

Line and Circle Logic

Use precise definitions to classify geometric figures.

HIGH SCHOOL • HSG-CO.A.1

CCSS.Math.Content.HSG-CO.A.1 "Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc."

NAME _____

DATE _____

DEFINITIONS BUILD PROOFS

An angle is two rays with a common endpoint, and a line segment is the part of a line between two endpoints. Perpendicular lines are coplanar lines that intersect to form right angles, while parallel lines are coplanar lines that never intersect. A circle is all points in a plane that are one fixed distance, called the radius, from its center.

WORKED EXAMPLE

A circle has center M and radius 9 units. Point Q is 9 units from M. Is Q on the circle?

1. A point on a circle is exactly one radius from the center.
2. $MQ = 9$ units, and the radius is 9 units.
3. Since MQ equals the radius, Q is on the circle.

Answer: Q is on circle M.

PRACTICE 6 problems

- 1** PRACTICE 1. Figure T has endpoints X and Y and includes every point on the line between them. Name figure T.

ANSWER _____

- 2** PRACTICE 2. Rays BA and BC share endpoint B. Name the figure formed by the rays.

ANSWER _____

- 3** PRACTICE 3. Lines g and h lie in the same plane and never intersect. What is their relationship?

ANSWER _____

- 4** PRACTICE 4. Lines j and k lie in the same plane and intersect to form four right angles. What is their relationship?

ANSWER _____

- 5** PRACTICE 5. Circle O has radius 6 units. Point R is 6 units from O. Where is R?

ANSWER _____

- 6** PRACTICE 6. Circle S has radius 8 units. Point T is 5 units from S. Is T inside, on, or outside the circle?

ANSWER _____

APPLY IT Show your work

- 1** APPLY 1. The theater crew places two straight tape guides on the flat stage floor. The guides cross and form four right angles. How should the crew classify the two tape guides?

WORK SPACE

ANSWER _____

- 2** APPLY 2. A gaming club designs a circular target with center C and radius 12 cm. Icon J is 12 cm from C, icon K is 11 cm from C, and icon L is 13 cm from C. Which icon is on the circular border?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

CHALLENGE. A student says, "Lines p and q never intersect, so they are parallel." You know that p and q are not coplanar. Is the student's statement enough to prove the lines are parallel? Explain using the precise definition.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	PRACTICE 1. Figure T has endpoints X and Y and includes every point on the line between them. Name figure T.	line segment XY
2	PRACTICE 2. Rays BA and BC share endpoint B. Name the figure formed by the rays.	angle ABC
3	PRACTICE 3. Lines g and h lie in the same plane and never intersect. What is their relationship?	parallel, $g \parallel h$
4	PRACTICE 4. Lines j and k lie in the same plane and intersect to form four right angles. What is their relationship?	perpendicular, $j \perp k$
5	PRACTICE 5. Circle O has radius 6 units. Point R is 6 units from O. Where is R?	R is on circle O.
6	PRACTICE 6. Circle S has radius 8 units. Point T is 5 units from S. Is T inside, on, or outside the circle?	T is inside circle S.

PART 2 • APPLY IT

1. **The tape guides are perpendicular lines.** The guides are in the same plane and intersect to form right angles. That matches the definition of perpendicular lines.
2. **Icon J only.** Points on the circular border are exactly 12 cm from C. Only J is the same distance from the center as the radius.

CHALLENGE

No. Parallel lines must be coplanar and never intersect. Since p and q are not coplanar, they are not parallel.

Accept segment YX for problem 1 and angle CBA for problem 2. Accept either words or standard symbols for parallel and perpendicular relationships.