### Understanding Points, Lines, and Planes

A **point** has no size. It is named using a capital letter.

All the figures below contain points.

<table>
<thead>
<tr>
<th>Figure</th>
<th>Characteristics</th>
<th>Diagram</th>
<th>Words and Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>line</td>
<td>0 endpoints</td>
<td></td>
<td>line $AB$ or $\overline{AB}$</td>
</tr>
<tr>
<td></td>
<td>extends forever in two directions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>line segment or segment</td>
<td>2 endpoints</td>
<td></td>
<td>segment $XY$ or $\overline{XY}$</td>
</tr>
<tr>
<td></td>
<td>has a finite length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ray</td>
<td>1 endpoint</td>
<td></td>
<td>ray $RQ$ or $\overline{RQ}$</td>
</tr>
<tr>
<td></td>
<td>extends forever in one direction</td>
<td></td>
<td>A ray is named starting with its endpoint.</td>
</tr>
<tr>
<td>plane</td>
<td>extends forever in all directions</td>
<td></td>
<td>plane $FGH$ or plane $\gamma$</td>
</tr>
</tbody>
</table>

#### Draw and label a diagram for each figure.

1. point $W$
2. line $MN$
3. $\overline{JK}$
4. $\overline{EF}$

#### Name each figure using words and symbols.

5. 

6. 

7. Name the plane in two different ways.
8. 

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### Reteach

**Understanding Points, Lines, and Planes continued**

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>collinear</td>
<td>points that lie on the same line</td>
<td></td>
</tr>
</tbody>
</table>
| noncollinear       | points that do not lie on the same line      | $F$ and $G$ are collinear.  
                          |                                               | $F$, $G$, and $H$ are noncollinear. |
| coplanar           | points or lines that lie in the same plane   | $W$, $X$, and $Y$ are coplanar.  
                          |                                               | $W$, $X$, $Y$, and $Z$ are noncoplanar. |
| noncoplanar        | points or lines that do not lie in the same  |       |
|                    | plane                                        |       |

Figures that intersect share a common set of points. In the first model above, $FH$ intersects $FG$ at point $F$. In the second model, $XZ$ intersects plane $WXY$ at point $X$.

### Use the figure for Exercises 9–14. Name each of the following.

9. three collinear points  
10. three noncollinear points

11. four coplanar points  
12. four noncoplanar points

13. two lines that intersect $CD$  
14. the intersection of $JK$ and plane $\mathcal{R}$


**Answer Key**

**LEsson 1-1**

**Practice A**
1. point A and point C
2. point B
3. point A, point B, and point C
4. line
5. line
6. plane
7. plane
8. point T and point U
9. one
10. point U
11. 
12. PQ

**Practice B**
1. Possible answers: plane BCD; plane BED
2. BD, BC, BE, or CE
3. Possible answers: EC, BC, BE
4. Points B, C, and E
5. Possible answers: points B, C, and D or point B, E, and D
6. point B
7. BC and BE
8. points X, Y, and Z
9. point Z
10. XZ and YZ
11. XY
12. \( \overrightarrow{LM} \)
13. ray \( \overrightarrow{LM} \)
14. 

**Practice C**
1. A plane is named with three noncollinear points. H, I, and J are collinear.
2. Possible answers: plane HIK; plane HJK; plane IJK
3. \( \overrightarrow{HI}, \overrightarrow{HJ}, \overrightarrow{IJ}, \overrightarrow{IH}, \overrightarrow{JH}, \) and \( \overrightarrow{JI} \)
4. \( \overrightarrow{ST} \) and \( \overrightarrow{TS} \) are not the same figure because \( \overrightarrow{ST} \) has its endpoint at S and \( \overrightarrow{TS} \) has its endpoint at T.
5. \( \overrightarrow{ST} \) and \( \overrightarrow{TS} \) are not opposite rays because they do not have the same endpoint.
6. a line
7. point, line, plane
8. Through any three noncollinear points there is exactly one plane containing them.
9. If two planes intersect, then they intersect in exactly one line.
10. 

**Reteach**
1. •W
2. 
3. \( \overrightarrow{JK} \)
4. \( \overrightarrow{EF} \)
5. line CD or CD
6. ray ST or ST
7. plane LMN; plane Q
8. segment WX; WX
9. Possible answers: A, P, and B; C, P, and D; J, D, and K
10. Sample answer: A, P, and D
11. Sample answer: C, P, B, and D
12. Sample answer: J, D, P, and B
13. \( \overrightarrow{AB} \) and \( \overrightarrow{JK} \)
14. point D