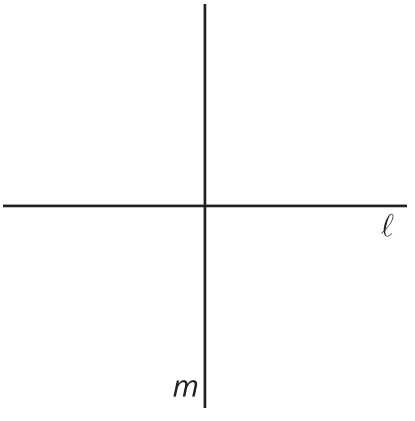
Unit 2 Lesson 8: The Perpendicular Bisector Theorem

1 Which One Doesn't Belong: Intersecting Lines (Warm up)

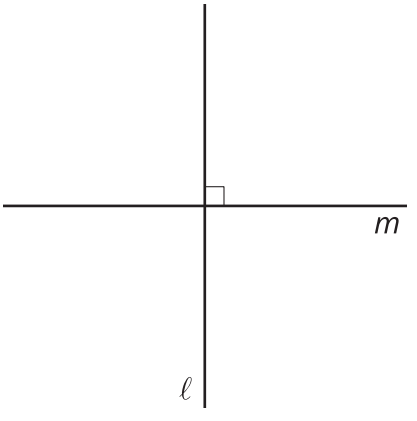
Student Task Statement

Which one doesn't belong?

A



B



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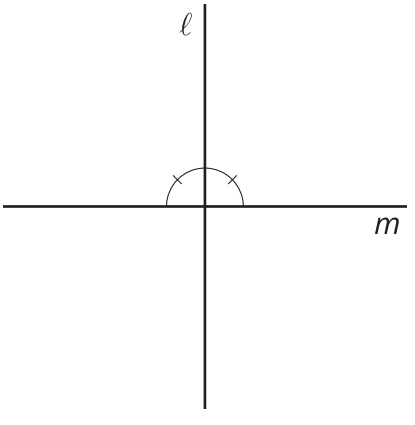
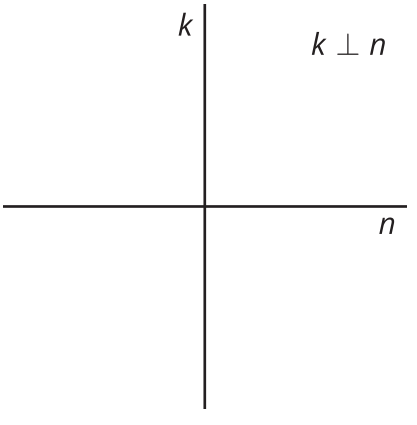


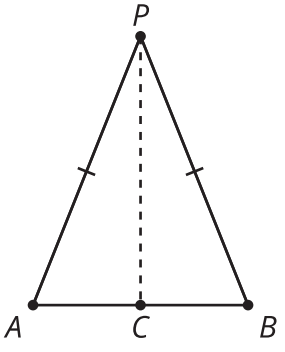
D



2 Lots of Lines

Images for Launch

$\overline{AP} \cong \overline{BP}$



Student Task Statement

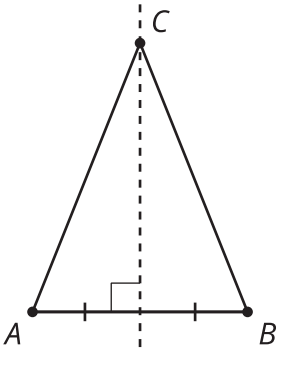
Diego, Jada, and Noah were given the following task:

Prove that if a point C is the same distance from A as it is from B, then C must be on the perpendicular bisector of AB.

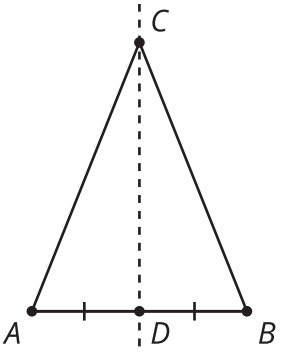
At first they were really stuck. Noah asked, "How do you prove a point is on a line?" Their teacher gave them the hint, "Another way to think about it is to draw a line that you know C is on, and prove that line has to be the perpendicular bisector."

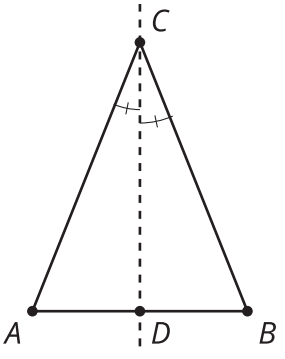
They each drew a line and thought about their pictures. Here are their rough drafts.

Diego's approach: "I drew a line through C that was perpendicular to AB and through the midpoint of AB. That line is the perpendicular bisector of AB and C is on it, so that proves C is on the perpendicular bisector."



Jada's approach: "I thought the line through C would probably go through the midpoint of AB so I drew that and labeled the midpoint D. Triangle ACB is isosceles, so angles A and B are congruent, and AC and BC are congruent. And AD and DB are congruent because D is a midpoint. That made two congruent triangles by the Side-Angle-Side Triangle Congruence Theorem. So I know angle ADC and angle BDC are congruent, but I still don't know if DC is the perpendicular bisector of AB."



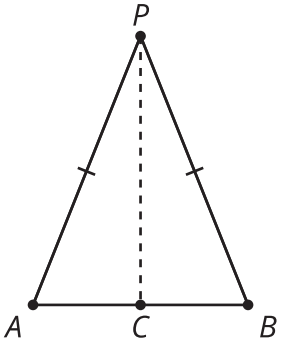


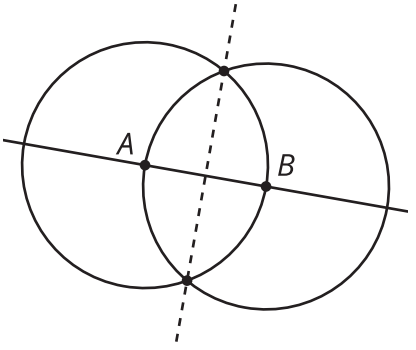
Noah's approach: "In the Isosceles Triangle Theorem proof, Mai and Kiran drew an angle bisector in their isosceles triangle, so I'll try that. I'll draw the angle bisector of angle ACB. The point where the angle bisector hits AB will be D. So triangles ACD and BCD are congruent, which means AD and BD are congruent, so D is a midpoint and CD is the perpendicular bisector."

1. With your partner, discuss each student's approach.
    - What do you notice that this student understands about the problem?
    - What question would you ask them to help them move forward?
2. Using the ideas you heard and the ways you think each student could make their explanation better, write your own explanation for why C must be on the perpendicular bisector of A and B.

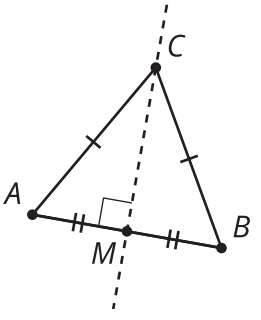
Activity Synthesis

$\overline{AP} \cong \overline{BP}$





$\overline{AC} \cong \overline{BC}$, so C is on the line through midpoint M perpendicular to $\overline{AB}$



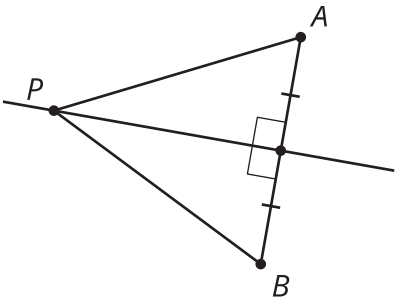
3 Not Too Close, Not Too Far

Student Task Statement

1. Work on your own to make a diagram and write a rough draft of a proof for the statement: If P is a point on the perpendicular bisector of AB, prove that the distance from P to A is the same as the distance from P to B.

2. With your partner, discuss each other's drafts. Record your partner's feedback for your proof.
    - What do you notice that your partner understands about the problem?
    - What question would you ask them to help them move forward?

Images for Activity Synthesis



$\overline{AB} \perp \overline{CM}, \overline{AM} \cong \overline{BM}$, **so** $\overline{AC} \cong \overline{BC}$