

MODULE 1

Geometric Relations



What this module is about

This module is about relations of segments and angles. As you go over the exercises, you will develop your skills involving points, segments and angle pairs and solve problems on the relationships between segments and between angles. Treat the lessons with fun and take time to go back if you feel you are at loss.



What you are expected to learn

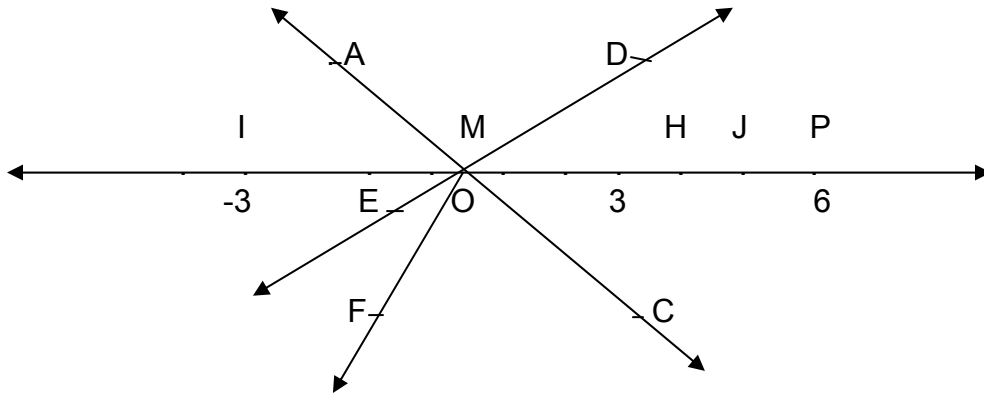
This module is designed for you to:

1. illustrate betweenness and collinearity.
2. illustrate the following:
 - congruent segments
 - midpoint of a segment
 - congruent angles
 - bisector of an angle
 - complementary angles
 - supplementary angles
 - adjacent angles
 - linear pair
 - vertical angles



How much do you know

Answer the following questions asked from the given figure:



Answer the following questions:

1. What is $|IP|$?
2. If $|IM| = |MH| = |HO|$, then what point is between the other two?
3. If M is the midpoint of \overline{AC} , what segments are congruent?
4. Name the coordinate of the midpoint of \overline{IJ}
5. $\angle EMF$ and $\angle FMC$ are ____ angles.
6. $\angle EMF$ form a linear pair with _____.
7. If $\angle EMF$ is the complement of $\angle FMC$ and on $\angle FMC = 75$, what is on $\angle EMF$?
8. If $\angle AMD \cong \angle DMC$ and are supplementary, what kind of angle is each?
9. What is the measure of each angle if the measure of the angles in a supplementary pair is twice that of the other?
10. What is the measure of each angle if the two angles are both vertical and complementary?

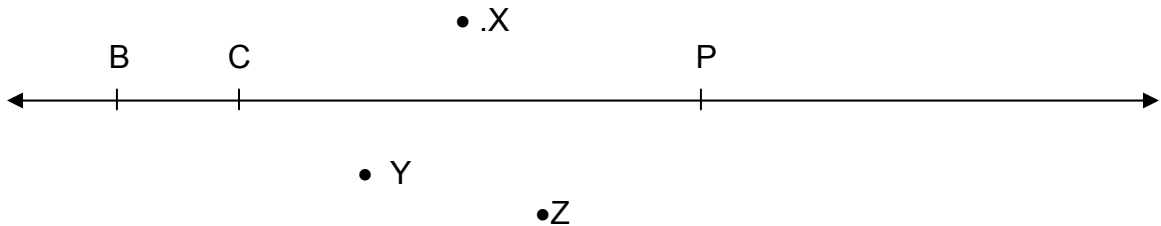


What you will do

Lesson 1

Collinearity of Points

You may ask this question, “how many points are there in a line?” “ How many points are there in a plane?” Do you know the answer? Yes, it is infinite or many points. Now you take a look at BP in the figure.



Points B, C, P are contained in \overleftrightarrow{BP}

Points X, Y, Z are not in \overleftrightarrow{BP}

Points B, X, Y are not in \overleftrightarrow{BP}

The set of points B, C, P are collinear

The set of points X, Y, Z are not collinear

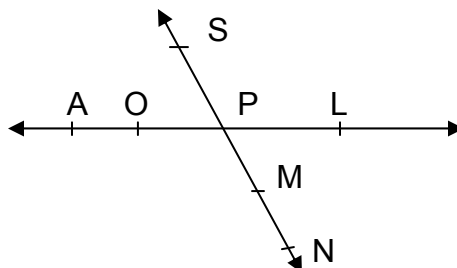
The set of points B, X, Y are not collinear

Collinear points is a set of points which are contained in a line

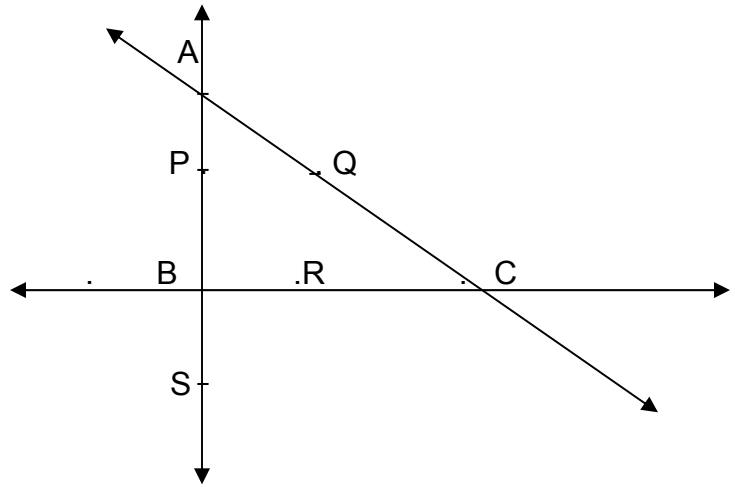
Examples:

The following set of points are collinear

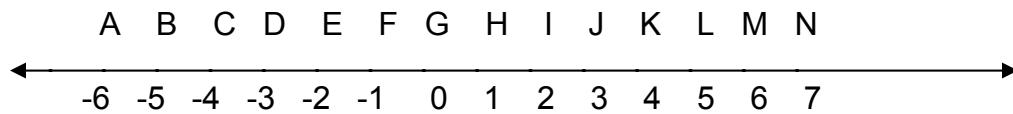
1. A, O, P, L
2. M, N, P, S



3. A, Q, C
4. A, P, B, S
5. B, R, C



Do you still remember the number line?



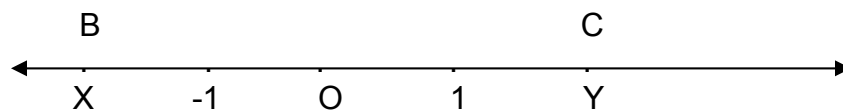
The points of a line can be placed in correspondence with the real numbers in such a way that:

1. to every point of the line there corresponds exactly one real number;
2. to every real number there corresponds exactly one point of the line;
3. the distance between any two points is the absolute value of the corresponding numbers.

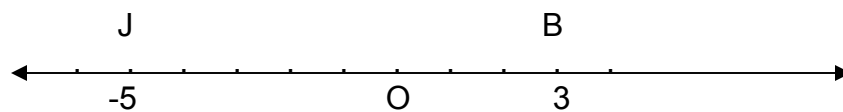
The number corresponding to a given point is called the coordinate of the point.

Examples:

1. The coordinate of M is 6, the coordinate of G is 0, the coordinate of B is -5.



2. If the coordinate of B is x and the coordinate of C is y then, $|BC| = |x - y|$ (read as distance BC equals the absolute value of x minus y).

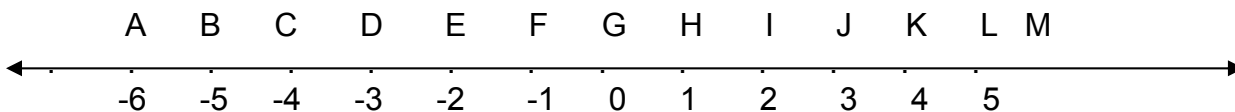
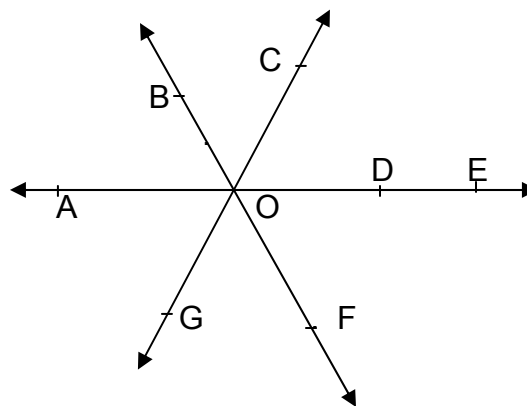


$$\begin{aligned}
 3) \text{ } |JB| &= |-5 - +3| \\
 &= |-8| \\
 &= 8
 \end{aligned}$$

Try this out

Which set of points are collinear:

1. A, O D
2. A, B, O
3. B, O, F
4. G, O, F
5. C, O G



Give the coordinate of each of the following points:

6. G
7. D
8. M
9. A
10. K

B. The coordinates of P and Q are listed. Find $|PQ|$.

$$\begin{array}{l}
 1. \text{ P: } 0 \\
 \text{ Q: } 7
 \end{array}$$

$$\begin{array}{l}
 6. \text{ P: } 7 \\
 \text{ Q: } 3
 \end{array}$$

2. P: 12
Q: 0

7. P: 19
Q: 113

3. P: 4
Q: 15

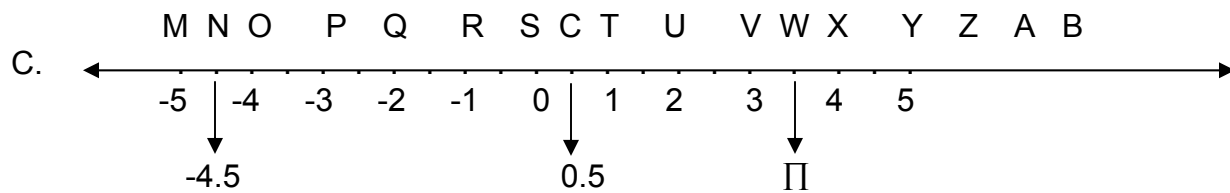
8. P: 5
Q: -5

4. P: 21
Q: 14

9. P: 56
Q: -18

5. P: 15
Q: 6

10. P: -12
Q: -51



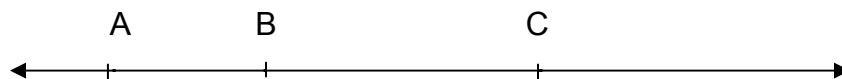
Find:

1. /PS/
2. /US/
3. /PT/
4. /NC/
5. /NT/

6. /RX/ + /PR/
7. /CR/ + /OR/
8. /PS/ + /RU/
9. /SW/ + /WY/
10. /NR/ + /RW/

Lesson 2

Betweenness

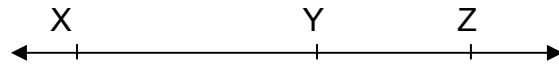


Let A, B, C be three points. B is between A and C. If A, B and C are on one line and $|AB| + |BC| = |AC|$. This definition of betweenness means that:

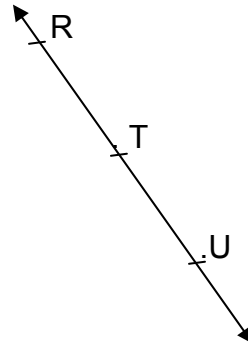
1. If B is between A and C, then A, B and C then, A, B, C are collinear and $|AB| + |BC| = |AC|$.
2. If A, B and C are collinear and $|AB| + |BC| = |AC|$ then, B is between A and C.

Examples:

1. If $x, y,$ and z are collinear and $|xy| + |yz| = |xz|$ then, Y is between X and Z .

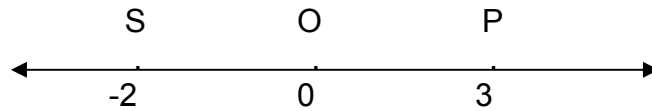


2. Given: T is between R and U
 Conclusion: R, T, U are collinear and $|RT| + |TU| = |RU|$



3. O is between S and P
 Find $|SP|$
 Solution:

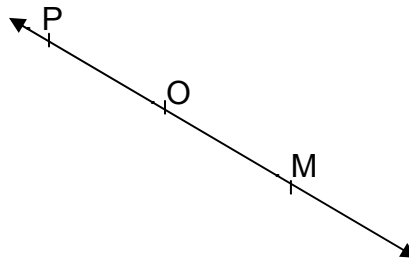
$$\begin{aligned} |SO| + |OP| &= |SP| \\ 2 + 3 &= |SP| \\ 5 &= |SP| \end{aligned}$$



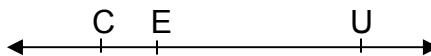
Try this out

A. Which point is between the other two?

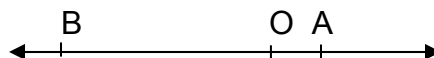
1.



2.



3.

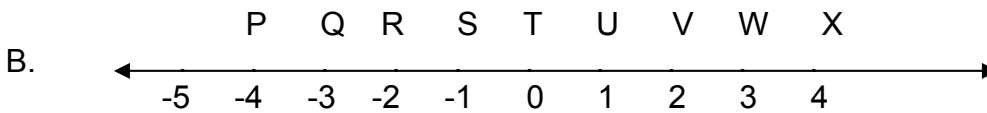


4. $A, B,$ and C are three points on a line with coordinates 8, 4, and 13 respectively.

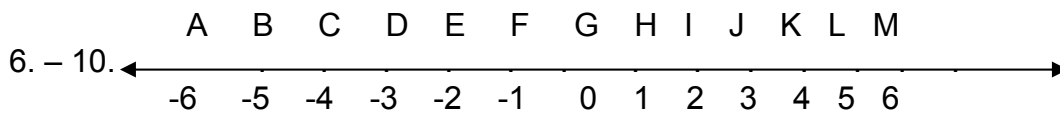
5. R, S, and T have coordinates x, y, and z respectively $x < y < z$.

From each of the following equations determine which point is between the other two.

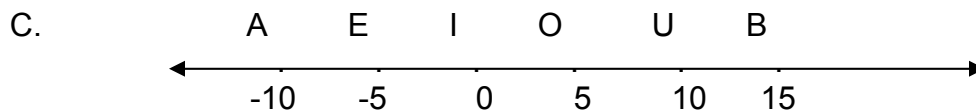
6. $|AB| + |BC| = |AC|$
7. $|PO| + |QR| = |PR|$
8. $|LM| + |LN| = |MN|$
9. $|BC| - |AB| = |AC|$
10. $|QR| - |PQ| = |RP|$



1. Is it true that $|QS| + |ST| = |QT|$?
2. Is it true that $|PS| + |ST| = |PT|$?
3. Is it true that $|PW| - |PR| = |RW|$?
4. Is it true that O is the coordinate of the midpoint of \overline{PX} ?
5. Is it true that $|XP| - |WX| = |PW|$?



6. Give the distance between points G and J.
7. Give the distance between points G and D.
8. Find the distance between G and the midpoint \overline{JL} .
9. Find the coordinate of the midpoint of \overline{DK} .
10. Find the midpoint of \overline{AM} .



Using the figure complete the statement in nos. 1 – 5.

If E is between A and B,

1. $|AB| = |AE| + \underline{\hspace{2cm}}$
2. $|AE| = |AB| - \underline{\hspace{2cm}}$
3. $|E| = |AB| - \underline{\hspace{2cm}}$
4. $|AB| = \underline{\hspace{2cm}}$
5. $|IB| = \underline{\hspace{2cm}}$
6. What is the coordinate of the midpoint of \overline{AU} ?

7. What two segments are congruent if O is the midpoint of \overline{BE} ?
8. Find a segment congruent to \overline{AO} with B as one endpoint.
9. O is the midpoint of a segment with I as one of the endpoints. Find the segments.
10. $\overline{AU} \cong$ _____.

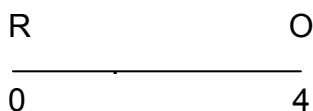
Lesson 3

Congruent Segments and Midpoint of a Segment

Segments are congruent if and only if they have equal measures.

Examples:

1. $\overline{RS} \cong \overline{XY}$



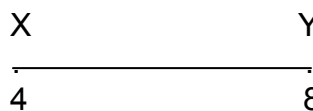
If you look at \overline{RS} and \overline{XY}

$m \overline{RS} = |0-4| = 4$

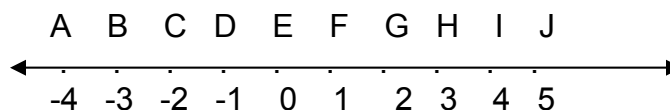
$m \overline{XY} = |4-8| = 4$

$m \overline{RS} = m \overline{XY}$

$\therefore \overline{RS} \cong \overline{XY}$



2. $\overline{AD} \cong \overline{EH}$



3. $\overline{AI} \cong \overline{BJ}$

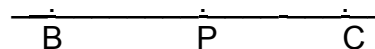
4. if $m \overline{MB} = 25$ cm. and $m \overline{ST} = 25$ cm then $\overline{MB} \cong \overline{ST}$

5. $\overline{RM} = \overline{MB} = 6$ then, $\overline{RM} \cong \overline{MB}$

Midpoint – is a midpoint of the segment which divides the segment into two congruent parts.

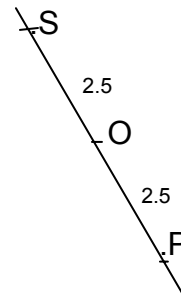
Examples:

1. P is the midpoint of \overline{BC}



if and only if $\overline{BP} \cong \overline{PC}$.

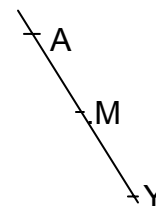
2. O is the midpoint of SP



3. M is between D and E
such that $\overline{MD} \cong \overline{ME}$, then
M is called the midpoint of DE

More about midpoint

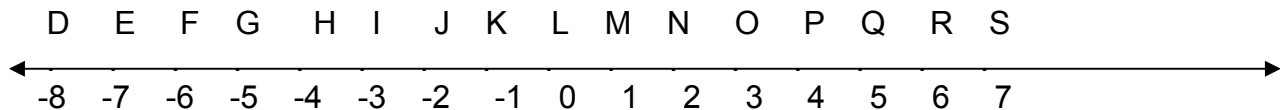
A segment has exactly one midpoint
If M is also midpoint of AY then
 $2 \overline{AM} = \overline{AY}$ $2 \overline{MY} = \overline{AY}$
 $\overline{AM} = \frac{1}{2} \overline{AY}$ $\overline{MY} = \frac{1}{2} \overline{AY}$



Any line that passes through the midpoint of a segment is called a bisector of the segment.

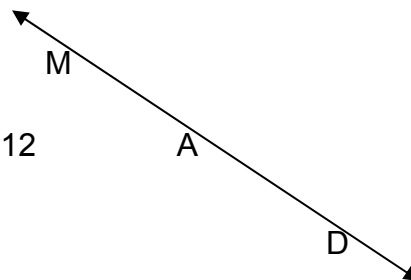
Try this out

A.



1. What is the distance between D and G?
2. What is $m \overline{LO}$?
3. What can you conclude about \overline{DG} and \overline{LO} ?
4. What two points are at a distance 3 from L?
5. What can you say about \overline{LO} and \overline{LI} ?

Given: \overleftrightarrow{MD} with point A
between points M and D
such that $\overline{MA} = \frac{1}{2} \overline{MD}$ and $\overline{MD} = 12$



6. What is \overline{MA} ?
7. What is \overline{AD} ?
8. Is $\overline{MA} = \overline{AD}$?

9. Is $\overline{MA} \cong \overline{AD}$?
10. Is A the midpoint of MD?

Given \overline{ME} , \overline{SO} , \overline{PA} , and \overline{RU} with their respective measures

M 5 cm E

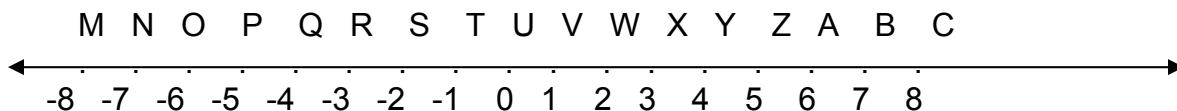
S 10 cm O

P 10 cm A

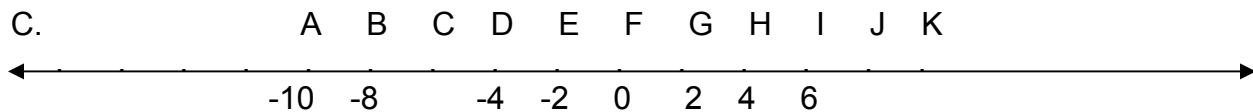
R 12 cm U

Write $<$, $>$ or $=$ to compare the measures of the line segments.

1. \overline{ME} _____ \overline{SO}
2. \overline{SO} _____ \overline{PA}
3. \overline{PA} _____ \overline{RU}
4. \overline{RU} _____ \overline{PA}
5. \overline{RU} _____ \overline{ME}



6. How far is it from M to P?
7. How far is it from C to Z?
8. Find \overline{RZ}
9. Find \overline{CU}
10. Give two pairs of congruent segments.



1. $\overline{AD} =$ _____
2. $m\overline{AD}$ _____ $m\overline{DG}$
3. \overline{AD} _____ \overline{DG}
4. If D is between A and G, $\overline{AD} + \overline{DG} =$ _____.
5. D is the midpoint of _____.
6. If G is the midpoint of EI then _____ \cong _____.
7. If $\overline{AD} \cong \overline{DG}$ then _____ is the midpoint of \overline{AG}
8. Suppose point B is on \overline{AC} and B is not a midpoint of \overline{AC} , then $\overline{AB} + \overline{BC} =$ _____.

Given: Point M is the midpoint of \overline{JK} and $\overline{JM} = 5$. Complete the following:

9. $\overline{MK} =$ _____
10. $\overline{JK} =$ _____ and $\overline{JM} \cong$ _____.

Lesson 4

Congruent Angles and Angle Bisector

Congruent Angles are two angles with equal measure

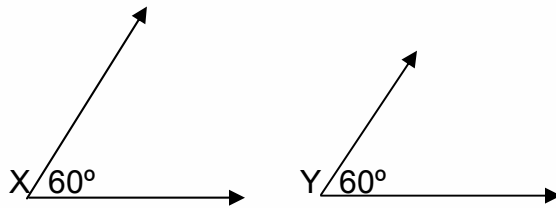
Angle bisector is a ray from the vertex of an angle to a point in its interior which divides the angle into two congruent parts.

Examples:

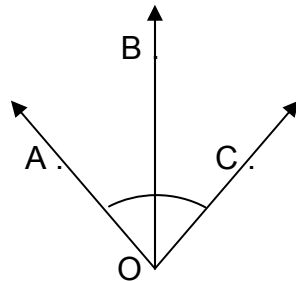
1. $m \angle AOF = 15$
 $m \angle EOG = 15$
 $m \angle AOF = m \angle EOG$
 $\therefore \angle AOF \cong \angle EOG$

2. $m \angle 1 = 45$
 $m \angle 2 = 45$
 $m \angle 1 = m \angle 2$
 $\therefore \angle 1 \cong \angle 2$

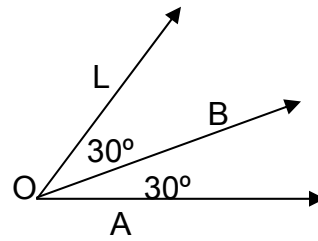
3. $\angle X \cong \angle Y$



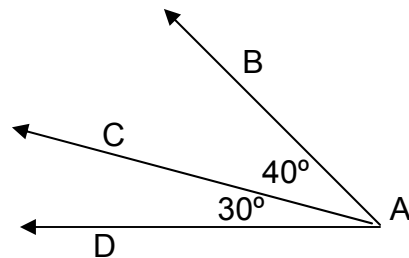
4. \overrightarrow{OB} is an angle bisector



5. \vec{OB} is an angle bisector of $\angle LOA$

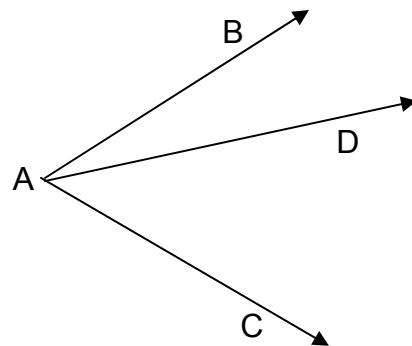


6. \vec{AC} is not an angle bisector



You can also state the definition of angle bisector this way:

If D is in the interior of $\angle BAC$ and $\angle BAD \cong \angle DAC$, then AD bisects $\angle BAC$ and AD is called the bisector of $\angle BAC$

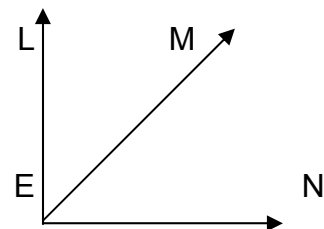


Try this out

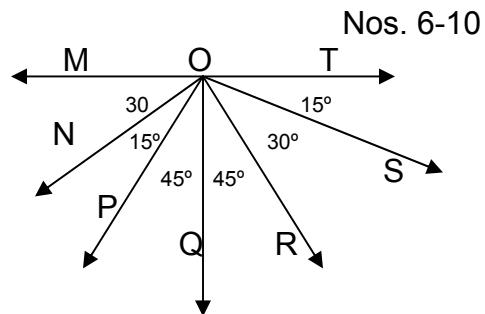
A. Complete the following statements:

1. Two angles are said to be congruent if the angles have _____ measures.
2. When two angles have equal measures, the angles are _____
3. If $m\angle 3 = 57$ and $\angle 4 = 57$ then $\angle 3$ and $\angle 4$ are _____ angles.
4. A ray from the vertex to the interior of the angle which bisects an angle is called _____.
5. If $\angle LEM \cong \angle MEN$ then _____ is the angle bisector of $\angle LEN$

6. $\angle MON \cong$ _____
7. $\angle SOT \cong$ _____

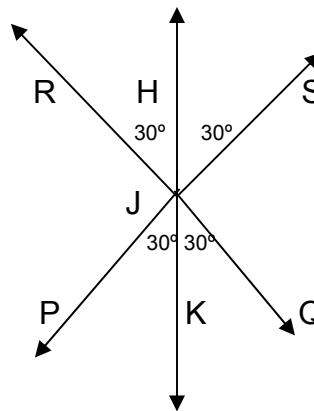


8. $\angle POQ \cong$ _____
9. $\angle MDQ \cong$ _____
10. _____ is the angle bisector of $\angle POR$.

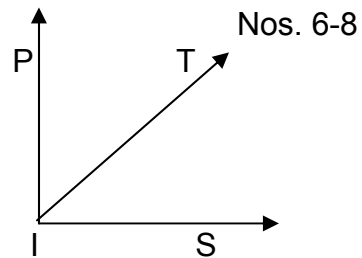


B.

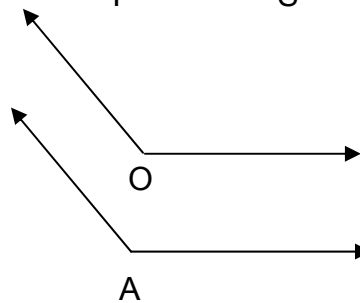
1. Name two congruent angles with \overline{JK} as a common side.
2. Give another pair of congruent angles each measuring 30° .
3. What do you call \overline{JH} ?
4. \overline{JK} is _____ of angle $\angle PJQ$.
5. $\angle RJS$ _____ $\angle PJQ$



6. If \overline{IT} is the angle bisector name two congruent angles.
7. If $m\angle PIS = 90$ and \overline{IT} is a bisector what is $m\angle SIT$?
8. If \overline{IT} is a bisector of $\angle PIS$ and $m\angle PIT = 33$, what is $m\angle SIP$?



9. If $m\angle O = 120$ what is $m\angle A$ if $\angle O \cong \angle A$?
10. If $\angle O$ is bisected what is the measure of each part?

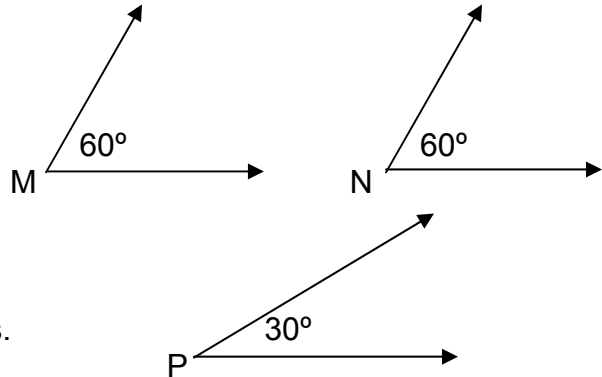


Lesson 5

Complementary and Supplementary Angles

The sum of the measures of complementary angles and two angles is equal to 90.

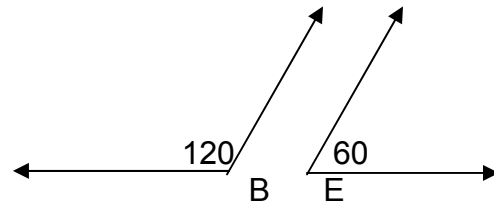
Here you can see $\angle M$ is the complement of $\angle P$.
 $\angle M$ is the complement of $\angle P$.



$m\angle M + m\angle P = 90$
 $\angle M$ and $\angle P$ are complementary angles.

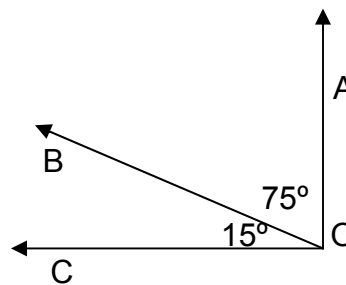
The sum of the measures of supplementary angles are two angles is equal to 180.

Each of two supplementary angles is called a supplement of the other angle. You can see that $\angle B$ is the supplement of $\angle E$.
 $m\angle B + m\angle E = 180$
 $\angle B$ and $\angle E$ are supplementary angles.

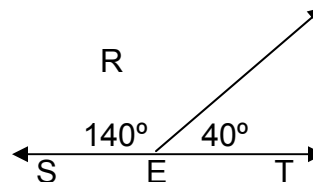


Examples:

- $15^\circ + 75^\circ = 90^\circ$
 $\angle AOB$ and $\angle BOC$ are complementary angles.



- $140^\circ + 40^\circ = 180^\circ$
 $\angle SER$ and $\angle TER$ are supplementary angles



- Given $m\angle LI = 70^\circ$, find its complement.
 Since the sum of the measures of complementary angles is equal to 90, subtract the given angle from 90 to get the complement.

Solution: $90 - m\angle I = \text{complement}$
 $90 - 70 = 20$

4. $\angle X$ and $\angle Y$ are supplementary. Find $m\angle Y$ if $m\angle X = 100$.

Solution: $m\angle X + m\angle Y = 180$

$$100 + m\angle Y = 180$$

$$m\angle Y = 180 - 100$$

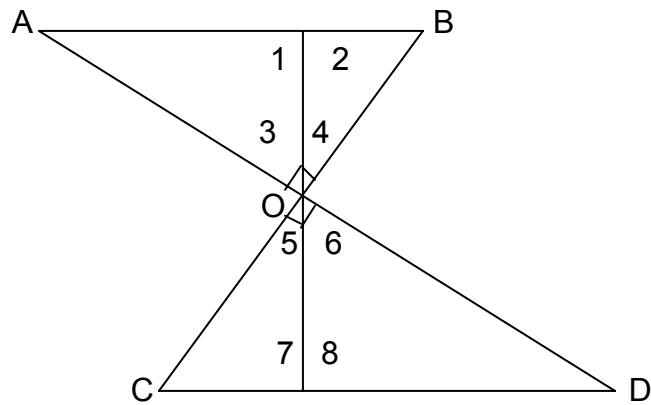
$$m\angle Y = 80$$

Try this out

- A. In the given figure, $\angle AOB$ and $\angle DOC$ are right angles

- 1 - 2. Name all pairs of complementary angles

- 3 - 4. Name all pairs of supplementary angles



What is the complement of each of the angles whose measures are given:

- | | |
|---------------|------------------|
| 5. 12° | 8. 67° |
| 6. 39° | 9. 79° |
| 7. 41° | 10. 84.5° |

- B. What is the supplement of each of the angles whose measures are:

1. 11°
2. 44°
3. 121°
4. 152.5°
5. 78.6°
6. $\angle A$ and $\angle B$ are complementary. If $\angle A = 78^\circ$ then, $\angle B =$ _____.
7. $\angle C$ and $\angle D$ are supplementary. If $\angle C = 110.5^\circ$ then, $\angle D =$ _____.
8. An angle has a measure x . Find the measure of its complement.
9. An angle has a measure $2x$. Find the measure of its supplement.
10. Two supplementary angles have measure of $2x - 15$ and $x + 30$.

- C. Find the measure of each angle.

1. If $\angle X$ and $\angle Y$ are supplementary then, $m\angle X + m\angle Y =$ _____.
2. If the $m\angle O + m\angle P = 90$ then, $\angle O$ and $\angle P$ are _____.

3. What is the complement of $\angle K$ whose measure is m ?
4. Find the supplement of an angle whose measure is a .
5. If two congruent angles are complementary then, each angle has a measure of ____.
6. If two angle are complementary then, each is a ____ of the other.
- 7-8. The measure of an angle is 15 greater than twice the measure of its complement.

Find the measure of each angle:

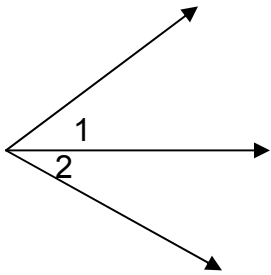
- 9-10. The measure of an angle is 20 less than three times the measure of its supplement.
Find the measure of each angle.

Lesson 6

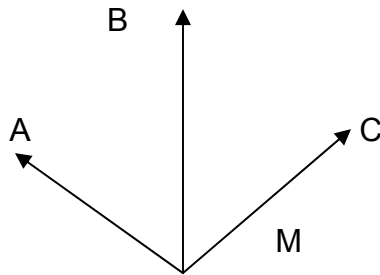
Adjacent Angles, Linear Pair, Vertical Angles

Adjacent angles are two angles which have a common side and a common vertex but no interior points common.

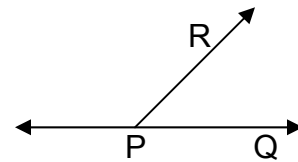
Examples:



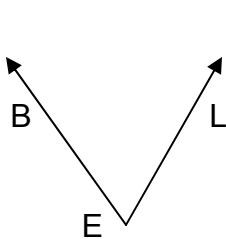
$\angle 1$ and $\angle 2$ are adjacent $\angle S$



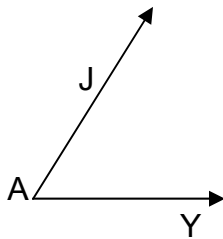
$\angle AOB$ and $\angle BOC$ are adjacent $\angle S$



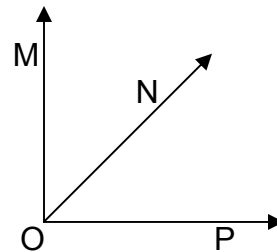
$\angle MPR$ and $\angle RPQ$ are adjacent $\angle S$



$\angle BEL$ and $\angle L$ are not adjacent angles

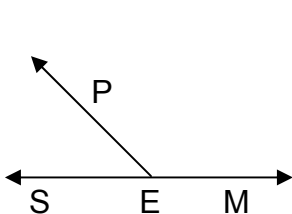


$\angle MOP$ and $\angle MON$ are not adjacent angles

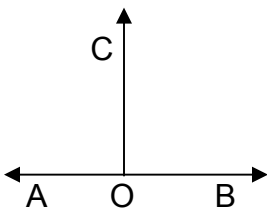


A linear pair are two adjacent angles whose non common sides are opposite rays.

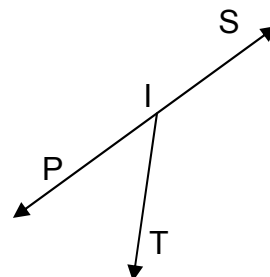
Examples:



$\angle SEP$ and $\angle PEM$
form a linear pair



$\angle COA$ and $\angle BOC$
form a linear pair

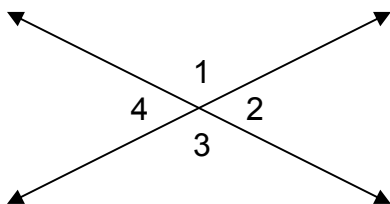


$\angle PIT$ and $\angle SIT$
form a linear pair

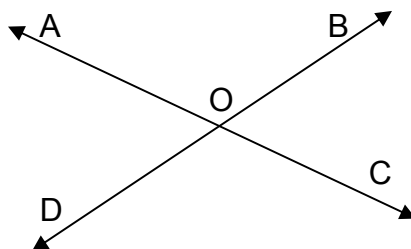
If you try to measure each angle forming a linear pair, you will find out that the sum of their measures is 180. So angles forming a linear pair are supplementary.

Vertical Angles are two nonadjacent angles formed by two intersecting lines:

Examples:



$\angle 1$ and $\angle 3$ are vertical angles
 $\angle 2$ and $\angle 4$ are vertical angles



$\angle AOB$ and $\angle DOC$ are vertical angles
 $\angle BOC$ and $\angle AOD$ are vertical angles

Use your protractor to measure each angle in the figure

Find:

$m\angle 1 =$ _____

$m\angle 2 =$ _____

$m\angle 3 =$ _____

$m\angle 4 =$ _____

$m\angle AOB =$ _____

$m\angle BOC =$ _____

$m\angle DOC =$ _____

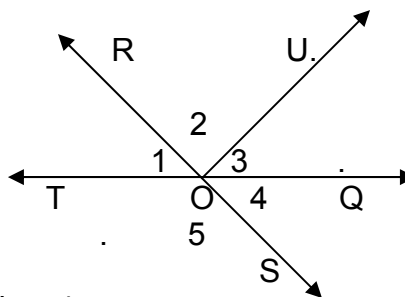
$m\angle AOD =$ _____

Have you found out that they have the same measure?
Therefore, vertical angles are congruent.

Try this out

A.

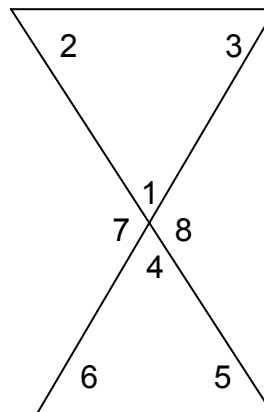
1 – 2 Name 2 angles adjacent to $\angle 1$



3. Name an angle which form a linear pair with $\angle 4$.
- 4 – 5. Name two pairs of vertical angles
6. Are $\angle 1$ and $\angle 5$ adjacent?
7. Are $\angle 4$ and $\angle 5$ adjacent?
8. What pair of $\angle S$ are $\angle 3$ and $\angle 4$?
9. Are $\angle 1$ and $\angle 3$ vertical angles?
10. $\angle SOU$ form a linear pair with \angle _____.

B. Answer with Yes or No.

1. Are $\angle 3$ and $\angle 6$ vertical angles?
2. Are $\angle 2$ and $\angle 3$ adjacent angles?
3. Are $\angle 1$ and $\angle 8$ vertical angles?
4. Are $\angle 7$ and $\angle 8$ linear pair?
5. Are $\angle 4$ and $\angle 8$ linear pair?
6. Are $\angle 1$ and $\angle 8$ adjacent?
7. Are $\angle 1$ and $\angle 7$ linear adjacent?
8. Are $\angle 1$ and $\angle 7$ linear pair?
9. Are $\angle 5$ and $\angle 6$ adjacent?
10. Are $\angle 1$ and $\angle 4$ vertical angles?



C. True or False

1. Complementary angles are always adjacent.
2. Supplementary angles are sometimes adjacent.
3. The angles of a linear pair are always adjacent.
4. Vertical angles are sometimes adjacent.
5. If two angles are vertical then, they are either both acute or both obtuse.
6. Two adjacent right angles are supplementary.
7. Two vertical angles are always congruent.
8. If two angles form a linear pair, they are supplementary.
9. If one of the angles in a linear pair is 90, then the other angle has a measure greater than 90.
10. If two adjacent angles are congruent and complementary, the measure of each angle is 90.



Let's Summarize

Collinear points is a set of points which are contained in a line. The points of a line can be placed in correspondence with the real numbers in such a way that:

- to every point of the line there corresponds exactly one real number;
- to every real number there corresponds exactly one point of the line;
- the distance between any two points is the absolute value of the difference of the corresponding numbers.

The number corresponding to a given point is called the coordinate of the point.

Let A, B, C be three points. If A, B, C are on one line and B is between A and C then, $|AB| + |BC| = |AC|$

Congruent segments are segments with equal measure.

Midpoint is a point of a segment which divides the segment into 2 congruent parts.

Congruent angles are angles with equal measure.

Angle bisector is a ray from the vertex of an angle to a point in its interior which divides the angle into two congruent parts.

Complementary angles are two angles whose measures have the sum equal to 90.

Supplementary angles are two angles whose measures have the sum equal to 180.

Adjacent angles are two angles which have a common side and a common vertex but no interior points in common.

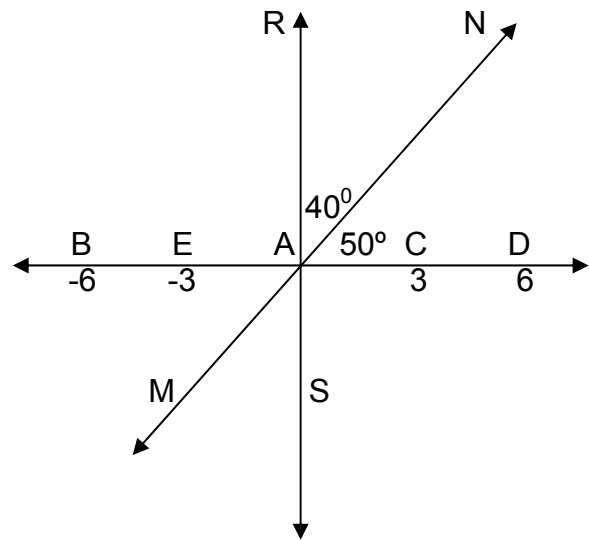
Linear Pair are two adjacent angles whose noncommon sides are opposite rays.

Vertical angles are two nonadjacent angles formed between two intersecting lines.



What have you learned

1. What is $\angle BD$?
2. If $\overline{RA} \cong \overline{SA}$ what do you call point A?
3. Name a supplement of $\angle NAS$.
4. What angle pair is illustrated by $\angle RAN$ and $\angle NAS$?
5. If $\angle BAM \cong \angle SAM$ what do you call \overline{AM} ?
6. $\angle RAN$ is vertical to \angle _____.
7. The measure of $\angle SAM =$ _____.
- 8.- 9. If the measure of an angle is twice the measure of its complement, what is the measure of each angle?
10. The measure of $\angle B$ is 9 more than twice the measure of $\angle C$. If $\angle B$ and $\angle C$ are supplementary angles, what is the measure of $\angle B$?





Answer Key

How much do you know

- 9
- \overline{M} is between and H
- $\overline{AM} \cong \overline{MC}$
- I
- adjacent
- $\angle FMD$
- 15
- right
- $60^\circ, 120^\circ$
- 45° Try this out

Try this out

Lesson 1

- A.
- collinear
 - not collinear
 - collinear
 - not collinear
 - collinear
 - 0
 - 3
 - 6
 - 6
 - 4
- B.
- 7
 - 12
 - 11
 - 7
 - 9
 - 4
 - 94
 - 10
 - 74
 - 39
- C.
- 3
 - 2
 - 4
 - 5
 - 5.5
 - 7
 - 4.5
 - 6
 - 5
 - 7.64

Lesson 2

- A.
- O is between P and M
 - E is between C and U
 - O is between B and A
 - A is between B and C
 - S is between R and T
 - B is between A and C
 - Q is between P and R
 - L is between M and N
 - A is between B and C
 - P is between R and Q
- B.
- Yes
 - Yes
 - Yes
 - Yes
 - 3
 - 3
 - 4
 - 0.5

5. Yes
 C. 1. \overline{EB}
 2. \overline{EB}
 3. \overline{AE}
 4. 25
 5. 15

10. G
 6. O
 7. $\overline{EO} \cong \overline{OB}$
 8. \overline{IB}
 9. \overline{IU}
 10. \overline{BE}

Lesson 3

- A. 1. 3
 2. 3
 3. $\overline{DG} \cong \overline{LO}$
 4. \overline{O} and \overline{I}
 5. $\overline{LO} \cong \overline{U}$

6. 6
 7. 6
 8. Yes
 9. Yes
 10. Yes

- B. 1. $<$
 2. $=$
 3. $<$
 4. $>$
 5. $>$

6. 3
 7. 3
 8. 8
 9. 8
 10. $\overline{MD} \cong \overline{CZ}$ and $\overline{RZ} \cong \overline{CU}$ (answers may vary)

- C. 1. 6
 2. $=$
 3. \cong
 4. 12
 5. \overline{AG} (answers may vary)

6. $\overline{EG} \cong \overline{GI}$
 7. D
 8. \overline{AC}
 9. 5
 10. 10, \overline{MK}

Lesson 4

- A. 1. equal or the same
 2. congruent
 3. congruent
 4. angle bisector
 5. \overline{EM}

6. $\angle SOR$
 7. $\angle NOP$
 8. $\angle QOR$
 9. $\angle TOQ$
 10. \overline{OQ}

- B. 1. $\angle PJK$ and $\angle QJK$
 2. $\angle RJH$ and $\angle HJS$
 3. angle bisector
 4. angle bisector
 5. \cong

6. $\angle PIT \cong \angle SIT$
 7. 45
 8. 66
 9. 120
 10. 60

Lesson 5

- A. 1. $\angle 3$ and $\angle 4$

6. 51°

2. $\angle 5$ and $\angle 6$
3. $\angle 1$ and $\angle 2$
4. $\angle 7$ and $\angle 8$
5. 78

7. 49°
8. 23°
9. 11°
10. 5.5°

- B.
1. 169°
 2. 136°
 3. 59°
 4. 27.5°
 5. 101°

6. 12°
7. 69.5°
8. $90 - x$
9. $180 - 2x$
10. 95, 85

- C.
1. 180
 2. complementary
 3. $90 - m$
 4. $180 - a$
 5. 45°

6. complement
7. 65
8. 25
9. 130
10. 50

Lesson 6

- A.
1. $\angle 2$
 2. $\angle 5$
 3. $\angle 5$ and $\angle ROQ$
 4. $\angle 1$ and $\angle 4$
 5. $\angle SOT$ and $\angle ROQ$

6. Yes
7. Yes
8. adjacent
9. No
10. $\angle ROU$

- B.
1. No
 2. No
 3. No
 4. Yes
 5. Yes

6. Yes
7. Yes
8. Yes
9. No
10. Yes

- C.
1. False
 2. True
 3. True
 4. False
 5. False

6. True
7. True
8. True
9. False
10. False

What have you learned

1. 12
2. Midpoint
3. $\angle RAN$
4. Linear pair
5. Angle bisector

6. $\angle SAM$
7. 40°
8. 60°
9. 30°
10. 123°