

**G.G.66: Midpoint 1: Find the midpoint of a line segment, given its endpoints**

- 1 Line segment  $\overline{AB}$  has endpoints  $A(2, -3)$  and  $B(-4, 6)$ . What are the coordinates of the midpoint of  $\overline{AB}$ ?

1)  $(-2, 3)$   
2)  $\left(-1, 1\frac{1}{2}\right)$   
3)  $(-1, 3)$   
4)  $\left(3, 4\frac{1}{2}\right)$

- 2 What are the coordinates of the midpoint of the line segment with endpoints  $(2, -5)$  and  $(8, 3)$ ?

1)  $(3, -4)$   
2)  $(3, -1)$   
3)  $(5, -4)$   
4)  $(5, -1)$

- 3 The endpoints of  $\overline{CD}$  are  $C(-2, -4)$  and  $D(6, 2)$ . What are the coordinates of the midpoint of  $\overline{CD}$ ?

1)  $(2, 3)$   
2)  $(2, -1)$   
3)  $(4, -2)$   
4)  $(4, 3)$

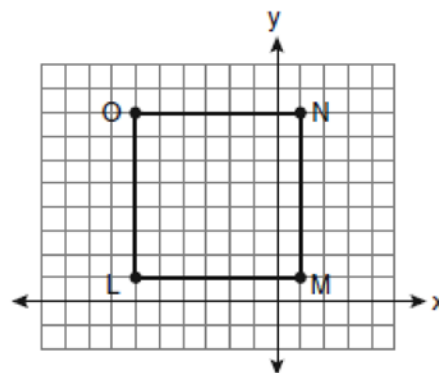
- 4 If a line segment has endpoints  $A(3x + 5, 3y)$  and  $B(x - 1, -y)$ , what are the coordinates of the midpoint of  $\overline{AB}$ ?

1)  $(x + 3, 2y)$   
2)  $(2x + 2, y)$   
3)  $(2x + 3, y)$   
4)  $(4x + 4, 2y)$

- 5 A line segment has endpoints  $A(7, -1)$  and  $B(-3, 3)$ . What are the coordinates of the midpoint of  $\overline{AB}$ ?

1)  $(1, 2)$   
2)  $(2, 1)$   
3)  $(-5, 2)$   
4)  $(5, -2)$

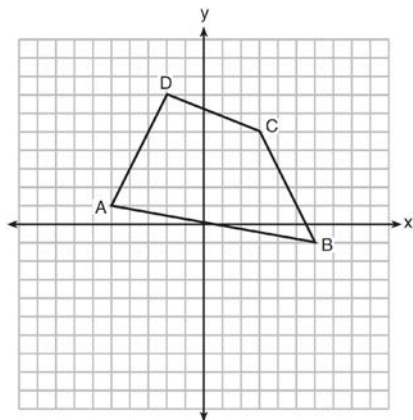
- 6 Square  $LMNO$  is shown in the diagram below.



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

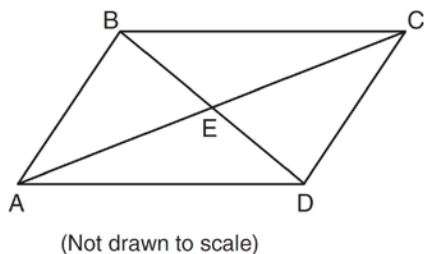
1)  $\left(4\frac{1}{2}, -2\frac{1}{2}\right)$   
2)  $\left(-3\frac{1}{2}, 3\frac{1}{2}\right)$   
3)  $\left(-2\frac{1}{2}, 3\frac{1}{2}\right)$   
4)  $\left(-2\frac{1}{2}, 4\frac{1}{2}\right)$

- 7 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  $\overline{AC}$ ?

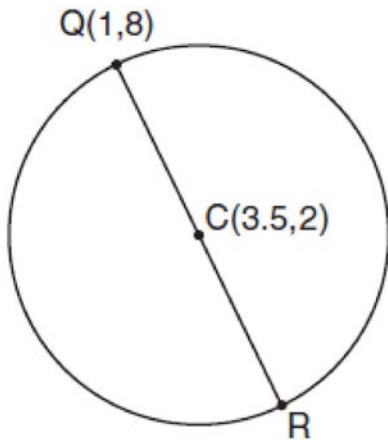
- 1)  $(-1, 3)$
  - 2)  $(1, 3)$
  - 3)  $(1, 4)$
  - 4)  $(2, 3)$
- 8 In the diagram below, parallelogram  $ABCD$  has vertices  $A(1, 3)$ ,  $B(5, 7)$ ,  $C(10, 7)$ , and  $D(6, 3)$ . Diagonals  $\overline{AC}$  and  $\overline{BD}$  intersect at  $E$ .



What are the coordinates of point  $E$ ?

- 1)  $(0.5, 2)$
  - 2)  $(4.5, 2)$
  - 3)  $(5.5, 5)$
  - 4)  $(7.5, 7)$
- 9 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  $B$ ?
- 1)  $(1, 2)$
  - 2)  $(7, 10)$
  - 3)  $(-4, 4)$
  - 4)  $(-7, -2)$
- 10 The midpoint of  $\overline{AB}$  is  $M(4, 2)$ . If the coordinates of  $A$  are  $(6, -4)$ , what are the coordinates of  $B$ ?
- 1)  $(1, -3)$
  - 2)  $(2, 8)$
  - 3)  $(5, -1)$
  - 4)  $(14, 0)$
- 11 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  $B$ ?
- 1)  $(6, 10)$
  - 2)  $(-6, 4)$
  - 3)  $(-8, -4)$
  - 4)  $(18, 16)$
- 12 What are the coordinates of the center of a circle if the endpoints of its diameter are  $A(8, -4)$  and  $B(-3, 2)$ ?
- 1)  $(2.5, 1)$
  - 2)  $(2.5, -1)$
  - 3)  $(5.5, -3)$
  - 4)  $(5.5, 3)$

- 13 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.
- 14 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  $(4, 2)$ ?
- $(1, 3)$
  - $(5, 5)$
  - $(8, 14)$
  - $(10, 10)$
- 15 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  $B$ ?
- $(6, 7)$
  - $(5, 8)$
  - $(-3, 8)$
  - $(-5, 2)$
- 16 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  $R$ .



**G.G.66: Midpoint 1: Find the midpoint of a line segment, given its endpoints**  
**Answer Section**

1 ANS: 2

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

REF: fall0813ge

2 ANS: 4

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

REF: 011502ge

3 ANS: 2

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

REF: 080910ge

4 ANS: 2

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

REF: 081019ge

5 ANS: 2

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

REF: 011106ge

6 ANS: 4

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

REF: 060919ge

7 ANS: 1

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

REF: 061402ge

8 ANS: 3

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

REF: 081407ge

9 ANS: 4

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

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

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

REF: 081203ge

10 ANS: 2

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

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

REF: 011401ge

11 ANS: 2

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

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

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

REF: 061505ge

12 ANS: 2

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

REF: 061312ge

13 ANS:

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

REF: 061134ge

14 ANS: 3

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

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

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

REF: 011305ge

15 ANS: 1

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

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

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

REF: 081115ge

16 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