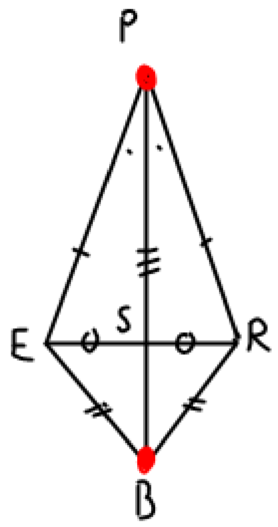


Given: $\overline{PE} \cong \overline{PR}$

$\overline{BE} \cong \overline{BR}$

Prove: $\overleftrightarrow{PB}$ is $\perp$ bisector of $\overline{ER}$

DETOUR!

Detour (steps 1–3)

Statements	Reasons
(1) $\overline{PE} \cong \overline{PR}$, $\overline{BE} \cong \overline{BR}$	(1) Given
(2) $\overline{PB} \cong \overline{PB}$	(2) Reflexive Property
(3) $\triangle PEB \cong \triangle PRB$	(3) SSS
(4) $\angle EPS \cong \angle RPS$	(4) CPCTC
(5) $\overline{PS} \cong \overline{PS}$	(5) Reflexive property
(6) $\triangle EPS \cong \triangle RPS$	(6) SAS
(7) $\overline{ES} \cong \overline{RS}$	(7) CPCTC
(8) $\overleftrightarrow{PB}$ bis $\overline{ER}$	(8) Def. of bisection
(9) $\angle PSE \cong \angle PSR$	(9) CPCTC
(10) $\angle PSE$ supp $\angle PSR$	(10) If 2 $\angle$ form st. $\angle$, then supp.
(11) $\angle PSE$, $\angle PSR$ rt. $\angle$	(11) If $\angle$s supp and $\cong$, then rt. $\angle$s.
(12) $\overleftrightarrow{PB} \perp \overline{ER}$	(12) If 2 lines int. to form rt. $\angle$s, then $\perp$.
(13) $\overleftrightarrow{PB} \perp$ bis $\overline{ER}$	(13) step 8 and 12

4.4 Equidistance.pdf - Adobe Reader

File Edit View Window Help

1 / 5 102% Tools Sign Comment

4.4. Honors Geometry

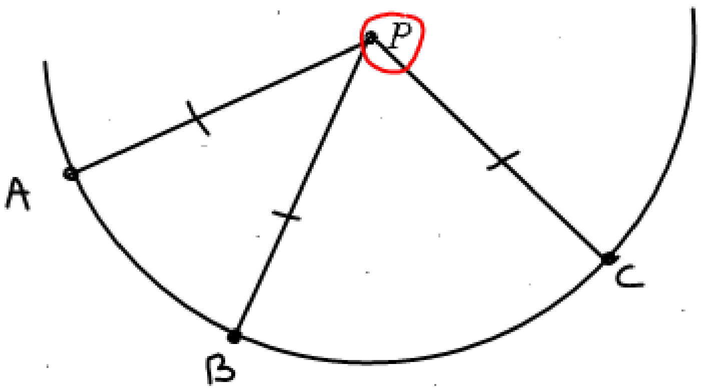
DATE: 12|12

Target 4E. Recognize and apply the relationship between equidistance and perpendicular bisection

The Equidistance Theorems

- Equidistant: Two or more points that are the same distance away from a third point.
  - Example: All of the points on a circle are equidistant from the center!

Use a compass to construct points A, B, and C so that they are all equidistant from P.



So, $\overline{AP} \cong \overline{BP} \cong \overline{CP}$ means that P is equidistant from A, B, and C.

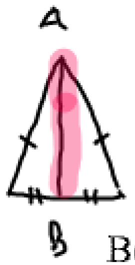
- Perpendicular Bisector: a segment or a line that bisects **and** is perpendicular to

4.4 Equidistance.pdf - Adobe Reader

File Edit View Window Help

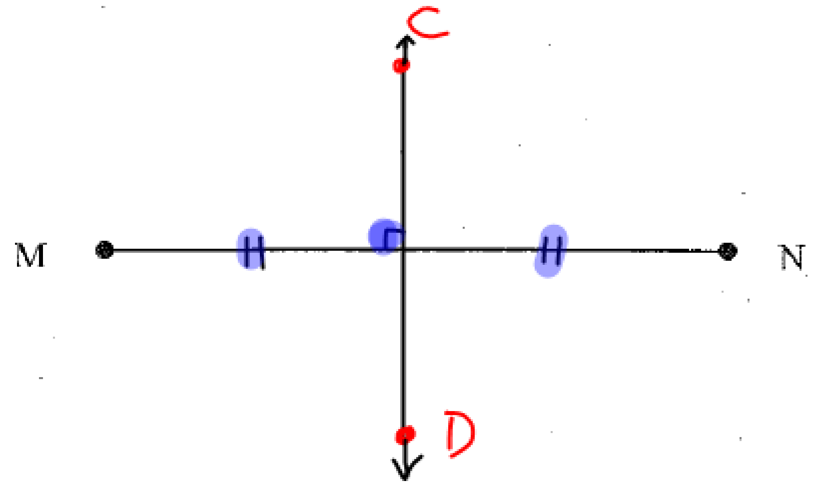
1 / 5 102% Tools Sign Comment

- Perpendicular Bisector: a segment or a line that bisects **and** is perpendicular to another segment.



  - Example: think back…The median of an isosceles triangle was also a $\perp$ bisector!

Below, create a sketch of $\overleftrightarrow{CD}$ so that it is the $\perp$ bisector of $\overline{MN}$. Use the proper tick marks to label all of the important information.

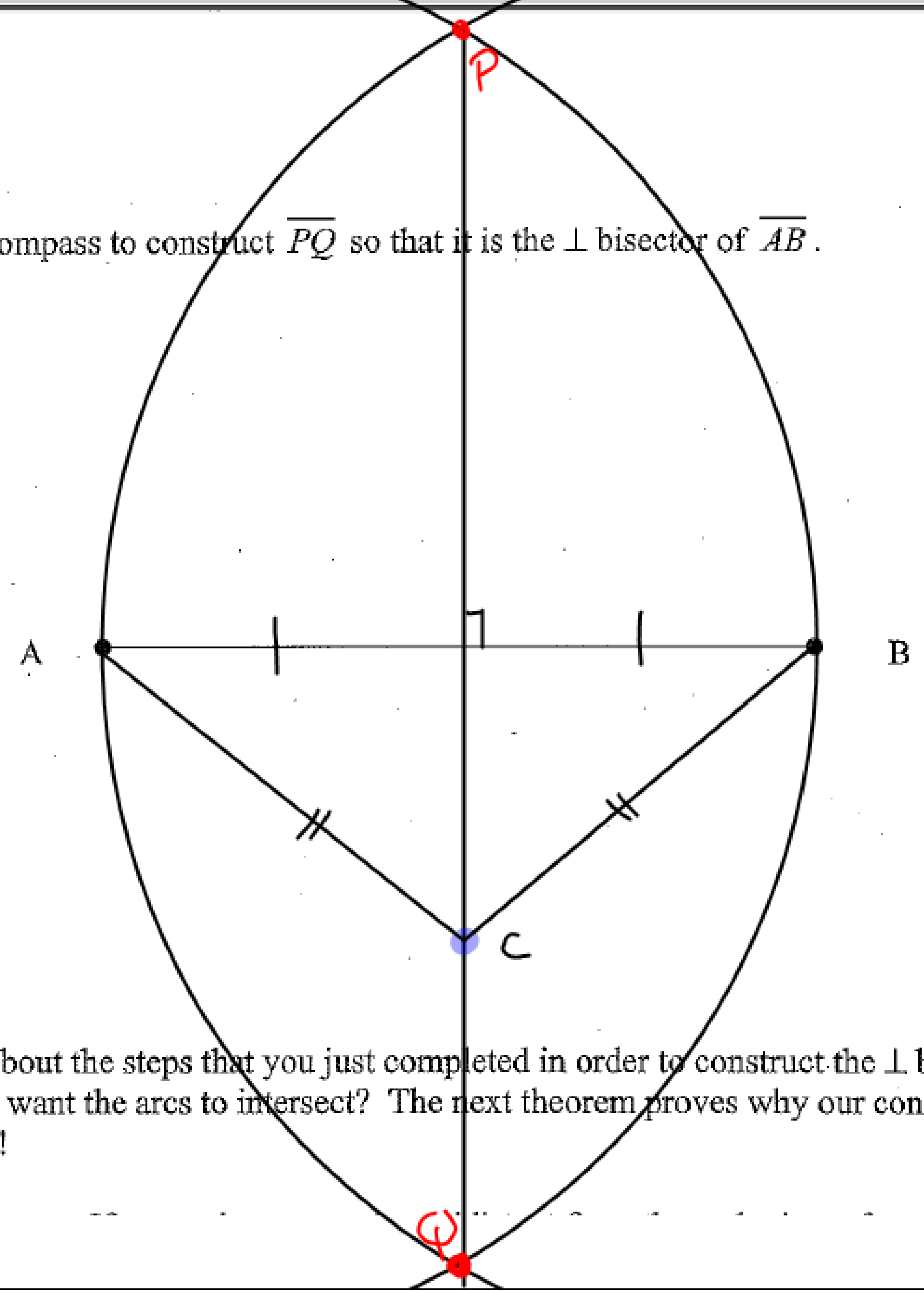


4.4 Equidistance.pdf - Adobe Reader

File Edit View Window Help

2 / 5 102% Tools Sign Comment

Use a compass to construct $\overline{PQ}$ so that it is the $\perp$ bisector of $\overline{AB}$.



Think about the steps that you just completed in order to construct the $\perp$ bisector. Why did you want the arcs to intersect? The next theorem proves why our construction worked!

4.4 Equidistance.pdf - Adobe Reader

File Edit View Window Help

2 / 5 102% Tools Sign Comment

Think about the steps that you just completed in order to construct the ⊥ bisector. Why did you want the arcs to intersect? The next theorem proves why our construction worked!

- Theorem: If two points are each equidistant from the endpoints of a segment, then the two points determine the ⊥ bisector of that segment.

  Given: $\overline{PA} \cong \overline{PB}$, $\overline{QA} \cong \overline{QB}$ (above)

  Prove: $\overleftrightarrow{PQ}$ is the ⊥ bisector of $\overline{AB}$
  (a detour proof for this theorem is provided on page 181, sample problem #2)

- Theorem: If a point is on a ⊥ bisector of a segment, then it is equidistant from the endpoints of that segment.

Draw a new point (name it point C) on $\overline{PQ}$ in your construction above. Then draw and measure segments $\overline{CA}$ and $\overline{CB}$. Is our theorem true?

Given: $\overleftrightarrow{CQ}$ is the ⊥ bisector of $\overline{AB}$

Prove: $\overline{CA} \cong \overline{CB}$
(a proof can be created using definition of perpendicular bisector, SAS, and CPCTC)

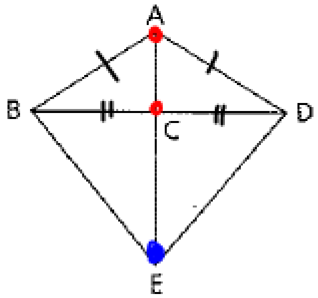
4.4 Equidistance.pdf - Adobe Reader

File Edit View Window Help

3 / 5 102% Tools Sign Comment

Given: $\overline{AB} \cong \overline{AD}$,
$\overline{BC} \cong \overline{CD}$

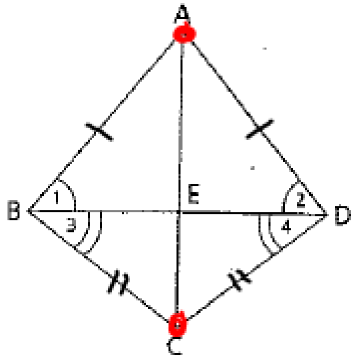
Conclusion: $\overline{BE} \cong \overline{ED}$

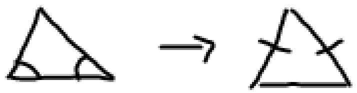


statement	Reason
① $\overline{AB} \cong \overline{AD}$ $\overline{BC} \cong \overline{CD}$	① Given
② $\overleftrightarrow{AC} \perp$ bis $\overline{BD}$	② Two pts. equidistant from the endpts (B, D) of a segment determine the $\perp$ bisector of the segment
③ $\overline{BE} \cong \overline{DE}$	③ A point on the $\perp$ bisector of a segment is equidistant from the endpts of the segment.

Given: $\angle 1 \cong \angle 2$,
$\angle 3 \cong \angle 4$

Prove: $\overleftrightarrow{AE} \perp$ bis. $\overline{BD}$



S	R
① $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$	① Given
② $\overline{AB} \cong \overline{AD}$	② 
③ $\overline{CB} \cong \overline{CD}$	③ Same as step 2.
④ $\overleftrightarrow{AE} \perp$ bis $\overline{BD}$	④ Equidistance Thm. (step 2, 3)

[Two pts equidistant from the endpts of a seg. determine ⊥ bis.]

Given: $\overline{AB} \cong \overline{AD}$,
$\overline{BC} \cong \overline{CD}$