Points, Lines, and Planes

Undefined Terms

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They are considered undefined because we can not give a definition for them without using other geometric terms. We can, at best, describe them.

Points

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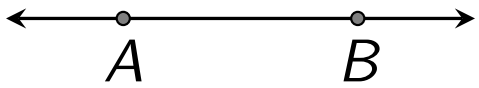

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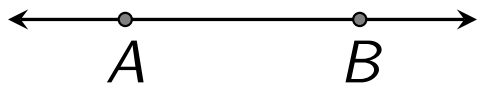
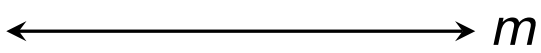


or as a single lowercase letter such as m.



Planes

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A plane contains infinitely many lines.

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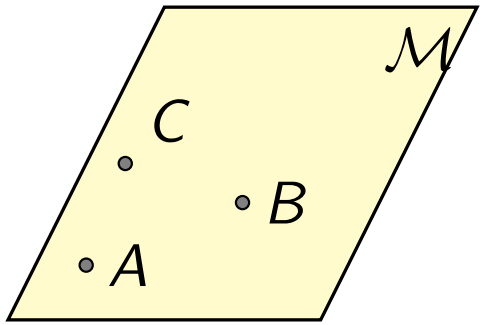
We name a plane either by using a capital scripted letter such as $\mathcal{M}$, or by at least 3 points not on the same line such as ABC.



Defined Terms Based on Undefined Terms

Now that we have the undefined terms above, we can define other geometry vocabulary in terms of them.

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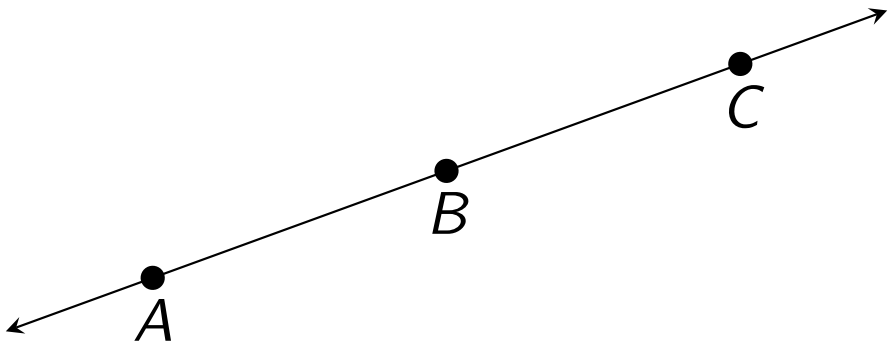
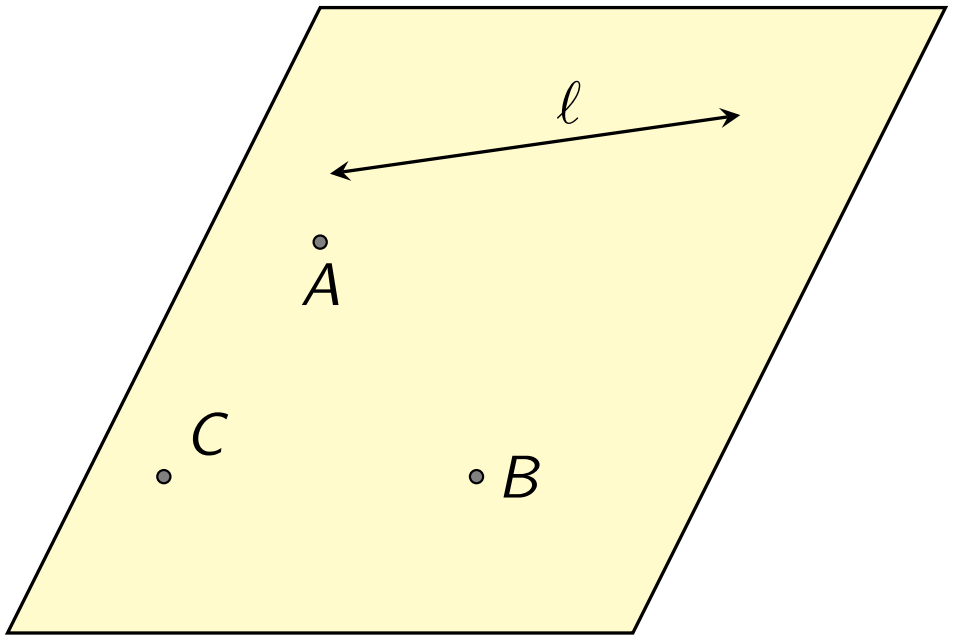


Coplanar Points

Coplanar Points

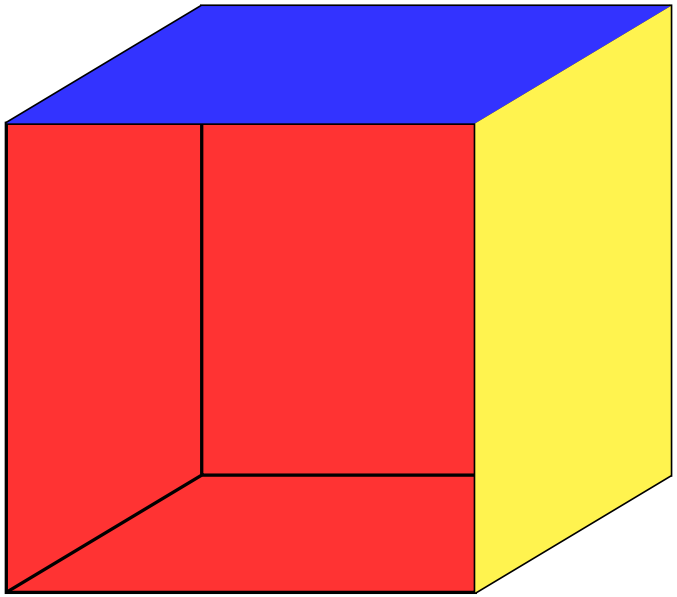
Coplanar points are points and lines that lie on the same plane.



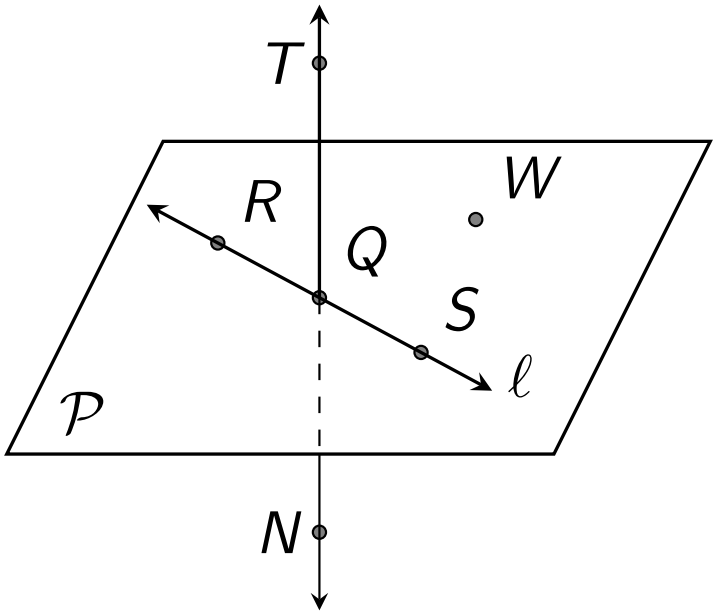
Space

Space

Space is the set of all points in 3 dimensions.

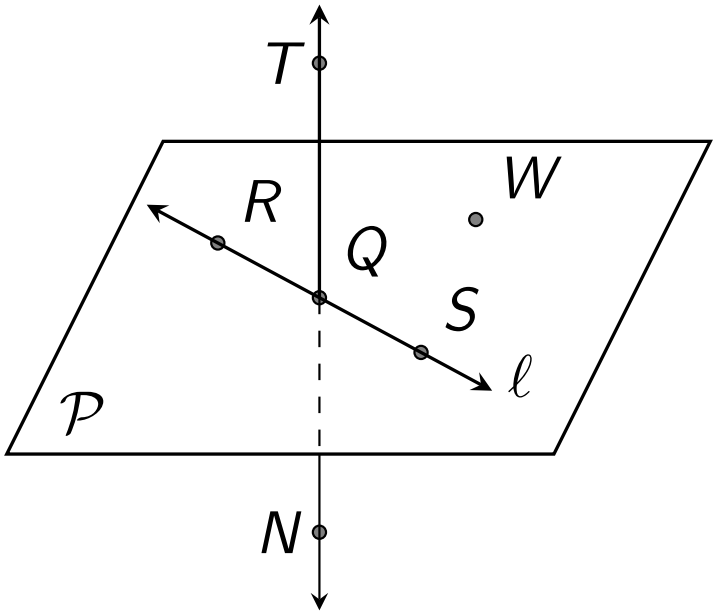


Example 1



(a) What are two other ways to name $\overleftrightarrow{QT}$?

Example 1



(a) What are two other ways to name $\overleftrightarrow{QT}$?

$\overleftrightarrow{QN}$ and $\overleftrightarrow{TN}$

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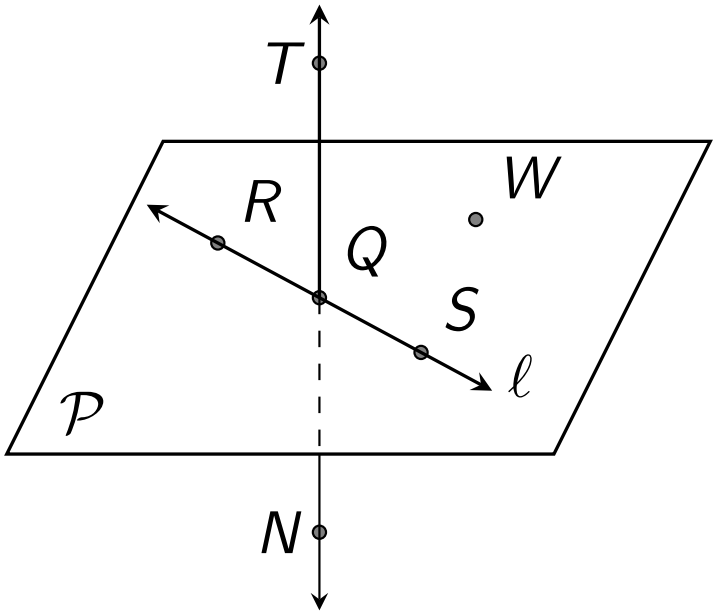

(b) What are two other ways to name $\mathcal{P}$?

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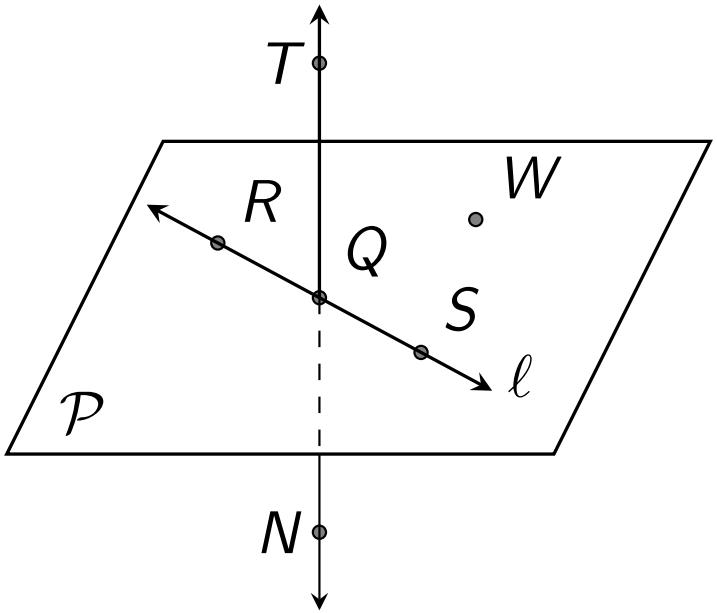
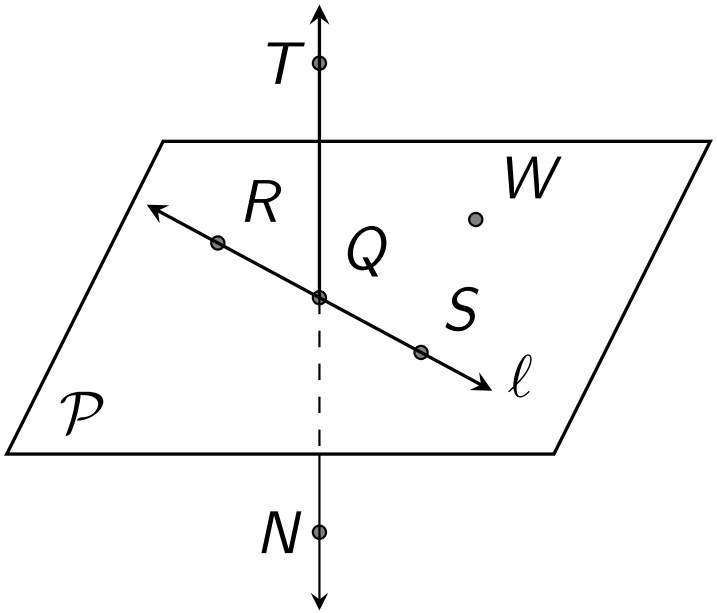


(b) What are two other ways to name $\mathcal{P}$?

plane *RQW*, plane *RSW*, and plane *QSW*

Example 1



(c) What are the names of 3 collinear points?

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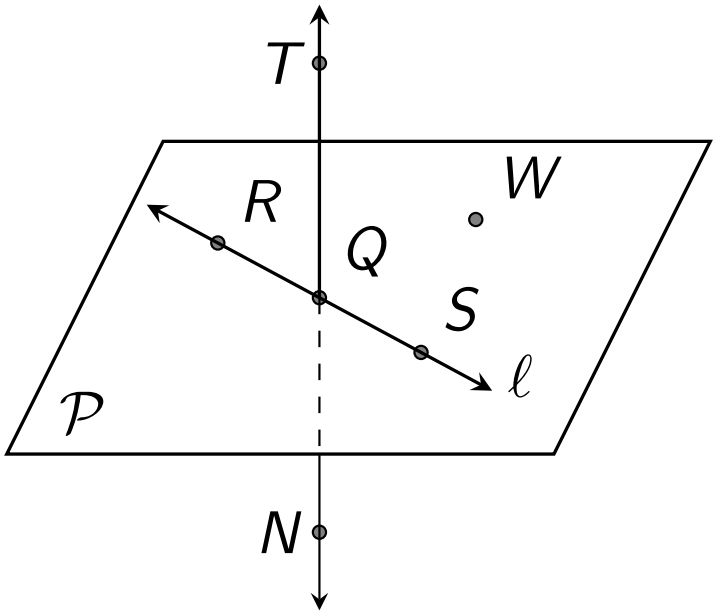

(c) What are the names of 3 collinear points?

R, Q, and S **as well as** T, Q, and N

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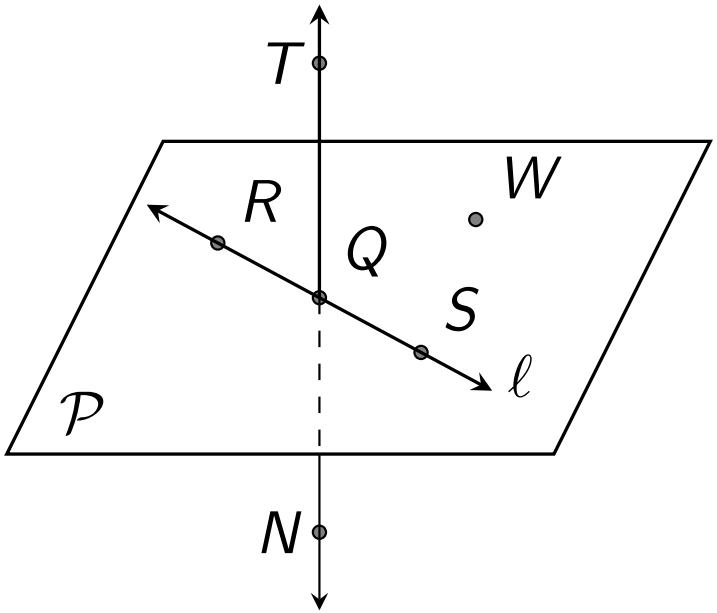

(d) What are the names of 4 coplanar points?

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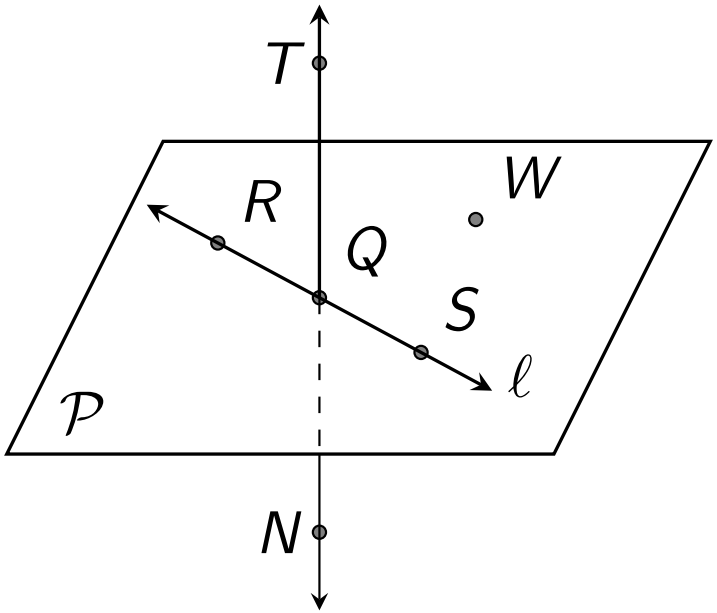

(d) What are the names of 4 coplanar points?

R, Q, S, and W

Segments

Segment

A **segment** is a part of a line that contains 2 endpoints and all points in between them.

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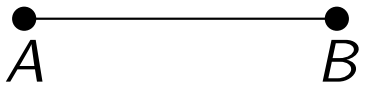
We name segments by the 2 endpoints such as $\overline{AB}$ or $\overline{BA}$.



Rays

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A **ray** is part of a line that consists of 1 endpoint and all the points on the line on one side of the endpoint.

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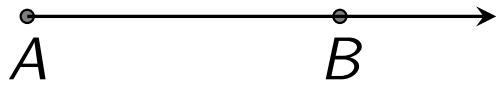
A **ray** is part of a line that consists of 1 endpoint and all the points on the line on one side of the endpoint.

We name a ray by its endpoint and any point on the ray, such as $\overrightarrow{AB}$.



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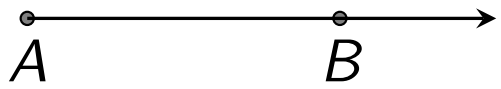

Note: $\overrightarrow{AB}$ is not the same as $\overrightarrow{BA}$

Opposite Rays

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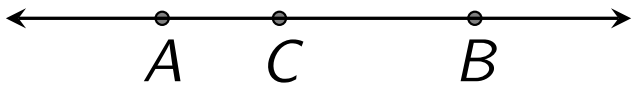
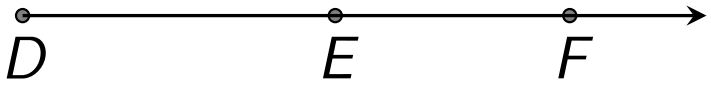
We name opposite rays by their shared endpoint and any point on each ray such as $\overrightarrow{CA}$ or $\overrightarrow{CB}$.

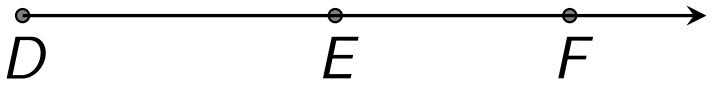


Example 2



(a) What are the names of the segments in the figure?

Example 2



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$\overline{DE}$, $\overline{ED}$, $\overline{DF}$, $\overline{FD}$, $\overline{EF}$, $\overline{FE}$

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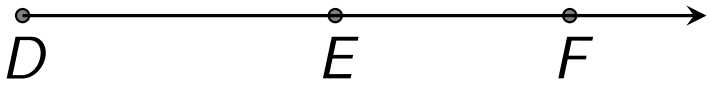

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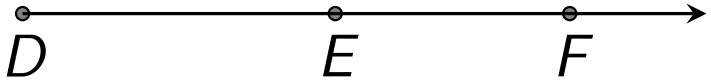

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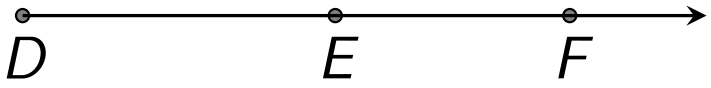

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(b) What are the names of the rays in the figure?

$\overrightarrow{DE}$, $\overrightarrow{DF}$, $\overrightarrow{EF}$

(c) What are the names of the opposite rays?

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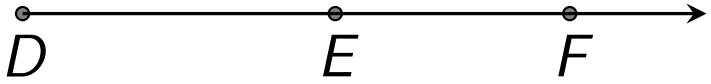

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$\overrightarrow{DE}$, $\overrightarrow{DF}$, $\overrightarrow{EF}$

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There aren't any

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Some Geometry Postulates:

- Through any two points there is a line.
- If 2 different lines intersect, they intersect at a point.
- If 2 different planes intersect, they intersect at a line.

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Some Geometry Postulates:

- Through any two points there is a line.
- If 2 different lines intersect, they intersect at a point.
- If 2 different planes intersect, they intersect at a line.
- You can draw a plane through any 3 noncollinear points.

Example 3