Tricky Triangles Activity

What do we know about triangles?

Can any three side lengths form a triangle?

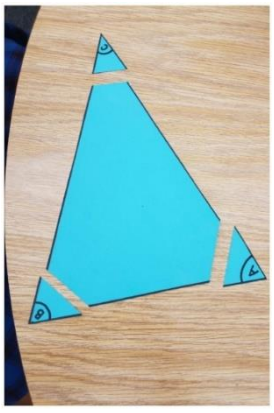
Where do we see triangles?

<u>Materials Needed</u>:

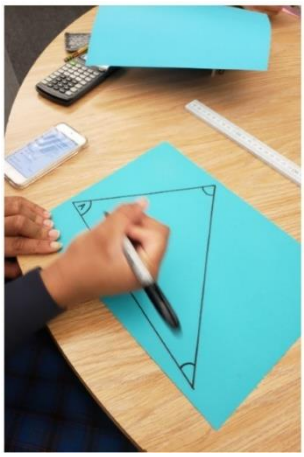
Construction paper or cardstock (different colours)/scissors/pen or pencil/ruler/coloured pencils

<u>Interior Angles Procedure</u>:

1) Sketch a triangle on a piece of paper. This can be any size or type. Do you know of any specific types of triangles?
2) Mark the angles inside the triangle as A, B, C. As shown in the diagram.



3) Cut out the triangle first and then cut out or tear off the corners.
4) Arrange the three angles on the line. How do they fit? What do you now about the angle of a straight line?
5) Complete a second triangle (different size and shape from the first) and see how the angles fit.



The **triangle sum theorem** states that all angles in a triangle add to _____.
[If you have a protractor at home use it to measure the angles and verify, they add up to this amount]

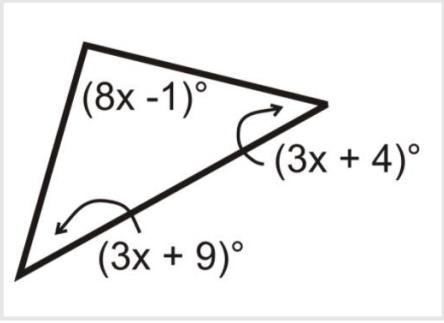
Other possible questions?

1) The sum of the interior angles of any polygon is related to the sum of the angles in a triangle...how? What equation can you develop to determine the sum of the interior angles in any polygon?

2) Can you draw a triangle that has two obtuse angles? Why or why not?

3) What is the two-column proof that all the angles in a triangle add up to 180 degrees?

4) Two interior angles of a triangle measure 50 degree and 70 degree. What is the third interior angle of the triangle?

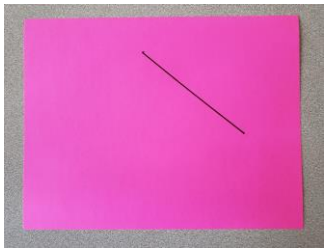
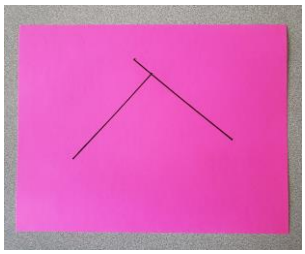
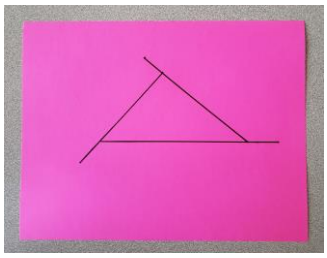


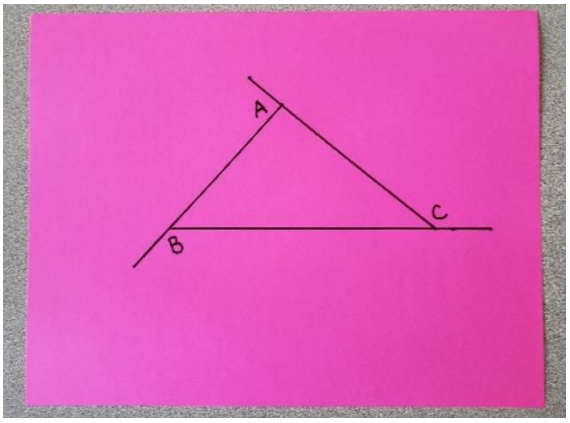
5)Find the value of x and the measure of each angle.

What about the *exterior* angles in a triangle?

Exterior Angles Procedure:

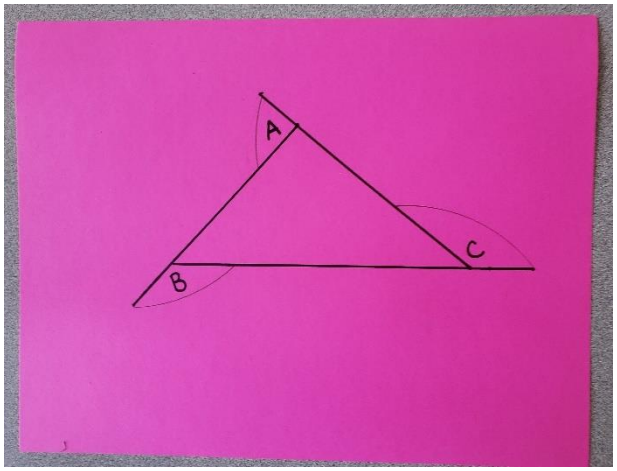
1) Sketch a triangle on a piece of paper and be sure to extend the lines.



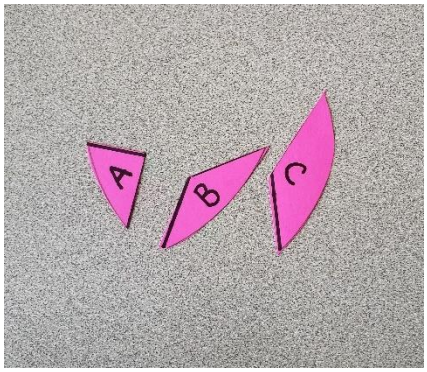
2) Mark the angles between the triangle and the line as A, B, and C as shown.

3) Draw in the arcs of each angle. You can colour in the arcs.



4) Cut out all the arcs and arrange the three arcs.

What shape does it form? How many degrees does this add to?



Other possible questions?

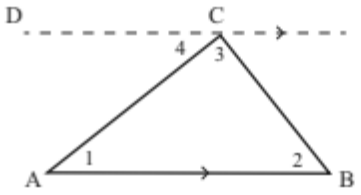
1) Are the exterior angles always obtuse?

2) What about the exterior angles of other polygons (quadrilateral, pentagon, hexagon)?

3) What about the relationship between the interior and exterior angles of a triangle?
   - ► Verify that the exterior angle of a triangle is greater than either of its opposite interior angles.

We will use our knowledge of parallel lines to prove this most important theorem.

Given: ΔABC
Prove: $\angle 1 + \angle 2 + \angle 3 = 180°$



Proof	Statement	Reason
1.	Draw line DC parallel to AB	construction
2.	$\angle 3 + \angle 4 = \angle DCB$	angle addition
3.	$\angle DCB + \angle 2 = 180°$	co-interior angles
4.	$\angle 3 + \angle 4 + \angle 2 = 180°$	substitution from step 2
5.	$\angle 1 = \angle 4$	alternate interior angles
6.	$\angle 1 + \angle 2 + \angle 3 = 180°$	substitution

Angle Sum of a Triangle Theorem

The sum of angles in a triangle is 180°.