

CHAPTER 1 – ESSENTIALS OF GEOMETRY



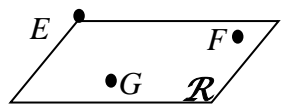
In this chapter we address three **Big IDEAS**:

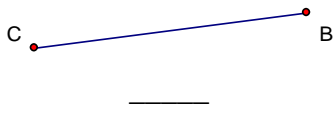
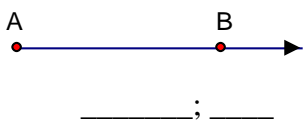
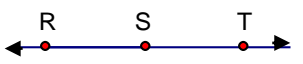
- 1) Describing geometric figures
- 2) Measuring geometric figures
- 3) Understanding equality and congruence

Section:	1 – 1 Identify Points, Lines, and Planes
Essential Question	

Warm Up:

Key Vocab:

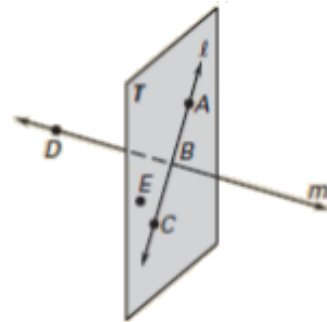
Undefined Terms		
A basic figure that is not defined in terms of _____.		
Point	An undefined term in geometry Has _____ dimension – _____ _____ _____	
Line	An undefined term in geometry Has _____ dimension – _____ _____ _____	 _____; _____; _____
Plane	An undefined term in geometry Has _____ dimensions – _____ _____ _____	 _____ or _____

Defined Terms	
Terms that can be described using other figures such as _____ or _____	
Collinear Points	Points that lie on the _____.
Coplanar Points	Points that lie in the _____.
Line Segment	 _____
Ray	 _____ ; _____
Opposite Rays	 \overrightarrow{SR} and \overrightarrow{ST} are _____ S is the _____.
Intersection	

Show:

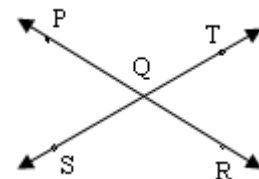
Ex 1:

- Give two other names for \overline{BD} .
- Give another name for plane T .
- Name three points that are collinear.
- Name four points that are coplanar.



Ex 2:

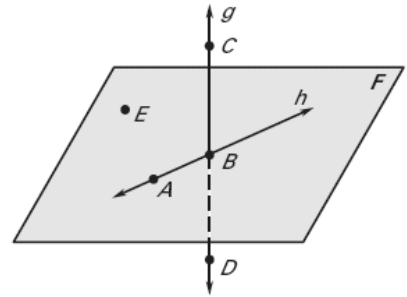
- Give another name for \overline{PR} .
- Name all rays with endpoint Q . Which of these rays are opposite rays?



LESSON 1.1
Practice A

In Exercises 1–8, use the diagram.

1. Give two other names for \overleftrightarrow{AB} .
2. Name three points that are collinear.
3. Give another name for plane F .
4. Name a point that is not coplanar with A , B , and C .
5. Give another name for \overline{CD} .
6. Name three rays with endpoint B .
7. Name a pair of opposite rays.
8. Give another name for \overrightarrow{CD} .



Sketch the figure described.

9. Three points that are collinear
10. Four points that are coplanar
11. Three lines that intersect at one point
12. A line and a plane that intersect at one point

In Exercises 13–20, use the diagram.

13. Are points J , K , and L collinear?

14. Are points J , K , and L coplanar?

15. Are points J , K , and M collinear?

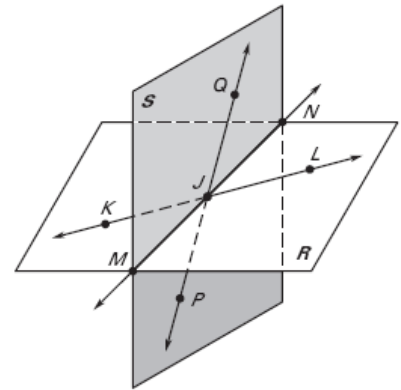
16. Are points J , K , and M coplanar?

17. Name the intersection of \overleftrightarrow{KL} and \overleftrightarrow{PQ} .

18. Name the intersection of \overleftrightarrow{PQ} and plane KMN .

19. Name the intersection of plane R and plane S .

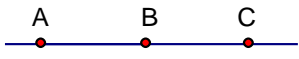

20. Name three pairs of opposite rays.



Section:	1 – 2 Use Segments and Congruence
Essential Question	

Warm Up:

Key Vocab:

Postulate or Axiom	
Theorem	
Between	<p>When three points are _____, you can say one point is _____ the other two.</p> <div style="display: flex; align-items: center; justify-content: center;">  </div> <p>_____</p>
Congruent Segments	<p>Line segments that have the _____ _____.</p> <div style="display: flex; align-items: center; justify-content: center; margin-bottom: 10px;">  </div> <p>_____</p> <p>_____</p> <p>_____</p>

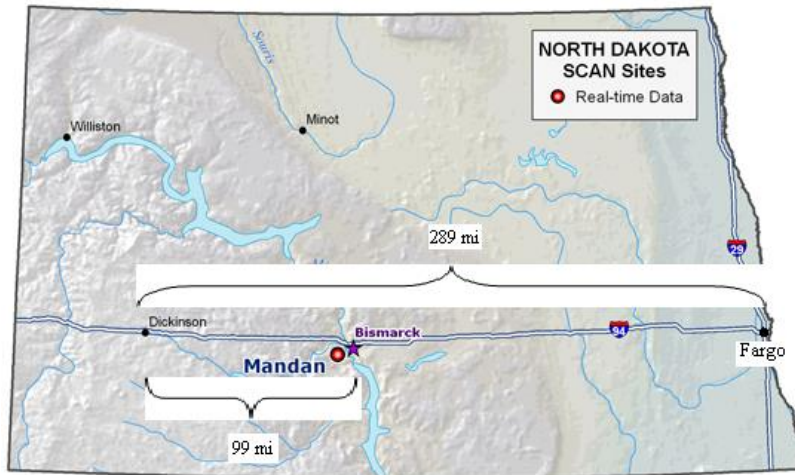
Postulates:

Ruler Postulate	
Allows for the creation of a measuring system.	
<p>_____</p> <p>_____</p> <p>The real number that corresponds to a point is the _____</p> <p>_____</p>	
<p>The distance between points A and B, _____ is the _____</p> <p>_____</p>	

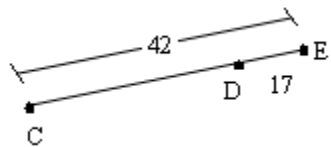
Segment Addition Postulate		
If	then	
If	then	

Show:

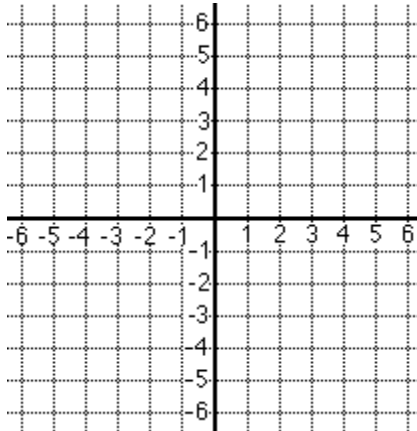
Ex 1: The cities shown on the map lie approximately in a straight line. Use the given distances to find the distance from Bismarck to Fargo.



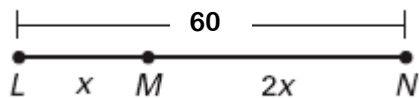
Ex 2: Find CD .



Ex 3: Graph the points $X(-2, -5)$, $Y(-2, 3)$, $W(-4, 3)$, and $Z(4, 3)$ in a coordinate plane. Are \overline{XY} and \overline{WZ} congruent?



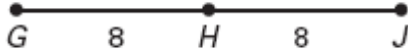
Ex 4: Find the value of x . Then find MN .



LESSON 1.2
Practice A

Find the indicated length.

1. Find GJ .



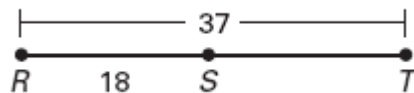
2. Find KM .



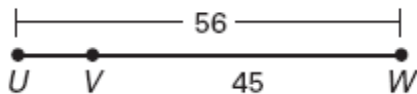
3. Find NQ .



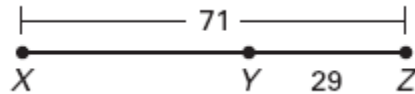
4. Find ST .



5. Find UV .

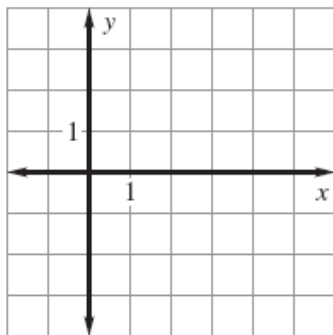


6. Find XY .



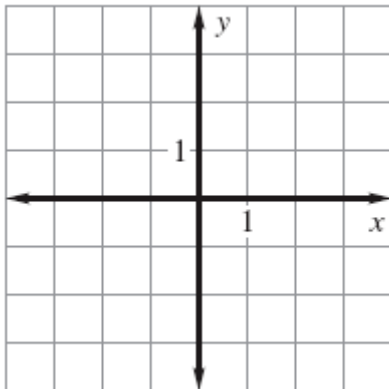
Plot the given points in a coordinate plane. Then determine whether the line segments named are congruent.

7. $A(2, 2)$, $B(2, -1)$, $C(0, -2)$, $D(3, -2)$; \overline{AB} and \overline{CD}

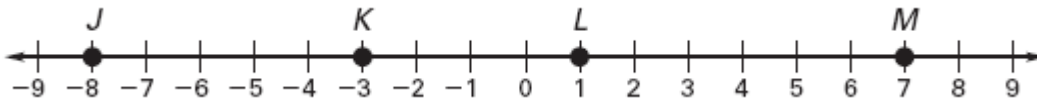


Plot the given points in a coordinate plane. Then determine whether the line segments named are congruent.

8. $E(-3, 2), F(1, 2), G(2, 3), H(2, -2); \overline{EF}$ and \overline{GH}



Use the number line to find the indicated distance.



9. JK

10. KL

11. LM

12. JL

13. JM

14. KM

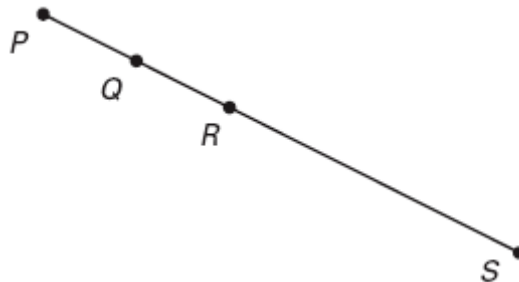
In the diagram, points $P, Q, R,$ and S are collinear, $PS = 46, PR = 18,$ and $PQ = QR.$ Find the indicated length.

15. PQ

16. QR

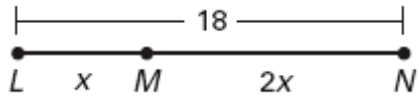
17. QS

18. RS

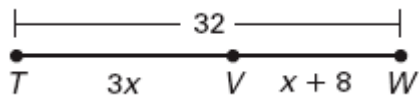


Find the indicated length.

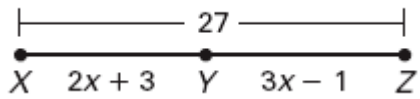
19. Find LM .



20. Find VW .



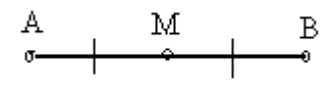
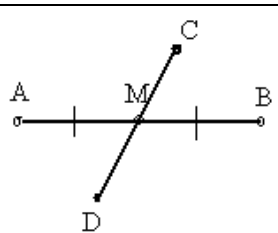
21. Find YZ .



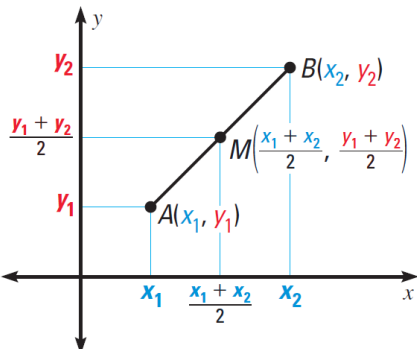
Section:	1 – 3 Use Midpoint and Distance Formulas
Essential Question	

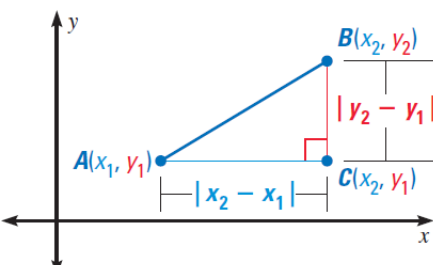
Warm Up:

Key Vocab:

Midpoint	The point that divides the segment into _____.	 _____
Segment Bisector	_____ _____ that intersects the segment at its _____.	 _____

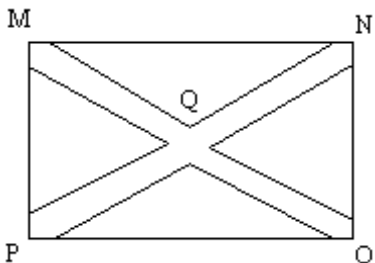
Key Concepts:

Midpoint Formula	
<p>If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points on a coordinate plane,</p>	<p>then the midpoint M of \overline{AB} has coordinates</p>
	

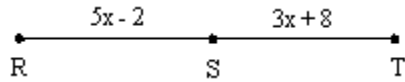
Distance Formula	
<p>If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane,</p>	<p>then the distance between A and B is</p>
	

Show:

Ex 1: The figure shows a gate with diagonal braces. \overline{MO} bisects \overline{NP} at Q . If $PQ=22.6$ in., find PN .



Ex 2: Point S is the midpoint of \overline{RT} . Find ST .



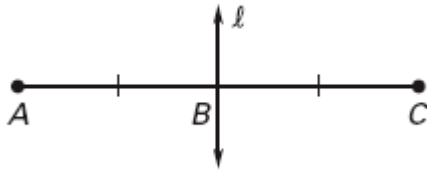
Ex 3: Find PQ given the coordinates for its endpoints are $P(2,5)$ and $Q(-4,8)$.
Approximate answer to the nearest hundredth.

Ex 4: The endpoints of \overline{GH} are $G(7, -2)$ and $H(-5, -6)$. Find the coordinates of the midpoint P .

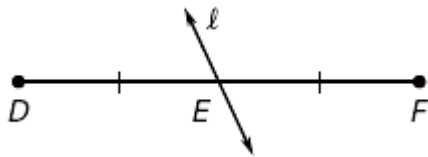
LESSON 1.3
Practice A

Line l bisects the segment. Find the indicated length.

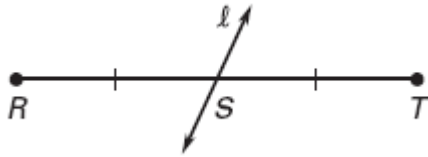
1. Find AC if $AB = 6$ cm.



2. Find DF if $DE = 17$ cm.



3. Find ST if $RT = 109$ in.



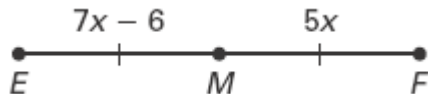
4. Line CD bisects \overline{AB} at point C . Find AC if $AB = 56$ feet.

In each diagrams, M is the midpoint of the segment. Find the indicated length.

5. Find XM .

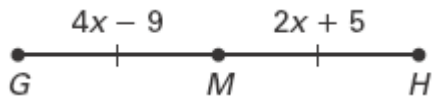


6. Find MF .



In each diagram, M is the midpoint of the segment. Find the indicated length.

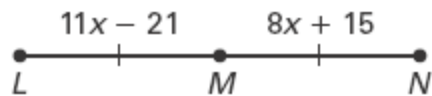
7. Find MH .



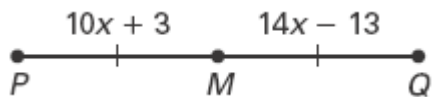
8. Find JK .



9. Find LN .



10. Find PQ .



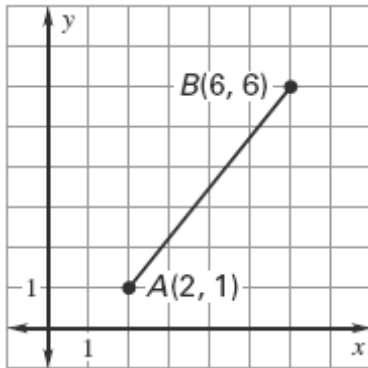
Find the coordinates of the midpoint of the segment with the given endpoints.

11. $R(3, 1)$ and $S(3, 7)$

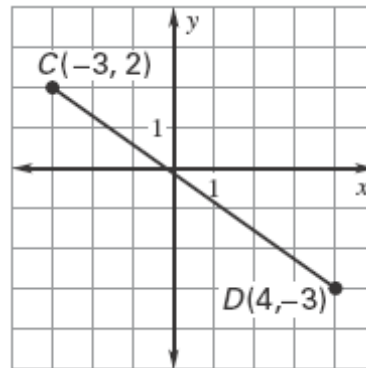
12. $V(2, 4)$ and $W(6, 6)$

Find the length of the segment. Round to the nearest tenth of a unit.

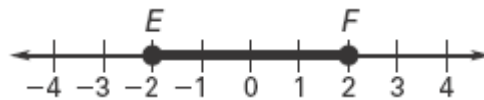
13.



14.



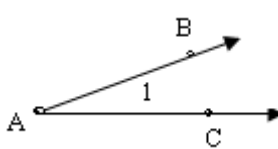
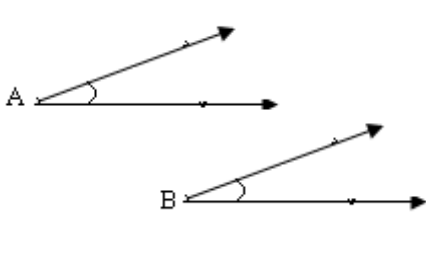
15. Find the length of the segment. Then find the coordinate of the midpoint of the segment.



Section:	1 – 4 Measure and Classify Angles
Essential Question	

Warm Up:

Key Vocab:

Angle	Notation:	
Sides	Notation:	
Vertex		
Congruent Angles		

Angle Bisector	A ray that divides an angle into _____ _____	
-----------------------	---	--

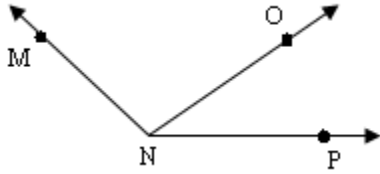
Classifying Angles		
Acute Angle		
Right Angle		
Obtuse Angle		
Straight Angle		

Postulate:

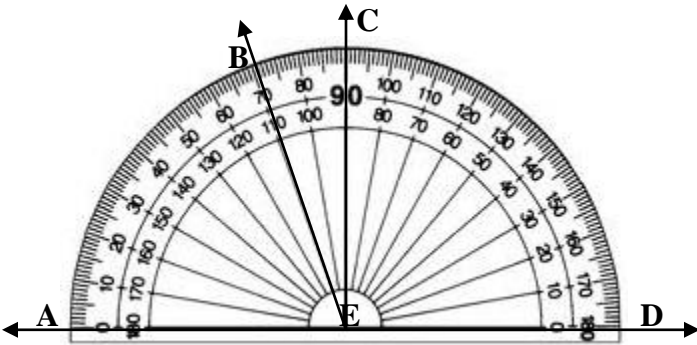
Angle Addition Postulate		
If	Then	
P is in the interior of $\angle RST$,		

Show:

Ex 1: Name each angle that has N as a vertex.

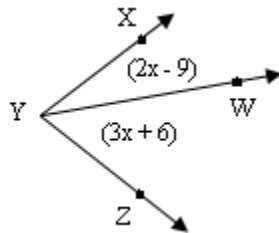


Ex 2: Use the diagram to find the measure of each angle and classify the angle.



- a. $\angle DEC$ _____
- b. $\angle DEA$ _____
- c. $\angle CEB$ _____
- d. $\angle DEB$ _____

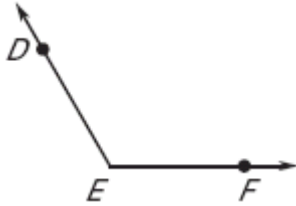
Ex 3: If $m\angle XYZ = 72^\circ$, find $m\angle XYW$ and $m\angle ZYW$.



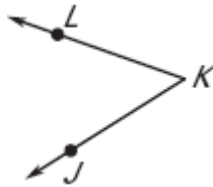
LESSON 1.4
Practice A

Write three names for the angle shown. Then name the vertex and sides of the angle.

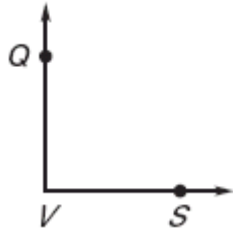
1.



2.



3.



Classify the angle with the given measure as *acute*, *obtuse*, *right*, or *straight*

4. $m\angle A = 115^\circ$ _____

5. $m\angle A = 85^\circ$ _____

6. $m\angle A = 90^\circ$ _____

7. $m\angle A = 170^\circ$ _____

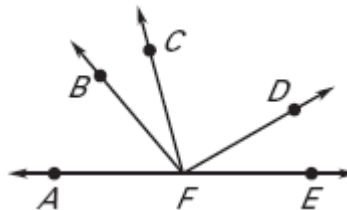
Use a protractor to find the measure of the given angle. Then classify the angle as *acute*, *obtuse*, *right*, or *straight*

8. $\angle DFE$

9. $\angle AFB$

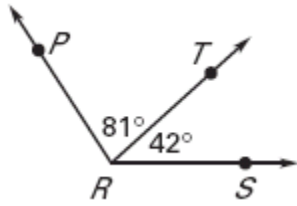
10. $\angle CFE$

11. $\angle AFE$

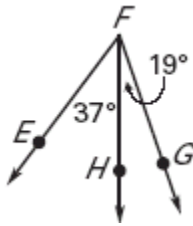


Find the indicated angle measure.

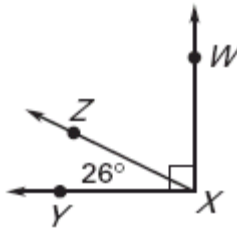
12. $m\angle PRS = \underline{\quad? \quad}$



13. $m\angle EFG = \underline{\quad? \quad}$

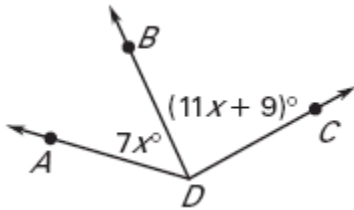


14. $m\angle WXZ = \underline{\quad? \quad}$

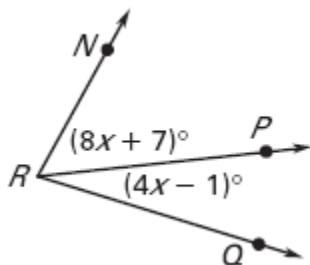


Use the given information to find the indicated angle measure.

15. Given $m\angle ADC = 135^\circ$, find $m\angle BDC$.

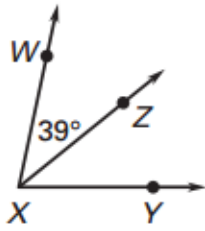


16. Given $m\angle NRQ = 78^\circ$, find $m\angle PRQ$.

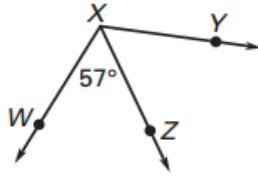


Given that \overline{XZ} bisects $\angle WXY$, find the two angle measures not given in the diagram.

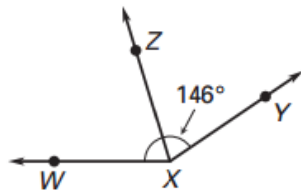
17.



18.

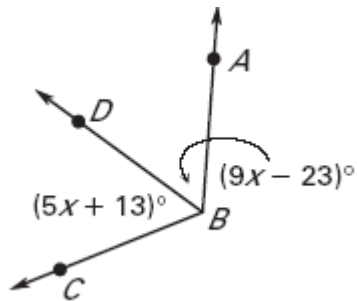


19.



Given that \overline{BD} bisects $\angle ABC$, find the $m\angle ABD$ and $m\angle CBD$.

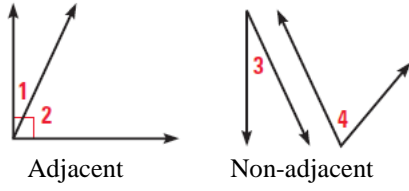
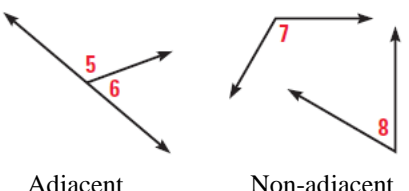
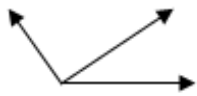
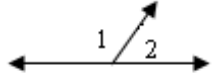
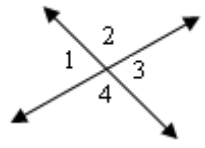
20.



Section:	1 – 5 Describe Angle Pair Relationships
Essential Question	

Warm Up:

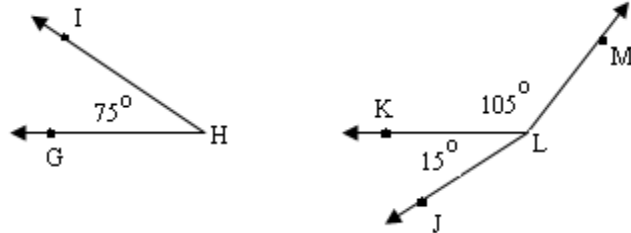
Key Vocab:

Complementary Angles		 <p>Adjacent Non-adjacent</p>
Supplementary Angles		 <p>Adjacent Non-adjacent</p>
Adjacent Angles	Two angles that share a common _____, but have no common interior points	
Linear Pair		
Vertical Angles	Two angles whose sides form two pairs of _____ Examples:	

Show:

Ex 1: In the figure, name a pair of complementary angles, a pair of supplementary angles, and a pair of adjacent angles.

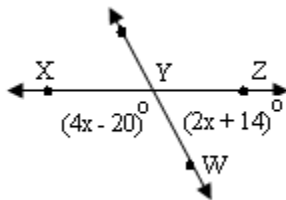
Supplementary Angles:	Complementary Angles:	Adjacent Angles:
-----------------------	-----------------------	------------------



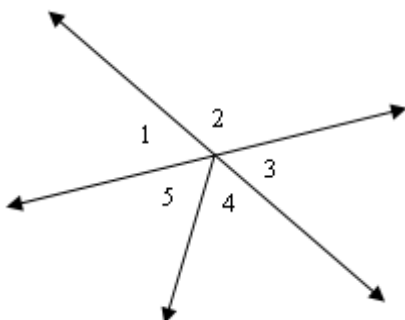
Ex 2: a. Given that $\angle 1$ is a complement of $\angle 2$ and $m\angle 1 = 17^\circ$, find $m\angle 2$.

b. Given that $\angle 3$ is a supplement of $\angle 4$ and $m\angle 3 = 119^\circ$, find $m\angle 4$.

Ex 3: Two roads intersect to form supplementary angles, $\angle XYW$ and $\angle WYZ$. Find $m\angle XYW$ and $m\angle WYZ$.



Ex 4: Identify all of the linear pairs and all of the vertical angles in the figure.



Linear Pairs:

Vertical Angles:

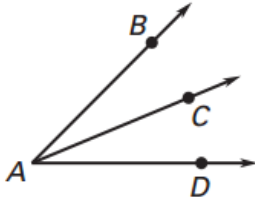
Ex 5: Two angles form a linear pair. The measure of one angle is 3 times the measure of the other angle. Find the measure of each angle.

Ex 6: The measure of one angle is 7 times the measure of its complement. Find the measure of each angle.

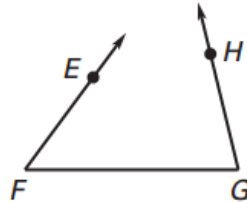
LESSON 1.5
Practice A

Tell whether the indicated angles are adjacent.

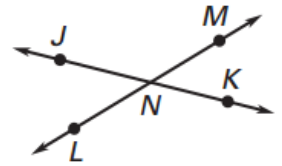
1. $\angle BAC$ and $\angle CAD$



2. $\angle EFG$ and $\angle HGF$

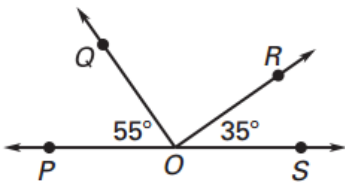


3. $\angle JNM$ and $\angle LNK$

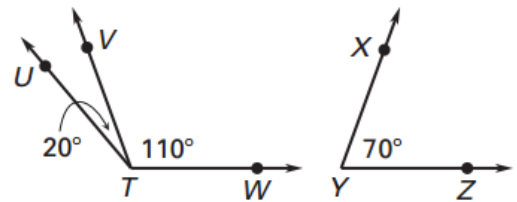


Name a pair of complementary angles and a pair of supplementary angles.

4.



5.



$\angle 1$ and $\angle 2$ are complementary angles. Given the $m\angle 1$, find $m\angle 2$.

6. $m\angle 1 = 52^\circ$

7. $m\angle 1 = 76^\circ$

8. $m\angle 1 = 19^\circ$

9. $m\angle 1 = 63^\circ$

$\angle 1$ and $\angle 2$ are supplementary angles. Given the $m\angle 1$, find $m\angle 2$.

10. $m\angle 1 = 147^\circ$

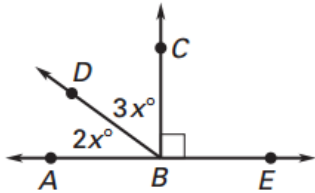
11. $m\angle 1 = 94^\circ$

12. $m\angle 1 = 38^\circ$

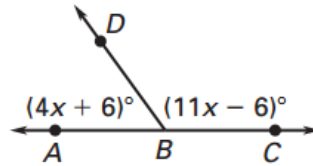
13. $m\angle 1 = 121^\circ$

Find the value of x .

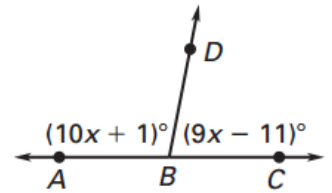
14.



15.



16.



Tell whether the angles are *vertical angles*, a *linear pair*, or *neither*.

17. $\angle 1$ and $\angle 2$

18. $\angle 1$ and $\angle 3$

19. $\angle 2$ and $\angle 4$

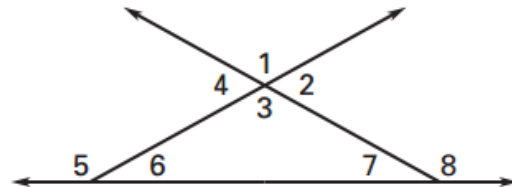
20. $\angle 3$ and $\angle 4$

21. $\angle 5$ and $\angle 6$

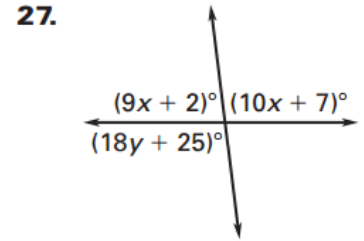
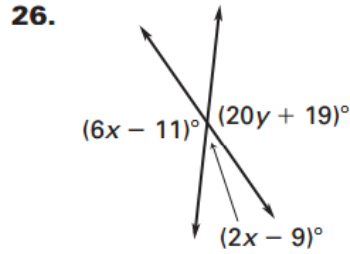
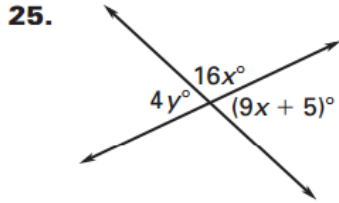
22. $\angle 5$ and $\angle 7$

23. $\angle 6$ and $\angle 8$

24. $\angle 7$ and $\angle 8$



Find the values of x and y .



$\angle A$ and $\angle B$ are complementary. Find $m\angle A$ and $m\angle B$

28. $m\angle A = x^\circ$
 $m\angle B = (x - 30)^\circ$

29. $m\angle A = (5x + 4)^\circ$
 $m\angle B = (7x - 10)^\circ$

30. $m\angle A = (4x - 2)^\circ$
 $m\angle B = (11x + 17)^\circ$

31. $m\angle A = (6x - 9)^\circ$
 $m\angle B = (8x + 1)^\circ$

$\angle A$ and $\angle B$ are supplementary. Find $m\angle A$ and $m\angle B$

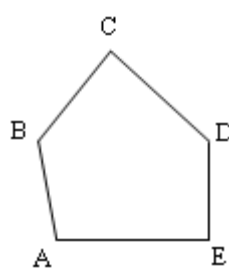
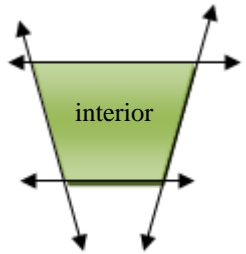
32. $m\angle A = x^\circ$
 $m\angle B = 3x^\circ$


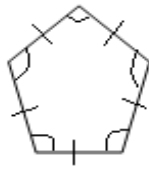
33. $m\angle A = (7x - 3)^\circ$
 $m\angle B = (x - 1)^\circ$

Section:	1 – 6 Classify Polygons
Essential Question	

Warm Up:

Key Vocab:

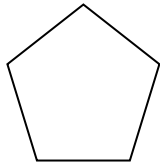
Polygon	<p>_____</p> <p>_____</p> <p>each side intersects exactly _____, so that no two sides with a common endpoint are collinear</p>	 <p>Sides:</p> <p>Vertices:</p>
Sides	Each _____ segment that forms a polygon	
Vertex	Each _____ of a side of a polygon	
Convex	<p>A polygon where no line containing a side of the polygon contains a _____ of the polygon</p> <p>_____</p> <p>_____</p>	

Concave	A polygon with one or more interior angles measuring _____ _____ _____	
n-gon		Example:
Equilateral	A polygon with all of its _____ congruent	
Equiangular	A polygon with all of its _____ congruent	
Regular	A _____ polygon that has _____ and _____ congruent	

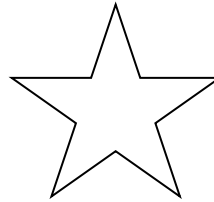
Show:

Ex 1: Tell whether each figure is a polygon. If it is, tell whether it is concave or convex.

a.

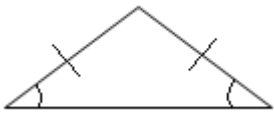


b.

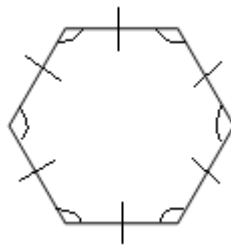


Ex 2: Classify the polygon by the number of sides. Tell whether the polygon is equilateral, equiangular, or regular. Explain your reasoning.

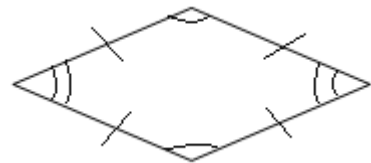
a.



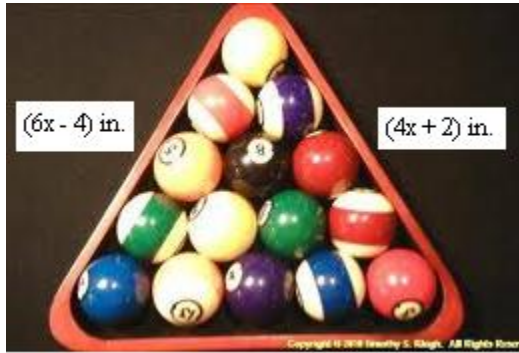
b.



c.



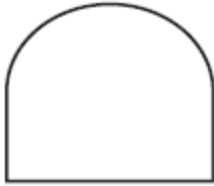
Ex 3: A rack for billiard balls is shaped like an equilateral triangle. Find the length of a side.



LESSON 1.6
Practice A

Tell whether the figure is a polygon. If it is not, *explain* why. If it is a polygon, tell whether it is *convex* or *concave*.

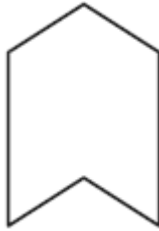
1.



YES or NO

EXPLANATION:

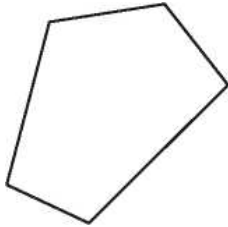
2.



YES or NO

EXPLANATION:

3.

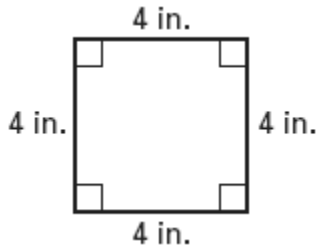


YES or NO

EXPLANATION:

Classify the polygon by the number of sides. Tell whether the polygon is *equilateral*, *equiangular*, or *regular*. *Explain your reasoning*.

4.



CLASSIFICATION: _____

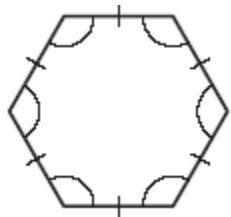
EQUILATERAL? Y or N

EQUIANGULAR? Y or N

REGULAR? Y or N

EXPLANATION:

5.



CLASSIFICATION: _____

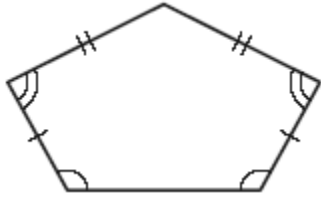
EQUILATERAL? Y or N

EQUIANGULAR? Y or N

REGULAR? Y or N

EXPLANATION:

6.



CLASSIFICATION: _____

EQUILATERAL? Y or N

EQUIANGULAR? Y or N

REGULAR? Y or N

EXPLANATION:

7.



CLASSIFICATION: _____

EQUILATERAL? Y or N

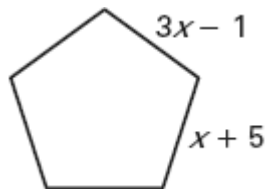
EQUIANGULAR? Y or N

REGULAR? Y or N

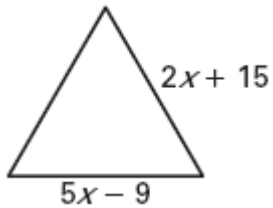
EXPLANATION:

Each figure is a **REGULAR** polygon. Expressions are given for two side lengths. Find the value of x .

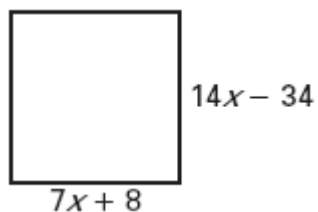
8.



9.



10.



11.

