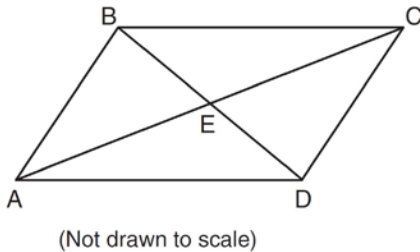


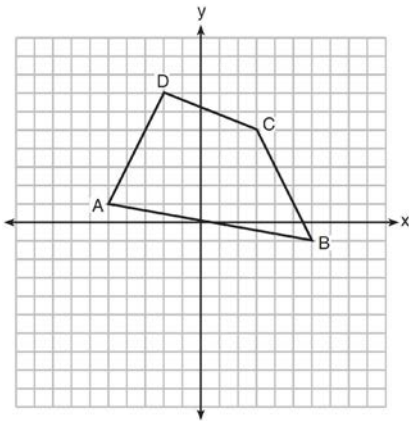
G.CO.A.1: Midpoint 1b

- 1 In the diagram below, parallelogram $ABCD$ has vertices $A(1,3)$, $B(5,7)$, $C(10,7)$, and $D(6,3)$. Diagonals \overline{AC} and \overline{BD} intersect at E .



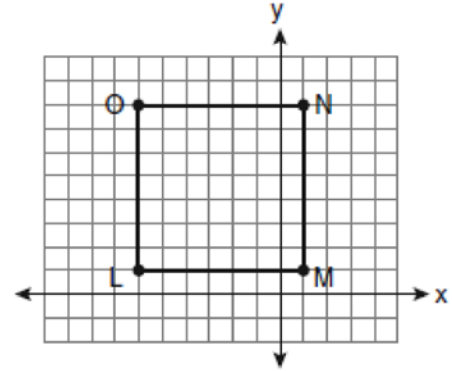
What are the coordinates of point E ?

- 2 In the diagram below, quadrilateral $ABCD$ has vertices $A(-5,1)$, $B(6,-1)$, $C(3,5)$, and $D(-2,7)$.



What are the coordinates of the midpoint of diagonal \overline{AC} ?

- 3 Square $LMNO$ is shown in the diagram below.

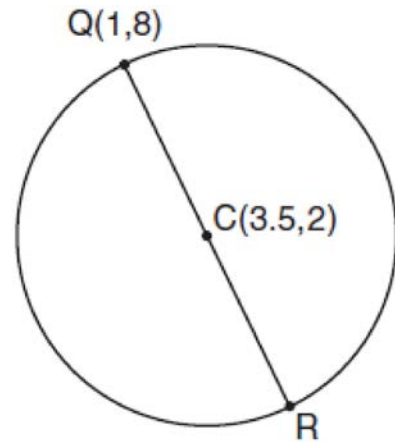


What are the coordinates of the midpoint of diagonal \overline{LN} ?

- 4 What are the coordinates of the midpoint of the line segment with endpoints $(2,-5)$ and $(8,3)$?
- 5 The endpoints of \overline{CD} are $C(-2,-4)$ and $D(6,2)$. What are the coordinates of the midpoint of \overline{CD} ?
- 6 A line segment has endpoints $A(7,-1)$ and $B(-3,3)$. What are the coordinates of the midpoint of \overline{AB} ?
- 7 The coordinates of A are $(-9,2)$ and the coordinates of G are $(3,14)$. What are the coordinates of the midpoint of \overline{AG} ?
- 8 Line segment AB has endpoints $A(2,-3)$ and $B(-4,6)$. What are the coordinates of the midpoint of \overline{AB} ?
- 9 What is the midpoint of the line segment that joins points $(4,-2)$ and $(-2,5)$?

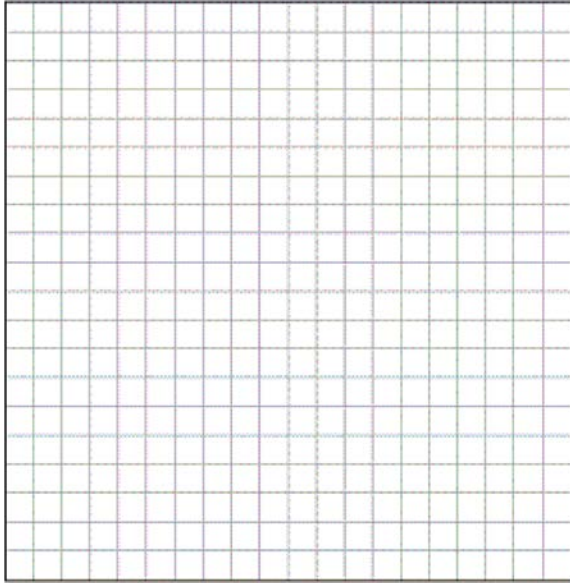
- 10 What are the coordinates of the center of a circle if the endpoints of its diameter are $A(8,-4)$ and $B(-3,2)$?
- 11 If a line segment has endpoints $A(3x + 5, 3y)$ and $B(x - 1, -y)$, what are the coordinates of the midpoint of \overline{AB} ?
- 12 Point M is the midpoint of \overline{AB} . If the coordinates of A are $(-3,6)$ and the coordinates of M are $(-5,2)$, what are the coordinates of B ?
- 13 The midpoint of \overline{AB} is $M(4,2)$. If the coordinates of A are $(6,-4)$, what are the coordinates of B ?
- 14 Point M is the midpoint of \overline{AB} . If the coordinates of M are $(2,8)$ and the coordinates of A are $(10,12)$, what are the coordinates of B ?
- 15 M is the midpoint of \overline{AB} . If the coordinates of A are $(-1,5)$ and the coordinates of M are $(3,3)$, what are the coordinates of B ?
- 16 The midpoint of \overline{AB} has coordinates of $(5,-1)$. If the coordinates of A are $(2,-3)$, what are the coordinates of B ?
- 17 The midpoint of \overline{AB} is $(-1,5)$ and the coordinates of point A are $(-3,2)$. What are the coordinates of point B ?
- 18 A line segment on the coordinate plane has endpoints $(2,4)$ and $(4,y)$. The midpoint of the segment is point $(3,7)$. What is the value of y ?

- 19 Segment AB is the diameter of circle M . The coordinates of A are $(-4,3)$. The coordinates of M are $(1,5)$. What are the coordinates of B ?
- 20 Line segment AB is a diameter of circle O whose center has coordinates $(6,8)$. What are the coordinates of point B if the coordinates of point A are $(4,2)$?
- 21 In the diagram below of circle C , \overline{QR} is a diameter, and $Q(1,8)$ and $C(3.5,2)$ are points on a coordinate plane. Find and state the coordinates of point R .

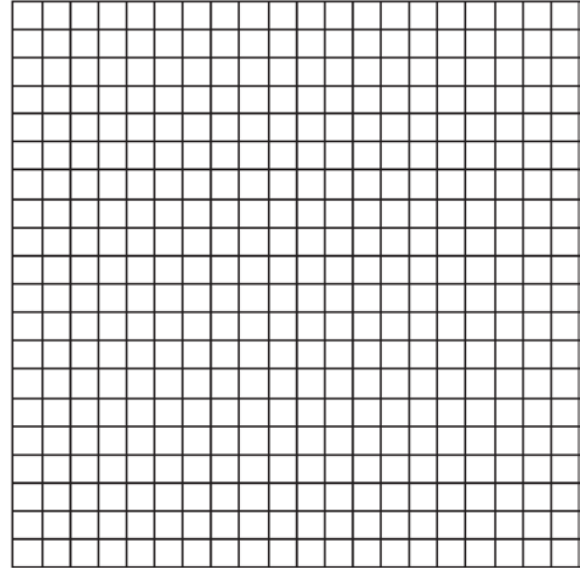


- 22 In circle O , diameter \overline{RS} has endpoints $R(3a, 2b - 1)$ and $S(a - 6, 4b + 5)$. Find the coordinates of point O , in terms of a and b . Express your answer in simplest form.

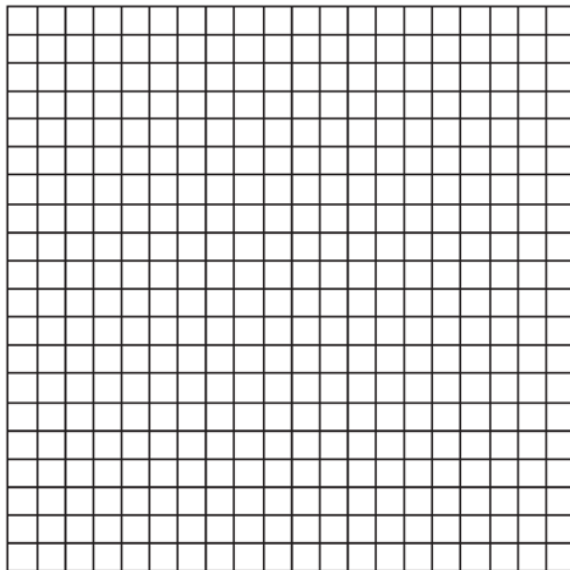
- 23 The midpoint M of line segment AB has coordinates $(-3,4)$. If point A is the origin, $(0,0)$, what are the coordinates of point B ? [The use of the accompanying grid is optional.]



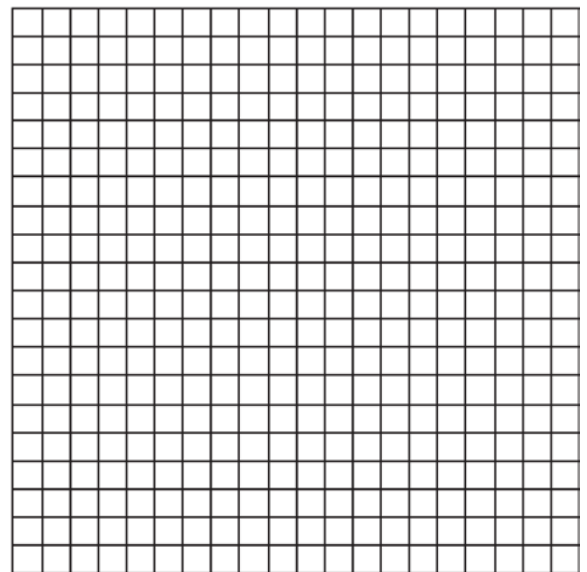
- 25 In a circle whose center is $(2,3)$, one endpoint of a diameter is $(-1,5)$. Find the coordinates of the other endpoint of that diameter. [The use of the accompanying grid is optional.]



- 24 The coordinates of the midpoint of \overline{AB} are $(2,4)$, and the coordinates of point B are $(3,7)$. What are the coordinates of point A ? [The use of the accompanying grid is optional.]



- 26 One endpoint of a line segment is $(6,2)$. The midpoint of the segment is $(2,0)$. Find the coordinates of the other endpoint. [The use of the grid is optional.]



**G.CO.A.1: Midpoint 1b
Answer Section**

1 ANS:

(5.5,5)

$$M_x = \frac{1+10}{2} = \frac{11}{2} = 5.5 \quad M_y = \frac{3+7}{2} = \frac{10}{2} = 5.$$

REF: 081407ge

2 ANS:

(-1,3)

$$M_x = \frac{-5+3}{2} = \frac{-2}{2} = -1. \quad M_y = \frac{1+5}{2} = \frac{6}{2} = 3.$$

REF: 061402ge

3 ANS:

 $\left(-2\frac{1}{2}, 4\frac{1}{2}\right)$

$$M_x = \frac{-6+1}{2} = -\frac{5}{2}. \quad M_y = \frac{1+8}{2} = \frac{9}{2}.$$

REF: 060919ge

4 ANS:

(5,-1)

$$M_x = \frac{2+8}{2} = 5. \quad M_y = \frac{-5+3}{2} = -1.$$

REF: 011502ge

5 ANS:

(2,-1)

$$M_x = \frac{-2+6}{2} = 2. \quad M_y = \frac{-4+2}{2} = -1$$

REF: 080910ge

6 ANS:

(2,1)

$$M_x = \frac{7+(-3)}{2} = 2. \quad M_y = \frac{-1+3}{2} = 1.$$

REF: 011106ge

7 ANS:

(-3,8)

$$M_x = \frac{-9+3}{2} = -3. \quad M_y = \frac{2+14}{2} = 8.$$

REF: 080624a

8 ANS:

$$\left(-1, 1\frac{1}{2}\right)$$

$$M_x = \frac{2+(-4)}{2} = -1. \quad M_y = \frac{-3+6}{2} = \frac{3}{2}.$$

REF: fall0813ge

9 ANS:

$$\left(1, \frac{3}{2}\right)$$

$$M_x = \frac{4+(-2)}{2} = 1. \quad M_y = \frac{-2+5}{2} = \frac{3}{2}.$$

REF: 060822a

10 ANS:

$$(2.5, -1)$$

$$M_x = \frac{8+(-3)}{2} = 2.5. \quad M_y = \frac{-4+2}{2} = -1.$$

REF: 061312ge

11 ANS:

$$(2x+2, y)$$

$$M_x = \frac{3x+5+x-1}{2} = \frac{4x+4}{2} = 2x+2. \quad M_y = \frac{3y+(-y)}{2} = \frac{2y}{2} = y.$$

REF: 081019ge

12 ANS:

$$(-7, -2)$$

$$-5 = \frac{-3+x}{2}. \quad 2 = \frac{6+y}{2}$$

$$-10 = -3+x \quad 4 = 6+y$$

$$-7 = x \quad -2 = y$$

REF: 081203ge

13 ANS:

$$(2, 8)$$

$$\frac{6+x}{2} = 4. \quad \frac{-4+y}{2} = 2$$

$$x = 2 \quad y = 8$$

REF: 011401ge

14 ANS:

 $(-6,4)$

$$2 = \frac{10+x}{2} \quad 8 = \frac{12+y}{2}$$

$$4 = 10+x \quad 16 = 12+y$$

$$-6 = x \quad 4 = y$$

REF: 061505ge

15 ANS:

 $(7,1)$

$$M_x = \frac{x_A + x_B}{2} \quad M_y = \frac{y_A + y_B}{2}$$

$$3 = \frac{-1 + x_B}{2} \quad 3 = \frac{5 + y_B}{2}$$

$$x_B = 7 \quad y_B = 1$$

REF: 080217a

16 ANS:

 $(8,1)$

$$M_x = \frac{x_A + x_B}{2} \quad M_y = \frac{y_A + y_B}{2}$$

$$5 = \frac{2 + x_B}{2} \quad -1 = \frac{-3 + y_B}{2}$$

$$x_B = 8 \quad y_B = 1$$

REF: 010914a

17 ANS:

 $(1,8)$

$$M_x = \frac{x_A + x_B}{2} \quad M_y = \frac{y_A + y_B}{2}$$

$$-1 = \frac{-3 + x_B}{2} \quad 5 = \frac{2 + y_B}{2}$$

$$x_B = 1 \quad y_B = 8$$

REF: 010718a

18 ANS:

10

$$M_y = \frac{y_A + y_B}{2}$$

$$7 = \frac{4 + y_B}{2}$$

$$y_B = 10$$

REF: 080515a

19 ANS:

(6,7)

$$1 = \frac{-4+x}{2}, \quad 5 = \frac{3+y}{2}.$$

$$-4+x=2 \quad 3+y=10$$

$$x=6 \quad y=7$$

REF: 081115ge

20 ANS:

(8,14)

$$6 = \frac{4+x}{2}, \quad 8 = \frac{2+y}{2}.$$

$$4+x=12 \quad 2+y=16$$

$$x=8 \quad y=14$$

REF: 011305ge

21 ANS:

$$(6,-4). \quad C_x = \frac{Q_x + R_x}{2}, \quad C_y = \frac{Q_y + R_y}{2}.$$

$$3.5 = \frac{1 + R_x}{2}, \quad 2 = \frac{8 + R_y}{2}$$

$$7 = 1 + R_x, \quad 4 = 8 + R_y$$

$$6 = R_x, \quad -4 = R_y$$

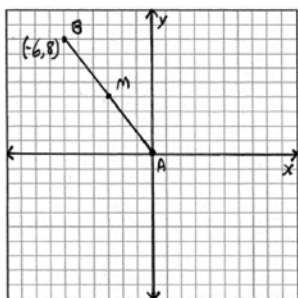
REF: 011031ge

22 ANS:

$$(2a-3, 3b+2). \quad \left(\frac{3a+a-6}{2}, \frac{2b-1+4b+5}{2} \right) = \left(\frac{4a-6}{2}, \frac{6b+4}{2} \right) = (2a-3, 3b+2)$$

REF: 061134ge

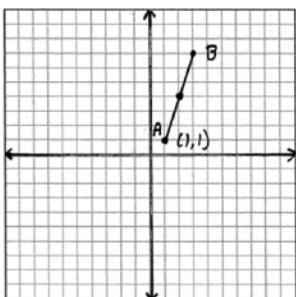
23 ANS:



$(-6,8)$.

REF: 010021a

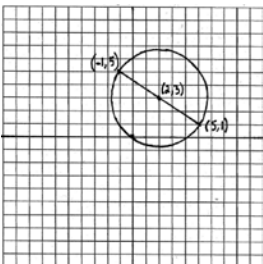
24 ANS:



$(1,1)$.

REF: 060434a

25 ANS:



$(5,1)$.

$$C_x = \frac{A_x + B_x}{2}, \quad C_y = \frac{A_y + B_y}{2}.$$

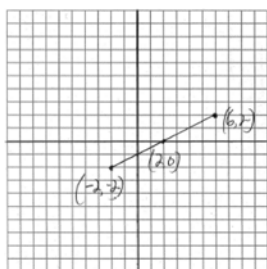
$$2 = \frac{-1 + R_x}{2}, \quad 3 = \frac{5 + R_y}{2}$$

$$4 = -1 + R_x, \quad 6 = 5 + R_y$$

$$5 = R_x, \quad 1 = R_y$$

REF: 010633a

26 ANS:

 $(-2, -2)$.

REF: 080834a