Unit: Angles & Triangles
Student Handout 1

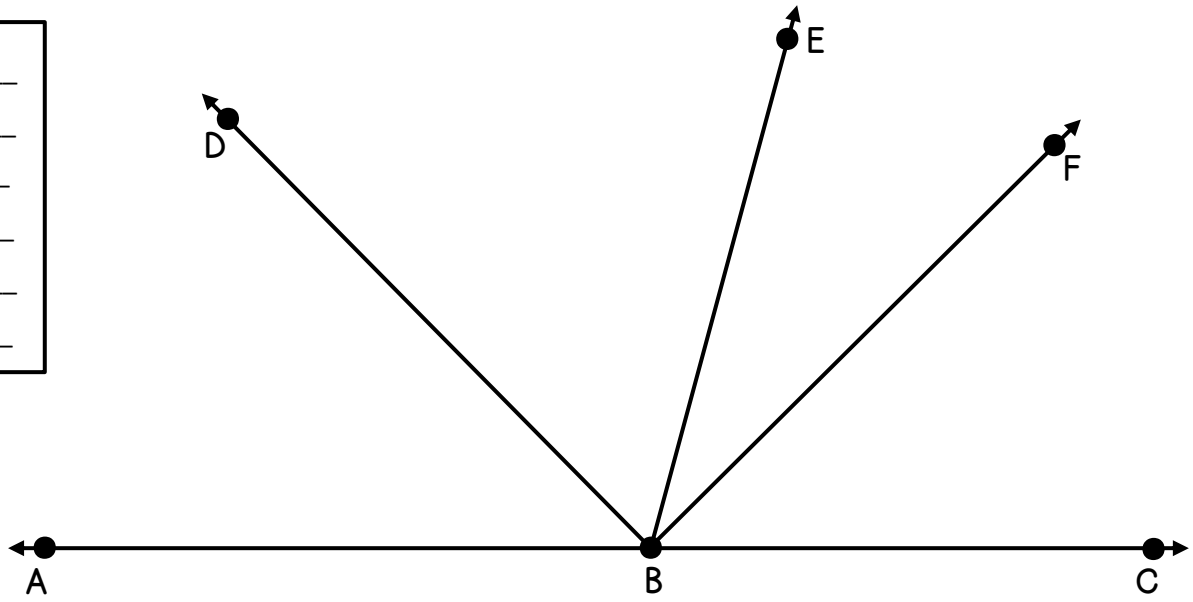
Name _____

Date _____Pd_____

COMPLEMENTARY AND SUPPLEMENTARY ANGLES

Use a protractor to measure the size of each angle and complete the table below.

m∠ABC = _____
m∠ABD = _____
m∠EBF = _____
m∠EBC = _____
m∠DBC = _____
m∠DBE = _____

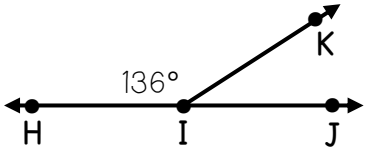


What is the sum of ∠ABD and ∠DBC? How does it compare to the measure of ∠ABC?

	DEFINITION	EXAMPLES
ACUTE ANGLE	An angle that measures _____ 90°.	
OBTUSE ANGLE	An angle that measures between _____ and _____.	
RIGHT ANGLE	An angle that measures _____ 90°.	
STRAIGHT ANGLE	An angle that measures _____ 180°.	
COMPLEMENTARY ANGLES	A pair of angles that have a sum of _____.	
SUPPLEMENTARY ANGLES	A pair of angles that have a sum of _____.	

In 1-2, use your understanding of angle relationships to set up an equation and solve for the missing angle measure.

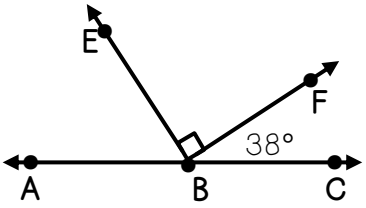
1. What is the measure of angle KIJ?



a. equation: _____

b. m∠KIJ _____

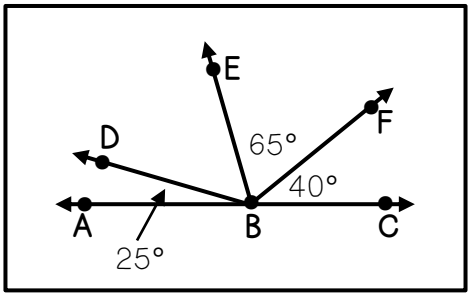
2. What is the measure of angle ABE?



a. equation: _____

b. m∠ABE _____

3. Use the diagram below to mark each statement as true or false.



_____ a. ∠ABD and ∠EBF are complementary angles

_____ b. ∠DBE measures 50°

_____ c. ∠FBC is an acute angle

_____ d. ∠ABF and ∠EBC are supplementary angles

Apply your understanding of angle relationships to answer the questions below.

4. Angles A and B are supplementary angles. The measure of angle A is 42°. Find the measure of ∠B.

a. equation: _____

b. m∠B _____

5. The measure of angle C is 12°. Angles C and D are complementary angles. Find m∠D.

a. equation: _____

b. m∠D _____

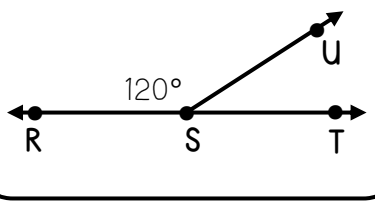
6. Angle F and angle G are complementary. Angle F measures (4x+5)° and angle G measures 15°. Find the value of x and the measure of each angle.

a. equation: _____

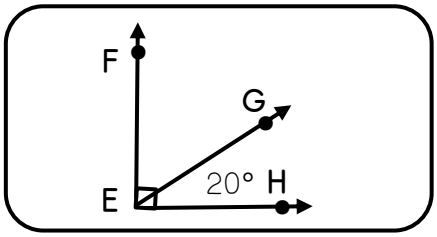
b. x = _____, m∠F _____, m∠G _____

7. Three students were asked to sketch a diagram that included an angle measure of 60°. Circle the name of the student(s) who correctly completed the task.

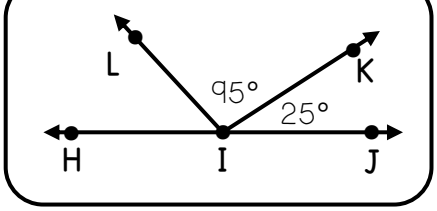
MAYA



ELLIS



JAKE



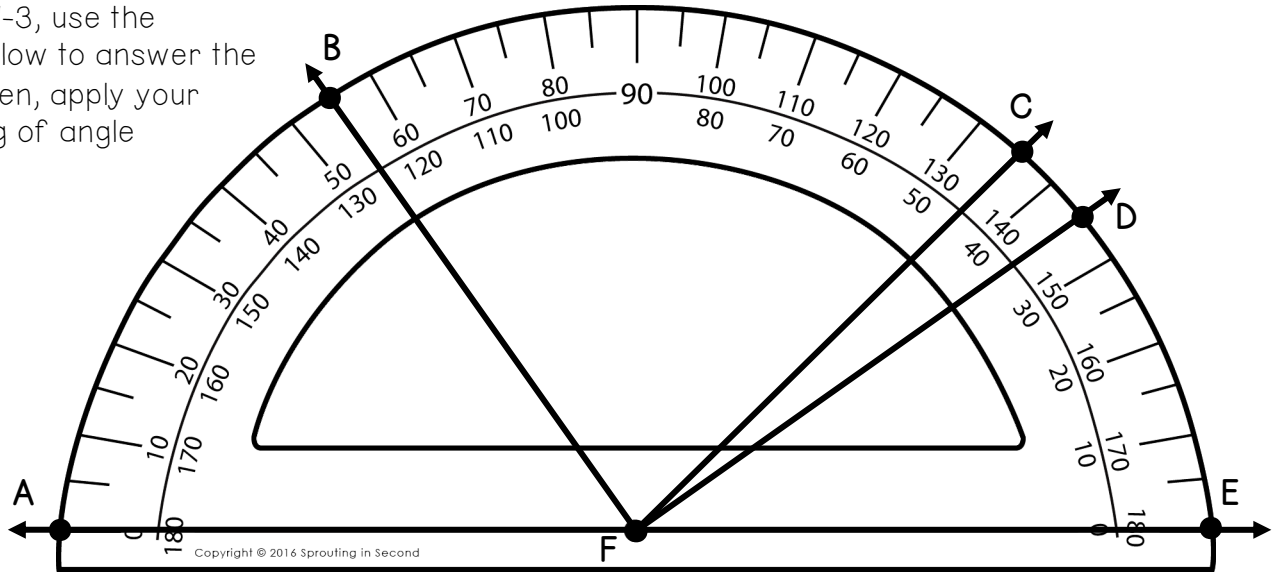
Unit: Angles & Triangles
Homework 1

Name _____

Date _____Pd_____

COMPLEMENTARY AND SUPPLEMENTARY ANGLES

In questions 1-3, use the protractor below to answer the questions. Then, apply your understanding of angle relationships.



1. Determine the measure of each angle below.

A	B	C	D
m∠AFC = _____	m∠CFB = _____	m∠AFD = _____	m∠EFC = _____

2. Find the angle that makes each set supplementary angles.

∠AFB and _____

∠AFC and _____

∠AFD and _____

3. Find the angle that makes each set complementary angles.

∠BFC and _____

∠AFB and _____

4. Angles A and B are supplementary angles. The measure of angle A is 38°. Find the measure of ∠B.

a. equation: _____

b. m∠B _____

5. The measure of angle C is 20.5°. Angles C and D are complementary angles. Find m∠D.

a. equation: _____

b. m∠D _____

6. Angle F and angle G are complementary. Angle F measures (2x+7)° and angle G measures 18°. Find the value of x and the measure of each angle.

a. equation: _____

b. x = _____, m∠F _____, m∠G _____

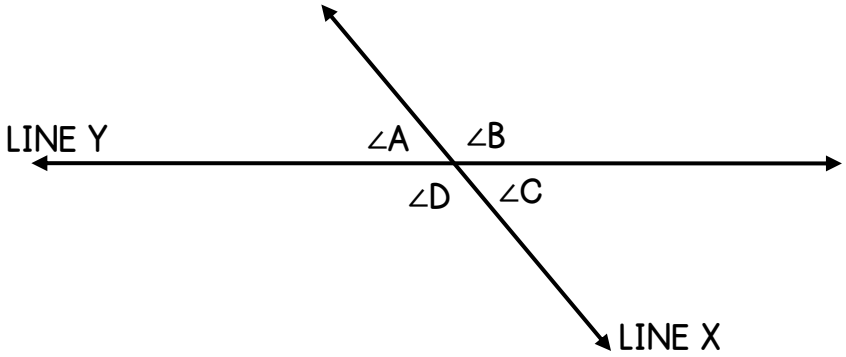
Unit: Angles & Triangles
Student Handout 2

Name _____

Date _____Pd_____

VERTICAL AND ADJACENT ANGLES

In the picture below, Lines X and Y are straight lines that intersect. Use a protractor to measure each of the 4 angles that were formed and complete the table.



m∠A = _____
m∠B = _____
m∠C = _____
m∠D = _____

a. What do you notice about the angle measures?

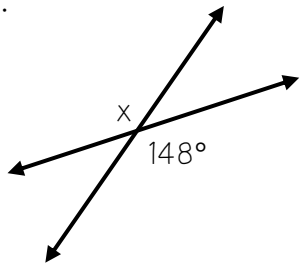
b. What do you notice about the sum of all four angles above?

Two types of special angles are formed when two lines intersect. Use the picture above and the table to help you define and describe these types of angle pairs.

	DEFINITION	EXAMPLES
VERTICAL ANGLES	A pair of _____ angles formed by _____ lines; the angles are _____	∠____ and ∠____ ∠____ and ∠____
ADJACENT ANGLES	Two angles that share a common _____ and a common _____; if the two angles form a straight line, they are supplementary and have a sum of _____	∠____ and ∠____ ∠____ and ∠____

Use what you know about intersecting lines to label the missing angles in the pictures below.

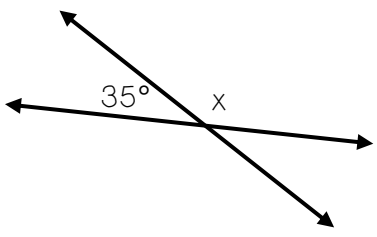
1.



x = _____

type of angle pair: _____

2.

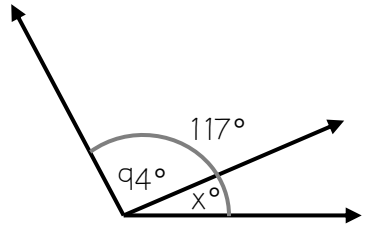


x = _____

type of angle pair: _____

Use your understanding of angle relationships to set up and solve an equation to find the missing angle measures.

3.

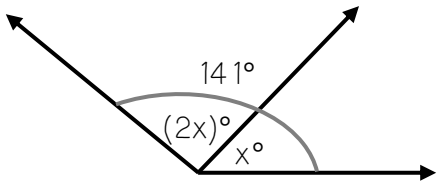


equation: _____

value of x: _____

angle measures: _____

4.

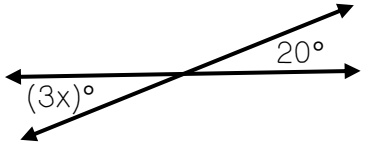


equation: _____

value of x: _____

angle measures: _____

5.



equation: _____

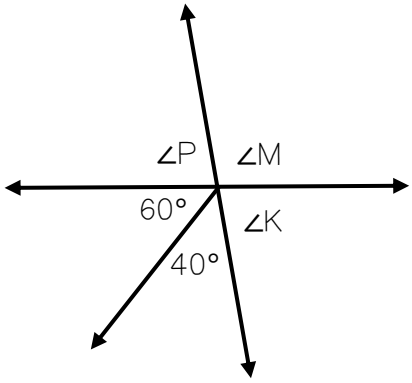
value of x: _____

angle measures: _____

Angle relationships allow us to determine any unknown _____ .

All angles around a _____ will always have a sum of _____ .

6. Determine the missing angle measures.



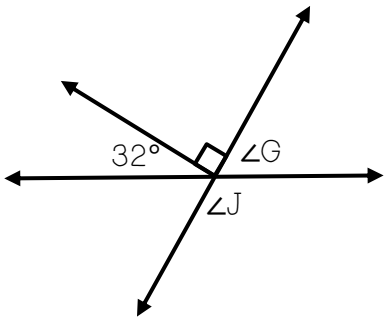
equation: _____

m∠K = _____

equation: _____

m∠M = _____

7. Determine the missing angle measures.



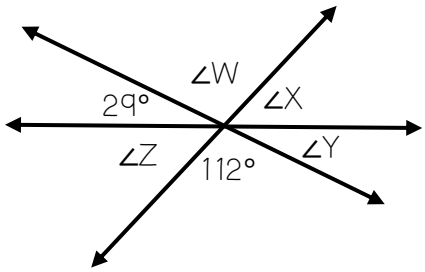
equation: _____

m∠G = _____

equation: _____

m∠J = _____

8. Determine the missing angle measures.



equation: _____

m∠Z = _____

Use your knowledge of vertical angles to find the measure of each angle.

m∠W = _____

m∠X = _____

m∠Y = _____

Summarize today's lesson:

Unit: Angles & Triangles
Homework 2

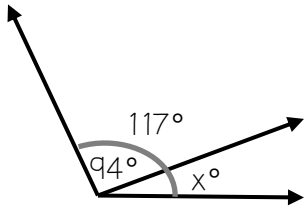
Name _____

Date _____Pd_____

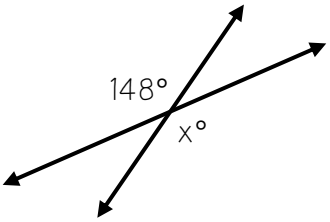
VERTICAL AND ADJACENT ANGLES

Answer each question below. Match your answers in the table to solve the riddle.

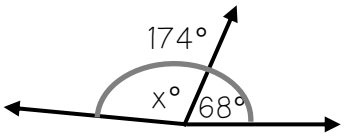
1 Find the value of x.



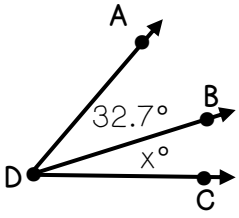
2 Find the value of x.



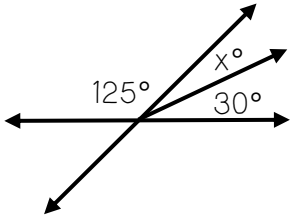
3 Find the value of x.



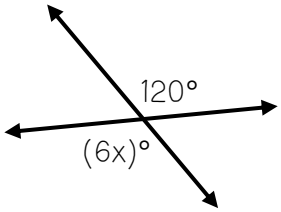
4 If the measure of ∠ADC is 50°, then what is the measure of ∠BDC?



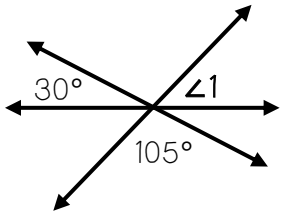
5 Find the value of x.



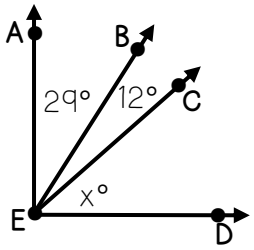
6 Find the value of x.



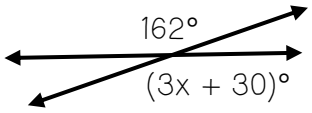
7 Find the measure of ∠1.



8 If the measure of ∠AED is 89°, then what is the measure of ∠CED?



9 Find the value of x.



W: 76°	S: 25°	T: 44°	N: 90°	U: 20°
L : 23°	H: 119°	M: 106°	P: 148°	C: 95°
A: 107°	E: 17.3°	D: 67°	R: 45°	I: 48°

WHAT DIY TOOLS DO YOU USE IN MATH?

___	___	___	___	___	___	___	___	___	___	___
3	6	1	9	8	2	1	8	4	7	5

Unit: Angles & Triangles
Mini-Quiz 1

Name _____

Date _____ Pd_____

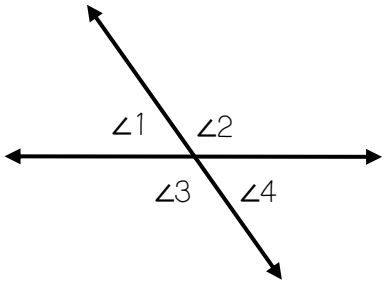
ANGLE RELATIONSHIPS MINI-QUIZ

Use your understanding of angle relationships to solve the questions below.

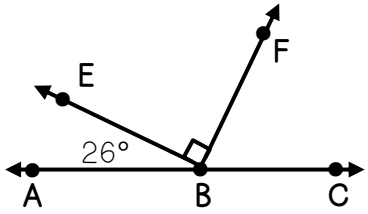
1. Angle 4 and Angle _____ are vertical angles.

2. Angle 3 is adjacent to which angles?

   A. Angles 1 and 2 B. Angles 1 and 4
   C. Angles 2 and 3 D. Angles 2 and 4

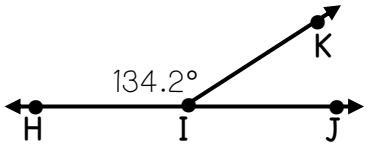


3. Find the m∠FBC.



x = _____

4. Find the missing angle measure.



_____

5. Angle F and angle G are complementary. Angle F measures $(2x+10)°$ and angle G measures 30°. Find the value of x.

_____

Unit: Angles & Triangles
Mini-Quiz 1

Name _____

Date _____ Pd_____

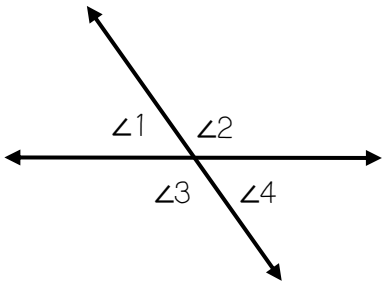
ANGLE RELATIONSHIPS MINI-QUIZ

Use your understanding of angle relationships to solve the questions below.

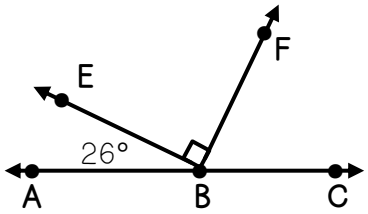
1. Angle 4 and Angle _____ are vertical angles.

2. Angle 3 is adjacent to which angles?

   A. Angles 1 and 2 B. Angles 1 and 4
   C. Angles 2 and 3 D. Angles 2 and 4

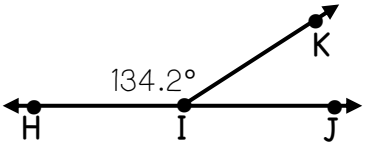


3. Find the m∠FBC.



x = _____

4. Find the missing angle measure.



_____

5. Angle F and angle G are complementary. Angle F measures $(2x+10)°$ and angle G measures 30°. Find the value of x.

_____

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Unit: Angles & Triangles
Student Handout 3

Name _____

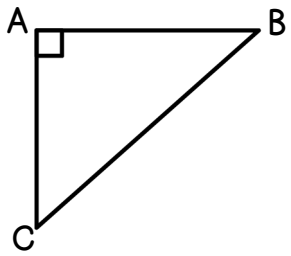
Date _____ Pd_____

ANGLE RELATIONSHIPS IN TRIANGLES

ANGLES OF A TRIANGLE

- Triangles can be named by the three angles. They can be described by the terms _____, _____, and _____.
- Angles can be named in two different ways:

Ex: Triangle ABC is shown at right.

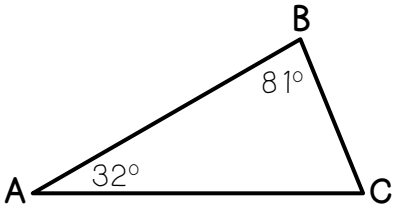


- ∠A can also be called angle _____ or _____.
- ∠B can also be called angle _____ or _____.
- ∠C can also be called angle _____ or _____.

- The _____ of the three angles in a triangle is _____. You can set up an equation to determine the missing angle measures.

Determine the missing angle in the triangles below.

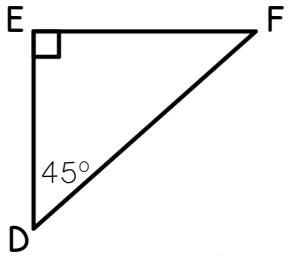
1. Find the measure of ∠C.



Equation: _____

m∠C: _____

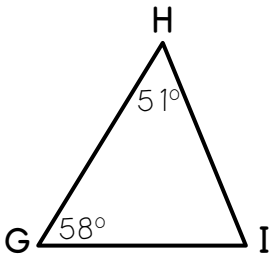
2. Find the measure of ∠F.



Equation: _____

m∠F: _____

3. Find the measure of ∠HIG.



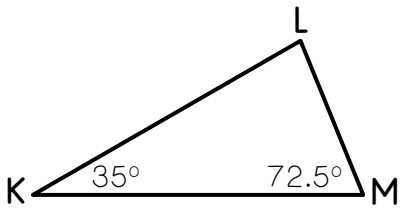
Equation: _____

m∠HIG: _____

4. Triangle JHL has angle HLJ, which measures 65°, and angle LJH, which measures 50°. Draw a sketch of triangle JHL and determine the missing angle measure.

Mark the statements in questions 5-7 as true or false. Then correct the false statement in the space provided.

5.



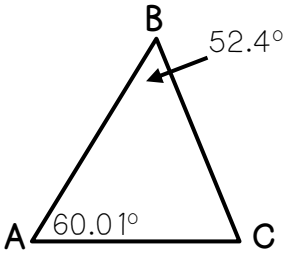
_____ a. The measure of ∠LKM is 35°, the measure of ∠KML is 72.5° and the measure of ∠KLM is unknown.

_____ b. The equation 35 + 72.5 + x = 180 can be used to find the measure of ∠KLM.

_____ c. The measure of ∠KLM is 35°.

Correct the false statement:

6.



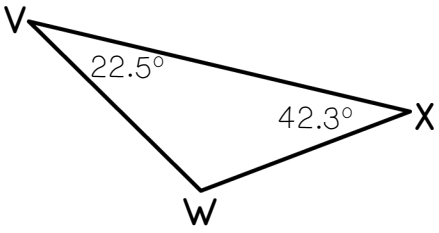
_____ a. Both ∠B and ∠A are acute angles.

_____ b. The equation 60.01 + 52.4 + x = 180 can be used to find the measure of ∠BCA.

_____ c. The measure of ∠BCA is 114.75°.

Correct the false statement:

7.



_____ a. The equation 22.5 + x = 42.3 can be used to find the measure of ∠VWX.

_____ b. The measure of ∠XWV is 115.2°.

_____ c. Triangle VWX is an obtuse triangle, since the measure of ∠W is greater than 90°.

Correct the false statement:

Use your understanding of triangles to answer the questions below.

8. The measure of angle G is 35° and the measure of angle E is 62.2°. Which of the following must be the measure of angle F in order to form triangle EFG?

A. 117.2°
B. 83.2°
C. 82.8°
D. 27.8°

9. Mrs. Tonell writes the measure of 3 angles on the board. Rachel says the three angles will form an acute triangle. Do you agree or disagree? Explain.

∠M = 57°
∠N = 78°
∠O = 55°

Summarize today's lesson:

Unit: Angles & Triangles
Homework 3

Name _____

Date _____ Pd_____

ANGLE RELATIONSHIPS & TRIANGLES

Answer each of the questions below. Be sure to show your thinking.

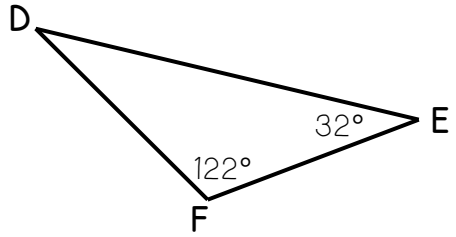
1. Which set of angle measures CANNOT be the angle measures of a triangle?

A. 65°, 65°, 50°
B. 54.3°, 47.5°, 78.2°
C. 22.5°, 36.4°, 110.1°
D. 40°, 40°, 100°

2. The measure of angle S is 29.1° and the measure of angle R is 80°. Which of the following must be the measure of angle Q in order to form triangle QRS?

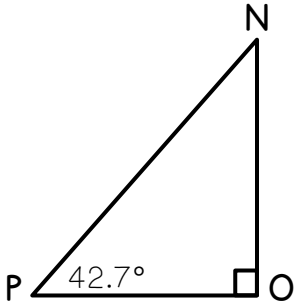
A. 109.1°
B. 71.1°
C. 150.9°
D. 70.9°

3. Triangle DEF is shown below. What is the measure of ∠D?



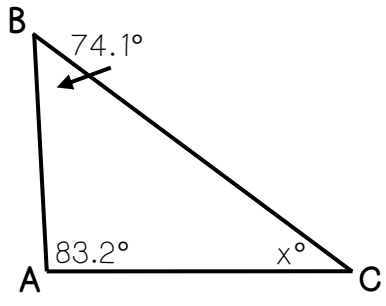
4. Triangle NOP is shown below. What is the measure of ∠N?

A. 47.3°
B. 137.3°
C. 48.8°
D. 132.8°

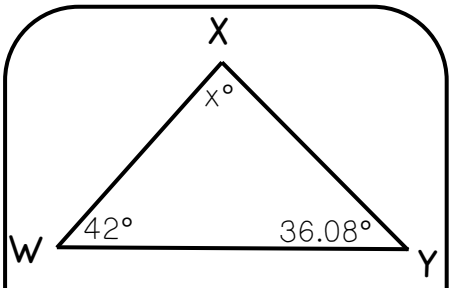


5. In triangle EFG, the measure of angle E is 97°, and the measure of angle F is 15°. What is the measure of angle G?

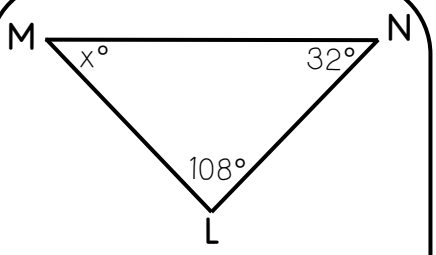
6. Anna solved three problems on her math test. One of them was incorrect. Circle the problem that was solved incorrectly and find the correct answer.



$83.2 + 74.1 + x = 180$
$157.3 + x = 180$
$x = 22.7°$



$42 + 36.08 + x = 180$
$78.08 + x = 180$
$x = 101.92°$



$32 + x = 108$
$x = 76°$

Unit: Angles & Triangles
Student Handout 4

Name _____

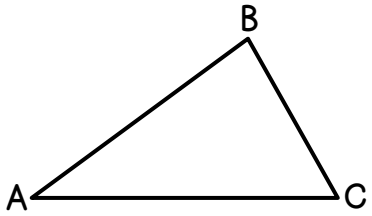
Date _____Pd_____

SIDE LENGTHS OF TRIANGLES

SIDE LENGTHS OF A TRIANGLE

- Triangles can be named by their sides and described by the terms _____, _____, and _____.
- The side length of a triangle corresponds with the angle measure _____ the side.

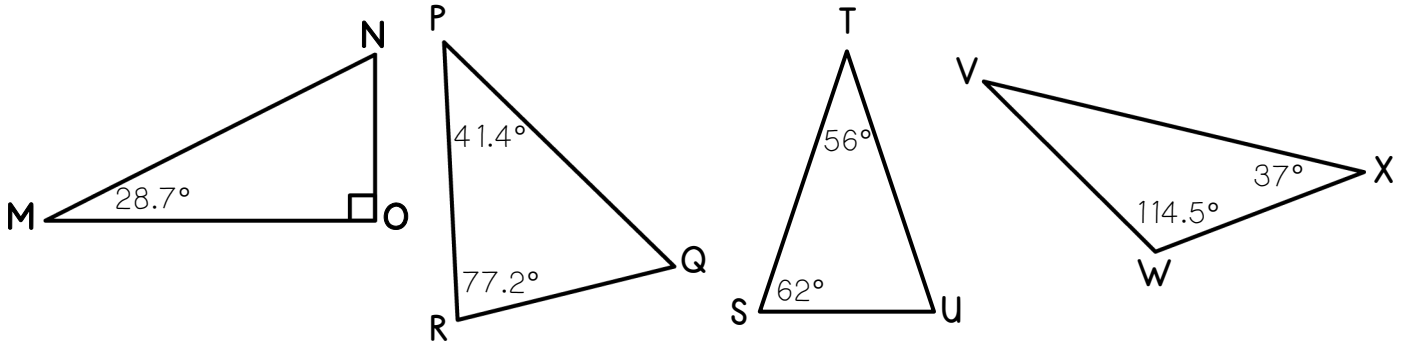
Ex: Triangle ABC is shown at the right.



- Side AB corresponds with angle _____.
- Side BC corresponds with angle _____.
- Side CA corresponds with angle _____.

- The smallest angle will be opposite the _____ side, while the largest angle will be opposite the _____ side.
- A side is _____ to another side if it has an equal length.

1. Use the triangles below to answer the questions about side length.



a. Which side corresponds to angle TUS? _____

b. Which side corresponds to angle VXW? _____

c. Which side length will be the smallest in triangle PQR? _____

d. Which side length will be the largest in triangle MNO? _____

TRIANGLE INEQUALITY THEOREM

- For a triangle to be formed, the sum of any _____ side lengths must be _____ the length of the third side.
- If the line segments satisfy those conditions, then exactly _____ _____ triangle is formed.

Ex: Triangle ABC has side lengths of AB = 7 cm and BC = 9 cm.

1. the greatest AC could be is _____
2. the shortest AC could be is _____
3. _____

Use your understanding of triangles to answer the following questions.

2. Three line segments have measures of 13 units, 7 units, and 5 units. Will the segments form a triangle?	3. Three line segments have measures of 4 units, 6 units, and 8 units. Will the segments form a triangle?
1: _____ 2: _____ 3: _____ Does it form a triangle?	1: _____ 2: _____ 3: _____ Does it form a triangle?

Measure the line segments below to the nearest inch. Use the table to determine which sets of line segments form a triangle. Justify your response.

LINE A

LINE B

LINE C

LINE D

LINE E

LINE F

LINE SEGMENTS	TRIANGLE?	HOW DO YOU KNOW?
A, B, D		
A, E, C		
A, C, D		
B, F, E		
D, B, F		

4. Mr. Stewart gives his students 3 straws that measure 10 inches, 12 inches and 18 inches. Ryan says that there is only one unique way to arrange the straws to form a triangle. Marcy says there are many ways to arrange the straws to form a triangle. Which student is correct? Explain.

_____

_____

Unit: Angles & Triangles
Homework 4

Name _____

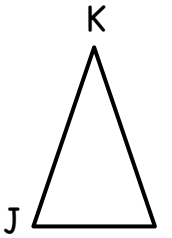
Date _____ Pd_____

SIDE LENGTHS OF A TRIANGLE

Students were asked to create true statements about side lengths of triangles. Circle the names of the students who correctly completed the task. Then, unscramble the underlined letters of the circled names to answer the riddle at the bottom.

BETHANY

side length KL corresponds with angle JKL

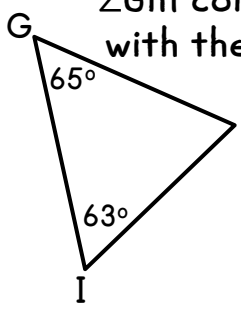


ISAIAH

Three side lengths of 23, 32, and 45 units will form exactly one unique triangle.

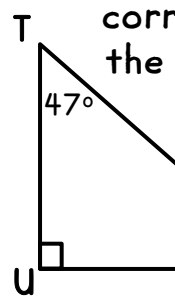
PABLO

∠GIH corresponds with the shortest side



QUINN

side length TV corresponds with the largest angle

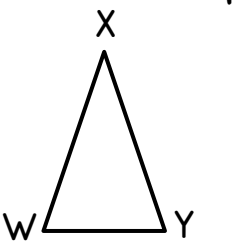


APRIL

If triangle QRS has side lengths of QR = 12.3 and RS = 8.8, then the greatest length side QS could be is 21.1.

TROY

side length WX corresponds with angle WYX

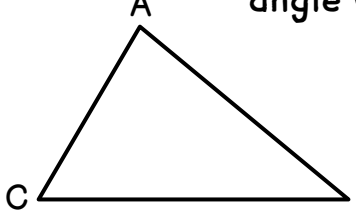


TRENT

Three side lengths of 6, 8, and 15 units will form a triangle.

SAMANTHA

side length BC corresponds with angle CAB



MEGAN

Three side lengths of 5.2, 6.3, and 10.5 units will form exactly one unique triangle.

WHAT KIND OF TRIANGLE IS NEVER WRONG?

_____

Unit: Angles & Triangles
Student Handout 5

Name _____

Date _____Pd_____

CONSTRUCTING TRIANGLES

Demarcus is sketching different angles in his math notebook. Use a protractor and ruler to help him complete the angles shown below.

75° angle

105° angle

29° angle

A triangle can be constructed using similar steps as constructing an angle. Use the steps shown in the box below to construct the triangle described in the example above.

CONSTRUCTING A TRIANGLE

1. Draw and label a _____ _____, measure if necessary.
2. Use a protractor to draw an _____ at one of the endpoints of the line segment.
3. Label the _____ _____ in the triangle.
4. Draw and label a second angle at the other _____ of the original line segment.
5. Mark the third point on the triangle where the sketched lines _____.
6. Erase any extra markings and check all angle measures.

1 Construct triangle ABC, where the $m\angle A = 90°$, the $m\angle B = 30°$, and the length of $\overline{AB}$ is 5 cm.

Construct the triangle given the conditions below, then answer questions a-b.

2 Triangle RST has angle measures of $m\angle R = 55°$, $m\angle S = 70°$, and $m\angle T = 55°$.

a. Measure the sides of triangle RST and then compare your measurements with a partner. Are the measures of the sides of your triangles the same or different?

b. What can you conclude about the number of triangles that can be formed given 3 angle measures?

3 Construct triangle XYZ, where the $m\angle YXZ = 40°$, the $m\angle XYZ = 60°$, and the length of $\overline{XY}$ is 5 cm.

Find the length of each side in centimeters.

$\overline{XZ}$ = _____

$\overline{YZ}$ = _____

4 Construct a triangle with angle measures of 65°, 35°, and 80°.

How many triangles can be constructed given this information? Explain.

5 Construct triangle MNO, where the $m\angle N = 35°$, the $m\angle O = 45°$, and the length of $\overline{MN}$ is 4 cm. (Hint: Find the missing angle before constructing.)

How many triangles can be constructed given this information? Explain.

6 Construct triangle ABC, where the $m\angle A = 90°$, $m\angle B = 45°$, and $m\angle C = 45°$.

Measure and label the length of each side of the triangle. What can you conclude about the measure of sides $\overline{AB}$ and $\overline{AC}$?

7 Determine the number of triangles that can be constructed given the conditions in a-d.

a. $m\angle A = 110°$, $m\angle B = 20°$, and $m\angle C = 50°$ → _____

b. Three line segments measure 21 inches, 7 inches, and 4 inches → _____

c. $\overline{RS}$ = 14 cm, $m\angle R = 27°$, and $m\angle S = 98°$ → _____

d. $m\angle E = 95°$, $m\angle F = 62°$, and $m\angle G = 18°$ → _____

Unit: Angles & Triangles
Homework 5

Name _____

Date _____ Pd _____

CONSTRUCTING TRIANGLES

Answer each of the questions below. Be sure to show your thinking.

1. Marissa is constructing triangles given different conditions. Which of the following conditions will NOT produce a triangle?

a. angle measures of 47°, 58°, 75°

b. $m\angle T = 61°$, $m\angle U = 61°$, $m\angle V = 58°$

c. side lengths of 5 ft, 11 ft, and 4 ft

d. $\overline{XZ} = 11$ cm, $\angle X = 42°$, and $\angle Z = 80°$

2. Mrs. Taylor asked her class to construct a triangle with angle measures of 78°, 15°, and 87°. Which of the following statements must be true?

a. One unique triangle can be constructed.

b. More than one triangle can be constructed.

c. No triangle can be constructed.

For 3-6, construct a triangle with the given conditions.

3. Triangle ABC with $\overline{AB} = 3$ cm, $\angle ABC = 40°$, and $\angle BAC = 70°$.

4. Triangle MNO has angle measures of $m\angle M = 40°$, $m\angle N = 65°$, and $m\angle O = 75°$.

5. Triangle RST has angle measures of $m\angle R = 90°$, $m\angle S = 20°$, and $m\angle T = 70°$.

6. Triangle XYZ with $\overline{XZ} = 2$ in, $\angle X = 25°$, and $\angle Y = 45°$.

Unit: Angles & Triangles
Mini-Quiz 2

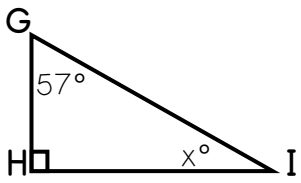
Name _____

Date _____Pd_____

TRIANGLES MINI-QUIZ

Use your understanding of triangle relationships to solve the questions below.

1. What is the missing angle measure?



x = _____

2. Which set of angle measures will not form a triangle?

A. 60°, 60°, 60°
B. 54.5°, 47.5°, 88°
C. 22.5°, 36.4°, 121.1°
D. 45°, 45°, 90°

3. In triangle QRS, the measure of angle RSQ is 29.1°, and the measure of angle QRS is 76°. What is the measure of angle SQR?

_____

4. Three line segments have measures of 13 units, 7 units, and 5 units. Will the segments form a triangle?

_____

5. Determine if ΔABC with m∠A = 40°, m∠B = 65°, and m∠C = 75° will form a unique triangle or more than one triangle.

_____

Unit: Angles & Triangles
Mini-Quiz 2

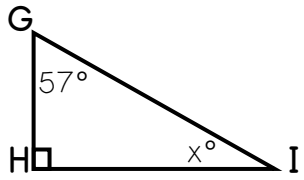
Name _____

Date _____Pd_____

TRIANGLES MINI-QUIZ

Use your understanding of triangle relationships to solve the questions below.

1. What is the missing angle measure?



x = _____

2. Which set of angle measures will not form a triangle?

A. 60°, 60°, 60°
B. 54.5°, 47.5°, 88°
C. 22.5°, 36.4°, 121.1°
D. 45°, 45°, 90°

3. In triangle QRS, the measure of angle RSQ is 29.1°, and the measure of angle QRS is 76°. What is the measure of angle SQR?

_____

4. Three line segments have measures of 13 units, 7 units, and 5 units. Will the segments form a triangle?

_____

5. Determine if ΔABC with m∠A = 40°, m∠B = 65°, and m∠C = 75° will form a unique triangle or more than one triangle.

_____

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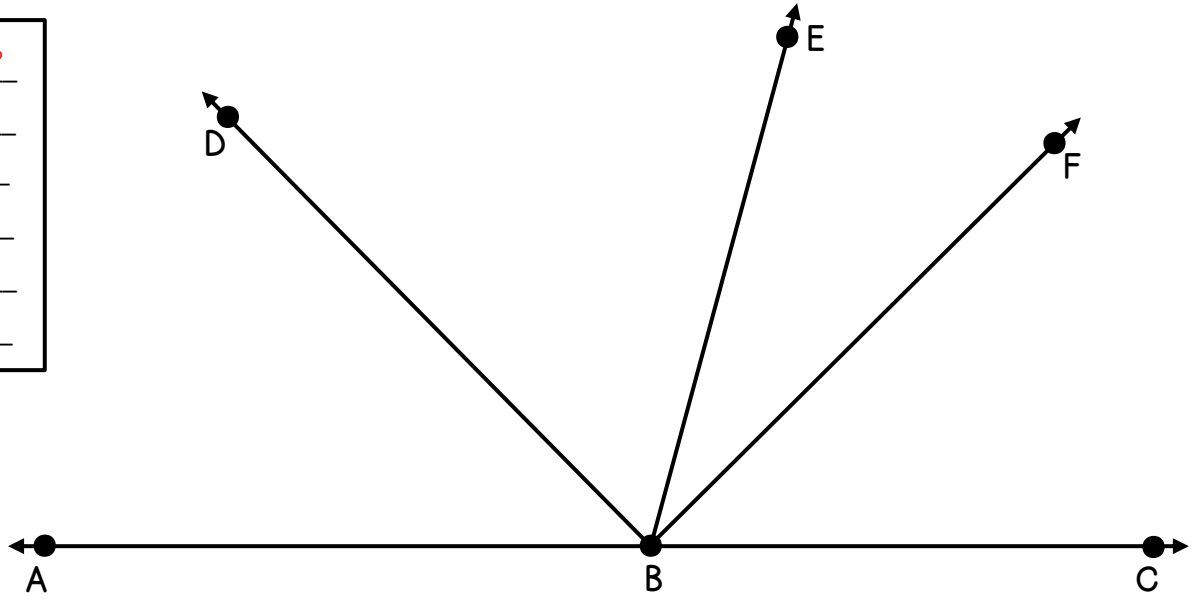
Unit: Angles & Triangles
Student Handout 1

*Students will need a protractor and may need to use a straightedge to extend the line for measuring.

COMPLEMENTARY AND SUPPLEMENTARY ANGLES

Use a protractor to measure the size of each angle and complete the table below.

m∠ABC = 180°
m∠ABD = 45°
m∠EBF = 30°
m∠EBC = 75°
m∠DBC = 135°
m∠DBE = 60°



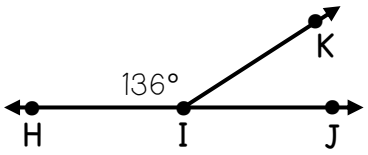
What is the sum of ∠ABD and ∠DBC? How does it compare to the measure of ∠ABC?

The sum of ∠ABD and ∠DBC is 180°, which equals the measure of ∠ABC.

	DEFINITION	EXAMPLES
ACUTE ANGLE	An angle that measures _less than_ 90°.	∠ABD, ∠EBF, ∠FBC, ∠EBC, ∠DBE
OBTUSE ANGLE	An angle that measures between _90°_ and _180°_.	∠ABE, ∠DBC, ∠ABF
RIGHT ANGLE	An angle that measures _exactly_ 90°.	∠DBF
STRAIGHT ANGLE	An angle that measures _exactly_ 180°.	∠ABC
COMPLEMENTARY ANGLES	A pair of angles that have a sum of _90°_.	∠DBE and ∠EBF
SUPPLEMENTARY ANGLES	A pair of angles that have a sum of _180°_.	∠ABD and ∠DBC

In 1-2, use your understanding of angle relationships to set up an equation and solve for the missing angle measure.

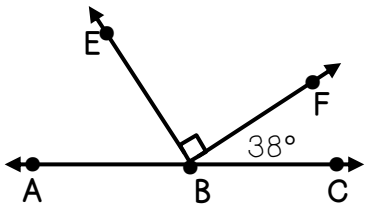
1. What is the measure of angle KIJ?



a. equation: 136 + x = 180

b. m∠KIJ 44°

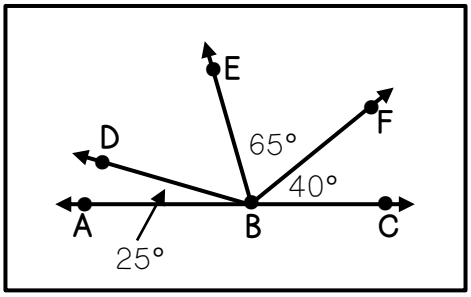
2. What is the measure of angle ABE?



a. equation: 90 + 38 + x = 180

b. m∠ABE 52°

3. Use the diagram below to mark each statement as true or false.



true a. ∠ABD and ∠EBF are complementary angles

true b. ∠DBE measures 50°

true c. ∠FBC is an acute angle

false d. ∠ABF and ∠EBC are supplementary angles

Apply your understanding of angle relationships to answer the questions below.

4. Angles A and B are supplementary angles. The measure of angle A is 42°. Find the measure of ∠B.

a. equation: 42 + x = 180

b. m∠B 138°

5. The measure of angle C is 12°. Angles C and D are complementary angles. Find m∠D.

a. equation: 12 + x = 90

b. m∠D 78°

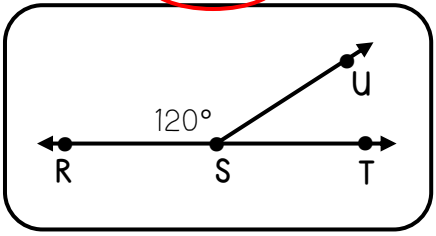
6. Angle F and angle G are complementary. Angle F measures (4x+5)° and angle G measures 15°. Find the value of x and the measure of each angle.

a. equation: 4x + 20 = 90

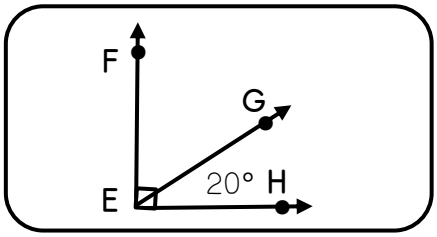
b. x = 17.5, m∠F 75°, m∠G 15°

7. Three students were asked to sketch a diagram that included an angle measure of 60°. Circle the name of the student(s) who correctly completed the task.

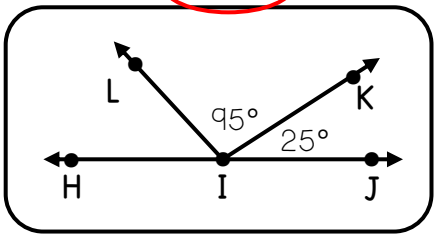
MAYA



ELLIS



JAKE



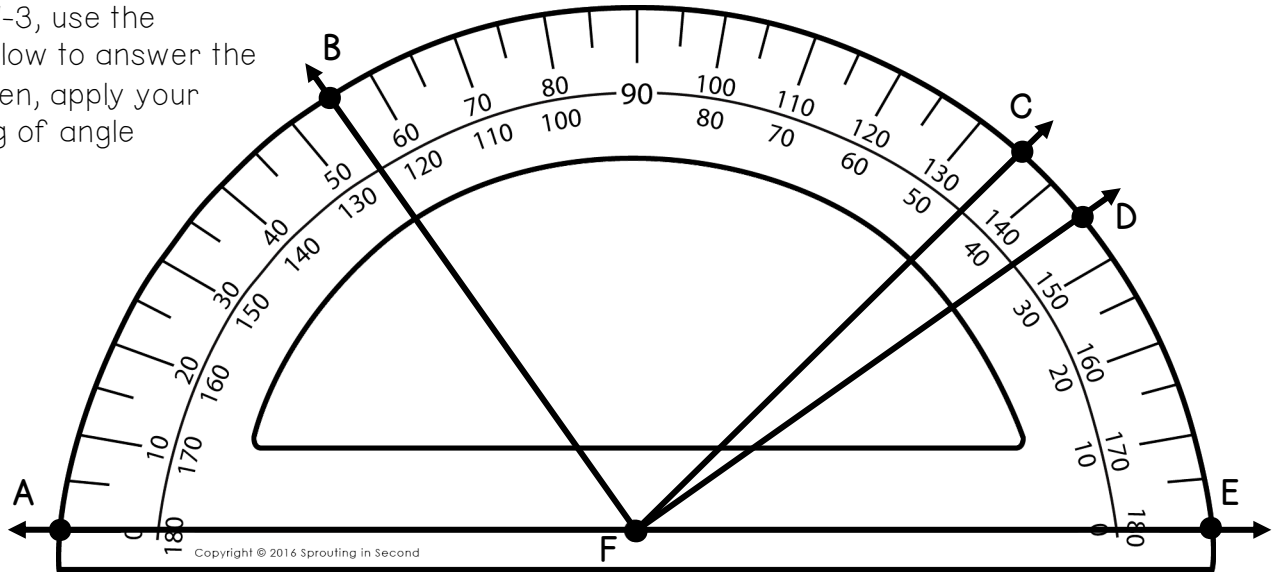
Unit: Angles & Triangles
Homework 1

Name _____

Date _____ Pd _____

COMPLEMENTARY AND SUPPLEMENTARY ANGLES

In questions 1-3, use the protractor below to answer the questions. Then, apply your understanding of angle relationships.



1. Determine the measure of each angle below.

A	B	C	D
m∠AFC = 135°	m∠CFB = 80°	m∠AFD = 145°	m∠EFC = 45°

2. Find the angle that makes each set supplementary angles.

∠AFB and ∠BFE

∠AFC and ∠CFE

∠AFD and ∠DFE

3. Find the angle that makes each set complementary angles.

∠BFC and ∠CFD

∠AFB and ∠DFE

4. Angles A and B are supplementary angles. The measure of angle A is 38°. Find the measure of ∠B.

a. equation: 38 + x = 180

b. m∠B 142°

5. The measure of angle C is 20.5°. Angles C and D are complementary angles. Find m∠D.

a. equation: 20.5 + x = 90

b. m∠D 69.5°

6. Angle F and angle G are complementary. Angle F measures (2x+7)° and angle G measures 18°. Find the value of x and the measure of each angle.

a. equation: 2x + 25 = 90

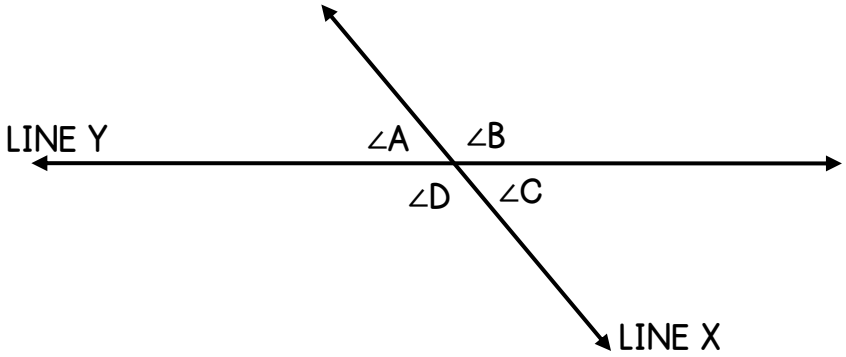
b. x = 32.5, m∠F 72°, m∠G 18°

Unit: Angles & Triangles
Student Handout 2

*Students will need a protractor and may need to use a straightedge to extend the lines for measuring.

VERTICAL AND ADJACENT ANGLES

In the picture below, Lines X and Y are straight lines that intersect. Use a protractor to measure each of the 4 angles that were formed and complete the table.



m∠A = _____
m∠B = _____
m∠C = _____
m∠D = _____

a. What do you notice about the angle measures?

∠A and ∠C are congruent or equal, and ∠B and ∠D are congruent or equal

b. What do you notice about the sum of all four angles above?

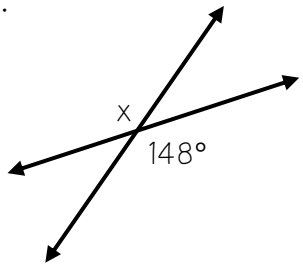
the sum of all four angles is 360°

Two types of special angles are formed when two lines intersect. Use the picture above and the table to help you define and describe these types of angle pairs.

	DEFINITION	EXAMPLES
VERTICAL ANGLES	A pair of ___opposite___ angles formed by ___intersecting___ lines; the angles are ___congruent___	∠___A___ and ∠___C___ ∠___B___ and ∠___D___
ADJACENT ANGLES	Two angles that share a common ___side___ and a common ___vertex___; if the two angles form a straight line, they are supplementary and have a sum of ___180°___	∠___A___ and ∠___B___ ∠___C___ and ∠___D___

Use what you know about intersecting lines to label the missing angles in the pictures below.

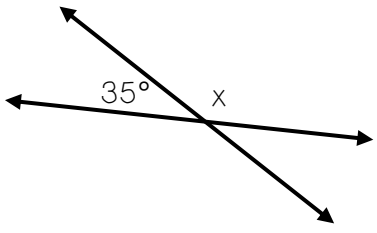
1.



x = ___148°___

type of angle pair: ___vertical angles___

2.

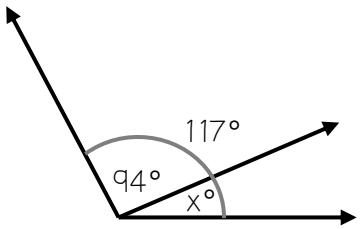


x = ___145°___

type of angle pair: ___adjacent angles___

Use your understanding of angle relationships to set up and solve an equation to find the missing angle measures.

3.

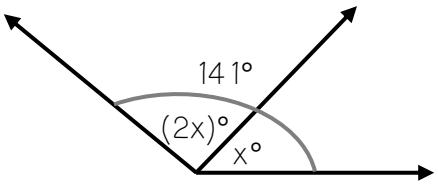


equation: x + 94 = 117

value of x: 23

angle measures: 94°, 23°

4.

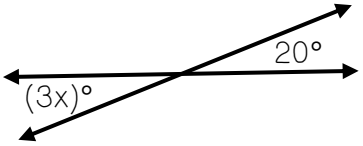


equation: 2x + x = 141

value of x: 47

angle measures: 47°, 94°

5.



equation: 3x = 20

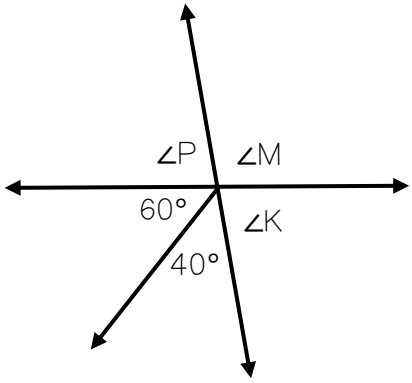
value of x: $6.\overline{6}$

angle measures: 20°, 20°

Angle relationships allow us to determine any unknown angle measures .

All angles around a point or vertex will always have a sum of 360° .

6. Determine the missing angle measures.



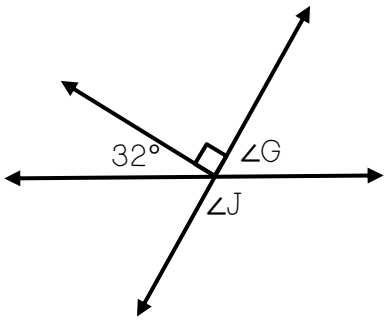
equation: 60 + 40 + k = 180

m∠K = 80°

equation: m = 60 + 40

m∠M = 100°

7. Determine the missing angle measures.



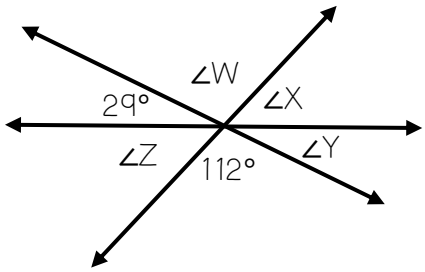
equation: 32 + 90 + g = 180

m∠G = 58°

equation: 58 + j = 180

m∠J = 122°

8. Determine the missing angle measures.



equation: 29 + 112 + z = 180

m∠Z = 39°

Use your knowledge of vertical angles to find the measure of each angle.

m∠W = 112°

m∠X = 39°

m∠Y = 29°

Summarize today's lesson:

Unit: Angles & Triangles
Homework 2

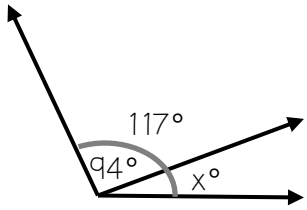
Name _____

Date _____ Pd_____

VERTICAL AND ADJACENT ANGLES

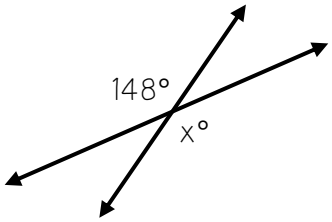
Answer each question below. Match your answers in the table to solve the riddle.

1 Find the value of x.



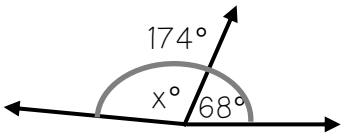
x = 23

2 Find the value of x.



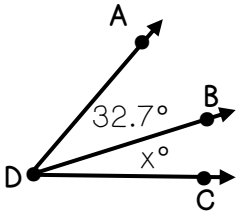
x = 148

3 Find the value of x.



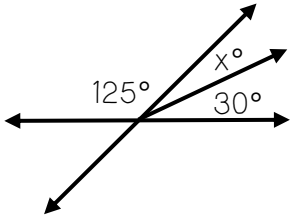
x = 106

4 If the measure of ∠ADC is 50°, then what is the measure of ∠BDC?



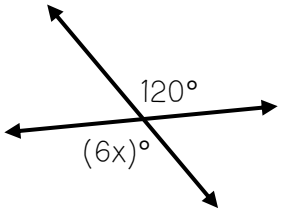
x = 17.3

5 Find the value of x.



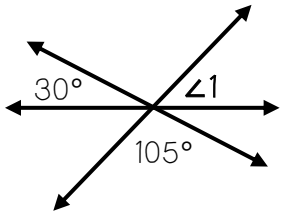
x = 25

6 Find the value of x.



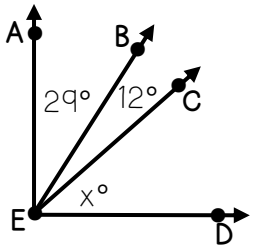
x = 20

7 Find the measure of ∠1.



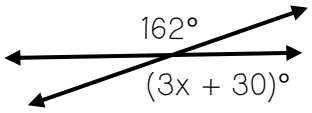
∠1 = 45

8 If the measure of ∠AED is 89°, then what is the measure of ∠CED?



x = 48

9 Find the value of x.



x = 44

W: 76°	S: 25°	T: 44°	N: 90°	U: 20°
L : 23°	H: 119°	M: 106°	P: 148°	C: 95°
A: 107°	E: 17.3°	D: 67°	R: 45°	I: 48°

WHAT DIY TOOLS DO YOU USE IN MATH?

M	U	L	T	I	P	L	I	E	R	S
3	6	1	9	8	2	1	8	4	7	5

Unit: Angles & Triangles
Mini-Quiz 1

Name _____

Date _____ Pd_____

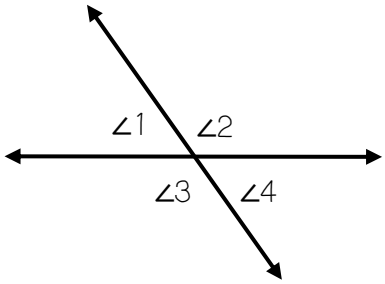
ANGLE RELATIONSHIPS MINI-QUIZ

Use your understanding of angle relationships to solve the questions below.

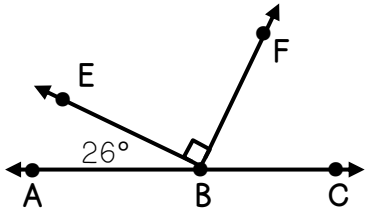
1. Angle 4 and Angle ___1___ are vertical angles.

2. Angle 3 is adjacent to which angles?

   A. Angles 1 and 2
   B. Angles 1 and 4
   C. Angles 2 and 3
   D. Angles 2 and 4

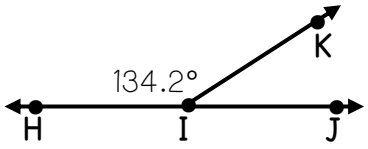


3. Find the m∠FBC.



x = ___64°___

4. Find the missing angle measure.



___45.8°___

5. Angle F and angle G are complementary. Angle F measures (2x+10)° and angle G measures 30°. Find the value of x.

___x = 25___

Unit: Angles & Triangles
Mini-Quiz 1

Name _____

Date _____ Pd_____

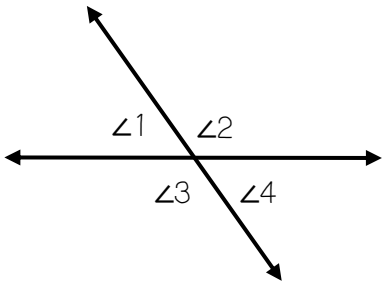
ANGLE RELATIONSHIPS MINI-QUIZ

Use your understanding of angle relationships to solve the questions below.

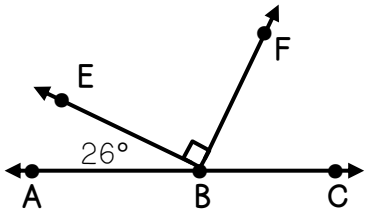
1. Angle 4 and Angle _____ are vertical angles.

2. Angle 3 is adjacent to which angles?

   A. Angles 1 and 2
   B. Angles 1 and 4
   C. Angles 2 and 3
   D. Angles 2 and 4

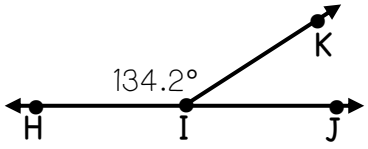


3. Find the m∠FBC.



x = _____

4. Find the missing angle measure.



_____

5. Angle F and angle G are complementary. Angle F measures (2x+10)° and angle G measures 30°. Find the value of x.

_____

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Unit: Angles & Triangles
Student Handout 3

Name _____

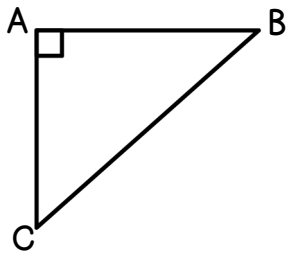
Date _____ Pd _____

ANGLE RELATIONSHIPS IN TRIANGLES

ANGLES OF A TRIANGLE

- Triangles can be named by the three angles. They can be described by the terms _____acute_____, _____right_____, and _____obtuse_____.
- Angles can be named in two different ways:

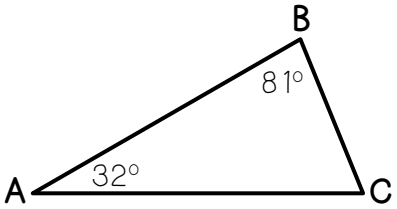
Ex: Triangle ABC is shown at right.



  - ∠A can also be called angle __CAB__ or __BAC__.
  - ∠B can also be called angle __ABC__ or __CBA__.
  - ∠C can also be called angle __BCA__ or __ACB__.
- The __sum__ of the three angles in a triangle is __180°__. You can set up an equation to determine the missing angle measures.

Determine the missing angle in the triangles below.

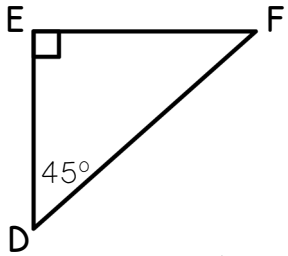
1. Find the measure of ∠C.



Equation: 32 + 81 + x = 180

m∠C: 67°

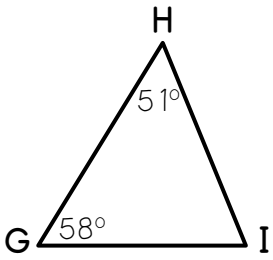
2. Find the measure of ∠F.



Equation: 90 + 45 + x = 180

m∠F: 45°

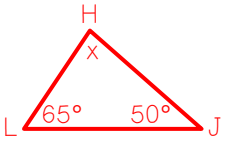
3. Find the measure of ∠HIG.



Equation: 58 + 51 + x = 180

m∠HIG: 71°

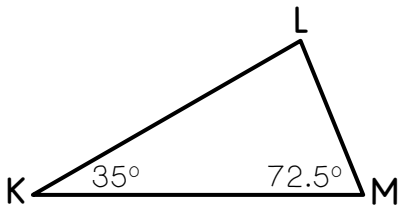
4. Triangle JHL has angle HLJ, which measures 65°, and angle LJH, which measures 50°. Draw a sketch of triangle JHL and determine the missing angle measure.



∠JHL = 65°

Mark the statements in questions 5-7 as true or false. Then correct the false statement in the space provided.

5.



true a. The measure of ∠LKM is 35°, the measure of ∠KML is 72.5° and the measure of ∠KLM is unknown.

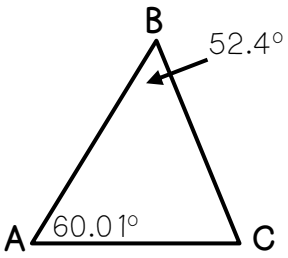
true b. The equation 35 + 72.5 + x = 180 can be used to find the measure of ∠KLM.

false c. The measure of ∠KLM is 35°.

Correct the false statement:

The measure of ∠KLM is 72.5°.

6.



true a. Both ∠B and ∠A are acute angles.

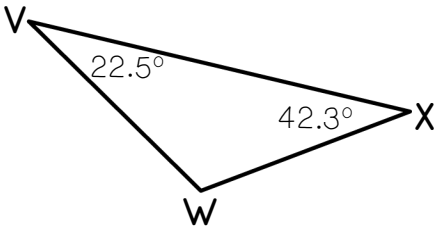
true b. The equation 60.01 + 52.4 + x = 180 can be used to find the measure of ∠BCA.

false c. The measure of ∠BCA is 114.75°.

Correct the false statement:

The measure of ∠BCA is 67.59°.

7.



false a. The equation 22.5 + x = 42.3 can be used to find the measure of ∠VWX.

true b. The measure of ∠XWV is 115.2°.

true c. Triangle VWX is an obtuse triangle, since the measure of ∠W is greater than 90°.

Correct the false statement:

We can use the equation 22.5 + 42.3 + x = 180.

Use your understanding of triangles to answer the questions below.

8. The measure of angle G is 35° and the measure of angle E is 62.2°. Which of the following must be the measure of angle F in order to form triangle EFG?

A. 117.2°
B. 83.2°
C. 82.8°
D. 27.8°

9. Mrs. Tonell writes the measure of 3 angles on the board. Rachel says the three angles will form an acute triangle. Do you agree or disagree? Explain.

∠M = 57°
∠N = 78°
∠O = 55°

Disagree; the angles add up to 190°, so they will not form a triangle.

Summarize today's lesson:

Unit: Angles & Triangles
Homework 3

Name _____

Date _____ Pd_____

ANGLE RELATIONSHIPS & TRIANGLES

Answer each of the questions below. Be sure to show your thinking.

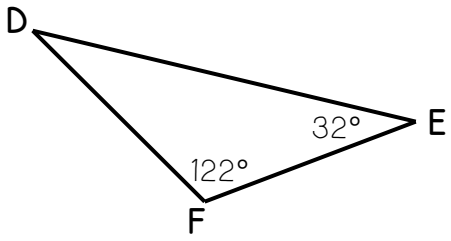
1. Which set of angle measures CANNOT be the angle measures of a triangle?

A. 65°, 65°, 50°
B. 54.3°, 47.5°, 78.2°
C. 22.5°, 36.4°, 110.1°
D. 40°, 40°, 100°

2. The measure of angle S is 29.1° and the measure of angle R is 80°. Which of the following must be the measure of angle Q in order to form triangle QRS?

A. 109.1°
B. 71.1°
C. 150.9°
D. 70.9°

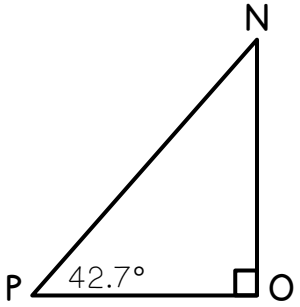
3. Triangle DEF is shown below. What is the measure of ∠D?



26°

4. Triangle NOP is shown below. What is the measure of ∠N?

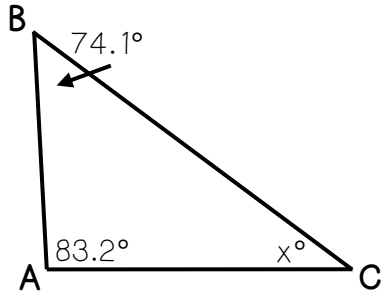
A. 47.3°
B. 137.3°
C. 48.8°
D. 132.8°



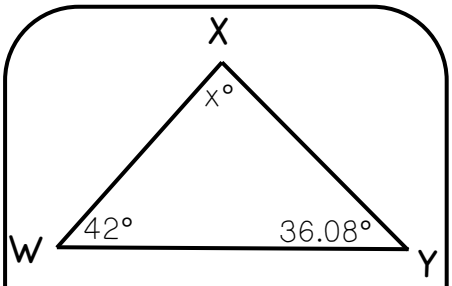
5. In triangle EFG, the measure of angle E is 97°, and the measure of angle F is 15°. What is the measure of angle G?

68°

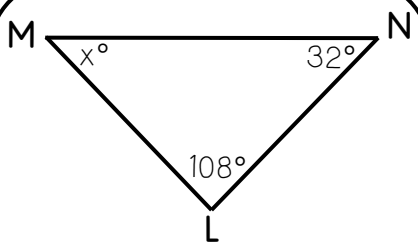
6. Anna solved three problems on her math test. One of them was incorrect. Circle the problem that was solved incorrectly and find the correct answer.



$83.2 + 74.1 + x = 180$
$157.3 + x = 180$
$x = 22.7°$



$42 + 36.08 + x = 180$
$78.08 + x = 180$
$x = 101.92°$



$x = 40°$

$32 + x = 108$
$x = 76°$

Unit: Angles & Triangles
Student Handout 4

Name _____

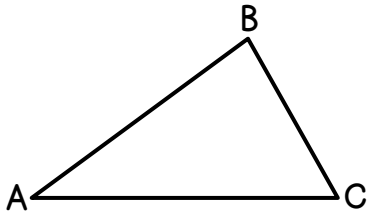
Date _____ Pd _____

SIDE LENGTHS OF TRIANGLES

SIDE LENGTHS OF A TRIANGLE

- Triangles can be named by their sides and described by the terms _equilateral_, _isosceles_, and _scalene_.
- The side length of a triangle corresponds with the angle measure _opposite_ the side.

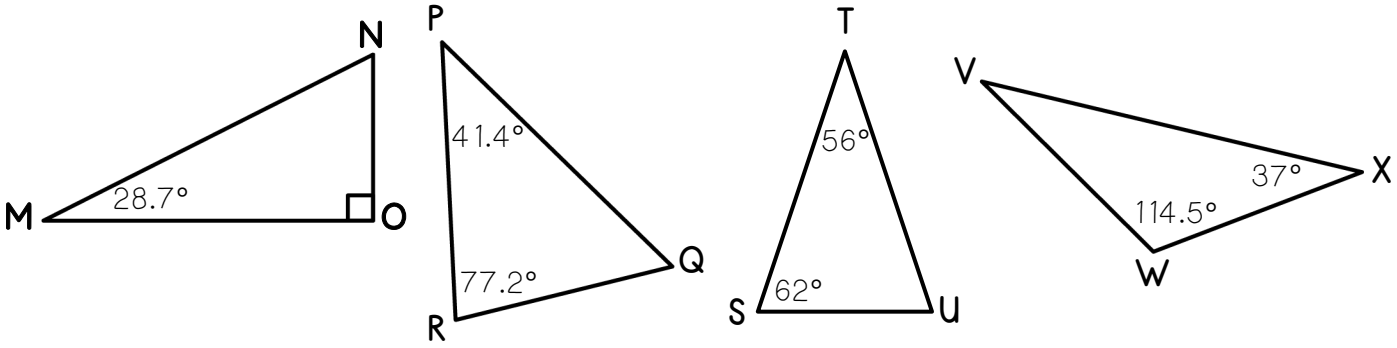
Ex: Triangle ABC is shown at the right.



- Side AB corresponds with angle _C_.
- Side BC corresponds with angle _A_.
- Side CA corresponds with angle _B_.

- The smallest angle will be opposite the _shortest_ side, while the largest angle will be opposite the _longest_ side.
- A side is _congruent_ to another side if it has an equal length.

1. Use the triangles below to answer the questions about side length.



a. Which side corresponds to angle TUS? _TS_

b. Which side corresponds to angle VXW? _VW_

c. Which side length will be the smallest in triangle PQR? _RQ_

d. Which side length will be the largest in triangle MNO? _MN_

TRIANGLE INEQUALITY THEOREM

- For a triangle to be formed, the sum of any _two_ side lengths must be _greater than_ the length of the third side.
- If the line segments satisfy those conditions, then exactly _one_ _unique_ triangle is formed.

Ex: Triangle ABC has side lengths of AB = 7 cm and BC = 9 cm.

1. the greatest AC could be is _AC < 9 + 7_
2. the shortest AC could be is _9 < AC + 7_
3. _2 < AC < 16_

Use your understanding of triangles to answer the following questions.

2. Three line segments have measures of 13 units, 7 units, and 5 units. Will the segments form a triangle?	3. Three line segments have measures of 4 units, 6 units, and 8 units. Will the segments form a triangle?
1: $5 + 7 < 13$ 2: $13 + 5 > 7$ 3: $7 + 13 > 5$	1: $4 + 6 > 8$ 2: $6 + 8 > 4$ 3: $8 + 4 > 6$
Does it form a triangle? No, because the sum of 5 and 7 is not greater than 13.	Does it form a triangle? Yes, because the sum of any two side lengths is greater than the length of the third.

Measure the line segments below to the nearest inch. Use the table to determine which sets of line segments form a triangle. Justify your response. *Consider having students cut a straw into pieces to match these line segments so they can observe that exactly one unique triangle can be formed from 3 given sides.

LINE A

LINE B

LINE C

LINE D

LINE E

LINE F

LINE SEGMENTS	TRIANGLE?	HOW DO YOU KNOW?
A, B, D	yes	The sum of any two side lengths is greater than the length of the third.
A, E, C	no	The sum of lines A and C is not greater than line E.
A, C, D	yes	The sum of any two side lengths is greater than the length of the third.
B, F, E	no	The sum of lines B and F is not greater than line E
D, B, F	no	The sum of lines D and F is not greater than line B.

4. Mr. Stewart gives his students 3 straws that measure 10 inches, 12 inches and 18 inches. Ryan says that there is only one unique way to arrange the straws to form a triangle. Marcy says there are many ways to arrange the straws to form a triangle. Which student is correct? Explain.

Ryan is correct. The three sides will form one unique triangle because the lengths of the sides satisfy the triangle inequality theorem. The straws will not be able to arranged in multiple ways.

Unit: Angles & Triangles
Homework 4

Name _____

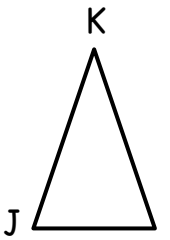
Date _____ Pd_____

SIDE LENGTHS OF A TRIANGLE

Students were asked to create true statements about side lengths of triangles. Circle the names of the students who correctly completed the task. Then, unscramble the underlined letters of the circled names to answer the riddle at the bottom.

BETHANY

side length KL corresponds with angle JKL

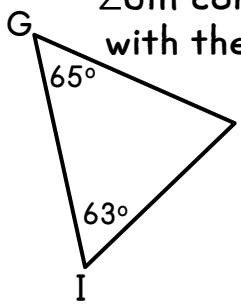


ISAIAH

Three side lengths of 23, 32, and 45 units will form exactly one unique triangle.

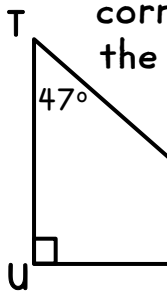
PABLO

∠GIH corresponds with the shortest side



QUINN

side length TV corresponds with the largest angle

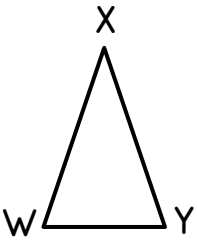


APRIL

If triangle QRS has side lengths of QR = 12.3 and RS = 8.8, then the greatest length side QS could be is 21.1.

TROY

side length WX corresponds with angle WYX

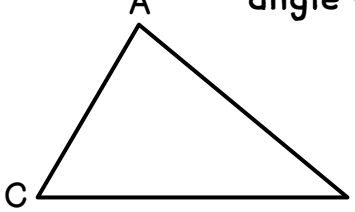


TRENT

Three side lengths of 6, 8, and 15 units will form a triangle.

SAMANTHA

side length BC corresponds with angle CAB



MEGAN

Three side lengths of 5.2, 6.3, and 10.5 units will form exactly one unique triangle.

WHAT KIND OF TRIANGLE IS NEVER WRONG?

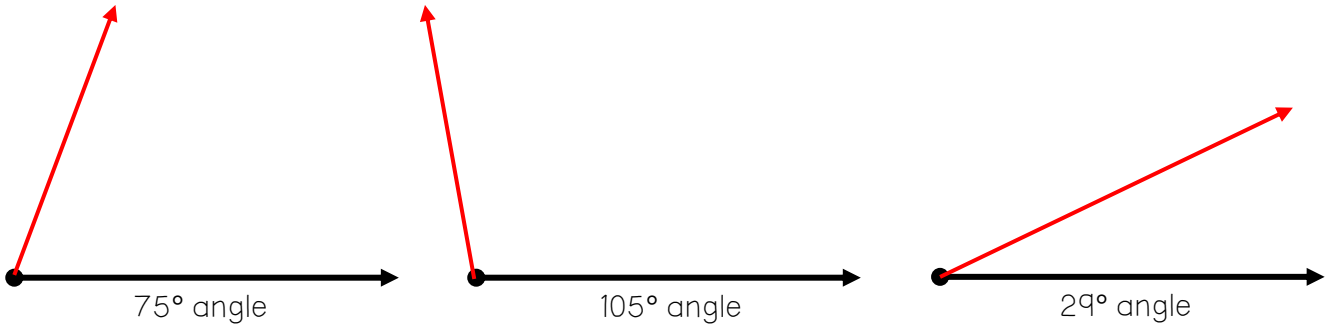
RIGHT

Unit: Angles & Triangles
Student Handout 5

Name Answer Key
Date _____ Pd_____

CONSTRUCTING TRIANGLES

Demarcus is sketching different angles in his math notebook. Use a protractor and ruler to help him complete the angles shown below.

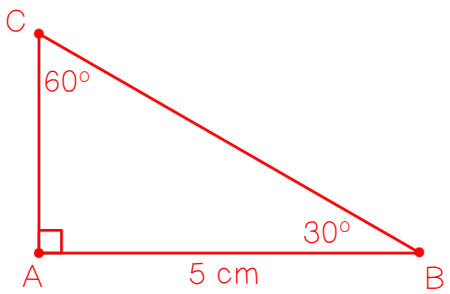


A triangle can be constructed using similar steps as constructing an angle. Use the steps shown in the box below to construct the triangle described in the example above.

CONSTRUCTING A TRIANGLE

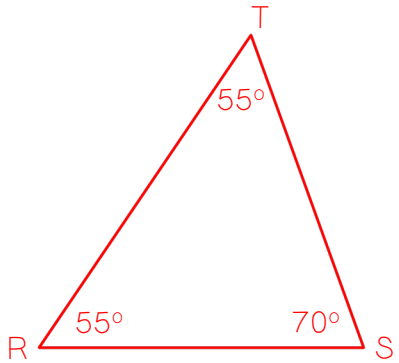
1. Draw and label a line segment, measure if necessary.
2. Use a protractor to draw an angle at one of the endpoints of the line segment.
3. Label the angle measure in the triangle.
4. Draw and label a second angle at the other endpoint of the original line segment.
5. Mark the third point on the triangle where the sketched lines intersect.
6. Erase any extra markings and check all angle measures.

1 Construct triangle ABC, where the m∠A = 90°, the m∠B = 30°, and the length of $\overline{AB}$ is 5 cm.



Construct the triangle given the conditions below, then answer questions a-b.

2 Triangle RST has angle measures of m∠R = 55°, m∠S = 70°, and m∠T = 55°.



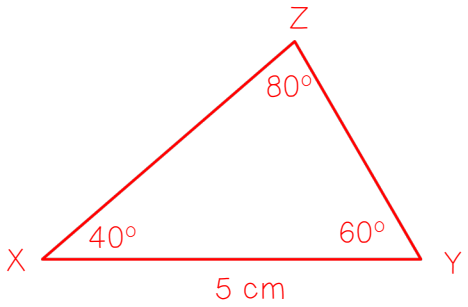
a. Measure the sides of triangle RST and then compare your measurements with a partner. Are the measures of the sides of your triangles the same or different?
The measurements are different.

*Encourage students to compare with many other students.

b. What can you conclude about the number of triangles that can be formed given 3 angle measures?

When given 3 angle measures, more than one triangle can be constructed.

3 Construct triangle XYZ, where the m∠YXZ= 40°, the m∠XYZ = 60°, and the length of $\overline{XY}$ is 5 cm.



- Have students compare measurements to discover that one unique triangle is formed

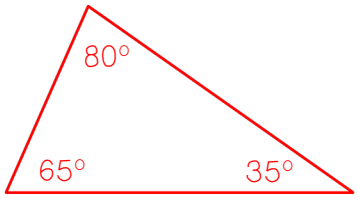
Find the length of each side in centimeters.

- Measurements may vary slightly.

$\overline{XZ}$ = 4.3 cm

$\overline{YZ}$ = 3.2 cm

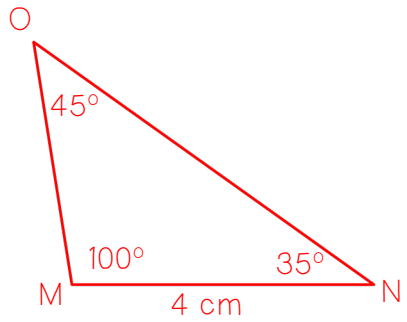
4 Construct a triangle with angle measures of 65°, 35°, and 80°.



How many triangles can be constructed given this information? Explain.

More than one triangle can be formed when given 3 angle measures.

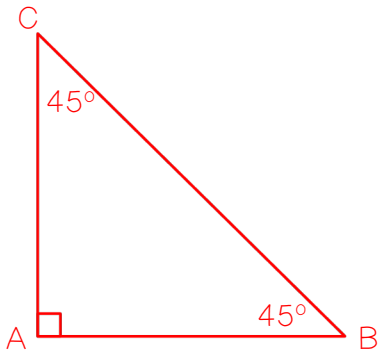
5 Construct triangle MNO, where the m∠N = 35°, the m∠O = 45°, and the length of $\overline{MN}$ is 4 cm. (Hint: Find the missing angle before constructing.)



How many triangles can be constructed given this information? Explain.

The specific measurement of the line segment limits the construction to one unique triangle.

6 Construct triangle ABC, where the m∠A = 90°, m∠B = 45°, and m∠C = 45°.



Measure and label the length of each side of the triangle. What can you conclude about the measure of sides $\overline{AB}$ and $\overline{AC}$?

The length of the two sides are equal so the sides are congruent.

7 Determine the number of triangles that can be constructed given the conditions in a-d.

a. m∠A = 110°, m∠B = 20°, and m∠C = 50° → more than one

b. Three line segments measure 21 inches, 7 inches, and 4 inches → no triangle formed

c. $\overline{RS}$ = 14 cm, m∠R = 27°, and m∠S = 98° → one unique triangle

d. m∠E = 95°, m∠F = 62°, and m∠G = 18° → no triangle formed

Unit: Angles & Triangles
Homework 5

Name Answer Key

Date _____ Pd _____

CONSTRUCTING TRIANGLES

Answer each of the questions below. Be sure to show your thinking.

1. Marissa is constructing triangles given different conditions. Which of the following conditions will NOT produce a triangle?

a. angle measures of 47°, 58°, 75°

b. $m\angle T = 61°$, $m\angle U = 61°$, $m\angle V = 58°$

c. side lengths of 5 ft, 11 ft, and 4 ft

d. $\overline{XZ}$ = 11 cm, $\angle X = 42°$, and $\angle Z = 80°$

2. Mrs. Taylor asked her class to construct a triangle with angle measures of 78°, 15°, and 87°. Which of the following statements must be true?

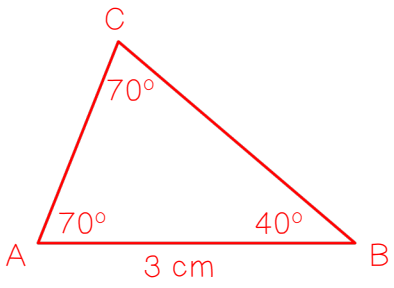
a. One unique triangle can be constructed.

b. More than one triangle can be constructed.

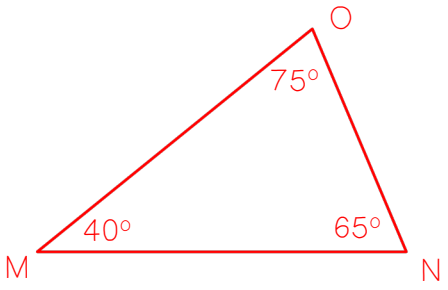
c. No triangle can be constructed.

For 3-6, construct a triangle with the given conditions.

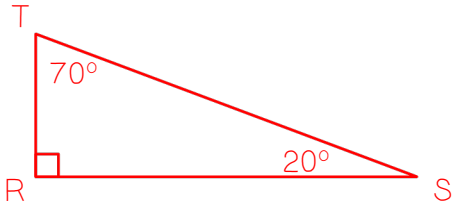
3. Triangle ABC with $\overline{AB}$ = 3 cm, $\angle ABC = 40°$, and $\angle BAC = 70°$.



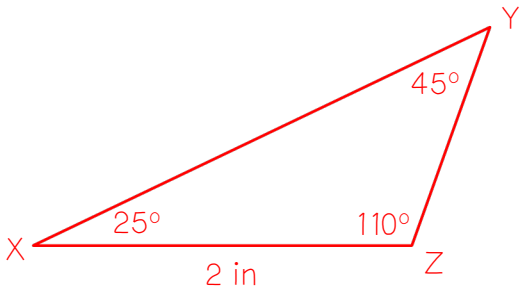
4. Triangle MNO has angle measures of $m\angle M = 40°$, $m\angle N = 65°$, and $m\angle O = 75°$.



5. Triangle RST has angle measures of $m\angle R = 90°$, $m\angle S = 20°$, and $m\angle T = 70°$.



6. Triangle XYZ with $\overline{XZ}$ = 2 in, $\angle X = 25°$, and $\angle Y = 45°$.



Unit: Angles & Triangles
Mini-Quiz 2

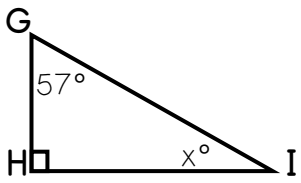
Name _____

Date _____ Pd_____

TRIANGLES MINI-QUIZ

Use your understanding of triangle relationships to solve the questions below.

1. What is the missing angle measure?



x = 33°

2. Which set of angle measures will not form a triangle?

A. 60°, 60°, 60°
B. 54.5°, 47.5°, 88°
C. 22.5°, 36.4°, 121.1°
D. 45°, 45°, 90°

3. In triangle QRS, the measure of angle RSQ is 29.1°, and the measure of angle QRS is 76°. What is the measure of angle SQR?

74.9°

4. Three line segments have measures of 13 units, 7 units, and 5 units. Will the segments form a triangle?

no

5. Determine if ΔABC with m∠A = 40°, m∠B = 65°, and m∠C = 75° will form a unique triangle or more than one triangle.

more than one

Unit: Angles & Triangles
Mini-Quiz 2

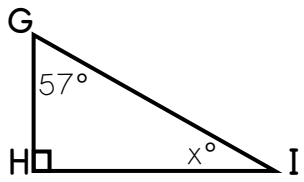
Name _____

Date _____ Pd_____

TRIANGLES MINI-QUIZ

Use your understanding of triangle relationships to solve the questions below.

1. What is the missing angle measure?



x = _____

2. Which set of angle measures will not form a triangle?

A. 60°, 60°, 60°
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C. 22.5°, 36.4°, 121.1°
D. 45°, 45°, 90°

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4. Three line segments have measures of 13 units, 7 units, and 5 units. Will the segments form a triangle?

5. Determine if ΔABC with m∠A = 40°, m∠B = 65°, and m∠C = 75° will form a unique triangle or more than one triangle.

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