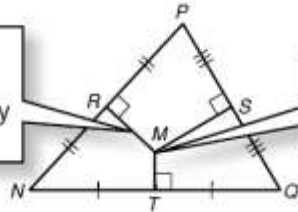


Properties of perpendicular bisectors

Perpendicular bisectors \overline{MR} , \overline{MS} , and \overline{MT} are **concurrent** because they intersect at one point.



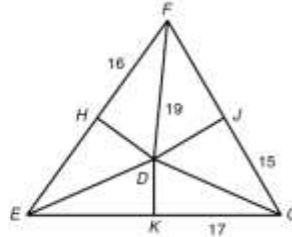
The point of intersection of \overline{MR} , \overline{MS} , and \overline{MT} is called the **circumcenter** of $\triangle NPQ$.

Any point on the perpendicular bisector is equidistant to the endpoints of the segments/sides that they bisect.

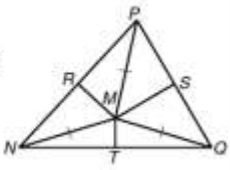
Example and practice 1

\overline{HD} , \overline{JD} , and \overline{KD} are the perpendicular bisectors of $\triangle EFG$. Find each length.

- 1. DG _____
- 2. EK _____
- 3. FJ _____
- 4. DE _____

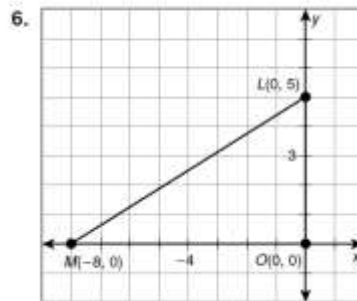
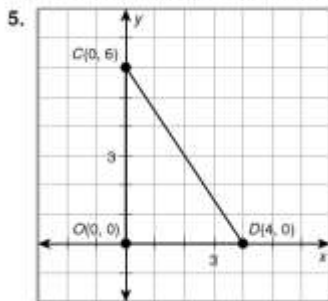


Circumcenter Theorem

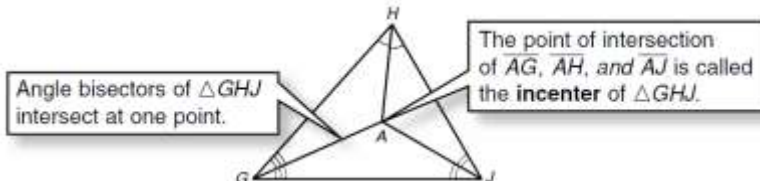
Theorem	Example
<p>Circumcenter Theorem The circumcenter of a triangle is equidistant from the vertices of the triangle.</p>	<p>Given: \overline{MR}, \overline{MS}, and \overline{MT} are the perpendicular bisectors of $\triangle NPQ$.</p> <p>Conclusion: $MN = MP = MQ$</p> 

Example and practice 2

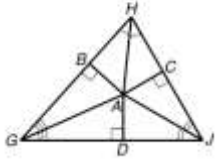
Find the circumcenter of each triangle.



Angle bisectors



Any point on the angle bisectors is equidistant to the sides of the angles they bisect.

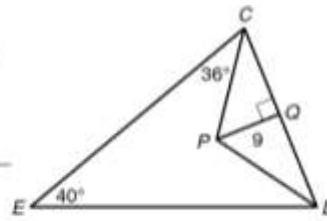
Theorem	Example
<p>Incenter Theorem The incenter of a triangle is equidistant from the sides of the triangle.</p>	<p>Given: \overline{AG}, \overline{AH}, and \overline{AJ} are the angle bisectors of $\triangle GHJ$.</p> <p>Conclusion: $AB = AC = AD$</p> 

Example and practice 3

\overline{PC} and \overline{PD} are angle bisectors of $\triangle CDE$. Find each measure.

7. the distance from P to \overline{CE}

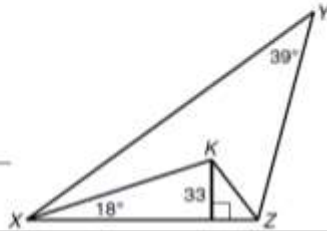
8. $m\angle PDE$



\overline{KX} and \overline{KZ} are angle bisectors of $\triangle XYZ$. Find each measure.

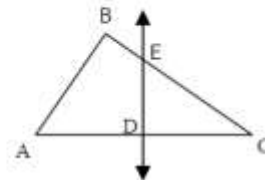
9. the distance from K to \overline{YZ}

10. $m\angle KZY$

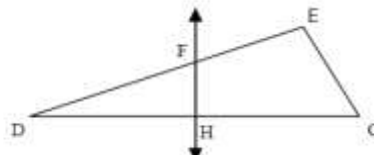


Example and practice 4

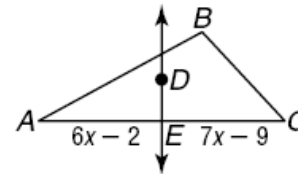
6) In $\triangle ABC$, \overline{DE} is perpendicular bisector of \overline{AC} with D on \overline{AC} . If $AD = 2y + 4$, $CD = y + 12$, and $m\angle EDC = 5(x - 12)^\circ$. Find the value of x and y . Find length of AD , DC , and AC .



10) In $\triangle DEG$, \overline{FH} is a perpendicular bisector of \overline{DG} with H on \overline{DG} . If $DH = 2y + 3$, $GH = 7y - 42$, and $m\angle FHG = (x^2 + 9)^\circ$, then find the value of x and y . What is the measure of $\angle DG$?

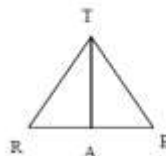


11) \overline{DE} is the perpendicular bisector of \overline{AC} . Solve for x .



Example and practice 5

12) In $\triangle RTE$, \overline{TA} bisects $\angle RTE$, $m\angle RTA = (3y - 4)^\circ$, and $m\angle ETA = (4y - 17)^\circ$. Find the measure of $\angle RTE$.



14) \overline{DF} bisects $\angle CDE$. Solve for x .

