

Midpoints & Segment Bisectors

Midpoint – A *Midpoint* is a point that is exactly half way between two given points.

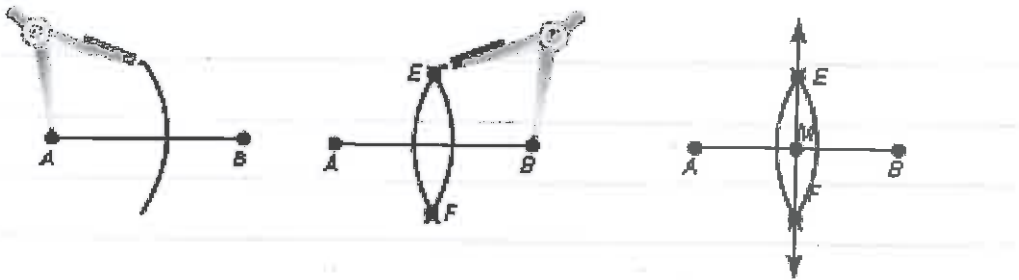
Segment Bisector – A *segment bisector* is a line, ray, or segment that passes through the midpoint of a given segment.

Perpendicular Bisector – A *perpendicular bisector* is a segment bisector that forms a right angle to a given segment.

at the midpoint.

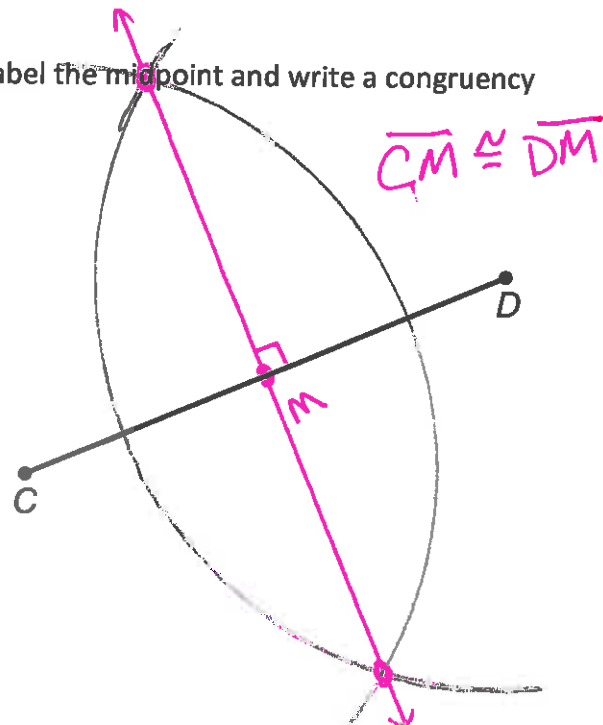
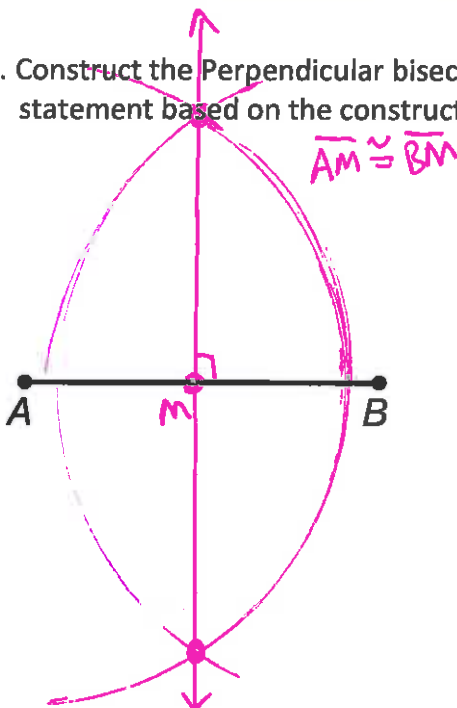
90°

Constructing a Midpoint, Segment Bisector, or Perpendicular Bisector:



<p>Construct an Arc</p> <p>Open the radius of the compass to more than half the length of line segment AB. Use endpoint A as the center and construct an arc.</p>	<p>Construct Another Arc</p> <p>Keep the compass radius and use point B as the center as you construct an arc. Label the points formed by the intersection of the arcs point E and point F.</p>	<p>Construct a Line</p> <p>Connect points E and F. Line segment EF is the segment bisector of line segment AB. The point M represents the midpoint of AB.</p>
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1. Construct the Perpendicular bisector of each segment. Label the midpoint and write a congruency statement based on the construction.

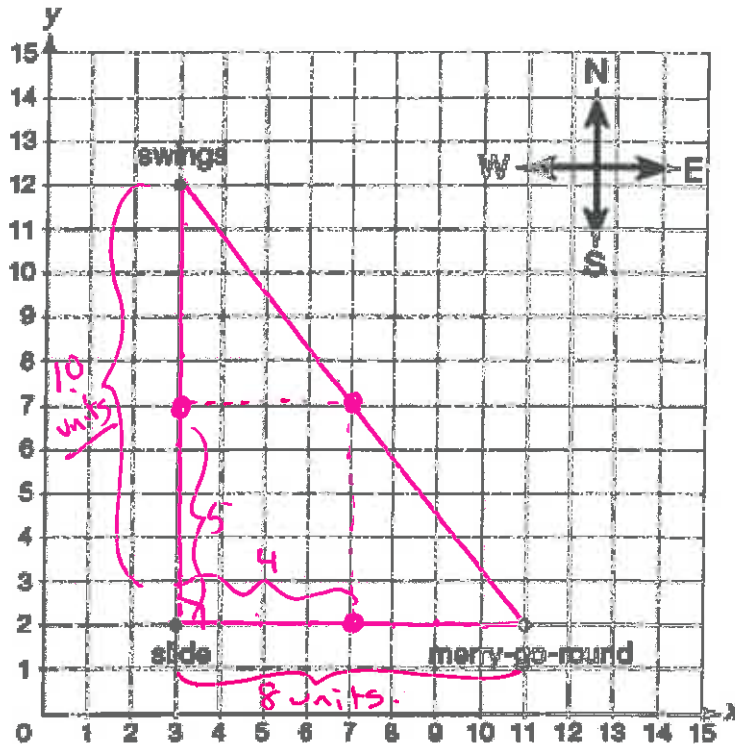


Finding Midpoints

Problem:

Ms. Lopez is planning a treasure hunt for her kindergarten students. She drew a model of the playground on a coordinate plane as shown. She used this model to decide where to place items for the treasure hunt, and to determine how to write the treasure hunt instructions.

Each grid square represents one square yard on the playground.



Complete the table below by locating the midpoint between each of the stated locations. Show how you determined each distance and explain your reasoning.

Locations	Midpoint Location	How did you find the Midpoint?
Slide & M.G.R.	(7, 2)	the slide and M.G.R. are 8 units apart. Moving 4 units over from the slide makes an x-coord of 7.
Swings & Slide	(3, 7)	the Swings + slide are 10 units apart. Moving 5 units up from the slide makes a y-coord of 7.
Swings & M.G.R.	(7, 7)	using the 1/2 way point of each side of the Δ finds the 1/2 point between the Swings + M.G.R.

Midpoint Practice:

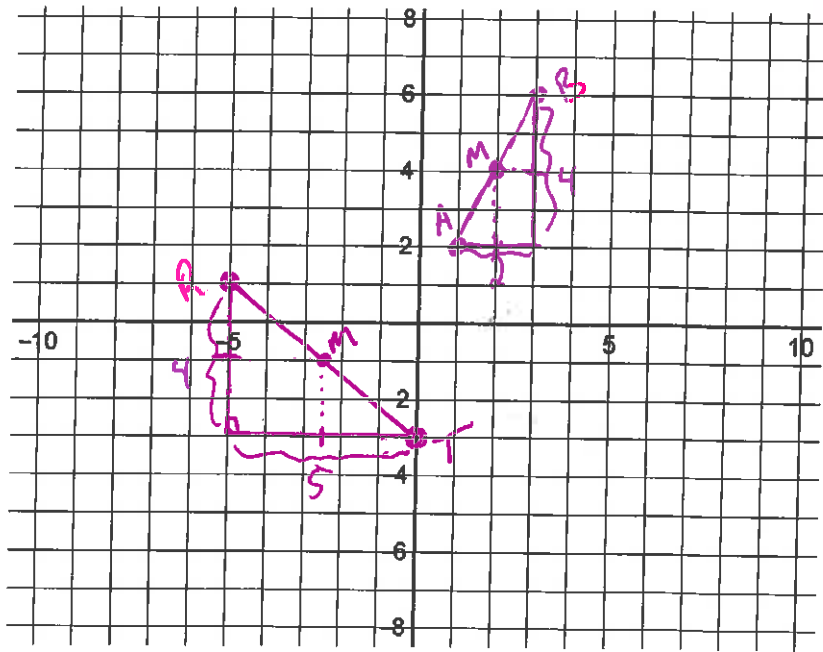
1. State the coordinates of the midpoint, M , between each set of given points.
Show all work (use of the grid is optional)

a. $A(1, 2)$ and $B(3, 6)$

$M(2, 4)$

b. $R(-5, 1)$ and $T(0, -3)$

$M(-2.5, -1)$



- 2a. Line Segment HG has endpoint $H(5, 12)$ and midpoint $M(9, 2)$. Find and state the coordinates of G , the other endpoint.



$9 + 4 = 13$



$2 - 10 = -8$

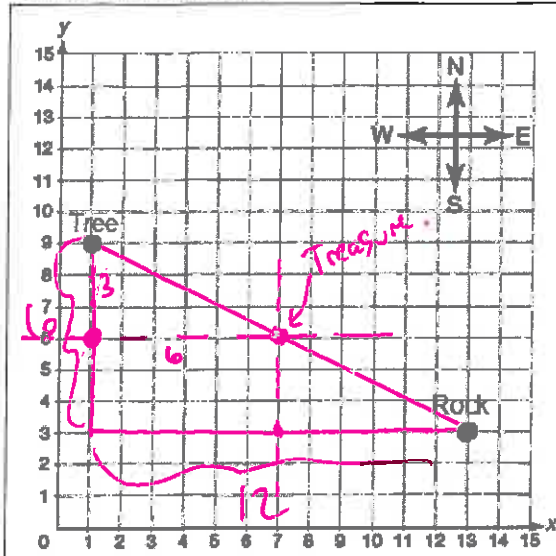
$G(13, -8)$

- b. If line segment HG is translated 6 units up to form segment $H'G'$, find and state the coordinates of the midpoint of segment $H'G'$. Explain your reasoning.

$M'(9, 8)$

Translating up changes the y -coordinate at the midpoint. Also, translation preserves distance, so M' is still the midpoint of $H'G'$.

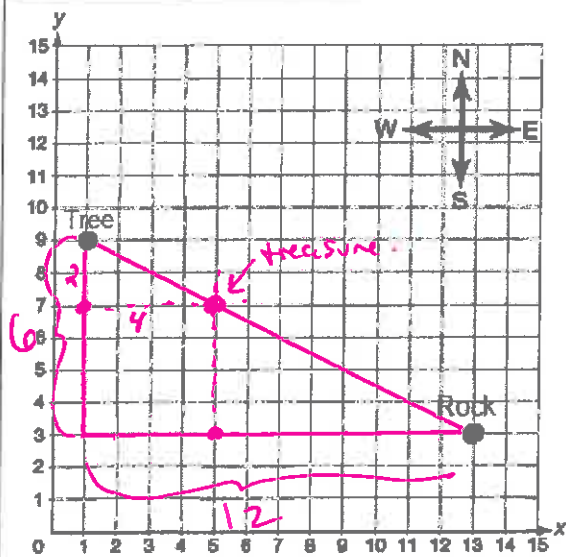
3. Sharon wants to bury a secret treasure somewhere between a rock and a tree. She made a diagram on a coordinate plane to model the situation. Starting from the tree she considers burying her treasure in three different locations.



a. Find where Sharon should bury her treasure if it is $\frac{1}{2}$ of the way between the tree and rock.

$$\begin{array}{l} \text{down} \\ \frac{6}{2} = 3 \end{array} \qquad \begin{array}{l} \text{over} \\ \frac{12}{2} = 6 \end{array}$$

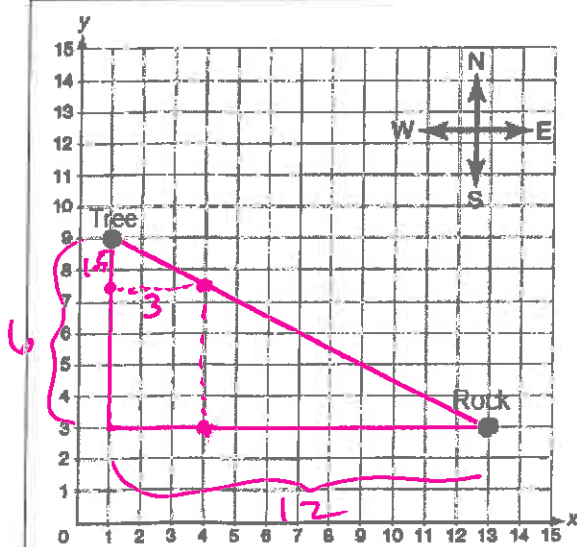
Sharon should bury the treasure at location (7, 6).



b. Find where Sharon should bury her treasure if it is $\frac{1}{3}$ of the way between the tree and rock. Explain how you arrived at your answer.

$$\begin{array}{l} \text{down} \\ \frac{6}{3} = 2 \end{array} \qquad \begin{array}{l} \text{over} \\ \frac{12}{3} = 4 \end{array}$$

Sharon should bury the treasure at (5, 7). To get my answer I divided the lengths of the legs of the triangle by 3 and counted that amount down and over from the tree.



c. Find where Sharon should bury her treasure if it is $\frac{1}{4}$ of the way between the tree and rock. Explain how you arrived at your answer.

$$\begin{array}{l} \text{Down:} \\ \frac{6}{4} = 1.5 \end{array} \qquad \begin{array}{l} \text{over:} \\ \frac{12}{4} = 3 \end{array}$$

Sharon should bury her treasure at (4, 7.5). To get my answer I divided the legs of the triangle by 4. I then counted that amount down + over from the tree.