Cluster 4.7: Geometry and Measurement

4.7C: Angle Measures: Roof Peaks

Focusing TEKS

4.7C Geometry and Measurement. The student applies mathematical process standards to solve problems involving angles less than or equal to 180 degrees. The student is expected to determine the approximate measures of angles in degrees to the nearest whole number using a protractor. **Readiness Standard**

Additional TEKS:

4.6C Apply knowledge of right angles to identify acute, right, and obtuse triangles. **Supporting Standard**

Focusing Mathematical Process

4.1A Apply mathematics to problems arising in everyday life, society, and the workplace.

4.1B Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.

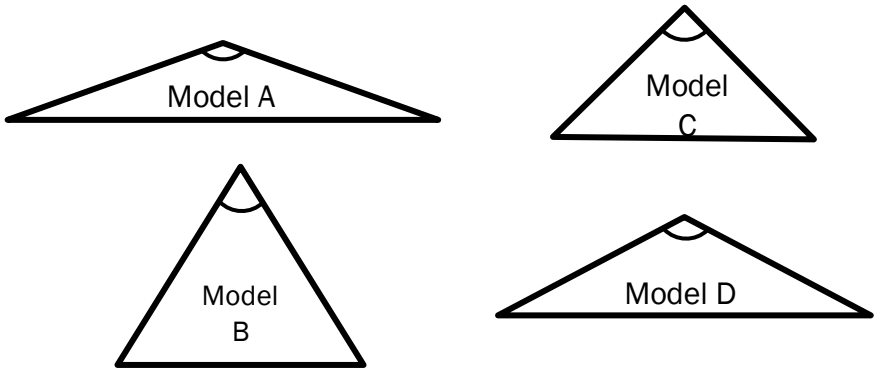
4.1C Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.

4.1F Analyze mathematical relationships to connect and communicate mathematical ideas.

4.1G Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

Performance Task

An architect drew the following models of roofs for a new house. The angle at the top of the roof, the roof peak, must measure between 120° and 148°. The angle at the roof peak is marked on each model.



Which model(s) above can be used on a house? Name each triangle based on its angle measures. Justify your reasoning.

Answer: *Model A and model D can be used on a house. Model A is an obtuse triangle, model B is an acute triangle, model C is a right triangle, and model D is an obtuse triangle.*

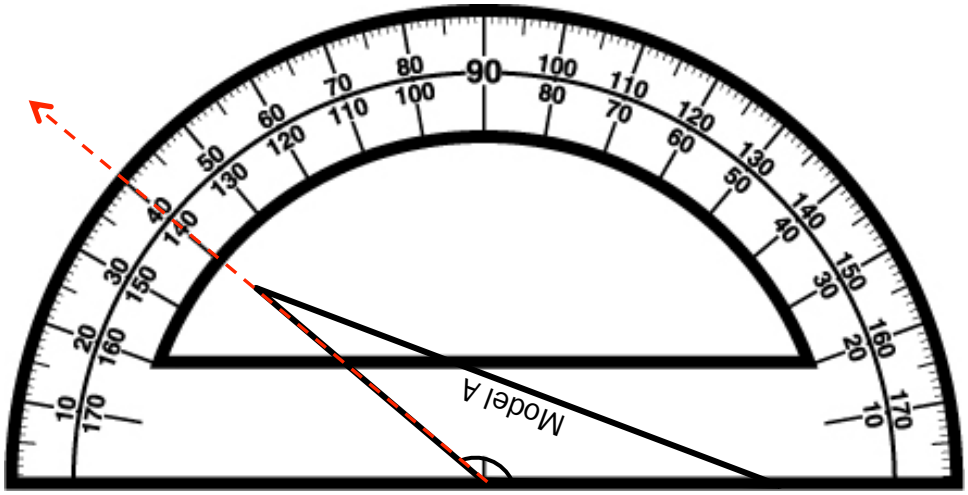
Mathematically Speaking…

In this task, students determine the angle measure of roof peaks, which are modeled as two-dimensional triangles. Students must determine which roof peaks can be used for a house if a roof peak must measure between 120° and 148°. Students are also asked to classify each triangle based on angle measures.

Students may use what they know about right angles to help classify each triangle and to begin eliminating triangles that cannot be used for a roof. Students must understand how to use a protractor in order to accurately measure each angle to the nearest degree.

Possible Solution

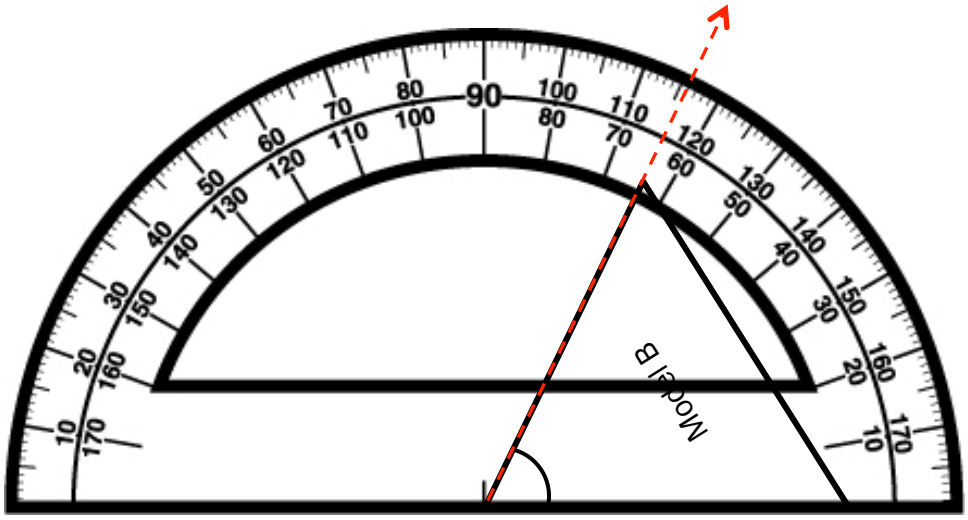
In the task it states that the roof peak must measure between 120° and 148° in order for the model to be used for a house. Measure each marked roof peak with a protractor. Each triangle may need to be rotated in order to line up the rays of the roof peak on the protractor.



When the line segment on a side of the triangle is extended, the angle can be measured using the protractor. The roof peak for model A measures 140°; therefore, model A can be used for a roof.

Because 140° is an obtuse angle, model A represents an obtuse triangle.

Next, measure the roof peak for Model B.

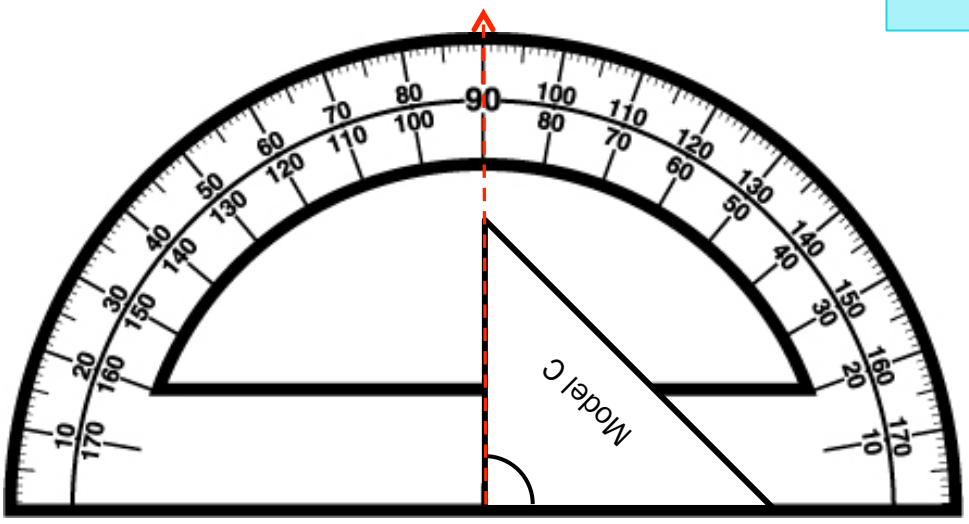


The roof peak of model B measures 64°. Because the measure of the roof peak on model B is smaller than 120°, model B cannot be used for a house.

Because all of the angles in model B are acute, model B is an acute angle.

Next, measure the roof peak for model C.

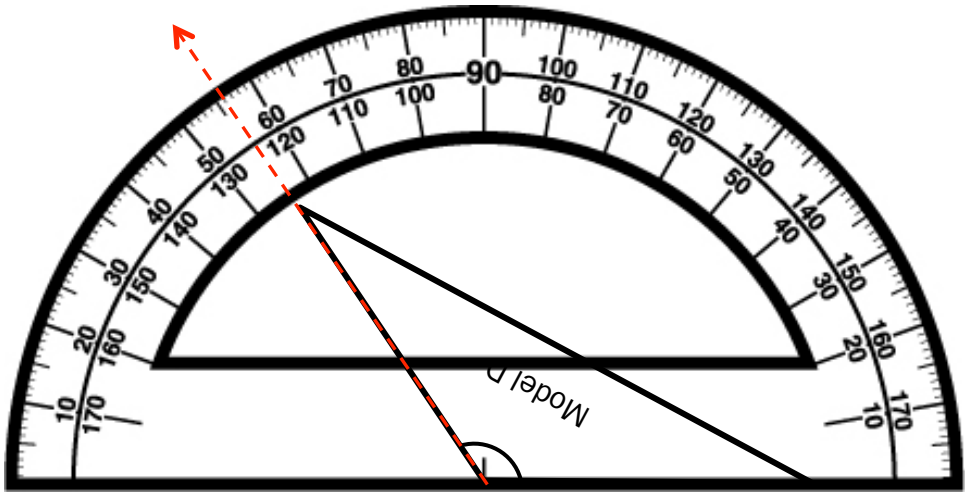
Students may be able to determine that model B cannot be used because all of the angles are acute and the roof peak must be an obtuse angle.



The roof peak of model C measures 90°, which is smaller than 120°. Model C cannot be used for a house.

Because model C has a 90° angle, or right angle, it is referred to as a right triangle.

Next, measure the roof peak for model D.



The roof peak of model D measures 124° which is between 120° and 148°; therefore, model D can be used for a house.

Because 124° is an obtuse angle, model D represents an obtuse triangle.

Model A and model D can be used for a house because they have roof peaks that measure between 120° and 148°. They are both obtuse triangles. Model B is an acute triangle and model C is a right triangle.

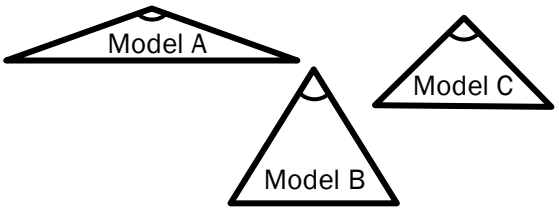
Look For...

- strategies such as the use of a protractor or the relationship of the angle of each roof peak and a right angle to determine if each model can be used for a house
- an understanding of how to correctly measure angles with a protractor
- an understanding of the definitions of acute, right, and obtuse triangles
- student justification of choices of solution strategy and/or models

Cluster 4.7: Geometry and Measurement

Differentiation: Simplified Task

An architect drew the following models of roofs for a new house. The angle at the top of the roof, the roof peak, must measure between 120° and 148°. The angle at the roof peak is marked on each model.

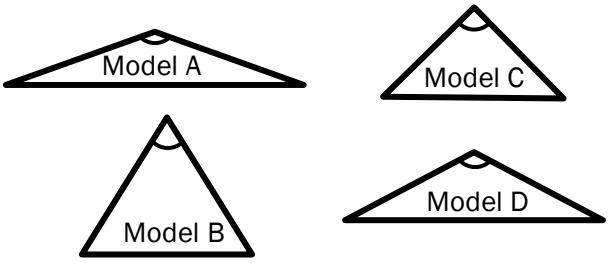


Which model above can be used on a house? Justify your reasoning.

Answer: *Model A can be used for a house.*

Differentiation: Enriching Task

An architect drew the following models of roofs for a new house. The angle at the top of the roof, the roof peak, must measure between 120° and 148°. The angle at the roof peak is marked on each model.



Which model(s) above can be used on a house? Name each triangle based on its angle measures.

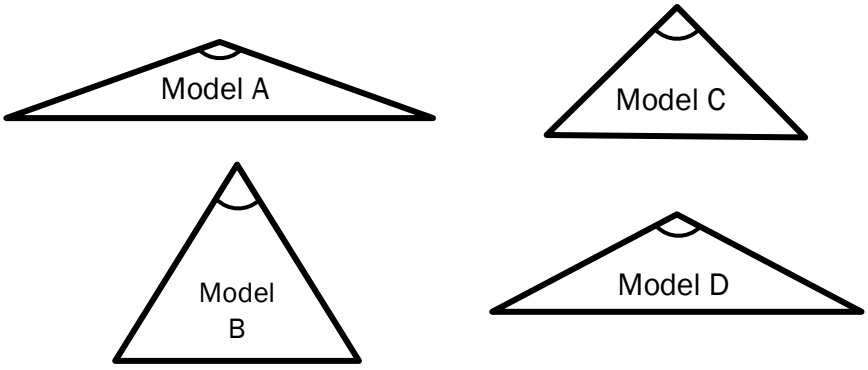
One customer asked for a roof with the largest angle measure for the peak. Draw this angle. Justify your reasoning.

Answer: *Model A and Model D can be used for a roof. The model of the roof peak with the largest measure is below.*

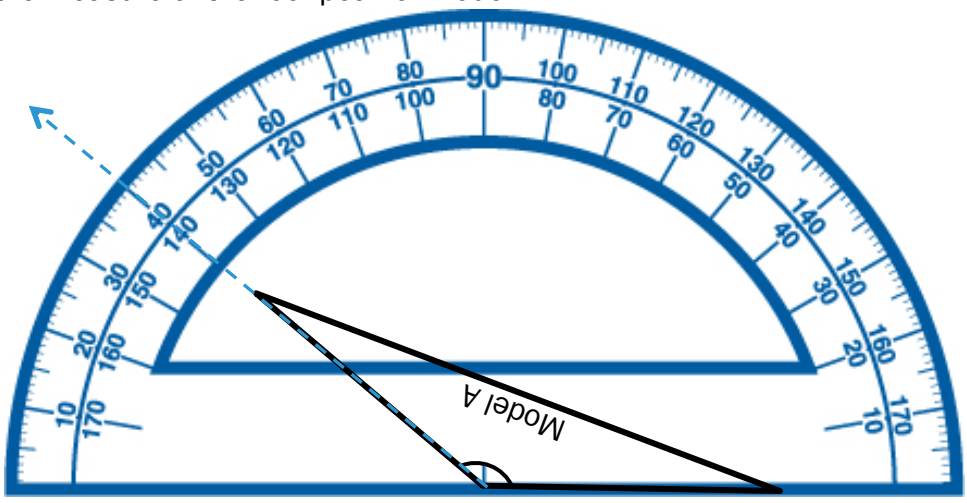
Cluster 4.7: Geometry and Measurement

Scaffolded Task with Answers

An architect drew the following models of roofs for a new house. The angle at the top of the roof, the roof peak, must measure between 120° and 148°. The angle at the roof peak is marked on each model.



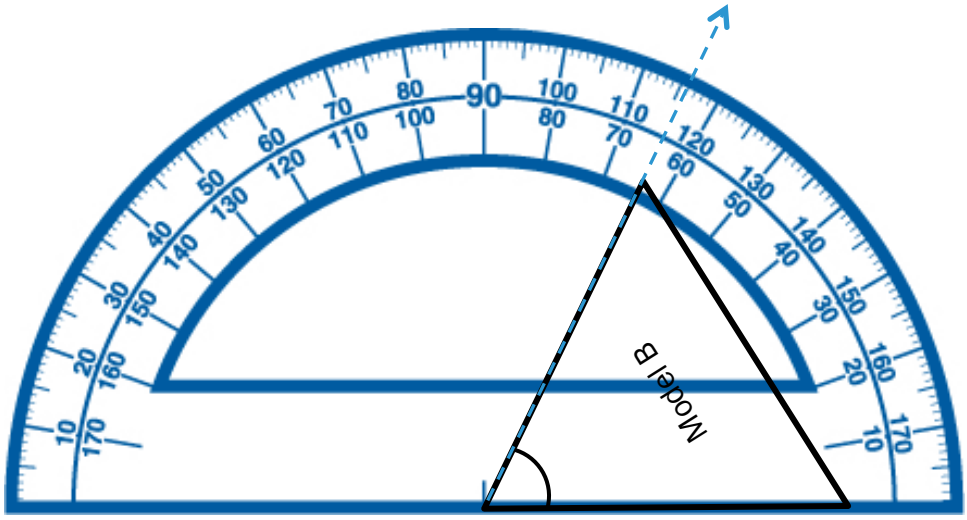
1. Define an acute triangle.
   An acute triangle has three acute angles or angles that measure less than 90°.
2. Define a right triangle.
   A right triangle is a triangle that has exactly one right angle or an angle that measures exactly 90°.
3. Define an obtuse triangle.
   An obtuse triangle is a triangle that has exactly one obtuse angle or an angle that measures greater than 90° but less than 180°.
4. What is the measure of the roof peak of Model A?



The roof peak for model A measures 140°.

5. What type of triangle is Model A?
   Because 140° is an obtuse angle, model A represents an obtuse triangle.

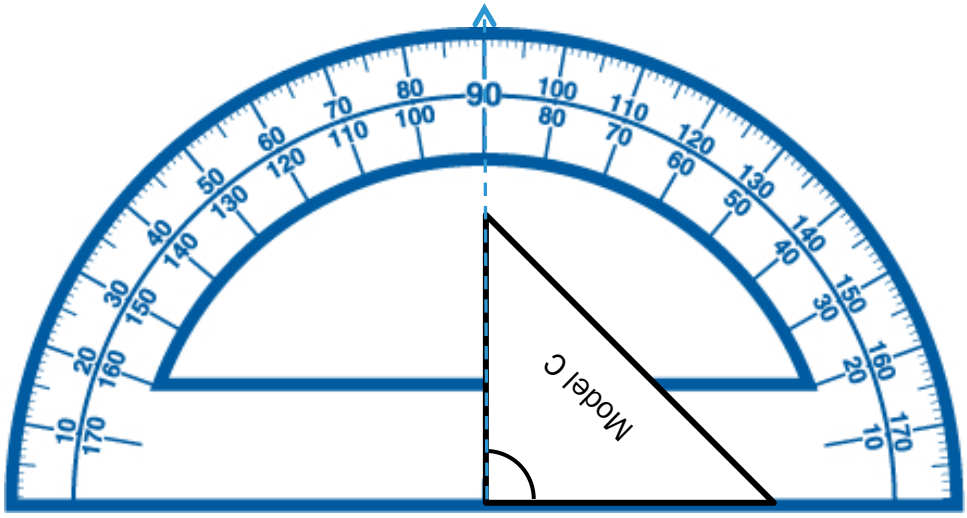
6. What is the measure of the roof peak for Model B?



   The roof peak of model B measures 64°.

7. What type of triangle is Model B?
   Because all of the angles in model B are acute, model B is an acute angle.

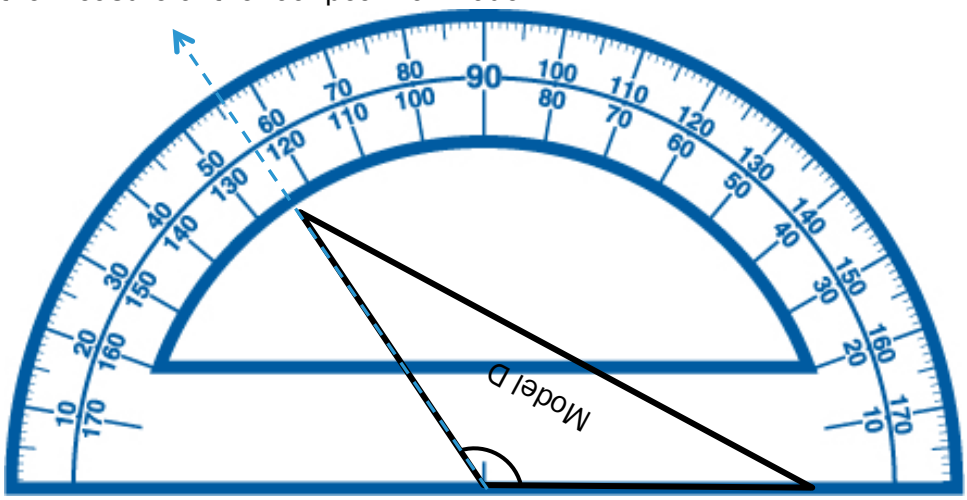
8. What is the measure of the roof peak for Model C?



   The roof peak of model C measures 90°.

9. What type of triangle is Model C?
   Because model C has a 90° angle or right angle, it is a right triangle.

10. What is the measure of the roof peak for Model D?



The roof peak of model D measures 124°.

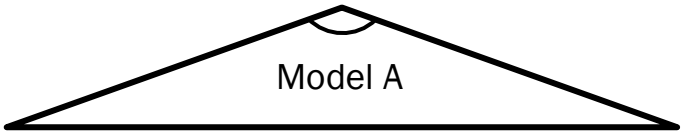
11. What type of triangle is Model D?
Because 124° is an obtuse angle, model D represents an obtuse triangle.

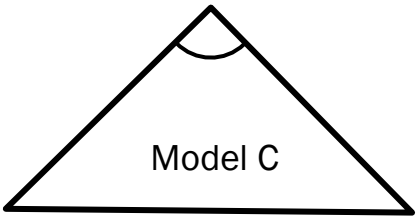
12. If the roof peak needs to measure between 120° and 148° which models can be used on a house?
Model A and model D can be used for a house because they have roof peaks that measure between 120° and 148°.

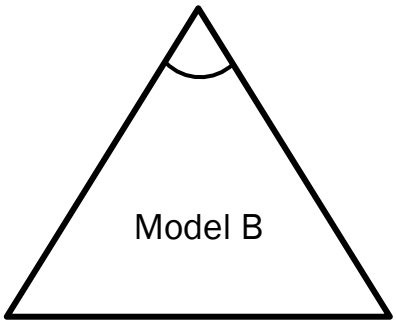
Name _____ Date_____

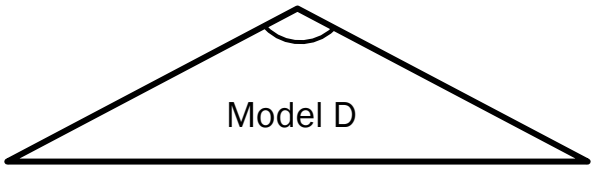
Performance Task: 4.7C
Angle Measures: Roof Peaks

An architect drew the following models of roofs for a new house. The angle at the top of the roof, the roof peak, must measure between 120° and 148°. The angle at the roof peak is marked on each model.









Which model(s) above can be used on a house? Name each triangle based on its angle measures. Justify your reasoning.

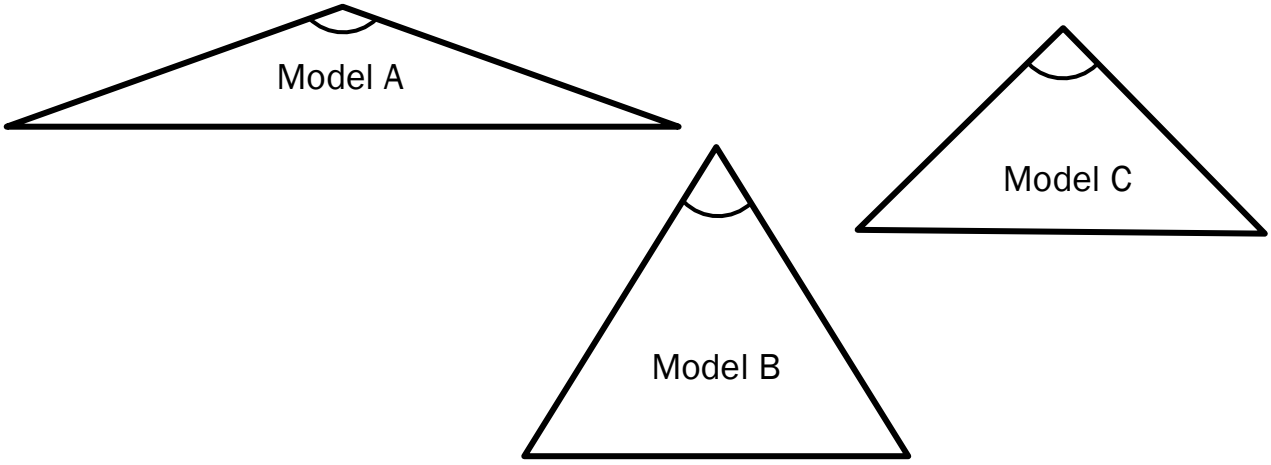
Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points:_____

Name _____ Date_____

Performance Task: 4.7C
Angle Measures: Roof Peaks

An architect drew the following models of roofs for a new house. The angle at the top of the roof, the roof peak, must measure between 120° and 148°. The angle at the roof peak is marked on each model.



Which model above can be used on a house? Justify your reasoning.

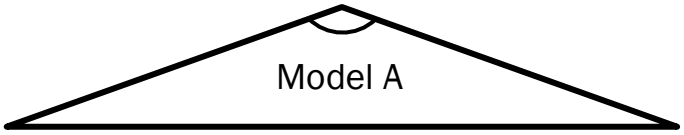
Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

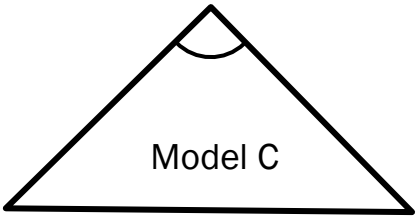
Total points:_____

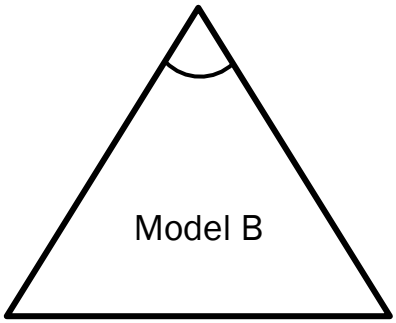
Name _____ Date_____

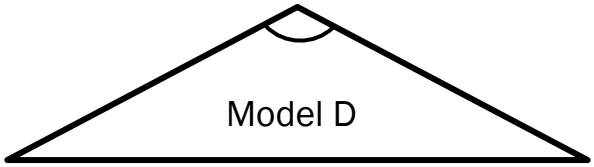
Performance Task: 4.7C
Angle Measures: Roof Peaks

An architect drew the following models of roofs for a new house. The angle at the top of the roof, the roof peak, must measure between 120° and 148°. The angle at the roof peak is marked on each model.









Which model(s) above can be used on a house? Name each triangle based on its angle measures.

One customer asked for a roof with the largest angle measure for the peak. Draw this angle. Justify your reasoning.

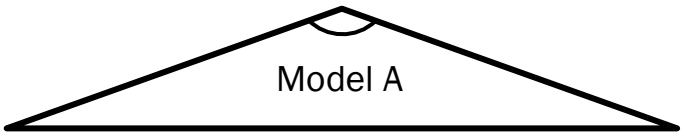
Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

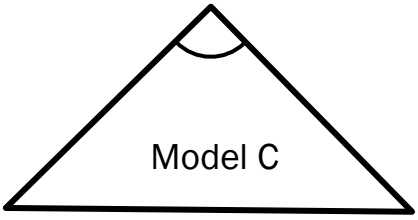
Total points:_____

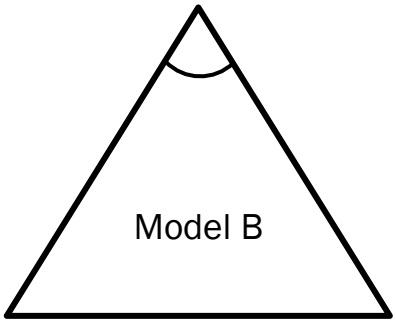
Name _____ Date_____

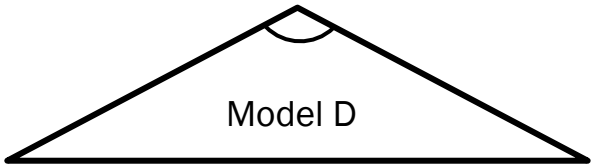
Performance Task: 4.7C
Angle Measures: Roof Peaks

An architect drew the following models of roofs for a new house. The angle at the top of the roof, the roof peak, must measure between 120° and 148°. The angle at the roof peak is marked on each model.









1. Define an acute triangle.

2. Define a right triangle.

3. Define an obtuse triangle.

Name _____ Date_____

4. What is the measure of the roof peak of Model A?

5. What type of triangle is Model A?

6. What is the measure of the roof peak for Model B?

7. What type of triangle is Model B?

8. What is the measure of the roof peak for Model C?

9. What type of triangle is Model C?

10. What is the measure of the roof peak for Model D?

11. What type of triangle is Model D?

12. If the roof peak needs to measure between 120° and 148° which models can be used on a house?