Name: _____ Date: _____

LINES, RAYS, AND ANGLES
COMMON CORE GEOMETRY

Now that we have the concepts of points, distance, and line segments, we introduce the important ideas of lines, rays, and angles.

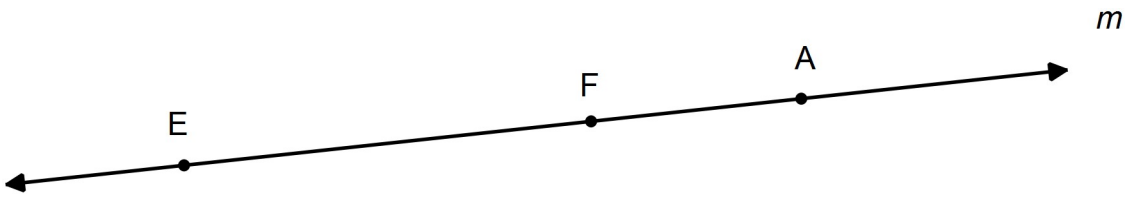
LINES AND RAYS

Line: An infinite set (collection) of points that extends forever in two directions. Since lines are uniquely determined by any two points on the line, we symbolize them by a double arrow over two points, e.g. $\overleftrightarrow{AB}$. Sometimes they are also referred to by lower case letters, such as *l*, *m*, and *n*.

Ray: An infinite set (collection) of points that extends forever in one direction from a starting point. Like lines, rays are symbolized by using two points, but only a single arrow, e.g. $\overrightarrow{AB}$.

***Exercise* #1:** Why is it possible to talk about the **measure** (or length) of line segment $\overline{AB}$ but not possible to talk about the **measure** (or length) of line $\overleftrightarrow{AB}$ or ray $\overrightarrow{AB}$?

***Exercise* #2:** In the diagram below, all points shown are collinear.



(a) Give three different ways to name this line.

(b) Give two ways to name the ray that starts at point *A* and extends in the direction of point *F*.

Although lines and rays are important, we will mainly deal with **line segments**, or portions of a line that have a definitive starting and ending point. Now we must introduce the concept of an **angle**.

ANGLES

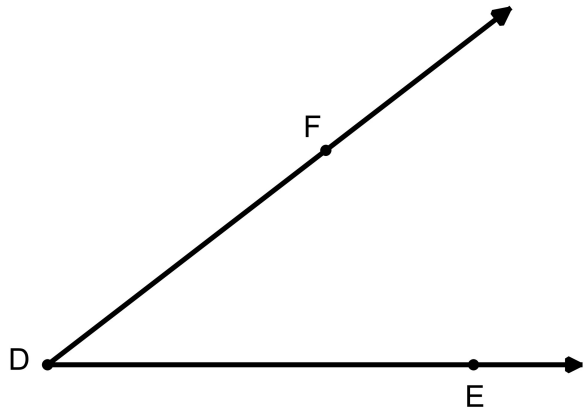
Angle: The geometric object created by two rays with a common starting point. Angles are symbolized by a single point, for instance $\angle A$, or a triple of points, such as $\angle BAC$, where the second letter is the **vertex** of the angle.

The Measure of an Angle: The amount of rotation needed to rotate one of the rays about their shared point so that it lies on top of the other ray. The measure of an angle is symbolized by $m\angle A$ or $m\angle BAC$.

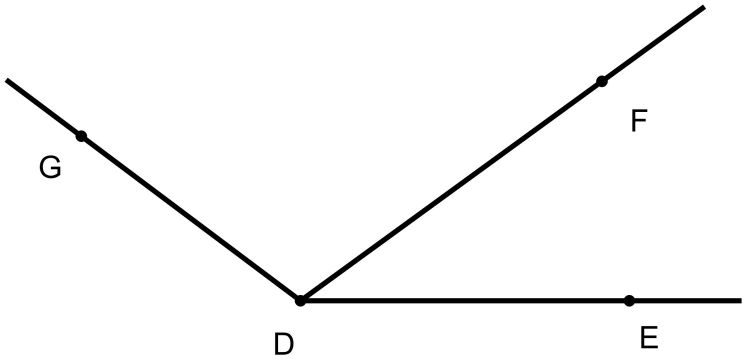
***Exercise* #3:** Consider the angle shown below.

(a) Give three acceptable names for this angle.

(b) Use your protractor to find the measure of this angle.



***Exercise* #4:** Answer the following questions based on the diagram show below. Note that the ray symbols do not need to be attached to the line segments to still discuss angles. A ray extends forever, whether an arrow is drawn or not.



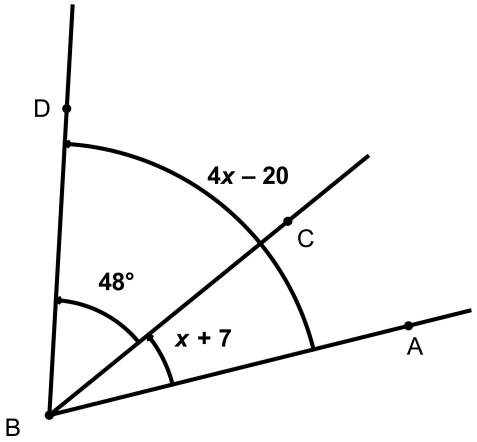
(a) Find $m\angle FDE$.

(b) Find $m\angle GDF$.

(c) Why can neither of the angles measured in parts (a) and (b) be labeled as $\angle D$?

(d) Find $m\angle GDE$. How does its measure compare to those in (a) and (b)?

***Exercise* #5:** The diagram shown is not drawn to scale. If $m\angle CBA = x + 7$, $m\angle DBC = 48^\circ$, and $m\angle DBA = 4x - 20$, then find the numerical value of $m\angle DBA$.



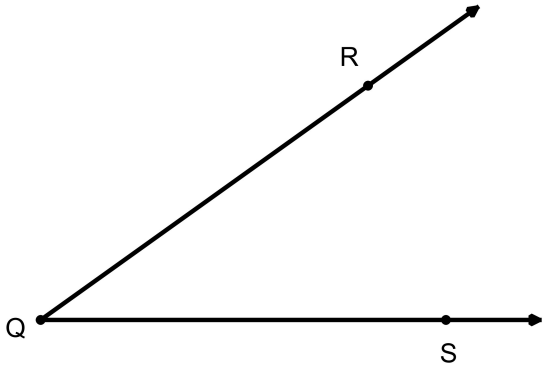
Name: _____ Date: _____

LINES, RAYS, AND ANGLES
COMMON CORE GEOMETRY HOMEWORK

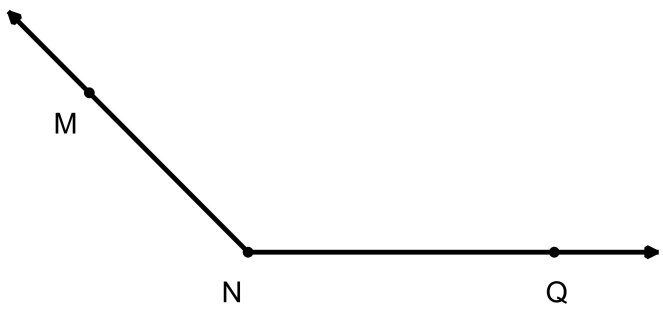
MEASUREMENT

1. Measure each of the following angles to the nearest degree using your protractor. Name the angle using three letters. Extend rays as needed (given they extend infinitely anyway, you can always do this!!!).

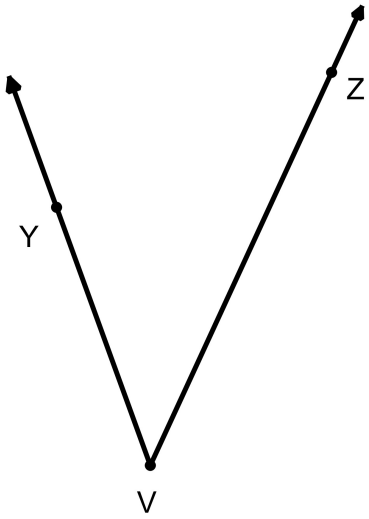
(a)



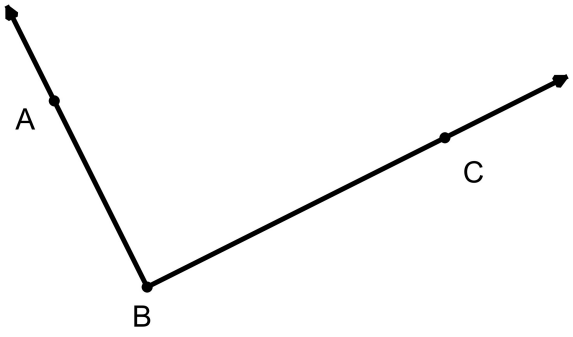
(b)



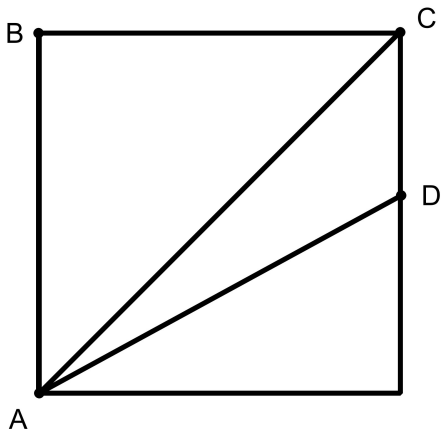
(c)



(d)



2. Using your protractor, find each of the following based on the diagram below.



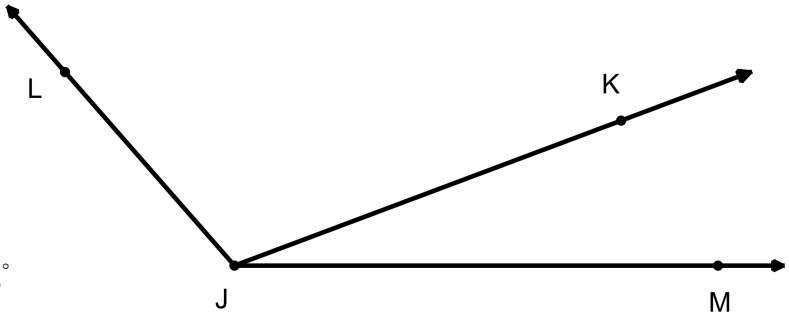
(a) $m\angle DAC$ (b) $m\angle BAC$

(c) $m\angle DAB$

(d) Why can no angle on the drawing be referred to at $\angle A$?

PROBLEM SOLVING

3. The drawing shown below is not drawn to scale. Answer each of the following questions based on the diagram. Each portion of this problem is independent of the others (does not depend on previous answers).



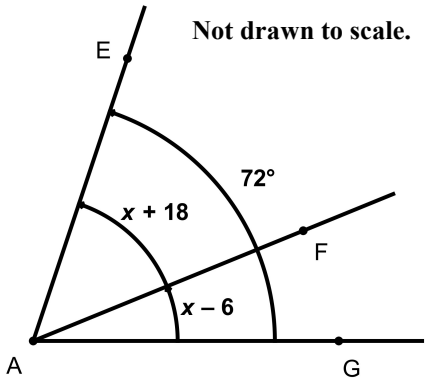
(a) Given: $m\angle KJM = 22^\circ$ and $m\angle KJL = 84^\circ$

Find: $m\angle MJL$

(b) Given: $m\angle LJM = 145^\circ$ and $m\angle KJM = 48^\circ$

Find: $m\angle LJK$

4. In the diagram shown to the right, $m\angle GAF = x - 6$, $m\angle EAF = x + 18$, and $m\angle GAE = 72^\circ$. Find the value of x and the numerical values of $m\angle GAF$ and $m\angle EAF$.



5. In the diagram below, it is known that $m\angle NPQ = 9x - 25$, $m\angle MPQ = 3x - 5$, and $m\angle MPN = 4x + 12$. Using this information, find the numerical value of $m\angle QPM$.