

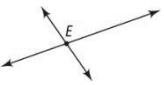
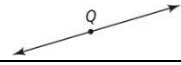
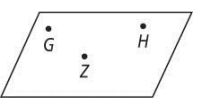
UNIT 1: TOOLS OF GEOMETRY

POINTS, LINES, & PLANES

Geometry is a mathematical system built on accepted facts, basic terms, and definitions.

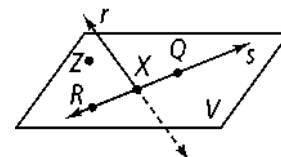
Point, line, and plane are all **undefined** terms. They are the basic ideas that are used to build all other definitions in geometry.

| | | |
|--------------|---|---|
| POINT | A point indicates a _____ and has no _____. Usually represented by a small dot. | Named by a capital letter |
| LINE | A line extends in _____ dimension. Usually represented by a straight line with two arrowheads to indicate that the line extends without end in two directions. A line contains _____ many points. | Named by two points and \leftrightarrow . |
| PLANE | A plane extends in _____ dimensions. It is a flat surface with no thickness. A plane appears to have edges, but in actuality it extends without end in every direction. | Named by a single capital letter or by three of its non-collinear points. |

| Word or Word Phrase | Definition | Picture or Example |
|----------------------|--|--|
| intersection | An <i>intersection</i> is the set of points two or more figures have in common. | Point E is the intersection of the lines.  |
| ray | A ray is part of a line that consists of one _____ and all the points of the line on one side of the endpoint. | |
| opposite rays | | Point Q is the endpoint shared by these two rays.  |
| segment | A <i>segment</i> is part of a line that consists of two endpoints and all points between them. | |
| collinear | Points that lie on the same line are <i>collinear</i> . | |
| coplanar | | Points G, H, and Z are coplanar.  |

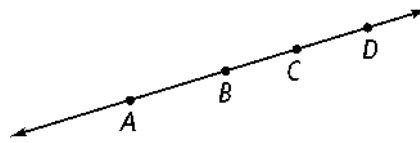
Ex .1 Using the diagram name the following:

- A plane.
- Two different lines
- Three collinear points
- Three coplanar points
- The intersection of line r and line s
- The intersection of line r and plane V



EX 2. Using the diagram name the following:

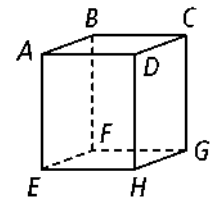
- Six segments
- The rays in the figure
- Opposite rays that contain the point C
- Another pair of opposite rays



| Postulate- | | |
|----------------------|---|--|
| Postulate 1-1 | Through any _____ points there is exactly one line. | |
| Postulate 1-2 | If two distinct lines intersect they intersect exactly at one _____. | |
| Postulate 1-3 | If two distinct planes intersect they intersect in exactly one _____. | |
| Postulate 1-4 | Through any _____ noncollinear points there is exactly one plane. | |

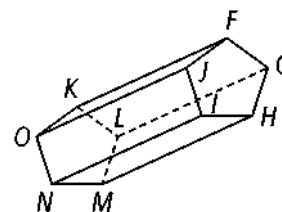
EX 3. Use the diagram to name the following:

- Name the intersection of plane DCG and plane EFG.
- Name the intersection of plane EFG and plane ADH.
- Name the intersection of plane ABG and plane CGH.
- Name two planes that intersect in the line CD.
- Name two planes that intersect in the line DH.
- Name two planes that intersect in the line FG.



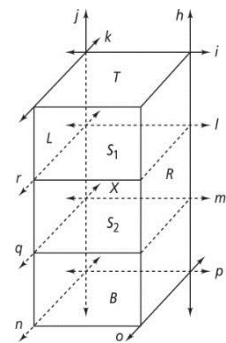
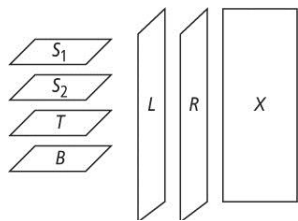
Ex. 4 Use the diagram at the right. How many planes contain each line and point.?

- \overleftrightarrow{KL} and G
- \overleftrightarrow{HM} and F
- \overleftrightarrow{NM} and M



OYO. Assembly Required

The bookshelf shown at the right comes in separate pieces, with assembly instructions. The pieces are listed below. *T* is the top piece, *B* is the base, and *S*₁ and *S*₂ are shelves. *R* is the right side, *L* is the left side, and *X* is the back piece.



Use the diagrams to answer each question.

- 1. After the bookshelf is assembled, will lines *j* and *o* intersect?
- 2. Will lines *k* and *j* intersect?

At how many points will the following lines intersect?

- 3. *j* and *q*
- 4. *m* and *p*
- 5. *h* and *o*

Name the intersection of each pair of planes. If they do not intersect, write none.

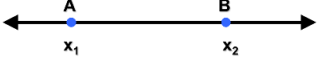

- 6. *B* and *S*₁
- 7. *B* and *L*
- 8. *B* and *R*

Name two planes that intersect in the given line.

- 9. *k*
- 10. *h*
- 11. *m*

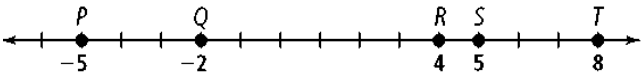
12. Draw a different bookshelf. Then draw each separate component of the bookshelf. How many planes are in your drawing? Which of these planes intersect?

Measuring Segments

| | | |
|-----------------------------------|--|---|
| Ruler Postulate | To find the distance between two points take the absolute value of the difference between the coordinates of 2 points. |  <p>The length of <i>AB</i> can be found by $x_2 - x_1$.</p> <p>**The symbol for the length of \overline{AB} is <i>AB</i>.</p> |
| Segment addition postulate | If <i>H</i> is between <i>G</i> & <i>I</i> , then <i>GH</i> + <i>HI</i> = <i>GI</i> . If <i>GH</i> + <i>HI</i> = <i>GI</i> , then <i>H</i> is between <i>G</i> & <i>I</i> . |  |

EX 1. Find the length of each segment.

- a. *PS*
- b. *QT*
- c. *PT*



EX 2. $GH = 7y + 3$, $HI = 3y - 5$, and $GI = 9y + 7$

- Find the value of y .
- Find GH , HI , and GI .



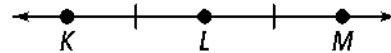
OYO 1. $GH = 3x + 8$, $HI = 2x + 6$, and $GI = 10x + 9$

- Find the value of x .
- Find GH , HI , and GI .



EX. $KL = 3x + 2$ and $LM = 5x - 10$.

- Find the value of KL .



OYO 2. $KL = 8x - 5$ and $LM = 6x + 3$

- Find the value of KM .

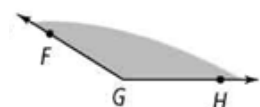
Measuring Angles

| | | |
|--------------|--|--|
| Angle | <p>Formed by two rays that share a common endpoint.</p> <ul style="list-style-type: none"> The rays are the _____ of the angle. (\overrightarrow{ZY} and \overrightarrow{ZX}) The common endpoint is the _____ of the angle. (point A) The angle has sides YZ and XZ and can be named _____, _____, _____, or _____. | |
|--------------|--|--|

| How to classify angles | | | |
|--|--|--|--|
| Acute | Right | Obtuse | Straight |
| An angle whose measure is greater than _____ ⁰ and less than _____ ⁰ | An angle whose measure is exactly _____ ⁰ | An angle whose measure is greater than _____ ⁰ and less than _____ ⁰ | An angle whose measure is exactly _____ ⁰ |
| | | | |

Name each shaded angle in three different ways.

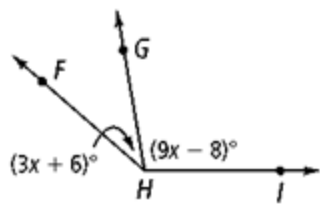
EX. 1



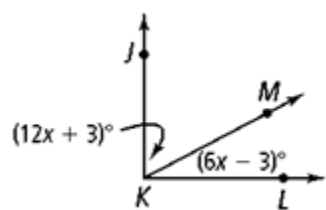
OYO 1.



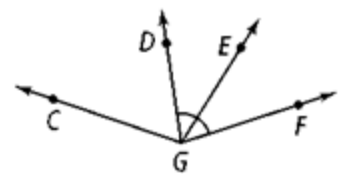
EX 5. If $m\angle FHI = 142$, what are $m\angle FHG$ and $m\angle GHI$?



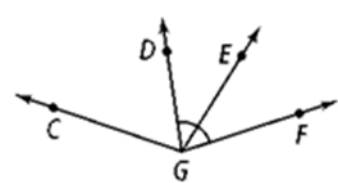
OYO 5. $\angle JKL$ is a right angle. What are $m\angle JKM$ and $m\angle MKL$?



EX 6. $m\angle CGD = 4x + 2$, $m\angle DGE = 3x - 5$, $m\angle EGF = 2x + 10$. Solve for x .

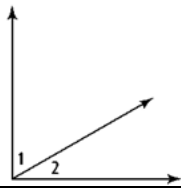
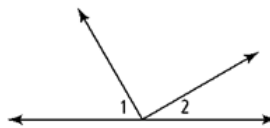
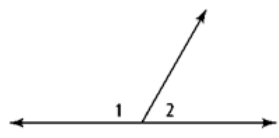
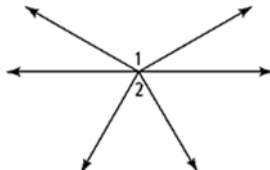


OYO 6. $m\angle CGD = 2x - 2$, $m\angle EGF = 37$, $m\angle CGF = 7x + 2$. Solve for x .



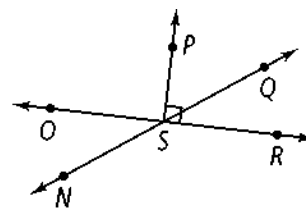
EXPLORING ANGLE PAIRS

| ANGLE PAIR RELATIONSHIPS | | | |
|--------------------------|------------|------------------|----------------------|
| NAME | DEFINITION | EXAMPLE | NON-EXAMPLE |
| Adjacent angles | | | |
| Vertical angles | | | |
| Linear Pair | | | |
| NAME | DEFINITION | ADJACENT EXAMPLE | NON-ADJACENT EXAMPLE |

| | | | |
|-----------------------------|--|--|---|
| Complementary angles | | $m\angle 1 = 60$ and $m\angle 2 = 30$  | $m\angle 1 = 60$ and $m\angle 2 = 30$  |
| Supplementary angles | | $m\angle 1 = 120$ and $m\angle 2 = 60$  | $m\angle 1 = 120$ and $m\angle 2 = 60$  |

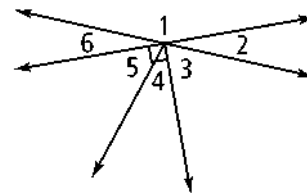
EX 1. Use the diagram at the right.

- Name two pairs of angles that form a linear pair.
- Name two pairs of angles that are complementary.
- Name two pairs of angles that are vertical.
- Name two pairs of angles that are supplementary.



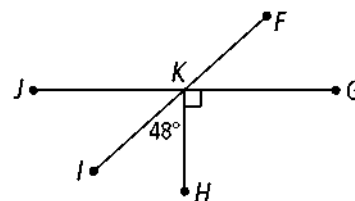
OYO 1. Use the diagram at the right. Is each statement true? Explain.

- $\angle 5$ and $\angle 4$ are supplementary angles.
- $\angle 6$ and $\angle 5$ are adjacent angles.
- $\angle 1$ and $\angle 2$ are a linear pair.
- $\angle 2$ and $\angle 5$ are a vertical angles



OYO 2. In the diagram at the right, $m\angle HKI = 48$. Find each of the following.

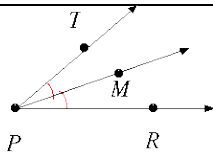
- $m\angle HKJ$
- $m\angle FKG$
- $m\angle FKJ$
- $m\angle IKJ$
- $m\angle FKH$
- $m\angle GKI$



Algebra Find the measure of each angle in the angle pair described.

EX 2. The measure of one angle is 5 times the measure of its complement.

OYO 3. The measure of an angle is 30 less than twice its supplement.

| | | |
|-----------------------|---|---|
| Angle bisector | A line, segment, or ray that _____ an angle in _____. |  |
|-----------------------|---|---|

Algebra \overrightarrow{QR} bisects $\angle PQS$. Solve for x and find $m\angle PQS$.

EX 3. $m\angle PQR = 3x$, $m\angle RQS = 4x - 9$

OYO 4. $m\angle PQR = 5x - 4$, $m\angle SQR = 3x + 10$

EX 4. $m\angle PQS = 4x - 6$, $m\angle PQR = x + 11$

OYO 5. $m\angle PQS = 16x + 2$, $m\angle SQR = 6x + 7$