

# Points, Lines, and Planes

Geometry Worksheet · Grade 6–8

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Learning Objectives

- Identify and describe the undefined terms: point, line, and plane
- Use correct notation to name points, lines, and planes
- Recognize collinear points, coplanar points, and geometric relationships

## Problems

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1. A point has no dimension and only marks a location. Which of the following is the correct way to name a point in geometry?

2. Look at the figure below. Name each labeled point using correct geometric notation.



3. A line extends in opposite directions without end and has one dimension. Using the figure below, write all three possible names for line  $l$ , which passes through points P and Q.

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4. A plane extends in two dimensions — length and width — but has no thickness. Which of the following correctly names a plane? Select all that apply. (A) Plane ABC (B) Plane abc (C) Plane M (D) Plane ABCD

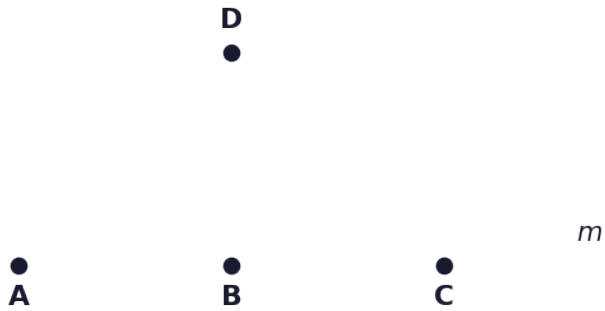
5. Look at the figure below. Points A, B, and C all lie on line  $m$ . What term describes these three points, and what does that term mean?



6. Use the figure below. Point D does NOT lie on line  $m$ . Are points A, B, C, and D collinear? Explain your answer.

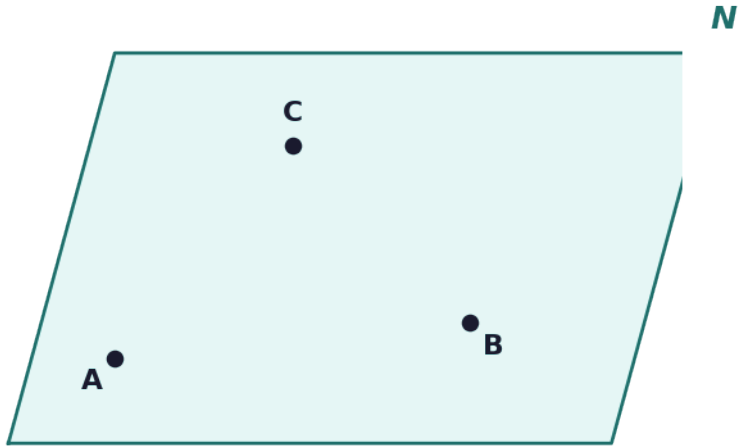
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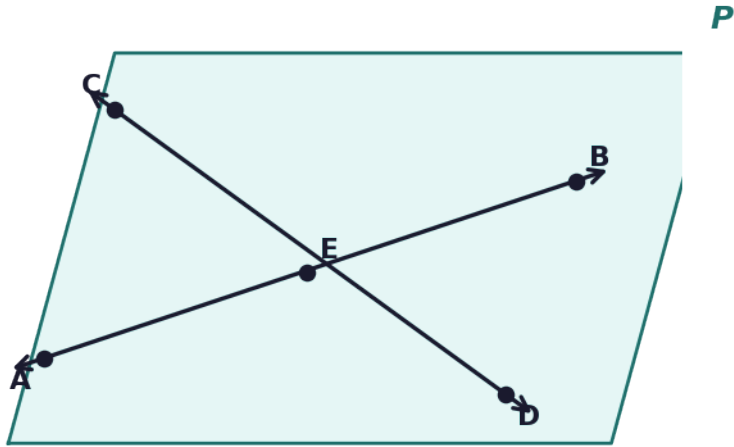
7. Use the figure below showing plane  $N$ . Name the plane in two different correct ways, given that points  $A$ ,  $B$ , and  $C$  lie on it and are not on the same line.





8. Study the figure below. Line AB and line CD both lie in plane P and intersect at point E. List: (a) the names of the two lines, (b) the point of intersection, and (c) the name of the plane.

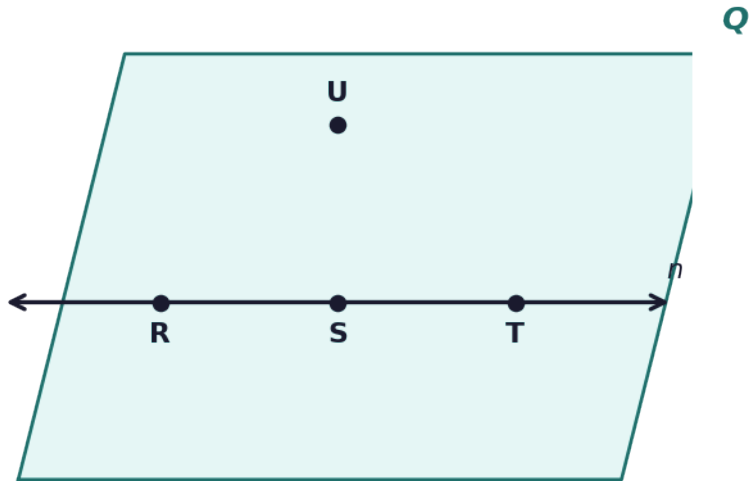




9. Use the figure below. Decide whether each statement is TRUE or FALSE. (a) Points R, S, and T are collinear. (b) Point U lies on line n. (c) Line n can also be called Line RS. (d) Points R, S, T, and U are coplanar (all lie on the same plane).

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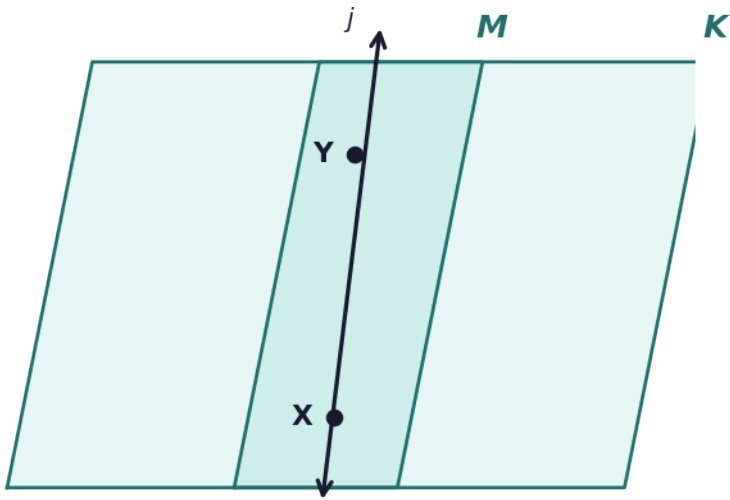




**10.** In the figure below, plane M and plane K intersect. Describe what their intersection looks like, name it using correct geometric notation, and explain why two planes cannot intersect at just one point.

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# Points, Lines, and Planes — Answer Key

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## Answer Key

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### 1. Answer: A single capital letter, e.g. Point A

- A point is named using a single capital letter.
  - Lowercase letters are not used for points.
  - Examples of correct names: Point A, Point B, Point Z.
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### 2. Answer: Point A, Point B, Point C



- Each dot in the figure represents a point.
  - Points are named with a single capital letter.
  - The three points are named: Point A, Point B, and Point C.
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### 3. Answer: Line I, Line PQ, Line QP





- A line can be named by a single lowercase letter: line  $l$ .
- A line can also be named by any two points on it: line PQ.
- The order of the two points can be interchanged: line QP.
- All three names refer to the same line.

**4. Answer: A and C**

- A plane is named either by a single capital letter (e.g., Plane M) or by exactly three non-collinear capital letters (e.g., Plane ABC).
- Option B uses lowercase letters — incorrect for naming a plane.
- Option D uses four letters — a plane needs exactly three non-collinear points.
- Correct answers: A (Plane ABC) and C (Plane M).

**5. Answer: Collinear — three or more points that lie on the same line**



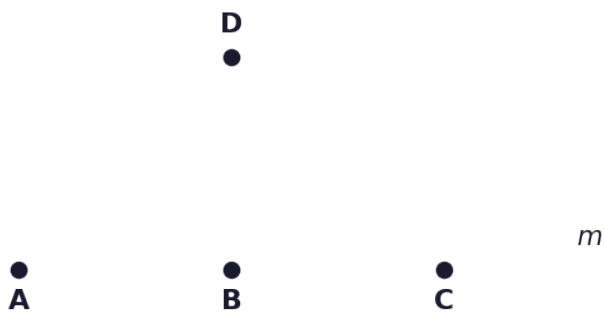
- Points that lie on the same line are called collinear points.
- Points A, B, and C all lie on line  $m$ .

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- Therefore, A, B, and C are collinear points.

**6. Answer: No — A, B, C, and D are not collinear because D does not lie on line m.**

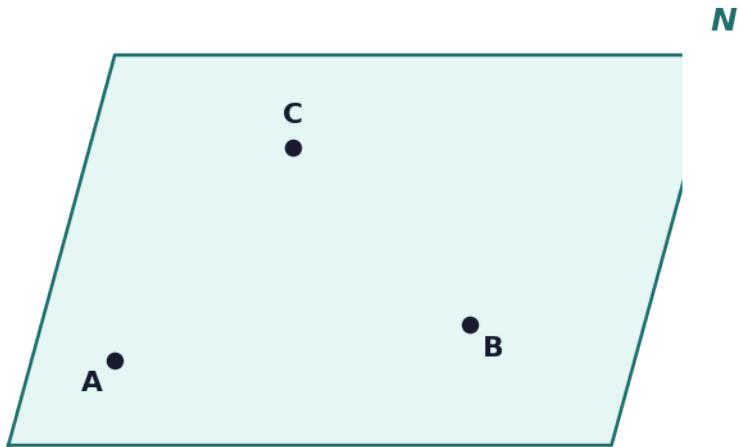


- Collinear points must ALL lie on the same single line.
- Points A, B, and C lie on line  $m$ , but point D does not.
- Since D is not on line  $m$ , the four points are NOT collinear.
- A, B, and C are collinear among themselves, but adding D breaks collinearity.

**7. Answer: Plane N or Plane ABC**

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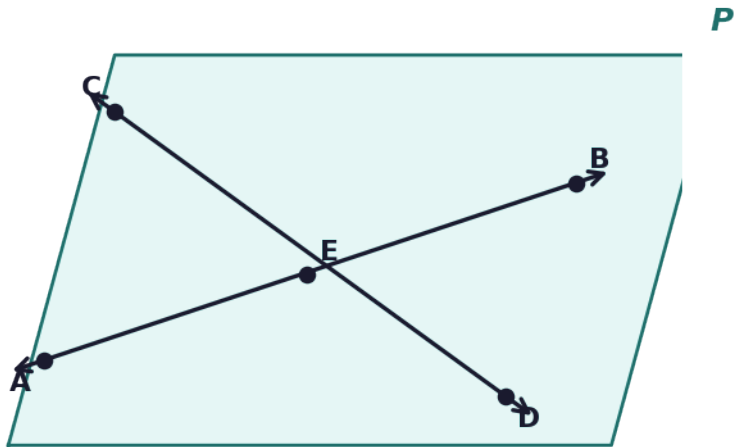




- A plane can be named by a single capital letter: Plane N.
- A plane can also be named by three non-collinear points on it: Plane ABC.
- Points A, B, and C are confirmed to be non-collinear (not on the same line).
- Both names are equally valid and refer to the same plane.

**8. Answer: (a) Line AB and Line CD (b) Point E (c) Plane P**



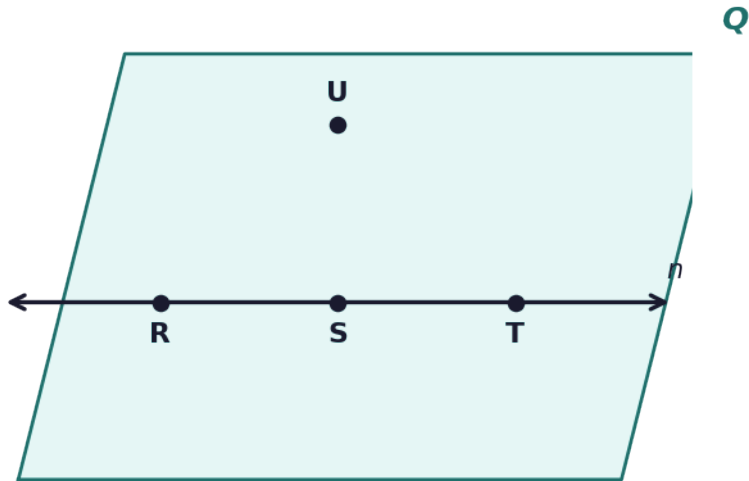


- (a) The two lines are named using two capital letters each: Line AB and Line CD.
- (b) The point where the two lines cross is Point E.
- (c) The flat surface containing both lines is Plane P.
- Two lines that intersect always meet at exactly one point.

**9. Answer: (a) TRUE (b) FALSE (c) TRUE (d) TRUE**

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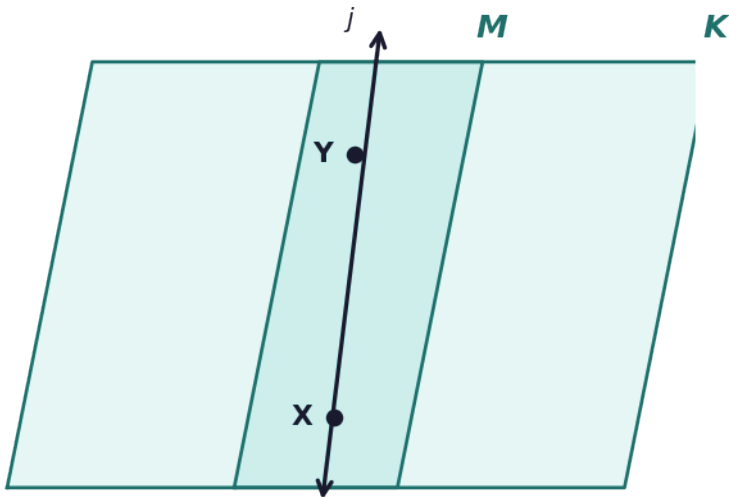


- (a) TRUE — R, S, and T all lie on line n, so they are collinear.
- (b) FALSE — Point U is above line n and does not lie on it.
- (c) TRUE — A line can be named by any two points on it, so Line RS is another valid name for line n.
- (d) TRUE — All four points lie within plane Q, so they are coplanar.

**10. Answer: Two planes intersect in a line (line j, also called Line XY). Two planes share infinitely many points along that line, so their intersection cannot be a single point.**

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- When two distinct planes meet, they share a common set of points.
- That shared set forms a straight line — in this case line j (or Line XY).
- A plane extends infinitely in length and width, so any crossing of two planes produces infinitely many shared points along one line.
- It is impossible for two planes to intersect at only a single point because a point has no dimension and cannot be the complete boundary of two infinite flat surfaces.
- Conclusion: the intersection of two planes is always a line.

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