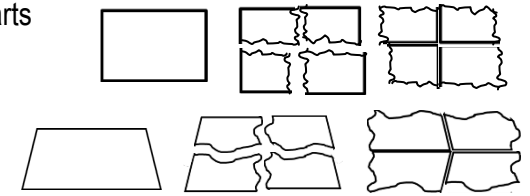
SIDE AND ANGLE PROPERTIES.

INVESTIGATIONS OVERVIEW PAGE
THIS PAGE IS A SUMMARY OF THE INVESTIGATIONS THAT STUDENTS MAY ENGAGE IN TO DEEPEN THEIR RELATIONAL UNDERSTANDING.
NVESTIGATIONS WITH INSTRUCTIONS TO STUDENTS FOLLOW ON SUBSEQUENT PAGES.

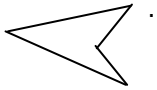
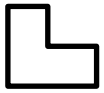
- In pairs, children construct equilateral, isosceles and scalene triangles, describing side and angle properties. Reflection: How can we describe the side and angle properties of equilateral, isosceles and scalene triangles?
- In pairs, children construct squares, rhombuses, rectangles, kites, trapeziums, describing side and angle properties. Reflection: How can we describe the side and angle properties of quadrilaterals – squares, rhombuses, rectangles, kites and trapeziums?
- In pairs, children enlarge shapes by drawing a 1 cm by 1 cm grid over the shape. They enlarge the shape by drawing a 2 cm by 2 cm grid and copying the shape. They identify that the shape's side and angle properties stayed the same while the area changed. Reflection: What changes and what stays the same when we enlarge triangles and quadrilaterals?
- In pairs, one child describes a triangle's or quadrilateral's side and angle properties and their friend identifies the shape from its description. Reflection: How can we describe the side and angle properties of triangles and quadrilaterals?
- In pairs, children have a set of pattern blocks. Children measure and classify angles in each block as acute, right, obtuse, straight, reflex or revolution. They measure the side lengths. They construct a shape with the same angle and side properties. They enlarge their shape, for example, by making each side twice as long. They compare their shapes for similarities, identifying that the side and angle properties are the same. Reflection: How can we construct shapes using their side and angle properties? How can we enlarge a shape? What changes and what stays the same when we enlarge triangles and quadrilaterals?

- Children create art works using similar shapes (same side and angle properties, different sizes) in different orientations. A computer may be used. Reflection: How can we construct and enlarge shapes?
- Children construct different special quadrilaterals using a protractor and a ruler. They cut the quadrilateral into 4 parts with an angle in each part. They rotate the parts to place the angles together, identifying that the 4 angles create a rotation, which is 360 degrees, for example, Reflection: How many degrees in the angles of a quadrilateral?



- Children construct and classify triangles, using side and angle properties. They cut the triangle into 3

parts with an angle is each part. They rotate the parts to place the angles together, identifying that the 3 angles create a straight angle, which is 180 degrees, for example,
Reflection: How many degrees in the angles of a triangle?

- In pairs, children each construct a triangle from a description of its angles, for example 2 acute and 1 obtuse angle OR 2 acute and 1 right angle. They share and classify their triangle. Children identify the maximum and minimum number of acute angles in a triangle, the maximum and minimum number of right angles in a triangle, the maximum and minimum number of obtuse angles in a triangle. Reflection: How many degrees in the angles of a triangle?
- In pairs, children each construct a quadrilateral from a description of its angles, for example 2 acute and 2 obtuse angles OR 2 acute and 2 right angles. They share and classify their quadrilateral. Children could also investigate concave quadrilaterals, for example,  . Children identify the maximum and minimum number of acute angles in a quadrilateral, themaximum and minimum number of obtuse angles in a quadrilateral, the maximum and minimum number of right angles in a quadrilateral, the maximum and minimum number of reflex angles in a quadrilateral. Reflection: How many degrees in the angles of a quadrilateral?
- In small groups, children have 8 metres of string or thin rope tied into a loop. Children determine a strategy to construct specified quadrilaterals and triangles using only the loop of string or thin rope. They justify their shape by measuring and describing its side and angle properties. Reflection: How can we construct shapes using their side and angle properties?
- In pairs, children construct shapes with 5, 6, 7, right angles, for example, 
  Reflection: How can we construct shapes using angle properties?
- Children use computer programs to investigate the relationships between quadrilaterals, for example, (http://www.mathopenref.com/quadrilateral.html), to deepen understanding that, for example, a square is a regular quadrilateral, and therefore by definition, if we make other special quadrilaterals regular, they will become square. So a square is a regular rectangle; a square is a regular rhombus; and because a rhombus is a kite with both pairs of adjacent sides equal, a square is also a regular kite!

Side and Angle Properties.

Construct:

- equilateral,
- isosceles and
- scalene triangles.

Describe the side and angle properties.

Reflection: How can we describe the side and angle properties of equilateral, isosceles and scalene triangles?

Side and Angle Properties.

Construct:

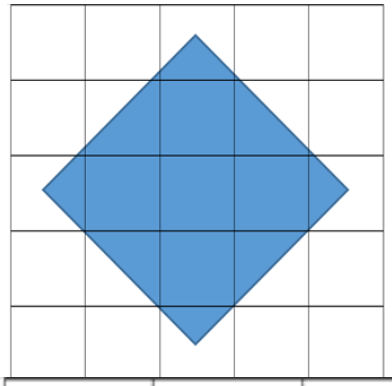
- squares,
- rhombuses,
- rectangles,
- kites and
- trapeziums.

Describe the side and angle properties.

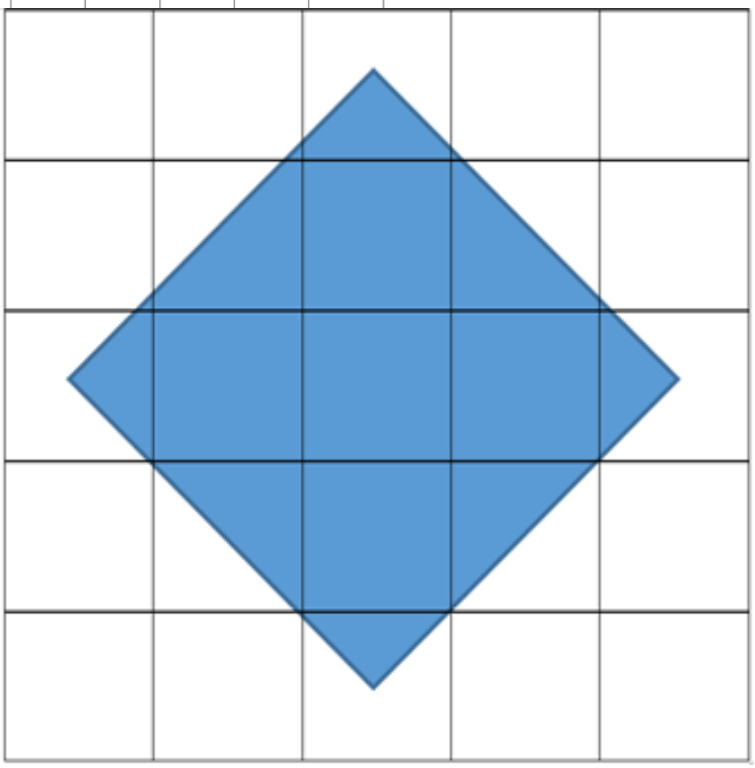
Reflection: How can we describe the side and angle properties of squares, rhombuses, rectangles, kites, trapeziums?

Side and Angle Properties.

Enlarge shapes by drawing a 1 cm by 1 cm grid over the shape, for example,



Draw a 2 cm by 2 cm grid and copy the shape onto the larger grid, for example,



What happened to the shape's side and angle properties?

What happened to the shape's area?

Reflection: What changes and what stays the same when we enlarge triangles and quadrilaterals?

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Side and Angle Properties.

Sit with a friend.

One of you describe a triangle's or a quadrilateral's side and angle properties.

Your friend identifies the shape from the description of the side and angle properties.

Reflection: How can we describe the side and angle properties of triangles and quadrilaterals?

Side and Angle Properties.

Have a set of pattern blocks. 

Measure and classify angles in each block as acute, right, obtuse, straight, reflex or revolution.

Construct a shape with the same properties in the same size.

Enlarge your shape.

Compare your shapes for similarities, identifying that the properties are the same.

Reflection: How can we construct shapes using their side and angle properties?

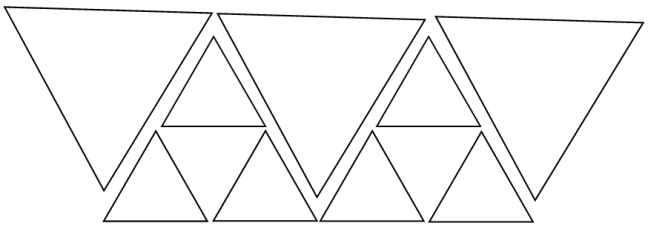
How can we enlarge a shape?

What changes and what stays the same when we enlarge triangles and quadrilaterals?

Side and Angle Properties.

Create art works using similar shapes (same properties, different areas) in different orientations, for example,

A computer may be used.

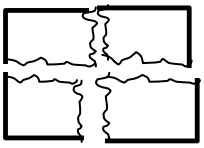


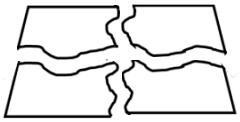
Reflection: How can we construct and enlarge shapes?

Side and Angle Properties.

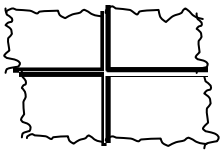
Construct different and classify special quadrilaterals, describing side and angle properties, for example,

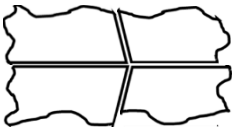
Cut the quadrilateral into 4 parts with an angle in each part, for example,





Rotate the parts to place the angles together, for example,



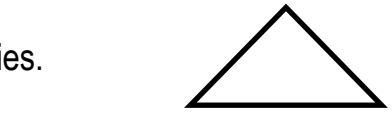


How many degrees in the angles of a quadrilateral?

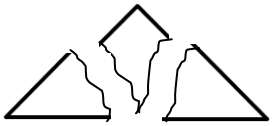
Reflection: How many degrees in the angles of a quadrilateral?

Side and Angle Properties.

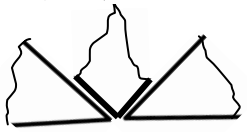
Construct and classify triangles, using side and angle properties.



Cut the triangle into 3 parts with an angle is each part.



Rotate the parts to place the angles together, for example,



How many degrees in the angles of a triangle?

What type of angle do the angles form?

Reflection: How many degrees in the angles of a triangle?

Side and Angle Properties.

Sit with a friend.

Each of you construct a triangle from a description of its angles, for example 2 acute angles and 1 obtuse angle

Share and classify your triangle.

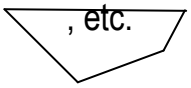
What is the maximum and minimum number of:

- acute angles in a triangle,
- right angles in a triangle,
- obtuse angles in a triangle,
- reflex angles in a triangle.

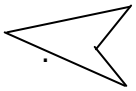
Reflection: How many degrees in the angles of a triangle?

Side and Angle Properties.

Sit with a friend.

Each of you construct a quadrilateral from a description of its angles, for example 2 acute angles and 2 obtuse angles   , etc.

Share and classify your quadrilateral.

You could also investigate concave quadrilaterals, for example,  .

What is the maximum and minimum number of:

- acute angles in a quadrilateral,
- right angles in a quadrilateral,
- obtuse angles in a quadrilateral,
- reflex angles in a quadrilateral.

Reflection: How many degrees in the angles of a quadrilateral?

Side and Angle Properties.

Investigate in a small group.

Have 8 metres of string or thin rope tied into a loop.

Determine a strategy to construct specified quadrilaterals and triangles using only the loop of string or thin rope, for example,

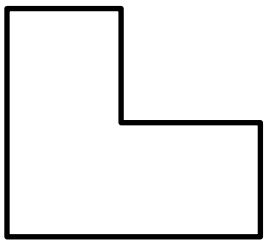
- equilateral triangle
- isosceles triangle
- scalene triangle
- square
- rectangle
- rhombus
- kite
- trapezium

Justify your shape by measuring and describing its side and angle properties.

Reflection: How can we construct shapes using their side and angle properties?

Side and Angle Properties.

Construct shapes with 5, 6, 7, right angles, for example,



Reflection: How can we construct shapes using angle properties?

Side and Angle Properties.

Use computer programs to investigate the relationships between quadrilaterals, for example, (http://www.mathopenref.com/quadrilateral.html).

If a square is a regular quadrilateral, if we make other special quadrilaterals regular, will they become square?

Is a square is a regular rectangle?

Is a square is a regular rhombus?

Because a rhombus is a kite with both pairs of adjacent sides equal, is a square a regular kite?