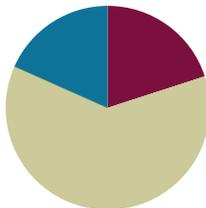


Lesson 1

Objective: Identify and draw points, lines, line segments, rays, and angles and recognize them in various contexts and familiar figures.

Suggested Lesson Structure

■ Fluency Practice	(12 minutes)
■ Concept Development	(37 minutes)
■ Student Debrief	(11 minutes)
Total Time	(60 minutes)



Fluency Practice (12 minutes)

- Multiply Mentally **4.OA.4** (4 minutes)
- Add and Subtract **4.NBT.4** (4 minutes)
- Sides, Angles, and Vertices **3.G.1** (4 minutes)

Multiply Mentally (4 minutes)

Materials: (S) Personal white boards

Note: This concept reviews G4–Module 3 content.

T: (Write $43 \times 2 = \underline{\quad}$.) Say the multiplication sentence.

S: $43 \times 2 = 86$.

T: (Write $43 \times 2 = 86$. Below it, write $43 \times 20 = \underline{\quad}$.) Say the multiplication sentence.

S: $43 \times 20 = 860$.

T: (Write $43 \times 20 = 860$. Below it, write $43 \times 22 = \underline{\quad}$.) On your boards, solve 43×22 .

S: (Write $43 \times 22 = 946$.)

Repeat process for the following possible sequence: 32×3 , 32×20 , 32×23 , 21×4 , 21×30 , and 21×34 .

Add and Subtract (4 minutes)

Materials: (S) Personal white boards

Note: This concept reviews the year-long Grade 4 fluency standard for adding and subtracting using the standard algorithm.

T: (Write 654 thousands 289 ones.) On your boards, write this number in standard form.

S: (Write 654,289.)

T: (Write 245 thousands 164 ones.) Add this number to 654,289 using the standard algorithm.

S: (Write $654,289 + 245,164 = 899,453$ using the standard algorithm.)

Continue the process for $591,848 + 364,786$.

T: (Write 918 thousands 670 ones.) On your boards, write this number in standard form.

S: (Write 918,670.)

T: (Write 537 thousands 159 ones.) Subtract this number from 918,670 using the standard algorithm.

S: (Write $918,670 - 537,159 = 381,511$ using the standard algorithm.)

Continue the process for $784,182 - 154,919$ and $700,000 - 537,632$.

Sides, Angles, and Vertices (4 minutes)

Materials: (S) Personal white boards

Note: This concept reviews features of various figures learned in previous grades.

T: (Project triangle.) Say the name of the shape.

S: Triangle.

T: How many sides are in a triangle?

S: Three.

T: How many angles are in a triangle?

S: Three.

T: (Point at one of the corners.) How many corners are in a triangle?

S: Three.



Continue the process for pentagon, hexagon, and rectangle.

Concept Development (37 minutes)

Materials: (T) Straightedge (S) Straightedge, blank paper

Problem 1: Draw, identify, and label points, a line segment, and a line.

T: I'd like to use my pencil to mark a specific location on my paper. How do you think I could do that?

S: You could put an X.

T: (Draw an X.) Ok, so is this the location I've marked? (Point to the upper right corner of the X.)

S: No! You marked the middle, where it crosses.

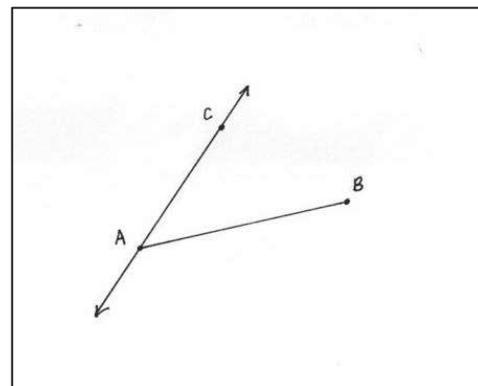
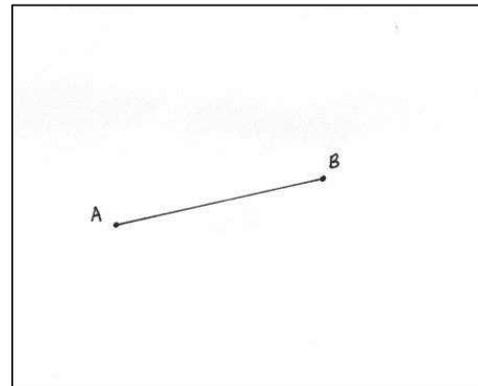
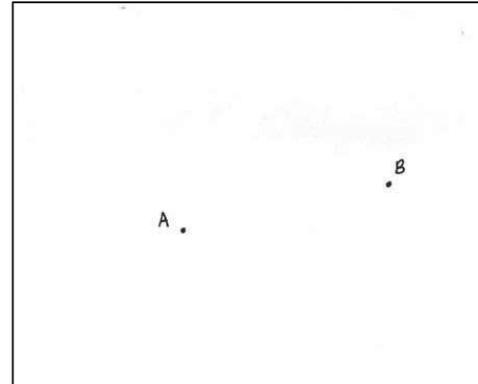
T: Oh, I see. Well, if that's all I want to mark, I don't really need all these extra marks. Let's just mark the point with a small dot.



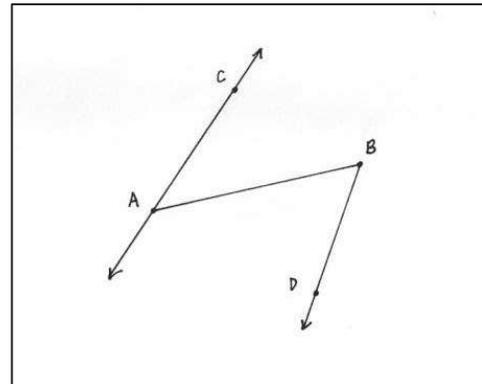
NOTES ON MULTIPLE MEANS OF REPRESENTATION:

You may choose to provide square grid paper or triangle grid paper to students for today's Concept Development. If you do provide grid paper, consider providing red markers to students to assist visual discrimination between the grid lines and the lines they construct.

- T: Let's try it. Mark a very specific location on your paper by drawing a small dot with your pencil tip.
- T: Place your pencil tip in another location on your paper. Draw another small dot. The dots are a representation of a location.
- T: Notice the dots, or **points**, that you and your neighbor drew are probably in different locations.
- T: How many points could you draw on this paper?
- S: A lot! → Too many to count. → I could draw points until my whole paper is filled with points.
- T: When we draw our dots, they have size. But we are trying to imagine and mark a location so precise that you couldn't even find it with the world's most powerful microscope.
- T: To identify your two points, label each with a letter. (Label point A and point B.)
- T: Use your straightedge to connect point A to point B. Compare what you drew to what your partner drew. Are your drawings the same? What is different about them?
- S: One is longer than the other. → This one is horizontal, and this one looks more diagonal. → They are both straight. → They both begin at point A and end with point B.
- T: Let's identify what we drew using the endpoints. We will call this **line segment** AB. (Write \overline{AB} .) Line segments have two endpoints.
- T: We can also identify this line segment, or segment, as \overline{BA} .
- T: Draw point C on your paper. Point C should not be located on \overline{AB} .
- T: Using your straightedge, draw \overline{AC} . (Allow students time to draw.)
- T: Could you extend line \overline{AC} to make it longer if you wanted to? If you had a really big piece of paper, could you continue to extend the segment in both directions? What if your paper extended forever? Could the segment go on forever? Let's extend \overline{AC} just a bit on both ends and draw an arrow on both ends to indicate that the line could keep going in either direction forever. We call this \overleftrightarrow{AC} .
- T: What is different about \overleftrightarrow{AC} and \overline{AB} ?
- S: This one is longer. → This one is shorter. → This one doesn't have points on the ends. Instead it has arrows. → The line goes past point A and point C. I guess the arrows mean that it's really longer than what we can see.



- T: Yes, a **line** extends in both directions without an end. We show that by drawing arrows on the ends of a line. This is line AC. (Write \overleftrightarrow{AC} .) We can also represent it as \overleftarrow{CA} . We couldn't actually show a line that goes on forever. It's like trying to list every number. You just can't do it. What we actually drew is a representation of a line. A real line has no thickness, and it extends forever without end in both directions.
- T: Compare the notation we used to identify line segment AB and line AC.
- S: We can write them \overline{AB} or \overline{BA} , or \overleftrightarrow{AC} or \overleftrightarrow{CA} . → We put a segment over the letters for a segment and a line with arrows for the line that goes on forever in both directions.

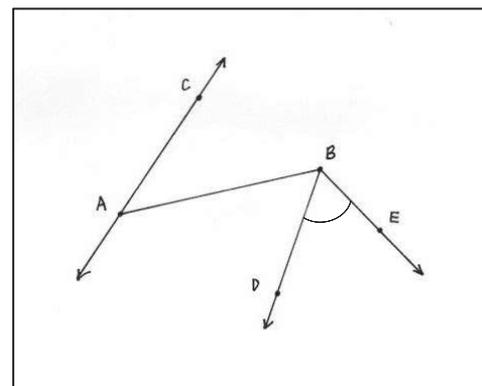
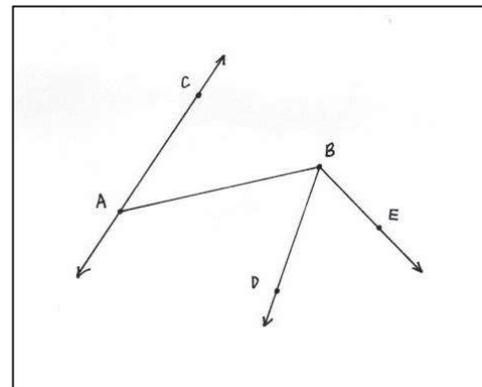


Problem 2: Draw, identify, and label rays and angles.

- T: Draw point D. Point D should not be located on \overline{AB} or anywhere on \overleftrightarrow{AC} (including the parts where it might extend).
- T: Using a straightedge, connect point B to point D. Use B as the endpoint, and extend your line past point D. Draw an arrow at the end of this line.

Students draw. Observe their work.

- T: Compare this part of the drawing, or **figure**, to the others you have drawn.
- S: This one is longer. → This one is shorter. → They are all straight because I used a straightedge. → They all have two points. → This line has an endpoint and an arrow.
- T: Because it has an endpoint and an arrow, we don't call this a line. We call it a **ray**. It has one endpoint that we think of as a starting point, and goes on forever in one direction. (Write \overrightarrow{BD} .) We record the letters in that order because the ray begins at point B and extends past D. The ray symbol shows the direction of the line above the letters. Unlike before, we can't call it \overleftarrow{DB} because that would imply that the ray starts at point D which it does not.
- T: Draw point E. Make sure point E does not lie in line with \overrightarrow{BD} , \overline{AB} , or \overleftrightarrow{AC} . Draw \overrightarrow{BE} .



Students draw. Observe their work.

- T: Touch point B with your pencil. Trace along the line to point D. Now touch point B. Trace along the line to point E. Discuss the connection of \overrightarrow{BD} and \overrightarrow{BE} .
- S: Both rays have the same endpoint. → Both rays are connected. → Mine looks like a corner of a rectangle.
- T: Both rays originate at point B and extend out. Any two rays sharing the same endpoint create an

angle.

T: We can call this angle DBE. (Write $\angle DBE$.)

S: Or, $\angle EBD$!

T: To identify this angle in the figure we will draw an arc. (Draw an arc to identify $\angle DBE$.) With your partner, identify two other angles in your figures.

Problem 3: Draw, identify, and label points, line segments, and angles in a familiar figure.

T: Quickly sketch a rectangle. Use your straightedge. Do you see any lines or line segments? Do you see any special points? Angles?

S: I see four line segments, four points where the line segments meet, and four angles!

T: Identify the line segments with your partner using the correct notation.

S: \overline{AB} , \overline{BC} , \overline{CD} , and \overline{DA} . There are four of them!

T: How many line segments are there in a square? A rhombus?

S: There are four in each one.

T: You mentioned angles earlier. I thought an angle was made of two rays. Where do you see rays in this picture?

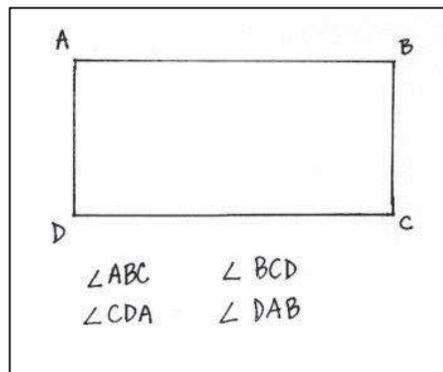
S: I don't see any. → But that still looks like an angle where \overline{AD} and \overline{AB} meet. → I could draw an arrow on the end of \overline{AB} and \overline{AD} to make rays.

T: You're right. Each of the segments is part of a larger ray. But we don't have to draw them to imagine that they're there. So, do the segments \overline{AB} and \overline{AD} meet to form an angle?

S: Yes!

T: Name each of the angles that lie inside the rectangle. Identify the angles using the correct notation.

S: $\angle ABC$, $\angle BCD$, $\angle CDA$, and $\angle DAB$.



Problem 4: Analyze of a familiar figure.

T: With a partner, make a list of the new terms that we learned today.

S: Point, line segment (segment), line, ray, angle, and figure.

T: Let's look at the first figure that we drew. What do you see?

S: Points, line segments, lines, rays, and angles.

MP.6

T: Did we create a figure that looks familiar?

S: No! It doesn't really look like anything that I've seen.

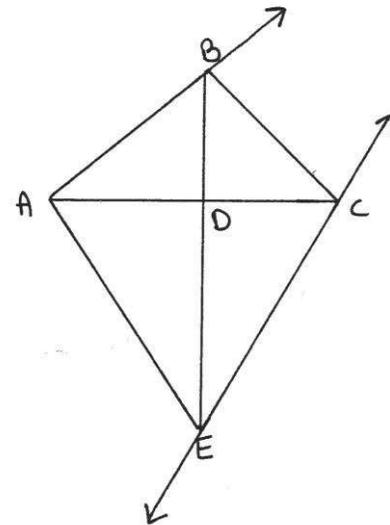
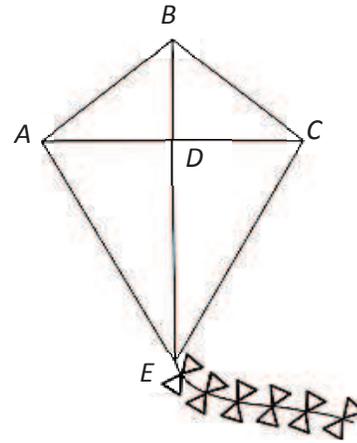
T: Look at the second figure that we drew. What do you see?

S: Now that looks familiar! → It has points, line segments (rays), and angles. Combined, they make a rectangle!

T: Here's another familiar figure. (Draw or project the figure of a kite.)

- S: It's a kite!
- T: Let's see if we can find points, line segments, lines, rays, and angles. Are there any points?
- S: There are lots of points. → There are too many points to count.
- T: Let's identify the points that show the corners.
- S: (Label points A, B, C, D, and E.)
- T: What else do you see? How about segments and angles?
- S: (Identify segments and angles by name, working first with a partner to identify and then sharing with the whole group.)
- T: Are there any rays or lines?
- S: No!
- T: Think again! Segments, or line segments, are just a part of a line. If we extend \overline{AB} in one direction, we represent \overrightarrow{AB} . And if we extend \overline{AB} in both directions, we represent \overleftrightarrow{AB} , which includes \overline{AB} and \overline{AB} .
- S: I get it! Lines, rays, and segments are all related!
- T: Draw the kite and then extend the segments to represent a ray and a line. (Demonstrate how to draw the kite, starting with a *t* shape and then joining the endpoints with a straightedge.)
- S: (Draw the kite and then represent a ray and a line.)

MP.6



Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Some problems do not specify a method for solving. This is an intentional reduction of scaffolding that invokes MP.5, Use Appropriate Tools Strategically. Students should solve these problems using the RDW approach used for Application Problems.

For some classes, it may be appropriate to modify the assignment by specifying which problems students should work on first. With this option, let the careful sequencing of the Problem Set guide your selections so that problems continue to be scaffolded. Balance word problems with other problem types to ensure a range of practice. Assign incomplete problems for homework or at another time during the day.

Student Debrief (11 minutes)

Lesson Objective: Identify and draw points, lines, line segments, rays, and angles and recognize them in various contexts and familiar figures.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- In Problem 3, the image of the USB drive has several lines with curved edges. We often talk about curved lines and straight lines. How are those lines different from the lines we learned about today?
- Compare your **figure** to your partner's for Problem 1. How are they alike? How are they different?
- A **point** indicates a precise location with no size, only position. Points are infinitely small. Why do we mark it with a dot? Won't our pencil marks have width? Won't our pencil marks actually cover many points since the dots we draw have width, and points do not?
- Just like a point, a **line** has no thickness. Can we draw a line that has no thickness, or will we always have to imagine that particular attribute? Why do we draw it on paper with thickness?
- How is a **line segment** different from a line?
- How many corners does a triangle have? A square? A quadrilateral? How does that relate to the number of angles a polygon has?
- How are a **ray** and a line similar? How are they different?
- How are **angles** formed? Where have you seen angles before? How does an **arc** help to identify an angle?

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 1 Problem Set 4•4

Name Jack Date _____

1. Use the following directions to draw a figure in the box to the right.

- Draw two points, A and B .
- Use a straightedge to draw \overline{AB} .
- Draw a new point that is not on \overline{AB} . Label it C .
- Draw segment \overline{AC} .
- Draw a point not on \overline{AB} or \overline{AC} . Call it D .
- Construct line \overleftrightarrow{CD} .
- Use the points you've already labeled to name one angle. $\angle BAC$

2. Use the following directions to draw a figure in the box to the right.

- Draw two points, A and B .
- Use a straightedge to draw \overline{AB} .
- Draw a new point that is not on \overline{AB} . Label it C .
- Draw \overline{BC} .
- Draw a new point that is not on \overline{AB} or \overline{BC} . Label it D .
- Construct \overline{AD} .
- Identify $\angle DAB$ by drawing an arc to indicate the position of the angle.
- Identify another angle by referencing points that you have already drawn. $\angle ABC$

COMMON CORE Lesson 1: Identify and draw points, lines, line segments, rays and angles and recognize them in various contexts and familiar figures. engageNY 4.A.9
Date: 9/6/13

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 1 Problem Set 4•4

3. a. Observe the familiar figures below.
b. Label points on each figure and then use those points to label and name representations of each of the following in the table below: ray, line, line segment, and angle. Extend segments to show lines and rays.

	house	flash drive	compass rose
ray	\overrightarrow{PT}	\overrightarrow{AC}	\overrightarrow{AE}
line	\overleftrightarrow{QR}	\overleftrightarrow{AB}	\overleftrightarrow{NS}
line segment	\overline{TS}	\overline{BD}	\overline{AB}
angle	$\angle QPT$	$\angle BDC$	$\angle XAS$

BONUS: Draw a familiar figure. Label it with points and then identify rays, lines, line segments, and angles as applicable.

COMMON CORE Lesson 1: Identify and draw points, lines, line segments, rays and angles and recognize them in various contexts and familiar figures. engageNY 4.A.10
Date: 9/6/13

- Why is it hard to find real life examples of lines, points, and rays?
- How does your understanding of a number line connect to this lesson on lines?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

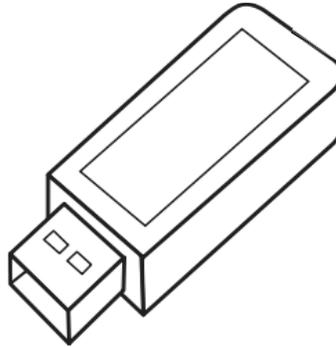
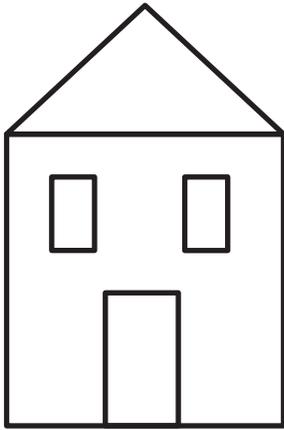
Name _____

Date _____

1. Use the following directions to draw a figure in the box to the right.
 - a. Draw two points, A and B .
 - b. Use a straightedge to draw \overline{AB} .
 - c. Draw a new point that is not on \overline{AB} . Label it C .
 - d. Draw segment \overline{AC} .
 - e. Draw a point not on \overline{AB} or \overline{AC} . Call it D .
 - f. Construct line \overleftrightarrow{CD} .
 - g. Use the points you've already labeled to name one angle. _____

2. Use the following directions to draw a figure in the box to the right.
 - a. Draw two points, A and B .
 - b. Use a straightedge to draw \overline{AB} .
 - c. Draw a new point that is not on \overline{AB} . Label it C .
 - d. Draw \overline{BC} .
 - e. Draw a new point that is not on \overline{AB} or \overline{BC} . Label it D .
 - f. Construct \overleftrightarrow{AD} .
 - g. Identify $\angle DAB$ by drawing an arc to indicate the position of the angle.
 - h. Identify another angle by referencing points that you have already drawn. _____

- 3.
- Observe the familiar figures below.
 - Label points on each figure and then use those points to label and name representations of each of the following in the table below: ray, line, line segment, and angle. Extend segments to show lines and rays.



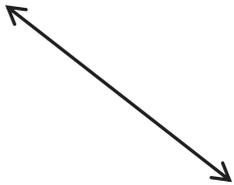
	house	flash drive	compass rose
ray			
line			
line segment			
angle			

BONUS: Draw a familiar figure. Label it with points and then identify rays, lines, line segments, and angles as applicable.

Name _____

Date _____

1. Draw a line segment to connect the word to its picture.



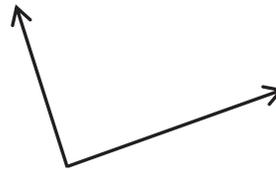
ray

line

line segment

point

angle

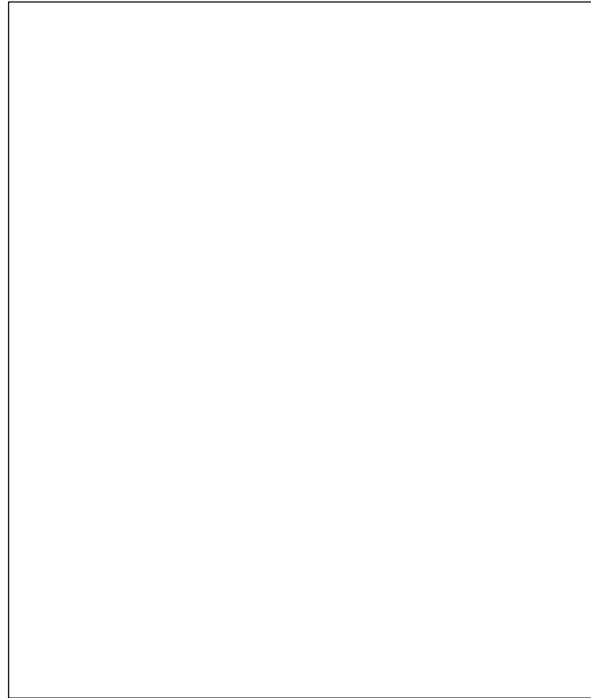


2. How is a line different from a line segment?

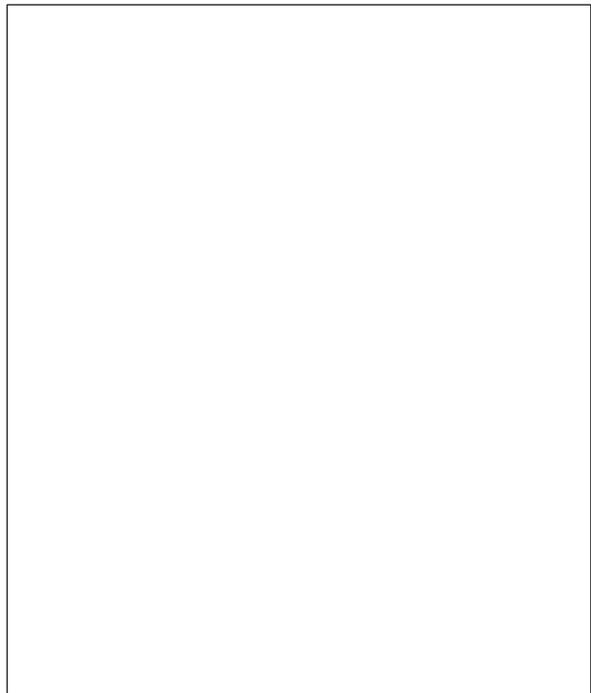
Name _____

Date _____

1. Use the following directions to draw a figure in the box to the right.
 - a. Draw two points, W and X .
 - b. Use a straightedge to draw \overline{WX} .
 - c. Draw a new point that is not on \overline{WX} . Label it Y .
 - d. Draw segment \overline{WY} .
 - e. Draw a point not on \overline{WX} or \overline{WY} . Call it Z .
 - f. Construct line \overleftrightarrow{YZ} .
 - g. Use the points you've already labeled to name one angle. _____



2. Use the following directions to draw a figure in the box to the right.
 - a. Draw two points, W and X .
 - b. Use a straightedge to draw \overline{WX} .
 - c. Draw a new point that is not on \overline{WX} . Label it Y .
 - d. Draw \overline{WY} .
 - e. Draw a new point that is not on \overline{WX} or \overline{WY} . Label it Z .
 - f. Construct \overleftrightarrow{WZ} .
 - g. Identify $\angle ZWX$ by drawing an arc to indicate the position of the angle.
 - h. Identify another angle by referencing points that you have already drawn. _____



- 3.
- Observe the familiar figures below.
 - Label points on each figure and then use those points to label and name representations of each of the following in the table below: ray, line, line segment, and angle. Extend segments to show lines and rays.



	clock	die	number line
ray			
line			
line segment			
angle			

BONUS: Draw a familiar figure. Label it with points and then identify rays, lines, line segments, and angles as applicable.