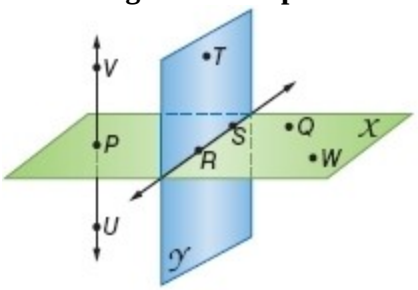
Mid-Chapter Quiz: Lessons 1-1 through 1-4

Use the figure to complete each of the following.



1. Name another point that is collinear with points *U* and *V*.

   SOLUTION:

   Collinear points are points that lie on the same line. Here, the point *P* lies on the line *UV*. So, the point *P* is collinear with points *U* and *V*.

   ANSWER:

   P

2. What is another name for plane *Y*?

   SOLUTION:

   There are three points *R*, *S*, and *T* marked in the plane *Y*. So, the plane *Y* can also be called plane RST.

   ANSWER:

   plane *RST*

3. Name a line that is coplanar with points *P*, *Q*, and *W*.

   SOLUTION:

   If a line is coplanar with points, then they should lie on the same plane. Here, the points *P*, *Q*, *W* and the line $\overleftrightarrow{RS}$ lie on the plane *X*.

   So, the line $\overleftrightarrow{RS}$ is coplanar with points *P*, *Q*, and *W*.

   ANSWER:

   $\overleftrightarrow{RS}$

Mid-Chapter Quiz: Lessons 1-1 through 1-4

Find the value of x and AC if B is between points A and C.

4. $AB = 12, BC = 8x - 2, AC = 10x$

SOLUTION:

Here B is between A and C. So, $AB + BC = AC$.
We have $AB = 12, BC = 8x - 2, AC = 10x$.

Substitute.

$$AB + BC = AC \qquad \text{Betweenness of Points.}$$
$$12 + (8x - 2) = 10x \qquad \text{Subtsitution.}$$
$$10 + 8x = 10x \qquad \text{Simplify.}$$
$$10 + 8x - 8x = 10x - 8x \qquad \text{Add } 8x \text{ to each side.}$$
$$10 = 2x \qquad \text{Simplify.}$$
$$\frac{10}{2} = \frac{2x}{2} \qquad \text{Divide each side by 2.}$$
$$5 = x \qquad \text{Simplify.}$$

Find AC.

$AC = 10x$
$= 10(5)$
$= 50$

ANSWER:

$x = 5; AC = 50$

5. $AB = 5x, BC = 9x - 2, AC = 11x + 7.6$

SOLUTION:

Here B is between A and C. So, $AB + BC = AC$.
We have $AB = 5x, BC = 9x - 2, AC = 11x + 7.6$.

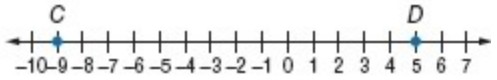
$AB + BC = AC$	Betweenness of Points.
$5x + (9x - 2) = 11x + 7.6$	Substitution.
$14x - 2 = 11x + 7.6$	Simplify.
$14x - 11x - 2 = 11x - 11x + 7.6$	$-11x$ from each side.
$3x - 2 = 7.6$	Simplify.
$3x - 2 + 2 = 7.6 + 2$	Add 2 to each side.
$3x = 9.6$	Simplify.
$\frac{3x}{3} = \frac{9.6}{3}$	$\div$ each side by 3.
$x = 3.2$	Simplify.

Find AC.
$AC = 11x + 7.6$
$= 11(3.2) + 7.6$
$= 42.8$

ANSWER:

$x = 3.2; AC = 42.8$

6. Find CD and the coordinate of the midpoint of $\overline{CD}$.



SOLUTION:

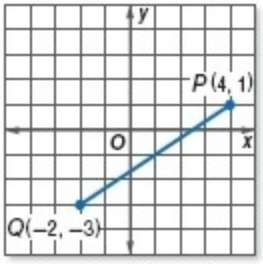
C is –9, and D is 5.
So, the distance between C and D, that is, CD =14.
Their midpoint is $\frac{-9+5}{2}$ or –2.

ANSWER:

14; –2

Mid-Chapter Quiz: Lessons 1-1 through 1-4

Find the coordinates of the midpoint of each segment. Then find the length of each segment.

7. 

SOLUTION:

Use the Midpoint Formula $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

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

The midpoint of $\overline{PQ}$ is (1, –1).

Use the Distance Formula. $PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Substitute.

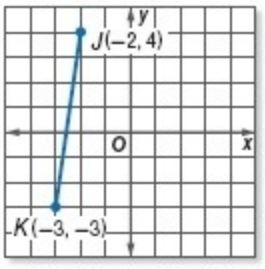
$$\begin{aligned} PQ &= \sqrt{(-2-4)^2 + (-3-1)^2} \\ &= \sqrt{(-6)^2 + (-4)^2} \\ &= \sqrt{36+16} \\ &= \sqrt{52} \\ &= 2\sqrt{13} \\ &\approx 7.2 \end{aligned}$$

The distance between *P* and *Q* is $2\sqrt{13}$ or about 7.2 units.

ANSWER:

(1, –1); $2\sqrt{13} \approx 7.2$

Mid-Chapter Quiz: Lessons 1-1 through 1-4

8. 

SOLUTION:

Use the Midpoint Formula $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$.

Substitute.

$$\left(\frac{-2-3}{2}, \frac{4-3}{2}\right)=\left(-\frac{5}{2}, \frac{1}{2}\right)$$

The midpoint of $\overline{JK}$ is $\left(-\frac{5}{2}, \frac{1}{2}\right)$.

Use the Distance Formula. $JK=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Substitute.

$$\begin{aligned} JK &= \sqrt{(-3-(-2))^2+(-3-4)^2} \\ &= \sqrt{(-1)^2+(-7)^2} \\ &= \sqrt{1+49} \\ &= \sqrt{50} \\ &= 5\sqrt{2} \\ &\approx 7.1 \end{aligned}$$

The distance between *J* and *K* is $5\sqrt{2}$ or about 7.1 units.

ANSWER:

$\left(-\frac{5}{2}, \frac{1}{2}\right)$; $5\sqrt{2} \approx 7.1$

Find the coordinates of the midpoint of a segment with the given endpoints. Then find the distance between each pair of points.

9. *P*(26, 12) and *Q*(8, 42)

SOLUTION:

Use the Midpoint Formula $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Substitute.

$\left(\frac{26+8}{2}, \frac{12+42}{2}\right) = (17, 27)$

The midpoint of $\overline{PQ}$ is (17, 27).

Use the Distance Formula. $PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Substitute.

$$\begin{aligned} PQ &= \sqrt{(8-26)^2 + (42-12)^2} \\ &= \sqrt{(-18)^2 + (30)^2} \\ &= \sqrt{324 + 900} \\ &= \sqrt{1224} \\ &\approx 35 \end{aligned}$$

The distance between *P* and *Q* is $\sqrt{1224}$ or about 35 units.

ANSWER:

(17, 27); $\sqrt{1224}$ or 35.0

10. $M(6, -41)$ and $N(-18, -27)$

SOLUTION:

Use the Midpoint Formula . $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Substitute.

$$\left(\frac{6-18}{2}, \frac{-41-27}{2}\right) = (-6, -34)$$

The midpoint of $\overline{MN}$ is $(-6, -34)$.

Use the Distance Formula. $MN = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Substitute.

$$\begin{aligned} MN &= \sqrt{(-18-6)^2 + (-27-(-41))^2} \\ &= \sqrt{(-24)^2 + (14)^2} \\ &= \sqrt{576 + 196} \\ &= \sqrt{772} \\ &\approx 27.8 \end{aligned}$$

The distance between M and N is $\sqrt{772}$ or about 27.7 units.

ANSWER:

(–6, –34); $\sqrt{772}$ or 27.8

11. **MAPS** A map of a town is drawn on a coordinate grid. The high school is found at point (3, 1) and town hall is found at (–5, 7).

a. If the high school is at the midpoint between the town hall and the town library, at which ordered pair should you find the library?
b. If one unit on the grid is equivalent to 50 meters, how far is the high school from town hall?

SOLUTION:

a. Let (x, y) be the location of town library.

Then by the Midpoint Formula,

$$\left(\frac{x-5}{2}, \frac{y+7}{2}\right) = (3, 1)$$

Write two equations to find the coordinates of the library.

$$\frac{x-5}{2} = 3$$
$$x - 5 = 6$$
$$x = 11$$

$$\frac{y+7}{2} = 1$$
$$y + 7 = 2$$
$$y = -5$$

The town library is found at point (11, –5).

b. Use the Distance Formula.

$$\begin{aligned}\text{Distance} &= \sqrt{(-5-3)^2 + (7-1)^2} \\ &= \sqrt{(-8)^2 + (6)^2} \\ &= \sqrt{64 + 36} \\ &= \sqrt{100} \\ &= 10\end{aligned}$$

Each unit is equivalent to 50 meters.
$10(50) = 500$
So, the distance between the high school and the town hall is 500 meters.

ANSWER:

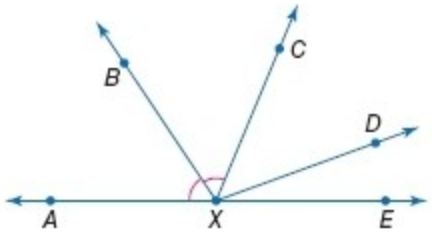
a. (11, –5)
b. 500 m

12. **MULTIPLE CHOICE** The vertex of $\angle ABC$ is located at the origin. Point A is located at (5, 0) and Point C is located at (0, 2). How can $\angle ABC$ be classified?
A acute
B obtuse
C right
D scalene

SOLUTION:
Since the vertex is at the origin and the other two points are on the axes of the coordinate plane, the triangle is a right triangle.
The correct choice is C.

ANSWER:
C

In the figure, $\overrightarrow{XA}$ and $\overrightarrow{XE}$ are opposite rays, and $\angle AXC$ is bisected by $\overrightarrow{XB}$.



13. If $m\angle AXC = 8x - 7$ and $m\angle AXB = 3x + 10$, find $m\angle AXC$.

SOLUTION:
In the figure, $m\angle AXC = m\angle AXB + m\angle BXC$.

$m\angle AXB = m\angle BXC$, since $\angle AXC$ is bisected by $\overline{XB}$.

$m\angle AXC = m\angle AXB + m\angle AXB$

Substitute.

$$8x - 7 = 3x + 10 + 3x + 10$$
$$8x - 7 = 6x + 20$$
$$2x = 27$$
$$x = 13.5$$

Substitute $x = 13.5$ in $m\angle AXC$.

$$\begin{aligned} m\angle AXC &= 8x - 7 \\ &= 8(13.5) - 7 \\ &= 101 \end{aligned}$$

ANSWER:
101

14. If $m\angle CXD = 4x + 6$, $m\angle DXE = 3x + 1$, and $m\angle CXE = 8x - 2$, find $m\angle DXE$.

SOLUTION:

In the figure, $m\angle CXE = m\angle CXD + m\angle DXE$.

Substitute.

$$8x - 2 = 4x + 6 + 3x + 1$$
$$8x - 2 = 7x + 7$$
$$x = 9$$

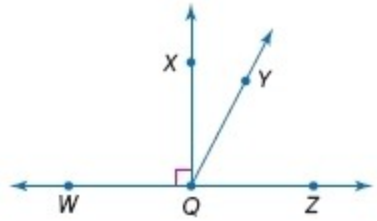
Substitute $x = 9$ in $m\angle DXE$.

$$m\angle DXE = 3x + 1$$
$$= 3(9) + 1$$
$$= 28$$

ANSWER:

28

Classify each angle as *acute*, *right*, or *obtuse*.



15. $\angle WQY$

SOLUTION:

In the figure $\angle XQW$ is a right angle, so $m\angle XQW = 90$.

Point *Y* on angle $\angle WQY$ lies in the exterior angle of right angle $\angle XQW$, so $\angle WQY$ is an obtuse angle.

ANSWER:

obtuse

16. $\angle YQZ$

SOLUTION:

In the figure $\angle ZQX$ is a right angle, so $m\angle ZQX = 90$.

Point *Y* on angle $\angle YQZ$ lies in the interior angle of right angle $\angle ZQX$, so $\angle YQZ$ is an acute angle.

ANSWER:

acute