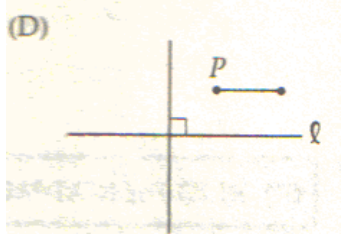
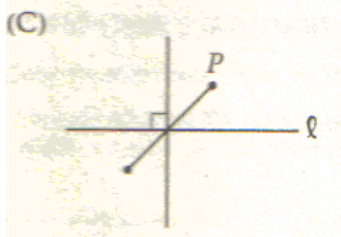


- In the figure above, $AC = 24$ and $AB = BC$. Point D (not shown) is on the line between A and B such that $AD = DB$. What does DC equal?
- (A) 6
(B) 12
(C) 16
(D) 18
(E) 20
8. C is the midpoint of line segment AB , and D and E are the midpoints of line segments AC and CB , respectively. If the length of DE is 8, what is the length of AB ?
- (A) 4
(B) 8
(C) 12
(D) 16
(E) 32
9. If a line ℓ is perpendicular to a segment AB at point E and $AE = EB$, how many points on line ℓ are the same distance from point A as from point B ?
- (A) None
(B) One
(C) Two
(D) Three
(E) All points
10. Points X and Y are the endpoints of a line segment, and the length of the segment is less than 25. There are five other points on the line segment, R , S , T , U , and V , which are located at distances of 1, 3, 6, 10, and 13, respectively, from point X . Which of the points could be the midpoint of XY ?
- (A) R
(B) S
(C) T
(D) U
(E) V

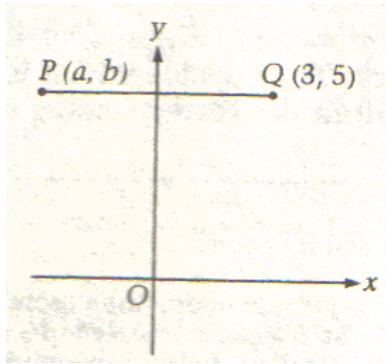
11.



In the figure above, a line segment is to be drawn from point P perpendicular to line ℓ . Which of the following could be the resulting figure?



12.



Note: Figure not drawn to scale.

In the figure above, is line segment PQ is parallel to the x -axis and has length 7, what is the value of a ?

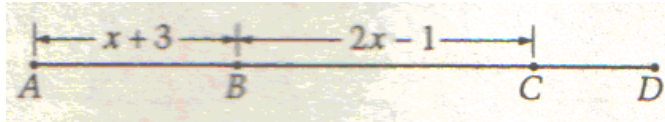
- (A) -4
 - (B) -3
 - (C) -2
 - (D) 3
 - (E) 5
13. Points P , Q , R , S , T and U are all different points lying in the same plane. Points P , Q , and U lie on the same line. The line through points P and Q is perpendicular to the line through points R and S . The line through points R and S is perpendicular to the line through points T and U . Which of the following sets contains points that must lie on the same line?
- (A) $\{P, Q, R\}$
 - (B) $\{Q, R, S\}$
 - (C) $\{Q, R, T\}$
 - (D) $\{Q, T, U\}$
 - (E) $\{R, T, U\}$

14. Points P , Q , and R lie in a plane. If the distance between P and Q is 5 and the distance between Q and R is 2, which of the following could be the distance between P and R ?

- I. 3
- II. 5
- III. 7

- (A) I only
- (B) II only
- (C) III only
- (D) I and III only
- (E) I, II, and III

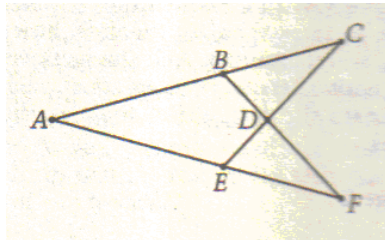
- 15.



In the figure above, if the length of AD is $3x + 7$, what is the length of CD ?

- (A) $x + 2$
- (B) $x + 5$
- (C) 2
- (D) 4
- (E) 5

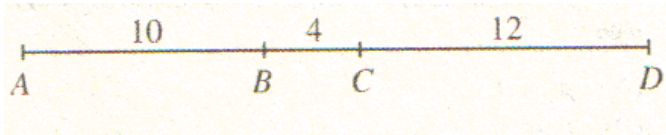
- 16.



Segments AC , AF , BF , and EC intersect at the labeled points as shown in the figure above. Define two points as "independent" if they do not lie on the same segment in the figure. Of the labeled points in the figure, how many pairs of independent points are there?

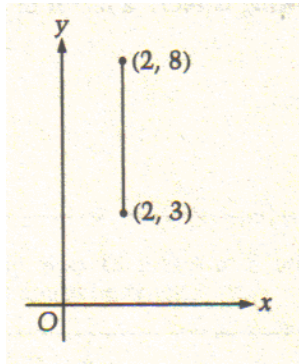
- (A) None
- (B) One
- (C) Two
- (D) Three
- (E) Four

17.



- In the figure above, points B and C divide line segment AD as shown. What is the length of the line segment whose endpoints are the midpoints of line segments AB and CD ?
- (A) 15
(B) 13
(C) 11
(D) 8
(E) 7
18. A , B , and C are points on a line in that order. If $AB = 30$ and BC is 20 more than AB , what does AC equal?
- (A) 50
(B) 60
(C) 70
(D) 80
(E) 90
19. Points A , B , C , and D lie on a line in that order. If $\frac{AD}{AC} = \frac{2}{1}$ and $\frac{AD}{AB} = \frac{3}{1}$, what is the value of $\frac{AC}{BD}$?
20. In the xy -coordinate plane, the distance between point $B(10, 18)$ and point $A(x, 3)$ is 17. What is one possible value of x ?

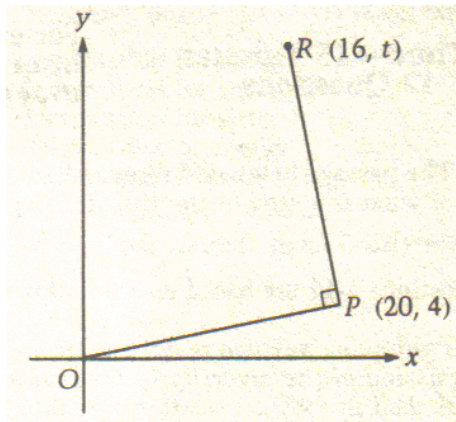
21.



In the figure above, the line segment joining the points $(2, 3)$ and $(2, 8)$ forms one side of a square. Which of the following could be the coordinates of another vertex of that square?

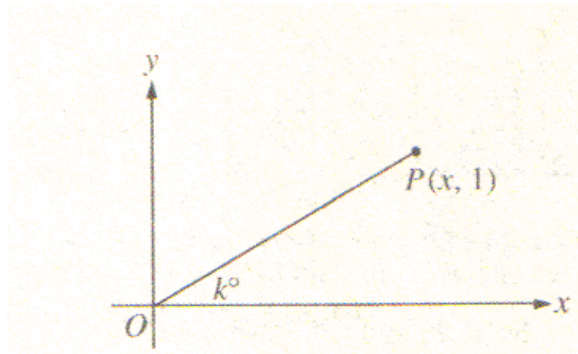
- (A) $(-2, 5)$
- (B) $(-2, 3)$
- (C) $(5, 2)$
- (D) $(7, 2)$
- (E) $(7, 8)$

22.



In the xy -plane above, $OP = PR$. What is the value of t ?

23.



In the figure above, if $k = 30$, what is the x-coordinate of point P ?

- (A) 1
- (B) $\sqrt{2}$
- (C) $\sqrt{3}$
- (D) 2
- (E) $\sqrt{5}$