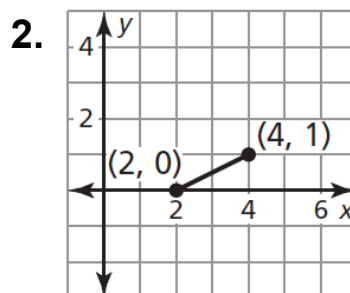
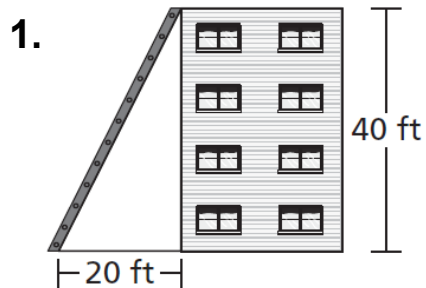


Find the slope.

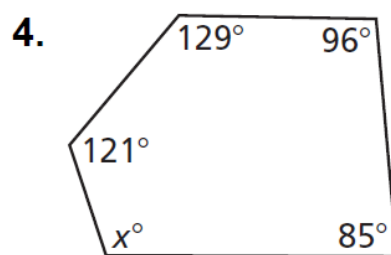
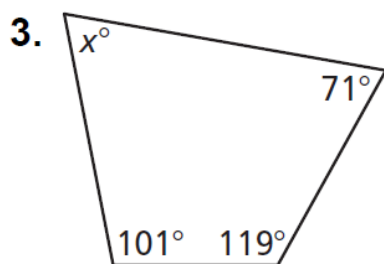
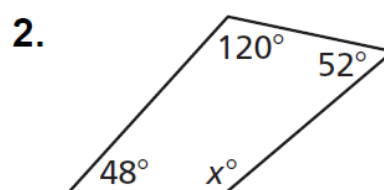
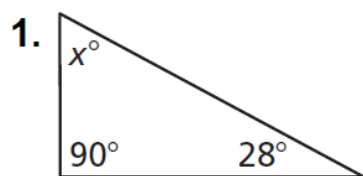


3. $(4, -4), (1, 2)$

4.

x	-5	-1	5	7
y	-3	-1	2	3

Find the missing angle measure.



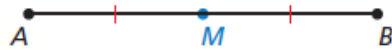
Essential Question

How can you find the midpoint and length of a line segment in a coordinate plane?

Core Concept

Midpoints and Segment Bisectors

The **midpoint** of a segment is the point that divides the segment into two congruent segments.



M is the midpoint of \overline{AB} .

So, $\overline{AM} \cong \overline{MB}$ and $AM = MB$.

A **segment bisector** is a point, ray, line, line segment, or plane that intersects the segment at its midpoint. A midpoint or a segment bisector *bisects* a segment.



\overleftrightarrow{CD} is a segment bisector of \overline{AB} .

So, $\overline{AM} \cong \overline{MB}$ and $AM = MB$.

In the skateboard design, \overline{VW} bisects \overline{XY} at point T , and $XT = 39.9$ cm. Find XY .

$$\overline{XY} = \overline{XT} + \overline{TY}$$

\overline{VW} bisects \overline{XY}

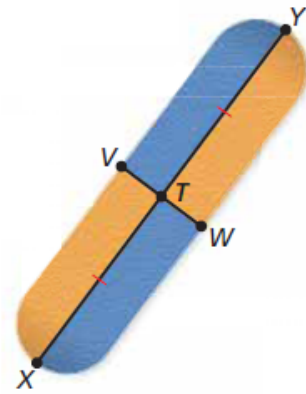
$$\hookrightarrow \overline{XT} = \overline{TY}$$

$$\overline{XT} \cong \overline{TY}$$

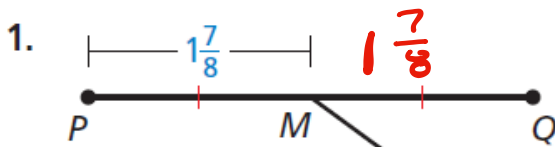
$$\overline{XY} = \overline{XT} + \overline{TY}$$

$$\overline{XY} = 39.9 + 39.9$$

$$\boxed{79.8 \text{ cm}}$$



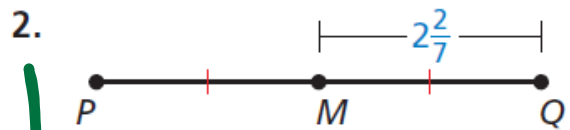
Identify the segment bisector of \overline{PQ} . Then find PQ .



\overrightarrow{MN}

$$PQ = 1\frac{7}{8} + 1\frac{7}{8} = 3.75$$

$$PQ = PM + MQ$$



point M

$$PQ = PM + MQ$$

$$\overline{MQ} \cong \overline{PM}$$

$$PM = MQ$$

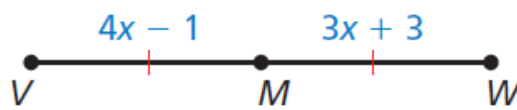
$$PQ = 2\frac{2}{7} + 2\frac{2}{7}$$

$$PQ = 4\frac{4}{7}$$

Point M is the midpoint of \overline{VW} . Find the length of \overline{VM} .

$$\overline{VM} \cong \overline{MW}$$

$$VM = MW$$



$$4x - 1 = 3x + 3$$

$$-3x + 1 \quad -3x + 1$$

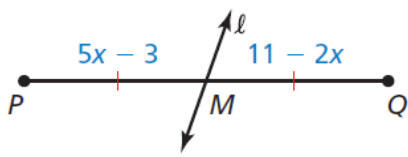
$$x = 4$$

$$VM = 4x - 1$$

$$VM = 4(4) - 1$$

$$VM = 15$$

3. Identify the segment bisector of \overline{PQ} . Then find MQ .



$$5x - 3 = 11 - 2x$$

$$+2x \quad +3 \quad +3 \quad +2x$$

$$\frac{7x}{7} = \frac{14}{7} \quad \boxed{x = 2}$$

line l

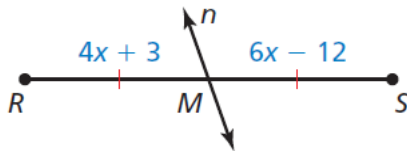
$$MQ = 11 - 2x$$

$$MQ = 11 - 2(2)$$

$$MQ = 11 - 4$$

$$\boxed{MQ = 7}$$

4. Identify the segment bisector of \overline{RS} . Then find RS .



Construction:
Segment Bisector

Core Concept

The Midpoint Formula

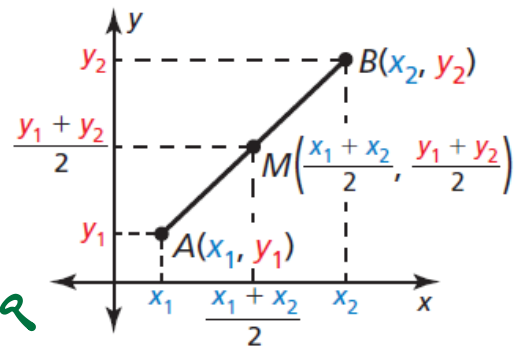
The coordinates of the midpoint of a segment are the averages of the x -coordinates and of the y -coordinates of the endpoints.

If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the midpoint M of \overline{AB} has coordinates

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

MP Formula

(x_1, y_1) and (x_2, y_2)



a. The endpoints of \overline{RS} are $R(1, -3)$ and $S(4, 2)$. Find the coordinates of the midpoint M .

b. The midpoint of \overline{JK} is $M(2, 1)$. One endpoint is $J(1, 4)$. Find the coordinates of endpoint K .

7. The midpoint of \overline{TU} is $M(2, 4)$. One endpoint is $T(1, 1)$. Find the coordinates of endpoint U .

8. The midpoint of \overline{VW} is $M(-1, -2)$. One endpoint is $W(4, 4)$. Find the coordinates of endpoint V .

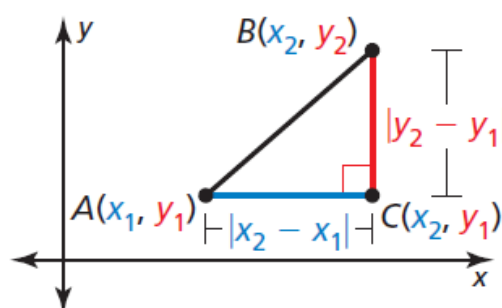
\overline{AB}

Core Concept

The Distance Formula

If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the distance between A and B is

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$



PROVE: $a^2 + b^2 = c^2$

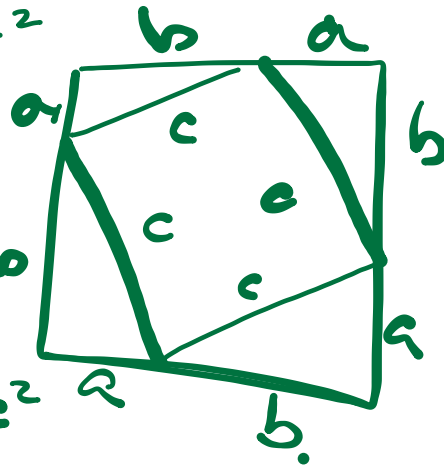
$$(a+b)^2 = 4\left(\frac{1}{2}ab\right) + c^2$$

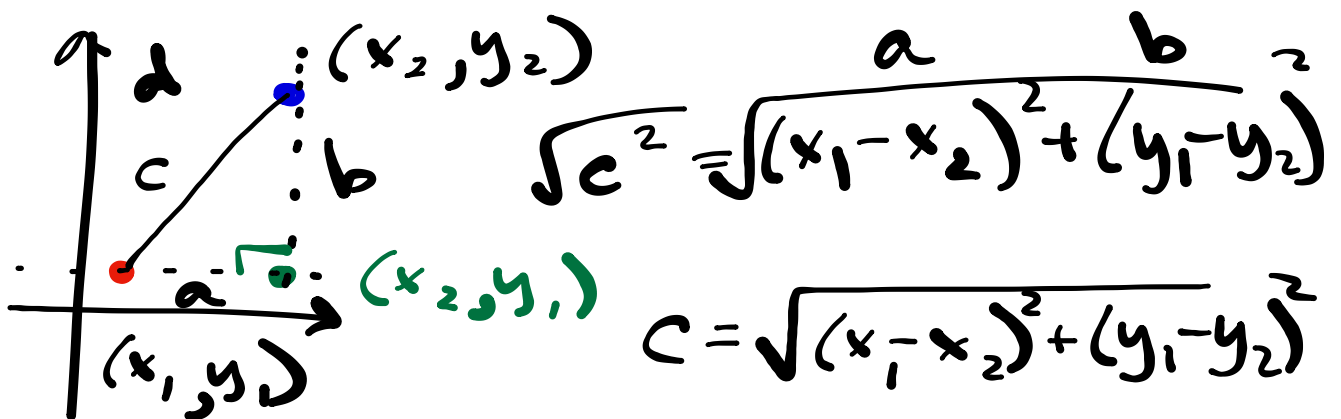
$$(a+b)(a+b)$$

$$a^2 + 2ab + b^2 = 2ab + c^2$$

$$\quad \quad \quad -2ab \quad \quad \quad -2ab$$

$$a^2 + b^2 = c^2 \checkmark \checkmark$$





$$a = x_1 - x_2$$

$$b = y_1 - y_2$$

Your school is 4 miles east and 1 mile south of your apartment. A recycling center, where your class is going on a field trip, is 2 miles east and 3 miles north of your apartment. Estimate the distance between the recycling center and your school.

9. In Example 4, a park is 3 miles east and 4 miles south of your apartment. Find the distance between the park and your school.

Exit Ticket: Given $A(-3, 5)$ and $B(4, -1)$, find the ~~coordinates of the~~
~~midpoint of \overline{AB} and the length of segment AB .~~

$$A(-3, 5) \quad B(4, -1)$$

$$\sqrt{(-3 - 4)^2 + (5 - (-1))^2} = d$$

$$\sqrt{(-7)^2 + (6)^2} =$$

$$\sqrt{49 + 36} = \sqrt{85} = 9.21$$

p24 # 8-10, 15, 16
19, 20, 23, 24, 26