Name: _______________

Chapter 1: Essentials of Geometry

Guided Notes

Geometry
Fall Semester

1.1 Identify Points, Lines, and Planes

Term	Definition	Example
undefined terms		
point		
line		
plane		
collinear points		
coplanar points		
defined terms		
line segment (segment)		
endpoints		

ray		
opposite rays		
intersection		

Naming and symbols:

Point:

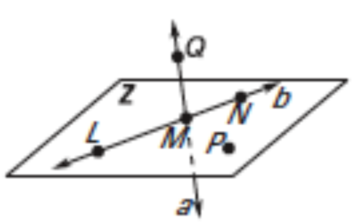
Line:

Plane:

Line Segment:

Ray:

Examples:

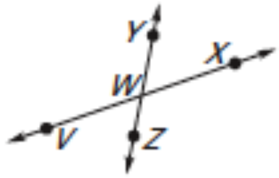
1. 

Other names for LN:

Other names for plane Z:

Points that are collinear:

2.



Another name for $\overline{VX}$:

All rays with endpoint W:

Opposite Rays:

3. Sketches:

a) Sketch a plane and a line that intersects the plane at one point.

b) Sketch a plane and a line that is in the plane. Sketch another line that intersects the line and plane at a point (use dotted lines to show where the intersecting line can not be seen).

c) Sketch two planes that intersect in a line.
Step 1: Draw one plane as if you are facing it. (straight up and down)
Step 2: Draw a second plane that is horizontal. (Use dotted lines to show where one plane can not be seen).
Step 3: Draw the line of intersection.

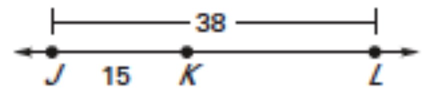
1.2 Use Segments and Congruence

Term	Definition	Example
postulate/axiom		
theorem		
coordinate		
distance		
Ruler Postulate	The points on a line can be matched one-to-one with the real numbers.	
between		
Segment Addition Postulate	If B is between A and C, then $AB + BC = AC$. If $AB + BC = AC$, then B is between A and C.	
congruent segments		

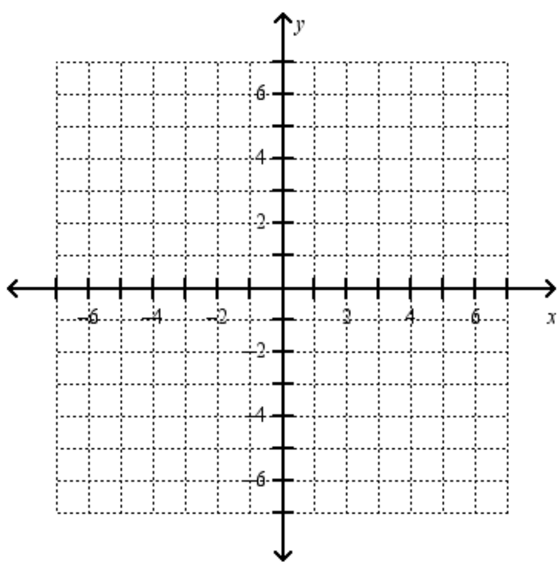
Examples:

1. Measure the length of CD to the nearest tenth of a centimeter using a ruler and the ruler postulate.

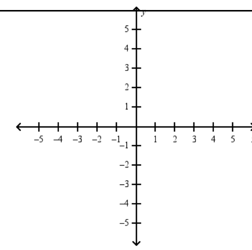
2. Use the Segment Addition Postulate to write an equation and solve for KL.



3. Plot F(4,5), G(-1,5), H(3,3), and J(3,-2) on coordinate grid. Then determine whether $\overline{FG}$ and $\overline{HJ}$ are congruent.

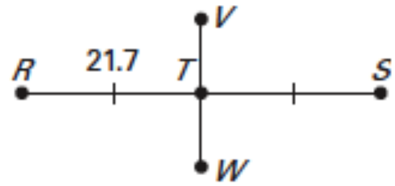


1.3 Use Midpoint and Distance Formulas

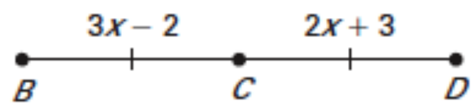
Term	Definition	Example
midpoint		
segment bisector		
The Midpoint Formula	The coordinates of the midpoint of a segment with endpoints (x_1, y_1) and (x_2, y_2) are $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.	
The Distance Formula	The distance d between any two points with coordinates (x_1, y_1) and (x_2, y_2) is given by $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.	
Pythagorean Theorem	In a right triangle, the sum of the squares of the measures of the legs equals the square of the measure of the hypotenuse. $\text{leg}^2 + \text{leg}^2 = \text{hyp}^2$ $a^2 + b^2 = c^2$	

Examples (Part One):

1. **Find *RS*.**

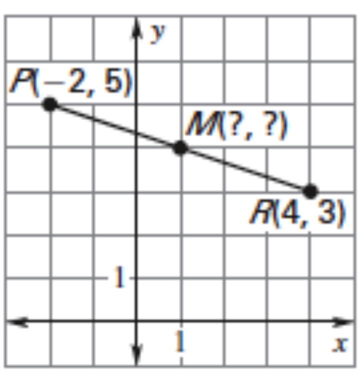


2. **Point *C* is the midpoint of $\overline{BD}$. Find the length of $\overline{BC}$.**



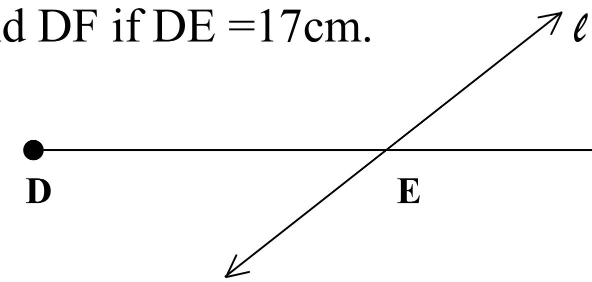
Find the length of $\overline{BD}$.

3. **a. Find Midpoint** The endpoints of $\overline{PR}$ are $P(-2, 5)$ and $R(4, 3)$. Find the coordinates of the midpoint *M*.

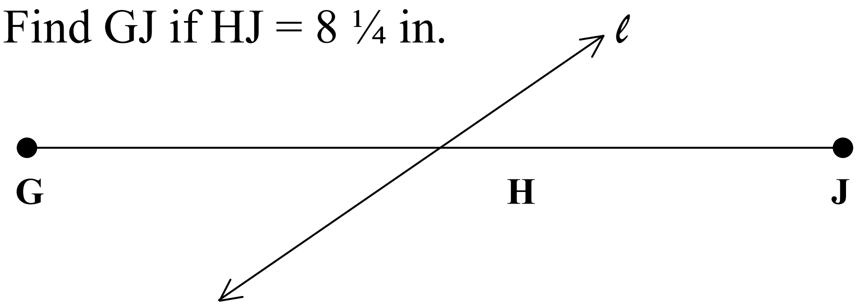


Line ℓ bisects the segment. Find the indicated length.

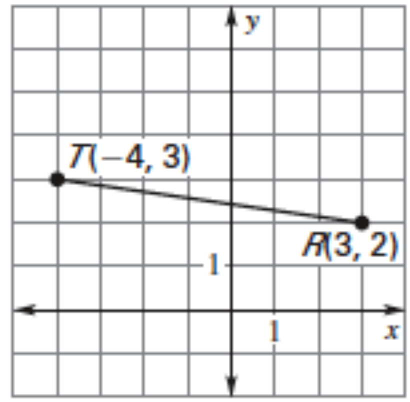
4. Find DF if DE =17cm.



5. Find GJ if HJ = 8 ¼ in.

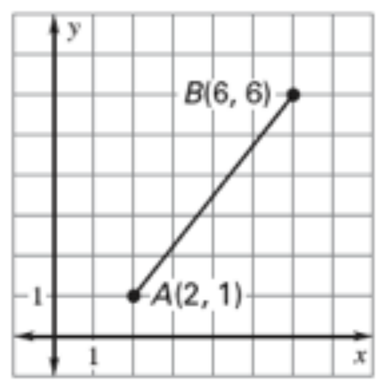


6. What is the approximate length of $\overline{RT}$, with endpoints R(3,2) and T(-4,3)?
(Use the distance formula)



Now use the Pythagorean Theorem to find the length of $\overline{RT}$.

7. Find the approximate length of the segment.
(Use the distance formula)



Now use the Pythagorean Theorem to find the length of the segment.

1.4 Measure and Classify Angles

Term	Definition	Example
angle		
sides		
vertex		
measure		
Protractor Postulate	Consider $\overrightarrow{OB}$ and a point A on one side of $\overrightarrow{OB}$. The rays of the form $\overrightarrow{OA}$ can be matched one-to-one with the real numbers from 0 to 180. The measure of $\angle AOB$ is equal to the absolute value of the difference between the real numbers for $\overrightarrow{OA}$ and $\overrightarrow{OB}$.	

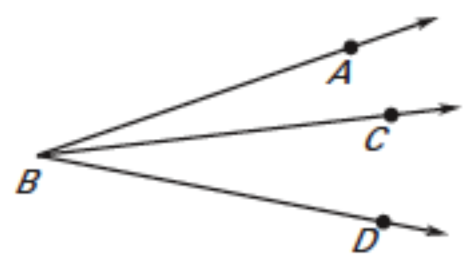
Classifying Angles: Angles are classified by their angle measures.

acute		
right		
obtuse		
straight		

interior		
Angle Addition Postulate	If *P* is in the interior of $\angle RST$, then $m\angle RST = m\angle RSP + m\angle PST$.	
congruent angles		
angle bisector		
construction		

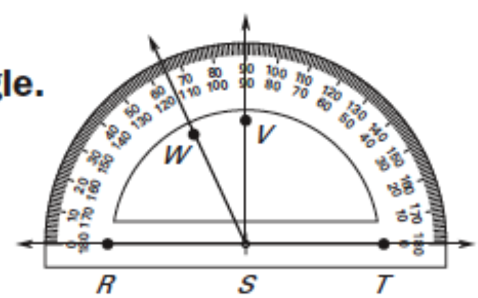
Examples

1. Name the three angles in the diagram.

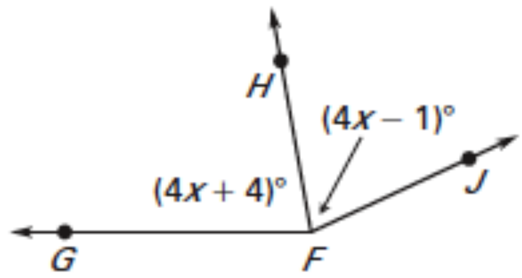


2. **Use the diagram to find the measure of the indicated angle. Then classify the angle.**

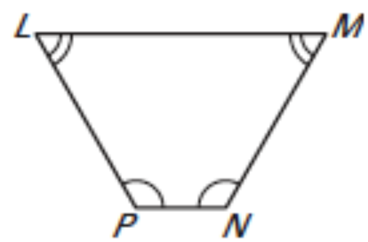
a. $\angle WSR$ **b.** $\angle TSW$
c. $\angle RST$ **d.** $\angle VST$



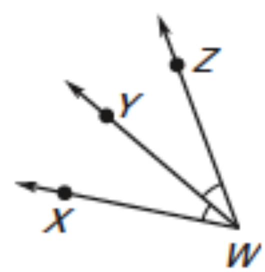
3. Given that $m\angle GFJ = 155°$, find $m\angle GFH$ and $m\angle HFJ$.



4. Identify all pairs of congruent angles in the diagram.



5. In the diagram at the right, $\overrightarrow{WY}$ bisects $\angle XWZ$, and $m\angle XWY = 29°$. Find $m\angle XWZ$.

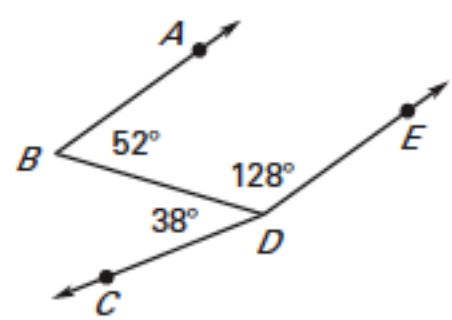


1.5 Describe Angle Pair Relationships

Term	Definition	Example
complementary angles		
supplementary angles		
adjacent angles		
non-adjacent angles		
linear pair		
vertical angles		

Examples:

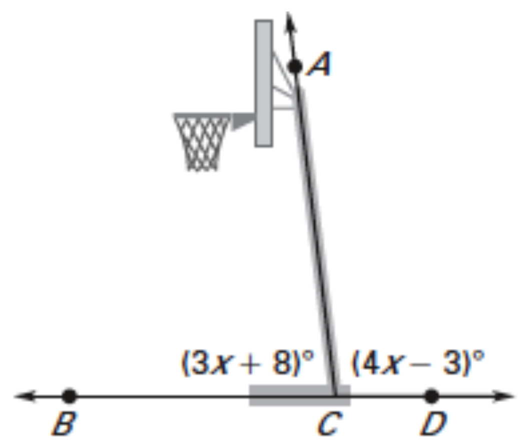
1. In the figure name a pair of complementary angles, a pair of supplementary angles, and a pair of adjacent angles.



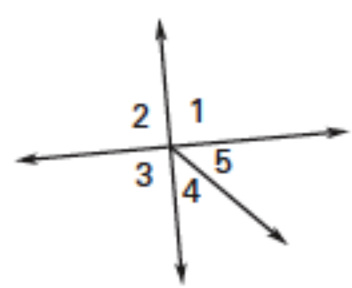
2. a) Given that $\angle 1$ is a complement of $\angle 2$ and $m\angle 2 = 57°$, find $m\angle 1$.

b). Given that $\angle 3$ is a supplement of $\angle 4$ and , $m\angle 4 = 41°$, find $m\angle 3$.

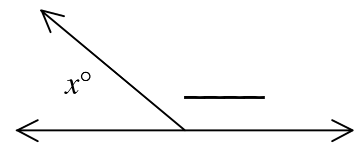
3. The basketball pole at right forms a pair of supplementary angles with the ground. Find $m\angle BCA$ and $m\angle DCA$.



4. Identify all of the linear pairs and all of the vertical angles in the figure at the right.



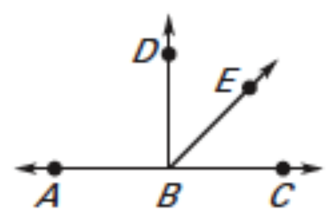
5. Two angles form a linear pair. The measure of one angle is 4 times the measure of the other. Find the measure of each angle.



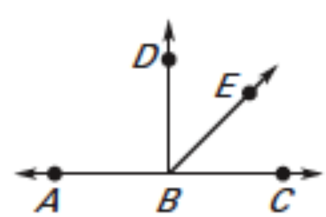
Interpreting a Diagram

There are some things you can conclude from a diagram, and some you cannot. Below, we will list things we can conclude from the diagram at right, and things we cannot conclude.

We CAN conclude that:



We CANNOT conclude that:

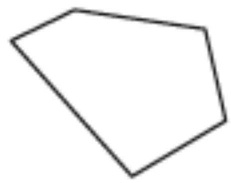


1.6 Classify Polygons

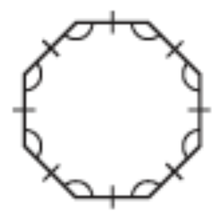
Term	Definition	Example
plane figure		
polygon		
sides		
vertex		
convex		
concave		
n-gon		
equilateral		
equiangular		
regular		

Examples:

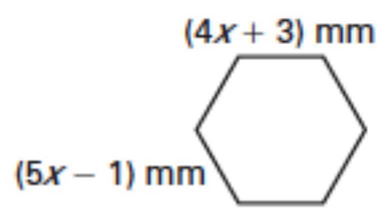
1. Tell whether the figure is a polygon and whether it is convex or concave.

a).  b).  c). 

2. Classify the polygon by the number of sides. Tell whether the polygon is equilateral, equiangular, or regular.



3. The head of a bolt is shaped like a regular hexagon. The expressions shown represent side lengths of the hexagonal bolt. Find the length of a side.



1.7 Find Perimeter, Circumference, and Area

Term	Definition	Example
perimeter		
circumference		
area		
diameter		
radius		
Pi (π)	The ratio of a circle's circumference to its diameter.	

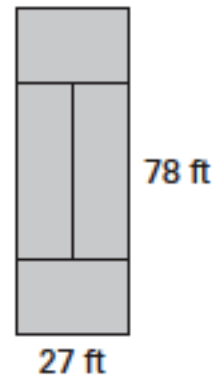
Formulas for Perimeter, Circumference, and Area:

	Perimeter/Circumference	Area
Square	$P = 4s$	$A = s^2$
Rectangle	$P = 2(l + w) = 2l + 2w$	$A = l \cdot w$
Triangle	$P = s_1 + s_2 + s_3$	$A = \frac{1}{2}bh$
Circle	$C = \pi d = 2\pi r$	$A = \pi r^2$

Examples:

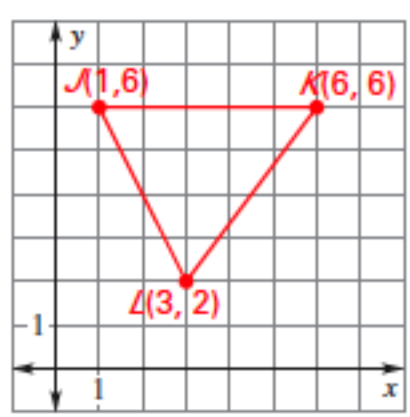
1. The in-bounds portion of a singles tennis court is shown. Find its perimeter and area.

Perimeter	Area

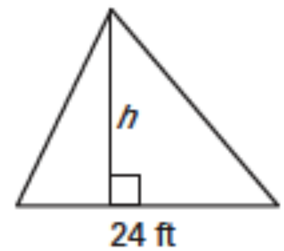


2. The smallest circle on an Olympic archery target is 12 centimeters in diameter. Find the approximate circumference and area of the smallest circle.

3. Triangle JKL has vertices J(1,6), K(6,6), and L(3,2). Find the approximate perimeter of triangle JKL.



4. The base of a triangle is 24 feet. The area is 216 square feet. Find the height of the triangle.



5. You are using a roller to smooth a lawn. You can roll about 125 square yards in one minute. About how many minutes would it take you to roll a lawn that is 120 feet long and 75 feet wide?