

Triangle Circle Lab

Find the center, then set the radius.

HIGH SCHOOL • MA.912.GR.5.3

MA.912.GR.5.3 "Construct the inscribed and circumscribed circles of a triangle."

NAME _____

DATE _____

TWO TRIANGLE CIRCLES

For an inscribed circle, construct angle bisectors to locate the incenter, then use its perpendicular distance to a side as the radius. For a circumscribed circle, construct perpendicular bisectors to locate the circumcenter, then use its distance to a vertex as the radius.

WORKED EXAMPLE

Triangle JKL has perpendicular bisectors that meet at O. If $OJ = 7$ cm, construct its circumscribed circle.

1. Locate O where the perpendicular bisectors meet.
2. Set the compass width to OJ, or 7 cm.
3. Draw a circle centered at O through J.

Answer: Circumscribed circle: center O, radius 7 cm.

PRACTICE 5 problems

- 1** The incenter I is 3 cm from side AB. What is the radius of the inscribed circle?

ANSWER _____

- 2** The circumcenter O is 9 cm from vertex A. What is the radius of the circumscribed circle?

ANSWER _____

- 3** A right triangle has legs 6 cm and 8 cm. What is the radius of its circumscribed circle?

ANSWER _____

- 4** An equilateral triangle has center C. C is 5 cm from each side and 10 cm from each vertex. State both circle radii.

ANSWER _____

- 5** An incenter is $9/2$ cm from a side. What compass width makes the inscribed circle?

ANSWER _____

APPLY IT Show your work

- 1** An esports club makes a triangular banner shaped like a 5-ft by 12-ft by 13-ft right triangle. A circular light strip must pass through all three corners. What radius should the strip have?

WORK SPACE

ANSWER _____

- A robotics team needs a circular sensor pad tangent to all three edges of a triangular foam insert.
- 2** The angle-bisector center is 4 cm from each edge. What radius should the pad have, and what lines locate its center?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A right triangle has legs 8 cm and 15 cm. Find the radii of its inscribed circle and circumscribed circle.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	The incenter I is 3 cm from side AB. What is the radius of the inscribed circle?	3 cm
2	The circumcenter O is 9 cm from vertex A. What is the radius of the circumscribed circle?	9 cm
3	A right triangle has legs 6 cm and 8 cm. What is the radius of its circumscribed circle?	5 cm
4	An equilateral triangle has center C. C is 5 cm from each side and 10 cm from each vertex. State both circle radii.	Inscribed radius: 5 cm; circumscribed radius: 10 cm
5	An incenter is $9/2$ cm from a side. What compass width makes the inscribed circle?	$9/2$ cm

PART 2 • APPLY IT

- $13/2$ ft** The circumcenter of a right triangle is the midpoint of the hypotenuse. The radius is half of 13 ft, so it is $13/2$ ft.
- 4 cm; the angle bisectors of any two angles** A circle tangent to all three sides is centered at the incenter. Its radius equals the perpendicular distance from the incenter to a side.

CHALLENGE

Inscribed radius: 3 cm; circumscribed radius: $17/2$ cm

Accept equivalent fraction forms, such as $6\frac{1}{2}$ ft for $13/2$ ft. For construction descriptions, accept any two angle bisectors for the incenter and any two perpendicular bisectors for the circumcenter.