### Geometry-Unit 1: Tools of Geometry

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<tr>
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<td>Sept 2</td>
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This is a tentative schedule, date may change. Please be sure to write down homework assignments daily.
### Geometry - Unit 1: Tools of Geometry

**Topic:** Unit 1 (12 days) - Tools of Geometry (Chapter 1)

**Key Learning(s):** Students will learn the basic geometry terms and their use for continuing geometry.

**Unit Essential Question(s):** Why is it important to learn the basic geometry terms and concepts before continuing the course?

### Optional Instructional Tools
- Ruler, protractor, graph/number line paper

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<thead>
<tr>
<th>Concept:</th>
<th>Points, Lines &amp; Planes (1.1 – 1 days)</th>
<th>Concept:</th>
<th>Segment Measure (1.2, 1.3 – 3 days)</th>
<th>Concept:</th>
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<tr>
<td><strong>Lesson EQ’s:</strong></td>
<td>What are the basic terms and their importance to Geometry?</td>
<td><strong>Lesson EQ’s:</strong></td>
<td>How are the lengths of segments used in everyday life?</td>
<td><strong>Lesson EQ’s:</strong></td>
<td>Why do we need to understand and use angles in Geometry?</td>
<td><strong>Lesson EQ’s:</strong></td>
<td>How are the pairs of angles classified?</td>
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| Vocabulary: | Point, line, plane, collinear, coplanar, space | Vocabulary: | Line segment, segment addition postulate, between, congruent, precision, constructions, midpoint, segment bisector, distance | Vocabulary: | Degree, vertex, ray, opposite ray, angles, sides, interior, exterior, acute angle, obtuse angle, right angle | Vocabulary: | Vertical angles, linear angles, adjacent angles, complementary angles, supplementary angles |

<table>
<thead>
<tr>
<th>Standards:</th>
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<tr>
<td><strong>Standards:</strong></td>
<td>M11.C.3.1.1 Calculate the distance and/or midpoint between 2 points on a number line or on a coordinate plane</td>
<td><strong>Standards:</strong></td>
<td>M11.B.2.1.1 Measure and/or compare angles in degrees (up to 360°) (protractor must be provided or drawn).</td>
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</table>
Define the following:

Space-

Collinear-

Coplanar-

**Naming Lines and Planes (See Chart)**

<table>
<thead>
<tr>
<th>Picture</th>
<th>Figure to name</th>
<th>How did you label it?</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image.jpg" alt="Diagram" /></td>
<td>A point on the plane.</td>
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<tr>
<td><img src="image2.jpg" alt="Diagram" /></td>
<td>A line that contains point G</td>
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<tr>
<td><img src="image3.jpg" alt="Diagram" /></td>
<td>A plane</td>
<td></td>
</tr>
<tr>
<td><img src="image4.jpg" alt="Diagram" /></td>
<td>A point not on the plane.</td>
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</tbody>
</table>
Drawing a Geometric Figure

1. Together:
   a. $TU$ lies in the plane $Q$ and contains the point $R$.

2. Check Your Progress (On Your Own)
   a. Draw and label a figure in which points $A$, $B$, and $C$ are coplanar and $B$ and $C$ are collinear.

Interpret Drawings:

1. Together, we will answer questions based on the picture to right:
   a. How many planes appear in this figure? _______________
   b. Name three collinear points. __________________________
   c. Are points $G$, $A$, $B$, and $D$ coplanar? __________________
   d. Where does $EF$ and $AB$ intersect? _______________
   e. Name the intersection of plane $GCD$ and plane $P$. __________

Reflection: What types of everyday objects could we use to represent these types of undefined terms?
1-1 Skills Practice

Points, Lines, and Planes

Refer to the figure.

1. Name a line that contains point D.

2. Name a point contained in line \( n \).

3. What is another name for line \( p \)?

4. Name the plane containing lines \( n \) and \( p \).

Draw and label a figure for each relationship.

5. Point \( K \) lies on \( RT \).

6. Plane \( J \) contains line \( s \).

7. \( \overline{YP} \) lies in plane \( B \) and contains point \( C \), but does not contain point \( H \).

8. Lines \( q \) and \( f \) intersect at point \( Z \) in plane \( \mathcal{U} \).

Refer to the figure.

9. How many planes are shown in the figure?

10. How many of the planes contain points \( F \) and \( E \)?

11. Name four points that are coplanar.

12. Are points \( A, B, \) and \( C \) coplanar? Explain.
Define the following vocabulary words:
- Be sure to use complete sentences
- Include an example or picture
- Relate it to real life

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<th>Definition</th>
<th>Picture/Example</th>
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<td>Congruent</td>
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<td>Midpoint</td>
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<td>Segment Addition</td>
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<td>Postulate</td>
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<tr>
<td>Distance</td>
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Definition:

Example 1: Find the value of $x$ and $KL$

Example 2: Find $x$ and $KL$

Example 3: Find the value of $x$ and $ST$ if $S$ is between $R$ and $T$ and: $RS = 7$, $ST = 3x$, and $RT = 25$

Example 4: Find $x$ and $LM$
Study Guide and Intervention  (continued)

Linear Measure and Precision

Calculate Measures  On $\overline{PQ}$, to say that point $M$ is between points $P$ and $Q$ means $P, Q, \text{ and } M$ are collinear and $PM + MQ = PQ$.

On $\overline{AC}, AB = BC = 3 \text{ cm}$. We can say that the segments are congruent, or $AB \cong BC$. Slashes on the figure indicate which segments are congruent.

Example 1  Find $EF$.

Calculate $EF$ by adding $ED$ and $DF$.

$ED + DF = EF$

$1.2 + 1.9 = EF$

$3.1 = EF$

Therefore, $EF$ is 3.1 centimeters long.

Example 2  Find $x$ and $AC$.

$B$ is between $A$ and $C$.

$AB + BC = AC$

$x + 2x = 2x + 5$

$3x = 2x + 5$

$x = 5$

$AC = 2x + 5 = 2(5) + 5 = 15$

Exercises

Find the measurement of each segment. Assume that the art is not drawn to scale.

1. $\overline{RT}$

2. $\overline{BC}$

3. $\overline{XZ}$

4. $\overline{WX}$

Find $x$ and $RS$ if $S$ is between $R$ and $T$.

5. $RS = 5x, ST = 3x, \text{ and } RT = 48$.

6. $RS = 2x, ST = 5x + 4, \text{ and } RT = 32$.

7. $RS = 6x, ST = 12, \text{ and } RT = 72$.

8. $RS = 4x, RS = ST, \text{ and } RT = 24$.

Use the figures to determine whether each pair of segments is congruent.

9. $\overline{AB} \text{ and } \overline{CD}$

10. $\overline{XY} \text{ and } \overline{YZ}$
GUIDED PRACTICE
Example: Find the distance between (2, 3) and (6,6)

\[ d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]

Example: Find the distance between (1, 4) and (6,8)

\[ d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]
Given the coordinate plane
(Two ordered pairs)

Step 1: Write formula from Formula Sheet
Step 2: Substitute x and y from the two given points
Step 3: Evaluate

GUIDED PRACTICE
Example: Find the midpoint between (2, 3) and (6,6)

\[
\left( \frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)
\]

Example: Find the midpoint between (1, 4) and (6,8)

\[
\left( \frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)
\]

Given a number line

Count the spaces between the two given points.
Divide by 2

Example: Find the midpoint between A and B

Example: Find the midpoint between D and F

Example: Find the midpoint between A and B
Find the length of each segment using the number line above:

1. $\overline{AD}$  
2. $\overline{HL}$  
3. $\overline{EJ}$  
4. $\overline{CG}$

Find the midpoint of the given segments using the number line above:

5. $\overline{AC}$  
6. $\overline{JM}$  
7. $\overline{DF}$  
8. $\overline{BG}$

Find the length of each segment given the two endpoints from the number line above:

9. -8 and 5  
10. -3 and 11  
11. -11 and -2

Distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$  
Midpoint formula: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Find the distance between the two points:

1. (5, 1) (-3, -3)  
2. (3, -4) (-2, -10)  
3. (-5, 6) (8, -4)

Find the midpoint between the two points:

4. (5, -2) (-1, 6)  
5. (5, 12) (-4, 8)  
6. Given J(-5, 10) and the midpoint of $\overline{JK}$ is (-8, 6) find the coordinate for K
Homework 1-3

Use the number line to find each measure.
1. $BD$
2. $DG$
3. $AF$
4. $EF$
5. $BG$
6. $AG$
7. $BE$
8. $DE$

Use the Distance Formula to find the distance between each pair of points.
13. $A(0, 0), B(15, 20)$
14. $O(-12, 0), P(-8, 3)$
15. $C(11, -12), D(6, 2)$
16. $E(-2, 10), F(-4, 3)$

Use the number line to find the coordinate of the midpoint of each segment.
1. $CE$
2. $DG$
3. $AF$
4. $EG$
5. $AB$
6. $BG$
7. $BD$
8. $DE$

Find the coordinates of the midpoint of a segment having the given endpoints.
9. $A(0, 0), B(12, 8)$
10. $R(-12, 8), S(6, 12)$
11. $M(11, -2), N(-9, 13)$
12. $E(-2, 6), F(-9, 3)$
13. $S(10, -22), T(9, 10)$
14. $M(-11, 2), N(-19, 6)$
Define the following vocabulary words:
- Be sure to use complete sentences
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<td>Vertex</td>
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<tr>
<td>Rays (Sides)</td>
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<tr>
<td>Straight Angle</td>
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<tr>
<td>Angle</td>
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<td>Right Angle</td>
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<td>Acute Angle</td>
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<td>Obtuse Angle</td>
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Angles and Their Parts

1. Together, we are going to identify parts using the diagram to the right
   a. Name 3 angles that have W as a vertex.
   b. Name all the sides of \( \angle 1 \).
   c. Write another name for \( \angle WYZ \).
   d. Name a pair of opposite rays.

How to read a protractor:

1. Put the dot in the center on the vertex
2. Line up the protractor with one of the rays crossing the 0
3. Read where the arrow crosses and use the correct number. (Big Angle Big #, Small Angle Small #)

Find: \( m \angle ADC = \) \( m \angle BDC = \) \( m \angle BDA = \) (challenge problem)
How to draw angles using a protractor:
1. Draw a ray
2. Place protractor with center dot at endpoint on ray
3. Using the numbers carefully mark the number you need on the outside of the protractor
4. Draw a new ray from the endpoint to the mark you made

<table>
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<tr>
<th>80°</th>
<th>95°</th>
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<th>120°</th>
<th>100°</th>
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<tr>
<td></td>
<td></td>
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<tr>
<td>$22^\circ$</td>
<td>$168^\circ$</td>
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<td>------------</td>
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<tr>
<td>$51^\circ$</td>
<td>$107^\circ$</td>
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Opposite Rays -

The rays that form an angle are called the _________.

The common endpoint is the ______________.

The ____________ is the points inside the angle.

The ____________ is the points outside the angle.

Angles can be classified by their measures

<table>
<thead>
<tr>
<th>Straight</th>
<th>Right</th>
<th>Acute</th>
<th>Obtuse</th>
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</thead>
</table>

Classify each angle:

1. 

2. 

3. 

4. 

5. 

6.
Skills Practice

Angle Measure

For Exercises 1–12, use the figure at the right.

Name the vertex of each angle.
1. \( \angle 4 \)
2. \( \angle 1 \)
3. \( \angle 2 \)
4. \( \angle 5 \)

Name the sides of each angle.
5. \( \angle 4 \)
6. \( \angle 5 \)

7. \( \angle STV \)
8. \( \angle 1 \)

Write another name for each angle.
9. \( \angle 3 \)
10. \( \angle 4 \)

11. \( \angle WTS \)
12. \( \angle 2 \)

Measure each angle and classify it as right, acute, or obtuse.
13. \( \angle NMP \)
14. \( \angle OMN \)
15. \( \angle QMN \)
16. \( \angle QMO \)

ALGEBRA In the figure, \( \overline{BA} \) and \( \overline{BC} \) are opposite rays, \( \overline{BD} \) bisects \( \angle EBC \), and \( \overline{BF} \) bisects \( \angle ABE \).

17. If \( m \angle EBD = 4x + 16 \) and \( m \angle DBC = 6x + 4 \), find \( m \angle EBD \).

18. If \( m \angle ABF = 7x - 8 \) and \( m \angle EBF = 5x + 10 \), find \( m \angle EBF \).
Define the following vocabulary words:
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<td>Supplementary Angles</td>
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Using Algebra with Angles

1. Together we will solve for:
   a. Suppose $\angle ABC \cong \angle DBF$ as shown, find the actual measure of each angle.
   b. Suppose $\overrightarrow{QP}$ and $\overrightarrow{QR}$ are opposite rays, and $\overrightarrow{QT}$ bisects $\angle QRS$. If $\angle RQT = 6x + 5$ and $\angle SQT = 7x - 2$. Find the measure of $\angle RQT$.

2. Check Your Progress (On Your Own)
   i. Hint Draw a Diagram to help you visualize.
   a. Suppose $\angle JKL \cong \angle MKN$. If $\angle JKL = 5x + 4$ and $\angle MKN = 3x + 12$. Find the actual measure of each angle.
   b. Suppose $\overrightarrow{QP}$ and $\overrightarrow{QR}$ are opposite rays, and $\overrightarrow{QT}$ bisects $\angle QRS$. If $\angle QRS = 22a - 11$ and $\angle RQT = 12a - 8$. Find the measure of $\angle TQS$. 

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Study Guide and Intervention (continued)

Angle Measure

Congruent Angles Angles that have the same measure are congruent angles. A ray that divides an angle into two congruent angles is called an angle bisector. In the figure, \( \overline{PN} \) is the angle bisector of \( \angle MPR \). Point \( N \) lies in the interior of \( \angle MPR \) and \( \angle MPN \cong \angle NPR \).

Example Refer to the figure above. If \( m\angle MPN = 2x + 14 \) and \( m\angle NPR = x + 34 \), find \( x \) and find \( m\angle MPR \).

Since \( \overline{PN} \) bisects \( \angle MPR \), \( \angle MPN \cong \angle NPR \), or \( m\angle MPN = m\angle NPR \).

\[
2x + 14 = x + 34 \\
x + 14 = 34 \\
x + 14 - 14 = 34 - 14 \\
x = 20
\]

Since \( m\angle MPN = m\angle NPR \),

\[
m\angle MPR = (2x + 14) + (x + 34) = 54 + 54 = 108
\]

Exercises

\( \overline{QS} \) bisects \( \angle PQT \), and \( \overline{QP} \) and \( \overline{QR} \) are opposite rays.

1. If \( m\angle PQT = 60 \) and \( m\angle PQS = 4x + 14 \), find the value of \( x \).

2. If \( m\angle PQS = 3x + 13 \) and \( m\angle SQT = 6x - 2 \), find \( m\angle PQT \).

\( \overline{BA} \) and \( \overline{BC} \) are opposite rays, \( \overline{BF} \) bisects \( \angle CBE \), and \( \overline{BD} \) bisects \( \angle ABE \).

3. If \( m\angle EBF = 6x + 4 \) and \( m\angle CBF = 7x - 2 \), find \( m\angle EBC \).

4. If \( m\angle 1 = 4x + 10 \) and \( m\angle 2 = 5x \), find \( m\angle 2 \).

5. If \( m\angle 2 = 6y + 2 \) and \( m\angle 1 = 8y - 14 \), find \( m\angle ABE \).

6. Is \( \angle DBF \) a right angle? Explain.
Use the picture below to answer the following questions:

1. Name two obtuse vertical angles

2. Name two acute adjacent angles

3. Name a linear pair

**Perpendicular**

Find \(x\) and \(y\) so that the lines are perpendicular.
1. Two angles are supplementary. One is 3 times the other. What is the measure of each angle?

2. An angle measures 3x. Its complement is 9 more than that. What is the measure of each angle?

3. Angle 1 is \((5x - 3)^\circ\). Angle 2 is \((2x + 9)^\circ\). Angle 1 and Angle 2 are vertical angles. Find the measure of each angle.

4. Find \(m\angle T\) if \(m\angle T\) is 20 more than 4 times the measure of its supplement.
Angle Practice: Look at the picture, then determine what type of angles you have and how to find their measure using the boxes provided. Then SOLVE for \(x\), and find the measurement of each angle!

### First Equation

\[
3x + 20 = 2x + 56
\]

**Solution:**

Circle the type of angle you have and the measurement:

- Vertical
- Supplementary

Are they equal to?

- Each other
- Ninety Degrees
- One-hundred Eighty

**Solution:**

\[
4x + 40 = 2x + 20
\]

**Solution:**

Circle the type of angle you have and the measurement:

- Vertical
- Supplementary

Are they equal to?

- Each other
- Ninety Degrees
- One-hundred Eighty

**Solution:**

\[
5x = 4x
\]

**Solution:**

Circle the type of angle you have and the measurement:

- Vertical
- Supplementary

Are they equal to?

- Each other
- Ninety Degrees
- One-hundred Eighty

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Geometry-Unit 1: Tools of Geometry

Solution:

Circle the type of angle you have and the measurement:
Vertical  Complementary  Supplementary
Are they equal to?
Each other  Ninety Degrees  One-hundred Eighty
Angle Homework: Look at the picture, then determine what type of angles you have and how to find their measure using the boxes provided. Then SOLVE for x, and find the measurement of each angle!

Circle the type of angle you have and the measurement:
- Vertical
- Complementary
- Supplementary

Are they equal to?
- Each other
- Ninety Degrees
- One-hundred Eighty

Solution:

Circle the type of angle you have and the measurement:
- Vertical
- Complementary
- Supplementary

Are they equal to?
- Each other
- Ninety Degrees
- One-hundred Eighty

Solution:

Circle the type of angle you have and the measurement:
- Vertical
- Complementary
- Supplementary

Are they equal to?
- Each other
- Ninety Degrees
- One-hundred Eighty

Solution:
1. Name two acute vertical angles.

2. Name two obtuse vertical angles.

3. Name a linear pair.

4. Name two acute adjacent angles.

5. Name an angle complementary to $\angle EKH$.

6. Name an angle supplementary to $\angle FKG$.

7. Find the measures of an angle and its complement if one angle measures 18 degrees more than the other.

8. The measure of the supplement of an angle is 36 less than the measure of the angle. Find the measures of the angles.

**ALGEBRA** For Exercises 9–10, use the figure at the right.

9. If $m\angle RTS = 8x + 18$, find $x$ so that $\overline{TR} \perp \overline{TS}$.

10. If $m\angle PTQ = 3y - 10$ and $m\angle QTR = y$, find $y$ so that $\angle PTR$ is a right angle.

Determine whether each statement can be assumed from the figure. Explain.

11. $\angle WZU$ is a right angle.

12. $\angle YZU$ and $\angle UZV$ are supplementary.

13. $\angle VZU$ is adjacent to $\angle YZX$. 