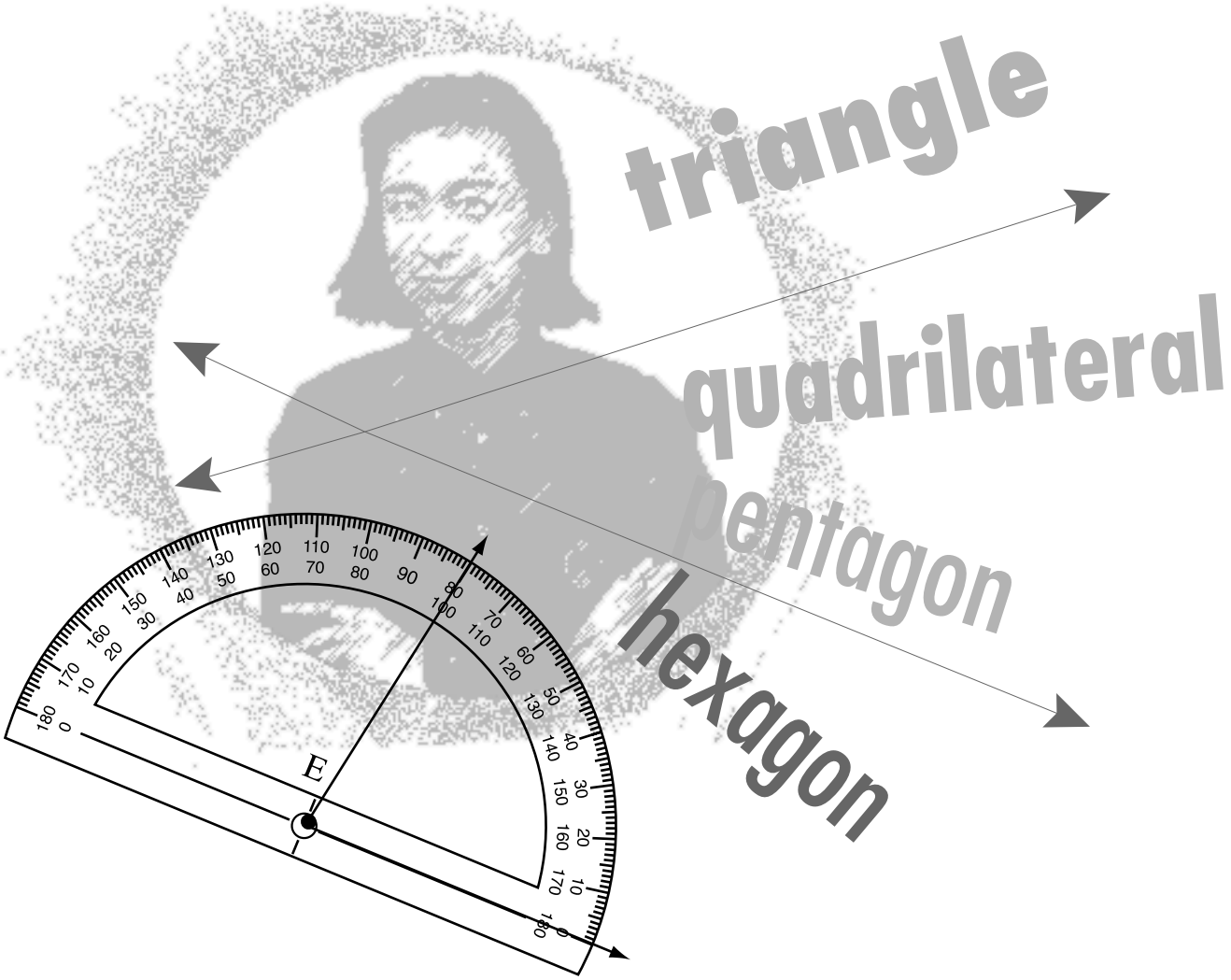
LESSON F5.1 – GEOMETRY I



Overview

To see these Review problems worked out, go to the Overview module of this lesson on the computer.

We see geometric shapes all around us in nature, in architecture, in business, and in art. In this lesson you will learn how to identify lines, line segments, and rays. Then, you will study different types of polygons. Finally, you will learn how to measure and classify angles.

Before you begin, you may find it helpful to review the following mathematical ideas which will be used in this lesson. To help you review, you may want to work out each example.

To see these Review problems worked out, go to the Overview module of this lesson on the computer.

Review 1 Subtracting whole numbers

Do this subtraction: 180 – 52

Answer: 128

Review 2 Subtracting a mixed number from a whole number

Do this subtraction: $180 - 117\frac{1}{2}$

Answer: $62\frac{1}{2}$

Review 3 Subtracting a decimal number from a whole number

Do this subtraction: 90 – 42.38

Answer: 47.62

Review 4 Solving an equation of the form $x + a = b$

Solve this equation for x: $x + 24 = 90$

Answer: $x = 66$

Explain

In Concept 1: Geometric Figures, you will learn about:

- **Identifying Points, Lines, Line Segments, and Rays**
- **The Definition of a Polygon**
- **Measuring an Angle**
- **Classifying Angles as Acute, Right, Obtuse, or Straight**
- **The Definitions of Complementary, Supplementary, Adjacent, and Vertical Angles**

CONCEPT 1: GEOMETRIC FIGURES

Identifying Points, Lines, Line Segments, and Rays

Points, lines, line segments, and rays are basic geometric figures.

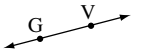
To name a **point**, use a capital letter.

point D

A straight **line segment** connects two points. To name a line segment, use its two endpoints.

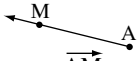
line segment $\overline{KL}$ or $\overline{LK}$

Each line segment is part of a **line**, that extends without end in both directions. To name a line, use any two of its points, or a lowercase letter.

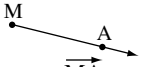


line $\overleftrightarrow{GV}$ or $\overleftrightarrow{VG}$

A **ray** is part of a line that extends without end in just one direction. To name a ray, start with its endpoint and use one of its other points.



ray $\overrightarrow{AM}$



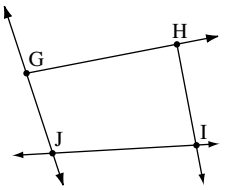
ray $\overrightarrow{MA}$

You may find these Examples useful while doing the homework for this section.

Example 1

You may find these Examples useful while doing the homework for this section.

1. Name the points, lines, line segments, and rays in this figure.



The points are G, H, I, and J.

The lines are $\overleftrightarrow{GJ}$ (or $\overleftrightarrow{JG}$) and $\overleftrightarrow{JI}$ (or $\overleftrightarrow{IJ}$).

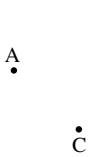
The line segments are $\overline{GH}$, $\overline{HI}$, $\overline{IJ}$, and $\overline{GJ}$ (or $\overline{HG}$, $\overline{IH}$, $\overline{JI}$, and $\overline{JG}$).

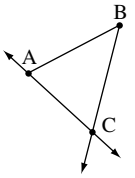
The rays are $\overrightarrow{GH}$ and $\overrightarrow{HI}$.

*Notice that the **ray** $\overrightarrow{GH}$ has one endpoint, while the **line segment** $\overline{GH}$ has two endpoints.*

Example 2

2. Using the points in this figure, sketch $\overline{AB}$, $\overleftrightarrow{AC}$, and $\overrightarrow{BC}$.





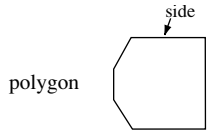
Line segment $\overline{AB}$ joins its endpoints, A and B.

Line $\overleftrightarrow{AC}$ goes through points A and C, and extends without end in both directions.

Ray $\overrightarrow{BC}$ starts at endpoint B and extends without end through point C.

The Definition of a Polygon

A **polygon** is a figure made up of straight line segments joined endpoint to endpoint without crossing and without any gaps. Each line segment is called a **side** of the polygon.

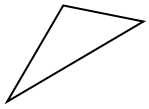


Each endpoint is shared by exactly two segments.

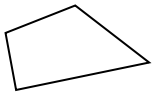
A polygon consists of the points on its line segments. A polygon does **not** include the points inside.

The name of a polygon depends on the number of its sides:

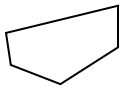
A polygon with 3 sides is a **triangle**.



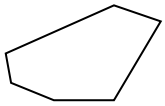
A polygon with 4 sides is a **quadrilateral**.



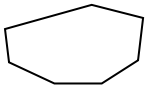
A polygon with 5 sides is a **pentagon**.



A polygon with 6 sides is a **hexagon**.

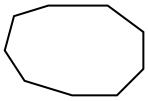


A polygon with 7 sides is a **heptagon**.

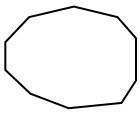


A polygon with 8 sides is an **octagon**.

A polygon with 9 sides in a **nonagon**.



A polygon with 10 sides is a **decagon**.



Example 3

3. Which of these figures are polygons?

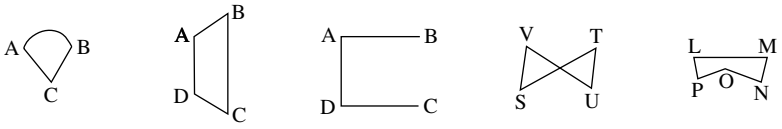


Figure 1 *Figure 2* *Figure 3* *Figure 4* *Figure 5*

*Figure 1 is **not** a polygon, because one of its sides is not a straight line segment.*

Figure 2 is a polygon, because it is made up of straight line segments joined endpoint to endpoint without crossing and without any gaps.

*Figure 3 is **not** a polygon, because there is a gap between endpoints B and C.*

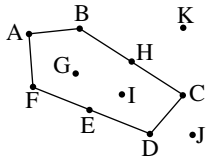
*Figure 4 is **not** a polygon, because segments $\overline{ST}$ and $\overline{UV}$ cross each other.*

(If you mark the point where $\overline{ST}$ and $\overline{UV}$ cross each other and label this point W, the figure is still not a polygon, since the endpoint W is shared by more than 2 line segments.)

Figure 5 is a polygon, because it is made up of straight line segments joined endpoint to endpoint without crossing and without any gaps.

Example 4

4. Name the labeled points in this figure that are **on** the polygon.



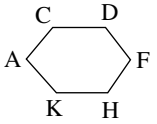
The points A, B, C, D, E, F, and H are on the polygon.

*(The points G and I are inside the polygon. The points J and K are outside the polygon. So, the points G, I, J, nd K are **not** on the polygon.)*

Example 5

5. Draw a hexagon.

Here is an example of a hexagon.



The figure shown is a hexagon, because it is a polygon with 6 sides.

6. Which of these figures is a decagon?

Example 6

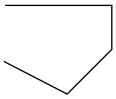


Figure 1

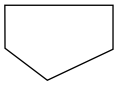


Figure 2

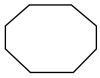


Figure 3

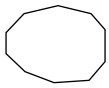


Figure 4

Figure 4 is a decagon, because it is a polygon with 10 sides.

*Figure 1 is **not** a decagon, because it is not a polygon.*

*Figure 2 is **not** a decagon, because it is a polygon with 5 sides.*

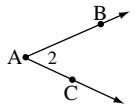
*Figure 3 is **not** a decagon, because it is a polygon with 8 sides.*

Measuring an Angle

An **angle** is formed by two rays that have the same endpoint.

Each ray is called a **side** of the angle.

The point where the rays meet is called the **vertex** of the angle.



There are 3 ways to name an angle:

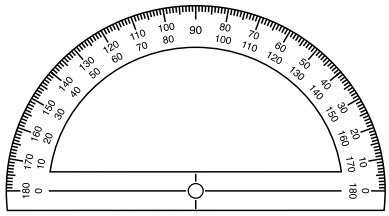
(a) using its vertex: $\angle A$

(b) using three points, one on each ray with the vertex in the middle: $\angle BAC$

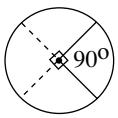
(c) using a number (or letter) inside the angle: $\angle 2$

The symbol "$\angle$" means "angle."

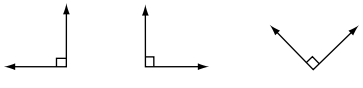
The device used to measure an angle is called a **protractor**, which fits in half a circle. An angle is measured in degrees. A complete circle has 360 degrees (360˚). Each of the two scales on a protractor go from 0˚ to 180˚, one scale in each direction.



An angle that makes a square corner is called a **right angle**. The measure of a right angle is 90˚. One way to see this is to observe that four right angles fit precisely inside a circle. ($4 \times 90˚ = 360˚$)

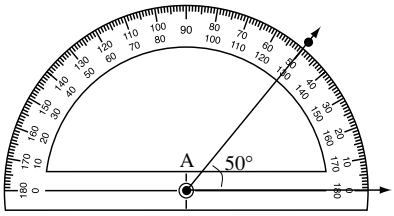


Here are three right angles:



To use a protractor to measure an angle:

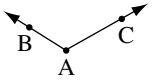
- First, estimate whether the angle measure is greater than 90˚ or less than 90˚.
- Place the vertex point of the protractor at the vertex of the angle.
- Line up the 0˚ line along one ray of the angle.
- Find the two numbers on the protractor where the other ray crosses the protractor scales. To decide which number to choose, use your estimate.



The measure of angle A is less than 90˚, so the measure of angle A is 50˚.
You can write m∠A = 50˚(m means measure).

Example 7

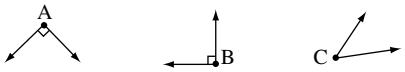
7. Write another way to name ∠BAC.



Another way to name ∠BAC is by using its vertex: ∠A

Example 8

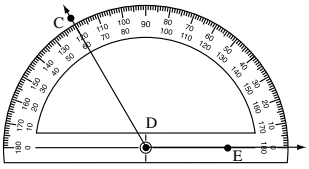
8. Which of these angles is not a right angle?



∠C is not a right angle, since it does not make a square corner.

Example 9

9. Use this protractor to find the measure of ∠CDE.



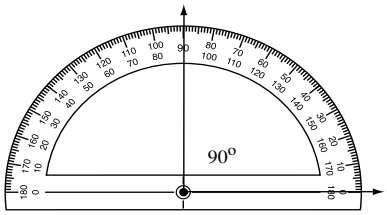
To find the measure of ∠CDE:

- *Estimate whether the measure of ∠CDE is more than 90˚ or less than 90˚. The angle measure is* ***more than*** *90˚.*
- *The angle measures shown on the protractor are 60˚ and 120˚.*

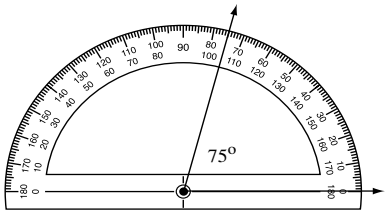
So, m∠CDE = 120˚.

Classifying Angles as Acute, Right, Obtuse, or Straight

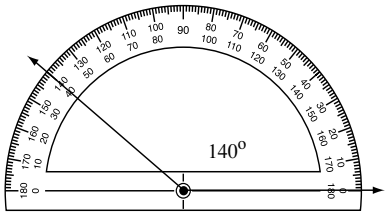
An angle with measure 90° is called a **right angle**.



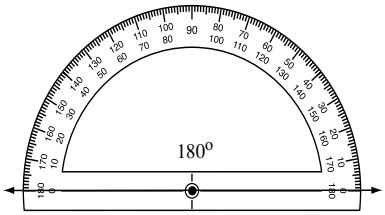
An angle with measure less than 90° is called an **acute angle**.



An angle with measure between 90° and 180° is called an **obtuse angle**.

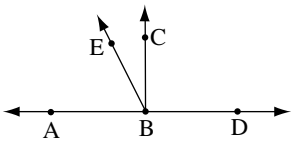


An angle with measure 180° is called a **straight angle**. The rays of a straight angle form a straight line.



Example 10

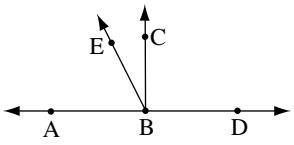
10. In this figure, name a right angle.



∠ABC is a right angle.
Also, ∠CBD is a right angle.

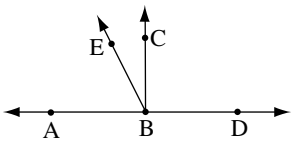
Example 11

11. In this figure, name an acute angle.



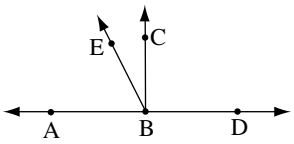
∠ABE is an acute angle.
Also, ∠EBC is an acute angle.

Example 12 12. In this figure, name an obtuse angle.



∠EBD is an obtuse angle.

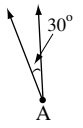
Example 13 13. In this figure, name a straight angle.

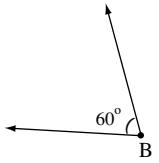


∠ABD is a straight angle.

Complementary, Supplementary, Adjacent, and Vertical Angles

Two angles whose measures add to 90° are called **complementary angles**.



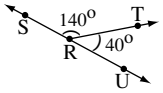


$m\angle A = 30^\circ$ $m\angle B = 60^\circ$

$30^\circ + 60^\circ = 90^\circ$

So, ∠A and ∠B are complementary angles.

Two angles whose measures add to 180° are called **supplementary angles**.

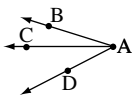


$m\angle SRT = 140^\circ$, $m\angle TRU = 40^\circ$

$140^\circ + 40^\circ = 180^\circ$

So, ∠SRT and ∠TRU are supplementary angles.

Two angles that have the same vertex and that share a side that lies between them are called **adjacent angles**.

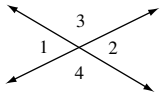


∠BAC and ∠CAD have the same vertex A.

∠BAC and ∠CAD share the side $\overline{AC}$ that lies between them.

So, ∠BAC and ∠CAD are adjacent angles.

Two angles that have the same vertex and whose sides form two straight lines are called **vertical angles**. Vertical angles have the same measure. Vertical angles are also called **opposite angles**.

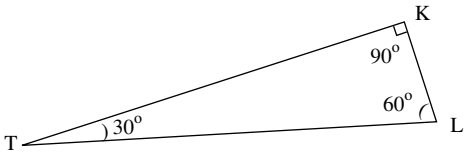


$\angle 1$ and $\angle 2$ are vertical angles.

$\angle 3$ and $\angle 4$ are vertical angles.

14. In this triangle, name a pair of complementary angles.

Example 14



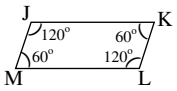
m $\angle T = 30^\circ$ *m* $\angle L = 60^\circ$

$30^\circ + 60^\circ = 90^\circ$.

So $\angle T$ *and* $\angle L$ *are complementary angles.*

15. In this parallelogram, name a pair of supplementary angles.

Example 15



$120^\circ + 60^\circ = 180^\circ$. *So* $\angle J$ *and* $\angle K$ *are supplementary angles.*

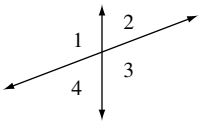
$120^\circ + 60^\circ = 180^\circ$. *So* $\angle J$ *and* $\angle M$ *are supplementary angles.*

$120^\circ + 60^\circ = 180^\circ$. *So* $\angle L$ *and* $\angle K$ *are supplementary angles.*

$120^\circ + 60^\circ = 180^\circ$. *So* $\angle L$ *and* $\angle M$ *are supplementary angles.*

16. In this figure, name a pair of adjacent angles.

Example 16

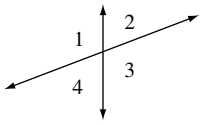


$\angle 1$ and $\angle 2$ are adjacent angles, since they have the same vertex and share a side that lies between them.

Other pairs of adjacent angles in this figure are $\angle 1$ and $\angle 4$, $\angle 2$ and $\angle 3$, and $\angle 3$ and $\angle 4$.

Example 17

17. In this figure, name a pair of vertical angles.



∠1 and ∠3 are vertical angles, since they have the same vertex and their sides form two lines.

∠2 and ∠4 are also vertical angles.

Example 18

18. Suppose:

m∠S = 20°

m∠T = 70°

m∠U = 160°

Which pair of angles is complementary?

Which pair of angles is supplementary?

Angles S and T are complementary angles, since their measures add to 90°. (20° + 70° = 90°)

Angles S and U are supplementary angles, since their measures add to 180°. (20° + 160° = 180°)

Explore

This Explore contains two investigations.

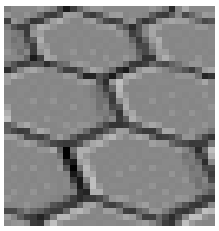
- **Tiling with Polygons**
- **What's the Sum?**

You have been introduced to these investigations in the Explore module of this lesson on the computer. You can complete them using the information given here.

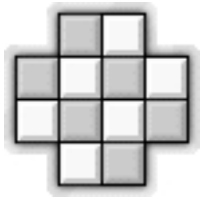
Investigation 1: Tiling with Polygons

Here, you will explore which polygons may be placed side by side with no gaps between them. Such an arrangement of shapes is called a **tessellation**.

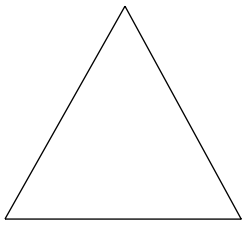
In the animal kingdom, one example of a tessellation is the honeycomb constructed by bees. The cells in a honeycomb are hexagons, placed side by side with no gaps between them.

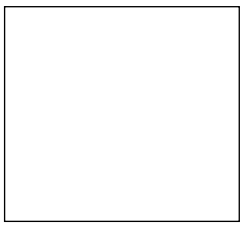


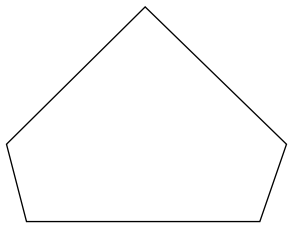
Tiled floors (in which all the tiles are the same shape and size) are also tessellations. That's why tessellation is sometimes called **tiling**.

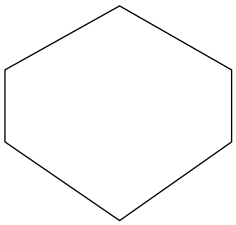


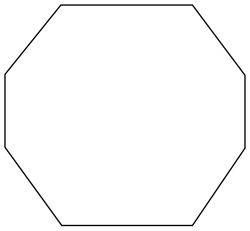
1. Some polygons tessellate and some do not. Use the templates on the following page to find examples of polygons that tessellate and those that don't. (Trace each template, and cut out copies of each one. Which polygons could you use to tile a floor?)
2. Measure the angles in each of the polygons. What is true about the angles in polygons that tessellate that's not true for polygons that do not tessellate? Hint: Consider the angles that share a common vertex in each tessellation.
3. Find at least 5 pictures of tessellations. You can find good examples in the architecture of the Spanish Moors, such as the Alhambra, and in the art of M. C. Escher. In addition to wall and floor mosaics in architecture, you may find examples of rugs, quilts, and pottery. For each of your examples, describe the basic shape that forms the tessellation.
4. Design your own shape to make a tessellation.

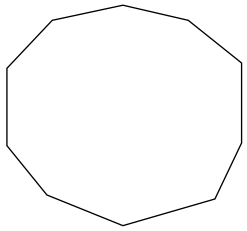


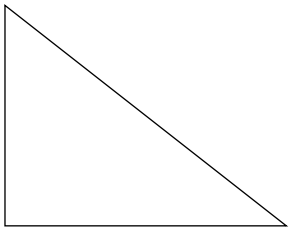


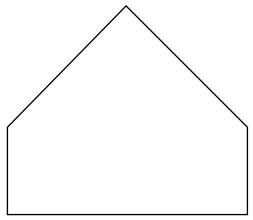


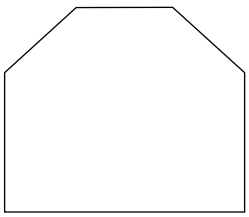


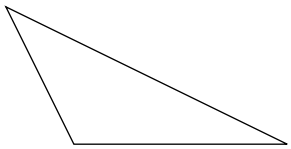


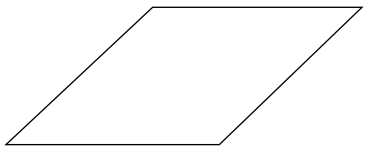


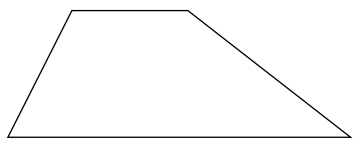










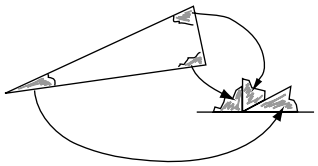


Investigation 2: What's the Sum?

Here you will investigate the sum of the measures of the angles of a polygon.

1. The Angle Sum of a Triangle

   The sum of the measures of the angles of a triangle is 180°. One way to see this is to draw and cut out a triangle. Tear off each of the three corners of the triangle, and place them side by side, with their vertices at the same point. (See the picture.)



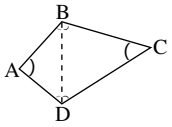
   Together, the 3 angles of the triangle form a straight angle, which is an angle whose measure is 180°.

   Test this result another way. Draw a triangle and measure each of the angles with your protractor. What is the sum of the measures of the 3 angles?

2. The Angle Sum of a Quadrilateral

   Draw a quadrilateral and measure its angles with your protractor. What is the sum of the measures of the angles of a quadrilateral?

   Here's another way to think about the angle sum in a quadrilateral. Draw a **diagonal** in the quadrilateral by connecting two vertices that aren't already connected. Now the quadrilateral is subdivided into two triangles. Since the sum of the measures of the angles of each triangle is 180°, the sum of the measures of the angles of a quadrilateral is 180° + 180°, which is 360°.



   The angle sum in triangle ABD is 180°.

   The angle sum in triangle BDC is 180°.

   So, the angle sum in quadrilateral ABCD is 180° + 180° = 360°.

3. Finding a Pattern in the Sum of the Measures of the Angles of a Polygon

In the same way, investigate the sum of the measures of the angles in other polygons. Record your results in this table. Predict the sum of the measures of the angles of a polygon with 20 sides and of a polygon with 100 sides. Write an expression for the sum of the measures of the angles of a polygon with N sides.

Polygon	Number of Sides	Number of Triangles	Angle Sum
Triangle	3	1	180°
Quadrilateral	4	2	360°
Pentagon			
Hexagon			
Heptagon			
Octagon			
Nonagon			
Decagon			
Icosagon	20		
100-gon	100		
N-gon	N		

Homework

CONCEPT 1: GEOMETRIC FIGURES

Identifying Points, Lines, Line Segments, and Rays

For help working these types of problems, go back to Examples 1–2 in the Explain section of this lesson.

1. In Figure 1, name a point.
2. In Figure 1, name a line segment.
3. In Figure 1, name a line.
4. In Figure 1, name a ray.

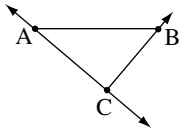


Figure 1

5. In Figure 2, circle point A.
6. Using the points in Figure 2, draw $\overline{AB}$.
7. Using the points in Figure 2, draw $\overleftrightarrow{BC}$.
8. Using the points in Figure 2, draw $\overrightarrow{CD}$.
9. Using the points in Figure 2, draw $\overrightarrow{ED}$.

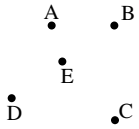


Figure 2

10. Draw a figure with 3 line segments that intersect in a single point.
11. Draw a figure with 2 rays that do not intersect.
12. Draw a figure with 2 lines that do not intersect.
13. Draw a figure with 3 lines that intersect in a single point.
14. Draw a figure with 4 rays that intersect in a single point.
15. How many endpoints does a line segment have?
16. How many endpoints does a line have?
17. How many endpoints does a ray have?
18. Give two names for the line segment that has endpoints M and N.
19. Name the ray that has endpoint K and contains the point L.
20. Name the ray that has endpoint L and contains the point K.
21. Give two names for the line that contains points U and V.
22. Give three names for the line that contains points F, G, and H.
23. Name two points that lie on the line segment $\overline{CD}$.
24. Name two points that lie on the ray $\overrightarrow{OP}$.

The Definition of a Polygon

For help working these types of problems, go to Examples 3–6 in the Explain section of this lesson.

25. Which of these figures is a polygon?

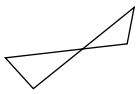


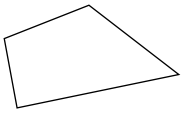
Figure 1

Figure 2

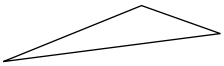
Figure 3

Figure 4

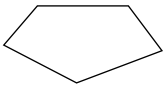
26. What is the name of this polygon?



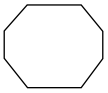
27. What is the name of this polygon?



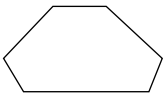
28. What is the name of this polygon?



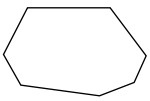
29. What is the name of this polygon?



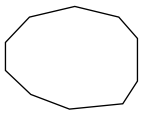
30. What is the name of this polygon?



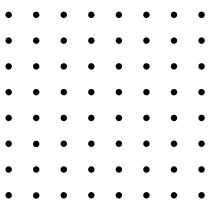
31. What is the name of this polygon?



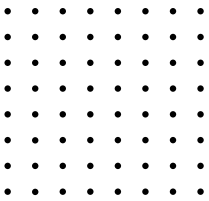
32. What is the name of this polygon?



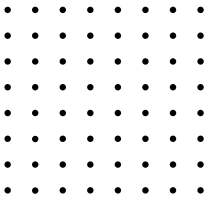
33. Draw a triangle on this grid. Mark and label 6 points on the triangle.



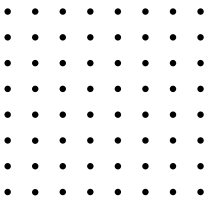
34. Draw a quadrilateral on this grid. Mark and label 6 points on the quadrilateral.



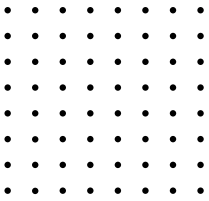
35. Draw a pentagon on this grid. Mark and label 6 points on the pentagon.



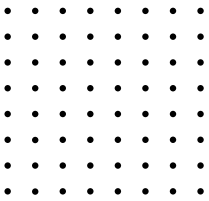
36. Draw a hexagon on this grid. Mark and label 10 points on the hexagon.



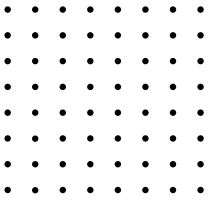
37. Draw a heptagon on this grid. Mark and label 10 points on the heptagon.



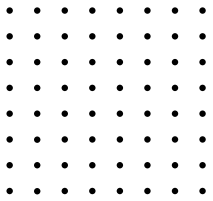
38. Draw an octagon on this grid. Mark and label 10 points on the octagon.



39. Draw a nonagon on this grid. Mark and label 10 points on the nonagon.



40. Draw a decagon on this grid. Mark and label 12 points on the decagon.



41. In Figure 3, name a triangle.

42. In Figure 3, name a quadrilateral.

43. In Figure 3, name a pentagon.

44. In Figure 3, name a hexagon.

45. In Figure 3, name a heptagon.

46. In Figure 3, name an octagon.

47. In Figure 3, name a nonagon.

48. In Figure 3, name a decagon.

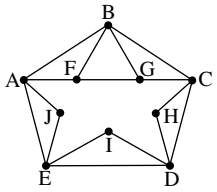
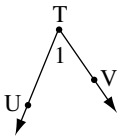


Figure 3

Measuring an Angle

For help working these types of problems, go to Examples 7–9 in the Explain section of this lesson.

49. Write another way to name $\angle 1$.



50. Name a side of the angle in Figure 4.

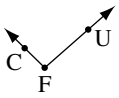
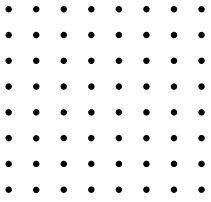


Figure 4

51. Name the vertex of the angle in Figure 4.

52. Draw a right angle on this grid.



53. What is the measure of a right angle?

54. Give an example of an angle in everyday life whose measure is 90˚.

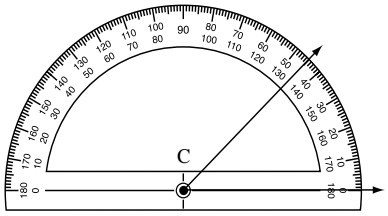
55. Draw an angle whose measure is less than 90˚.

56. Give an example of an angle in everyday life whose measure is less than 90˚.

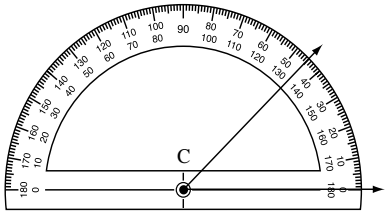
57. Draw an angle whose measure is greater than 90˚.

58. Give an example of an angle in everyday life whose measure is greater than 90˚.

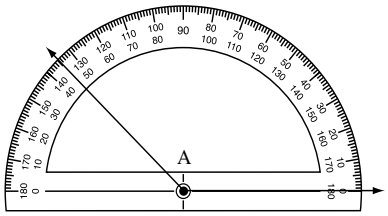
59. In the figure below, is the measure of ∠C greater than 90˚ or less than 90˚?



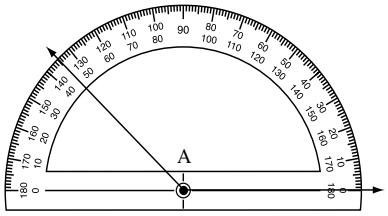
60. In the figure below, use the protractor to find the measure of ∠C.



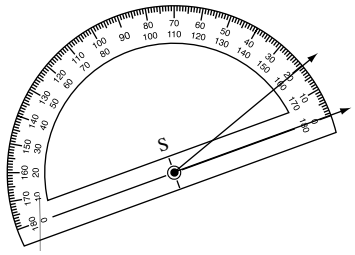
61. In the figure below, is the measure of ∠A greater than 90˚ or less than 90˚?



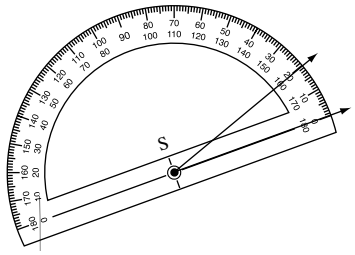
62. In the figure below, use the protractor to find m∠A.



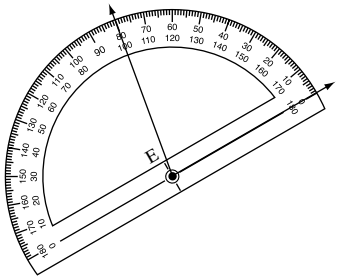
63. In the figure below, is the measure of ∠S greater than 90˚ or less than 90˚?



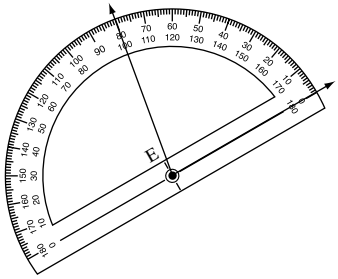
64. In the figure below, use the protractor to find m∠S.



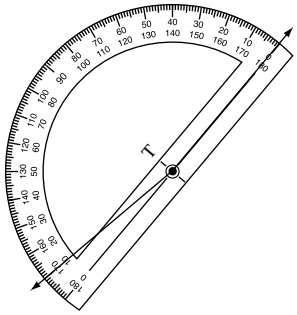
65. In the figure below, is the measure of ∠E greater than 90° or less than 90°?



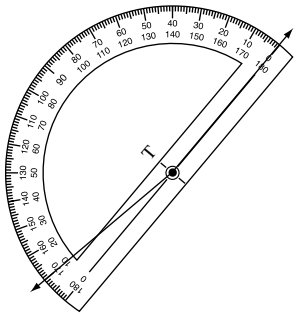
66. In the figure below, use the protractor to find m∠E.



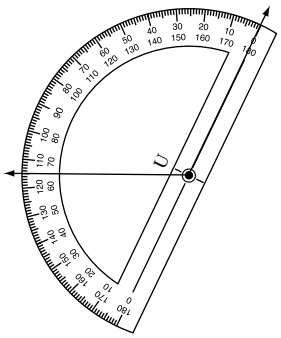
67. In the figure below, is the measure of ∠T greater than 90° or less than 90°?



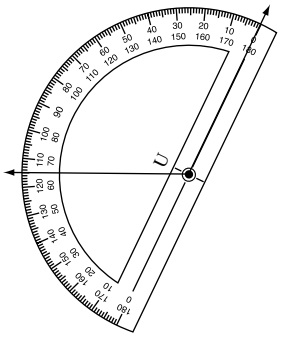
68. In the figure below, use the protractor to find m∠T.



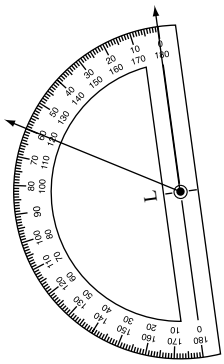
69. In the figure below, is the measure of $\angle U$ greater than 90° or less than 90°?



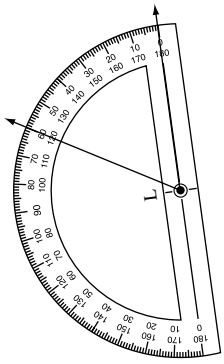
70. In the figure below, use the protractor to find $m\angle U$.



71. In the figure below, is the measure of $\angle L$ greater than 90° or less than 90°?



72. In the figure below, use the protractor to find $m\angle L$.



Classifying Angles as Acute, Right, Obtuse, or Straight

For help working these types of problems, go to Examples 10–13 in the Explain section of this lesson.

73. In Figure 5, name a right angle.

74. In Figure 5, name an obtuse angle.

75. In Figure 5, name an acute angle.

76. In Figure 5, name a straight angle.

77. In Figure 5, how many right angles can you name?

78. In Figure 5, how many obtuse angles can you name?

79. In Figure 5, how many acute angles can you name?

80. In Figure 5, how many straight angles can you name?

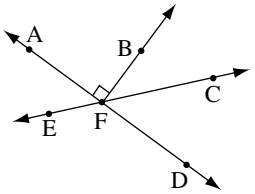


Figure 5

81. If an angle measures 89.5°, is it an acute, obtuse, right, or straight angle?

82. If an angle measures $93\frac{1}{3}^{\circ}$, is it an acute, obtuse, right, or straight angle?

83. If an angle measures 22.5°, is it an acute, obtuse, right, or straight angle?

84. If an angle measures 180°, is it an acute, obtuse, right, or straight angle?

85. On the grid in Figure 6, draw an acute angle.

86. On the grid in Figure 6, draw a straight angle.

87. On the grid in Figure 6, draw an obtuse angle.

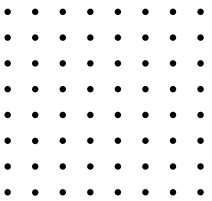
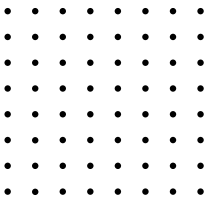


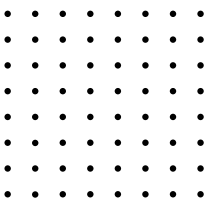
Figure 6

88. Without drawing a picture, how would you describe a right angle to a person who doesn't know what a right angle is?

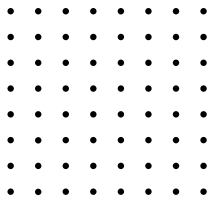
89. On this grid, draw a triangle that has 1 right angle and 2 acute angles.



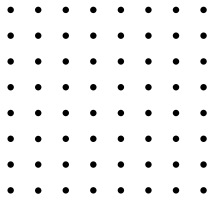
90. On this grid, draw a triangle that has 1 obtuse angle and 2 acute angles.



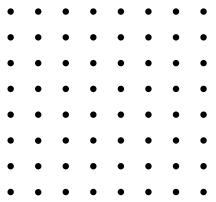
91. On this grid, draw a triangle that has 3 acute angles.



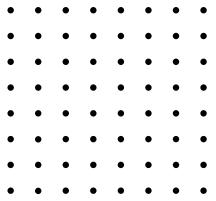
92. On this grid, draw a quadrilateral that has 4 right angles.



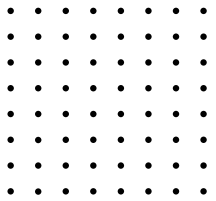
93. On this grid, draw a quadrilateral that has 2 acute angles and 2 obtuse angles.



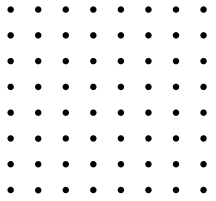
94. On this grid, draw a quadrilateral that has 2 right angles, 1 acute angle and 1 obtuse angle.



95. On this grid, draw a hexagon that has 6 obtuse angles.



96. On this grid, draw a hexagon that has 2 right angles, 2 obtuse angles, and 1 acute angle.



Complementary, Supplementary, Adjacent, and Vertical Angles

For help working these types of problems, go to Examples 14–18 in the Explain section of this lesson.

97. If m∠A = 35° and m∠B = 55°, are angles A and B complementary, supplementary, or neither?

98. If m∠K = 35° and m∠L = 145°, are angles K and L complementary, supplementary, or neither?

99. If m∠C = 20.5° and m∠D = 69.5°, are angles C and D complementary, supplementary, or neither?

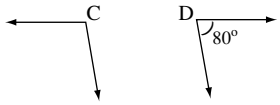
100. If $m\angle E = 90\frac{1}{3}°$ and $m\angle F = 89\frac{2}{3}°$, are angles E and F complementary, supplementary, or neither?

101. If ∠1 and ∠2 form a straight angle, are angles 1 and 2 supplementary angles? Explain your answer.

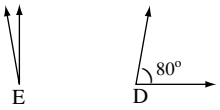
102. If angles 1 and 2 are supplementary angles, do they form a straight angle? Explain your answer. You can use a sketch.

103. Angles A and B are complementary angles. Find the measure of angle B.

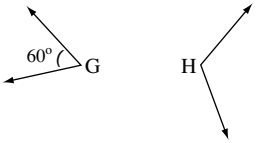
104. Angles C and D are supplementary angles. Find the measure of angle C.



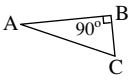
105. Angles E and D are complementary angles. Find the measure of angle E.



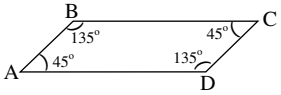
106. Angles G and H are supplementary angles. Find the measure of angle H.



107. In this triangle, name a pair of complementary angles.



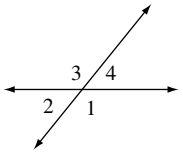
108. In this parallelogram, name 4 pairs of supplementary angles.



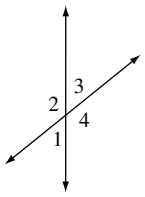
109. Suppose m∠S = 30°, m∠T = 60°, and m∠U = 150°. Which pair of angles is complementary?

110. Suppose m∠S = 30°, m∠T = 60°, and m∠U = 150°. Which pair of angles is supplementary?

111. In this figure, name a pair of adjacent angles formed by two lines that intersect.



112. In this figure, name a pair of vertical angles formed by two lines that intersect.



113. In Figure 7, what is the measure of ∠MAL?

114. In Figure 7, what is the measure of ∠KAL?

115. In Figure 7, what is the measure of ∠KAN?

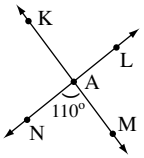


Figure 7

116. In Figure 8, name 3 pairs of adjacent angles.

117. In Figure 8, name a pair of vertical angles.

118. In Figure 8, what is the measure of ∠FAE?

119. In Figure 8, what is the measure of ∠FAB?

120. In Figure 8, what is the measure of ∠CAD?

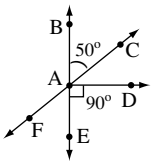


Figure 8

121. In Figure 9, what is the measure of ∠RAS?

122. In Figure 9, what is the measure of ∠SAT?

123. In Figure 9, what is the measure of ∠TAQ?

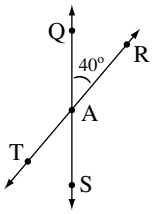


Figure 9

124. In Figure 10, name three pairs of adjacent angles.

125. In Figure 10, name a right angle.

126. In Figure 10, what is the measure of ∠FAB?

127. In Figure 10, what is the measure of ∠BAC?

128. In Figure 10, what is the measure of ∠CAD?

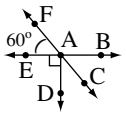


Figure 10

129. In Figure 11, what is the measure of ∠GAH?

130. In Figure 11, what is the measure of ∠HAE?

131. In Figure 11, what is the measure of ∠EAF?

Figure 11

132. In Figure 12, name a pair of vertical angles.

133. In Figure 12, name a pair of supplementary angles.

134. In Figure 12, what is the measure of ∠QAU?

135. In Figure 12, what is the measure of ∠UAT?

136. In Figure 12, what is the measure of ∠SAR?

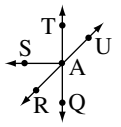


Figure 12

Evaluate

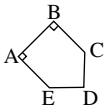
Take this Practice Test to prepare for the final quiz in the Evaluate module of this lesson on the computer.

Practice Test

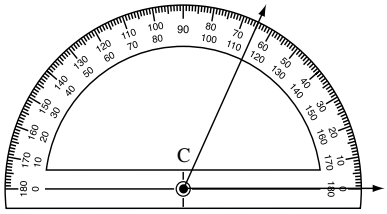
1. Using points B and C, draw ray $\overrightarrow{BC}$.

2. Find the measure of the angle that is the complement of 16˚.

3. In this pentagon, name an obtuse angle.

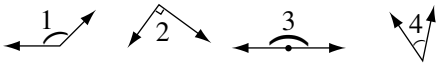


4. Use the protractor to find the measure of the angle below. Choose the correct measure.

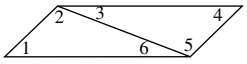


65˚ 75˚ 115˚ 110˚

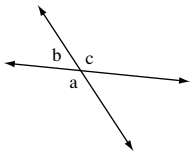
5. Choose the acute angle.



6. In the figure, name each pair of adjacent angles.



7. In the figure, m∠a is 160˚. Find m∠b and m∠c.



8. In the figure, m∠a = 40˚; ∠a and ∠b are complementary angles. Find m∠c.