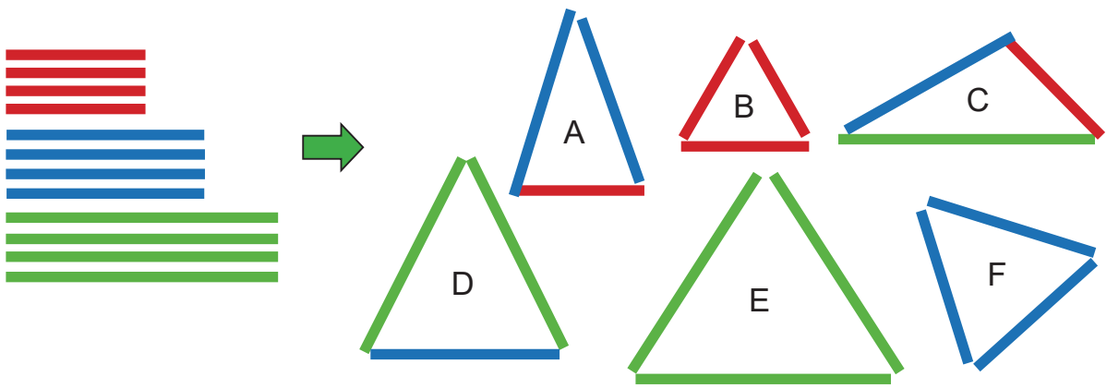
13 - 1 Triangles

Isosceles Triangles and Equilateral Triangles (1)

Example 1 Make various triangles using three kinds of coloured sticks.

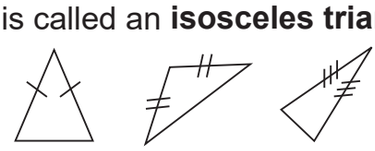


Sort the triangles according to the lengths of their sides.

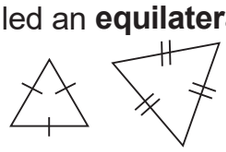
1. Triangles with two sides that are the same length — A, D
2. Triangles with all three sides that are the same length — B, E, F
3. Triangles with all three sides that are different lengths — C

Instruction Let's classify triangles.

- A triangle with two equal sides is called an **isosceles triangle**.

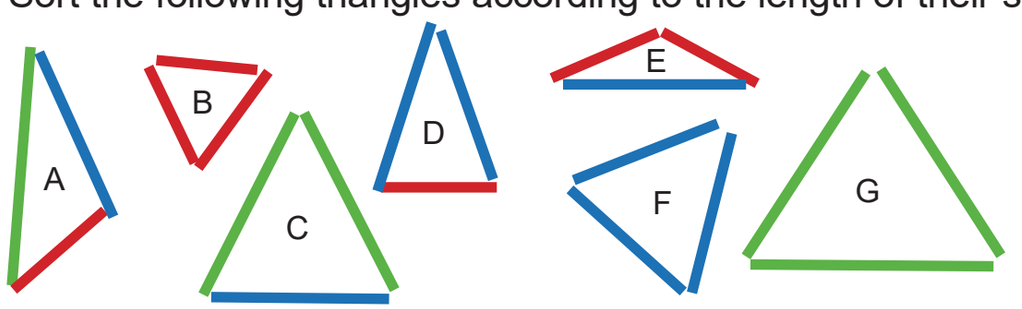


- A triangle with three equal sides is called an **equilateral triangle**.



Symbols such as ‖ indicate the sides that are the same length.

1 Sort the following triangles according to the length of their sides.

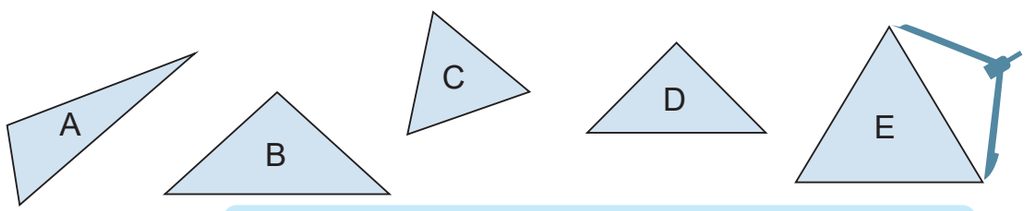


1 Triangles with two sides that are the same length

2 Triangles with all three sides that are the same length

3 Triangles with all three sides that are different lengths

Example 2 Look at the following triangles.



Measure the length of sides with a compass or a ruler to find isosceles and/or equilateral triangles.

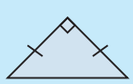
1 Which of these triangles are isosceles triangles?

B, D

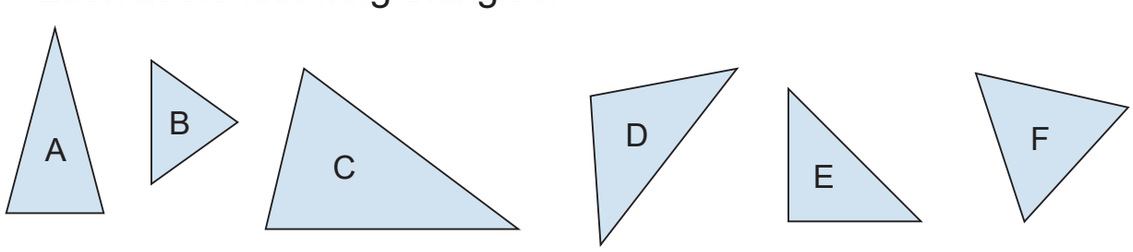
2 Which of these triangles are equilateral triangles?

C, E

A triangle like triangle D is called a **right-angled isosceles triangle**.



2 Look at the following triangles.



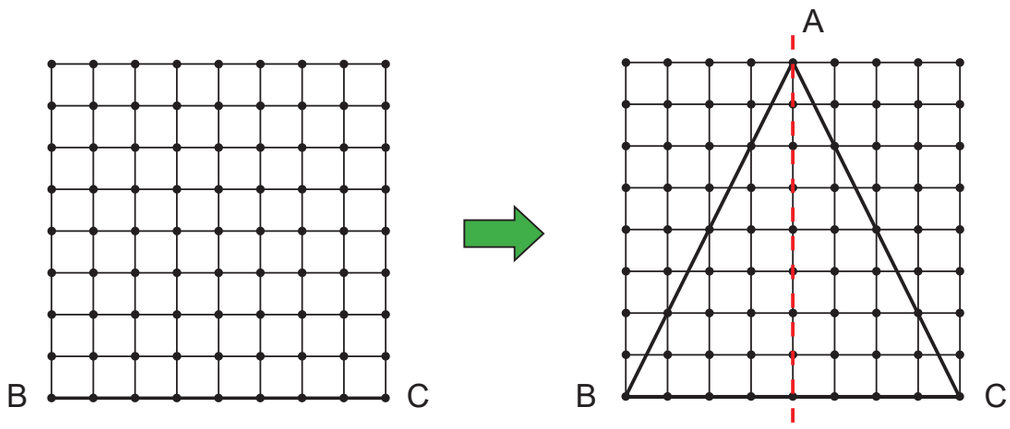
1 Which of these triangles are isosceles triangles?

2 Which of these triangles are equilateral triangles?

13 - 2 Triangles

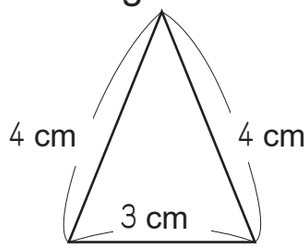
Isosceles Triangles and Equilateral Triangles (2)

Instruction Draw an isosceles triangle. If the line between Point B and Point C is the base of the triangle, where would the top of the triangle be? Mark the top of the triangle as Point A and connect Points A, B, and C together with straight lines.

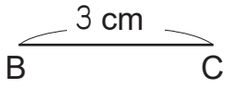


Point A is on the line that runs through the middle of line BC. Any point on that line can be the top of an isosceles triangle.

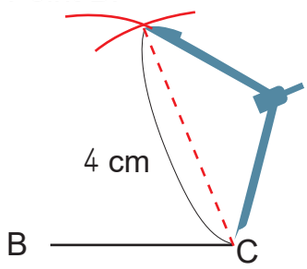
Let's draw an isosceles triangle whose sides have 3 cm, 4 cm and 4 cm.



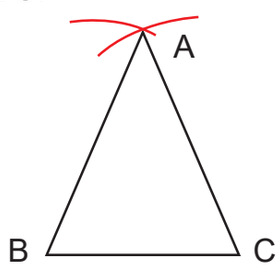
1. Draw line BC 2 cm long. This is the base of the triangle.



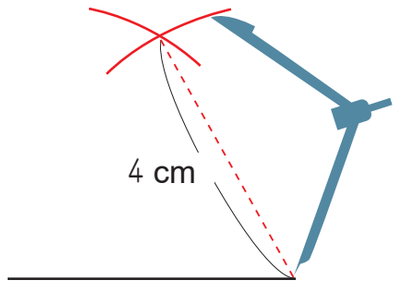
2. Using a compass, place the middle on Point C. Draw a part of a circle with a 3 cm radius. Repeat from Point B.

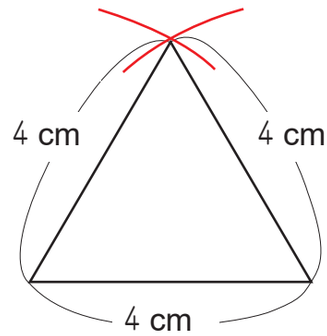


3. The vertex of the triangle is where these two lines cross each other. This is Point A. Draw straight lines from Point A to Point B and Point A to Point C.



Example Draw an equilateral triangle whose sides have 4 cm using the same technique.





1 Draw isosceles triangles whose sides are the following lengths.

1. 2 cm, 5 cm and 5 cm
2. 5 cm, 4 cm and 4 cm

2 Draw equilateral triangles whose sides are the following lengths.

1. 5 cm side
2. 7 cm side

13 - 3 Triangles

Circles and Triangles

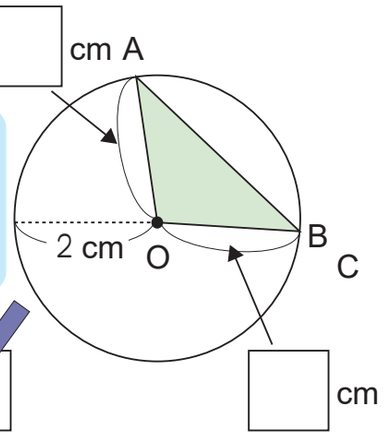
Example There is a triangle in the circle with a radius of 2 cm. Point O is the centre of the circle.

1. How long is OA? 2 cm
2. How long is OB? 2 cm

Both OA and OB are the radius of the circle.

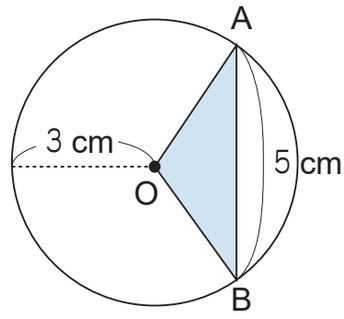
3. What kind of triangle is this triangle?

Isosceles triangle



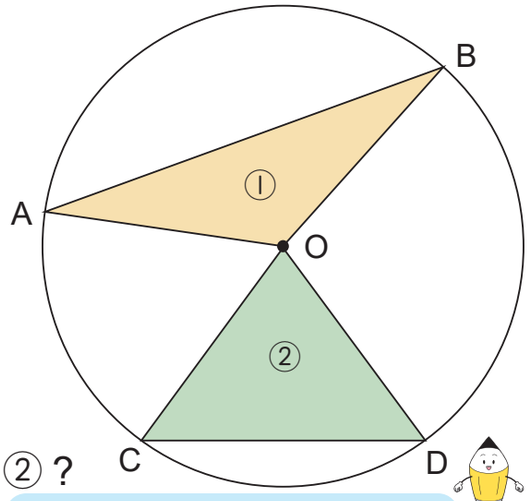
1 There is a triangle in the circle with a radius of 3 cm. Point O is the centre of the circle.

1. How long is OA? cm
2. How long is OB? cm
3. What kind of triangle is this triangle?



2 There are two triangles in the circle with a radius of 6 cm. Point O is the centre of the circle.

1. Find the length of OA. cm
2. Find the length of OB. cm
3. What kind of triangle is the triangle ① ?
4. When the length of CD is 6 cm, what kind of triangle is the triangle ② ?



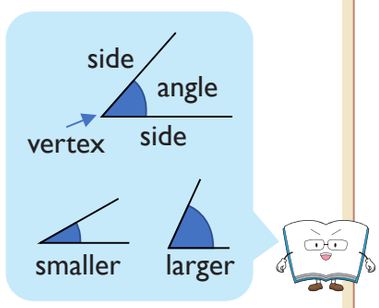
The length of OC and OD are the same as the radius of this circle.

13 - 4 Triangles

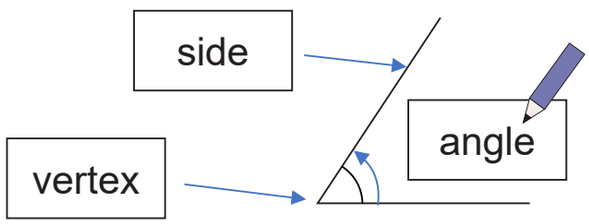
Sides and Angles of Triangles

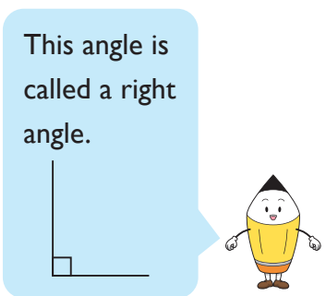
Instruction Let's look at the corners of a triangle.

- An angle is the figure formed by 2 straight lines that meet at a common point.
- This point is called the **vertex**. The two straight lines that form the angle are called the **sides**.
- The size of the opening between the two sides is called the size of the **angle**.

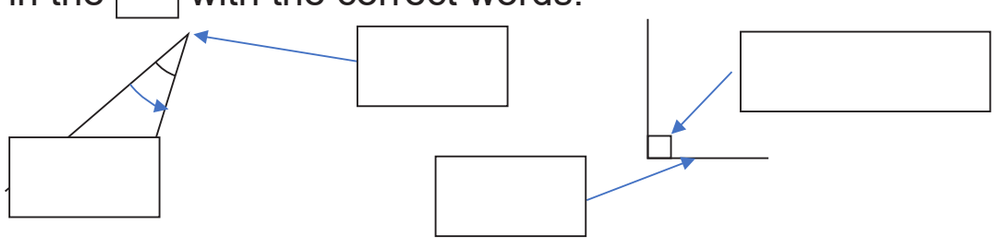


Example Fill in the ☐ with the correct words.





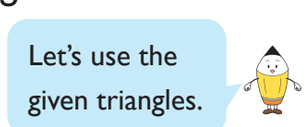
1 Fill in the ☐ with the correct words.



2 Let's make designs by putting the following two types of triangles whose size are the same but the colour are different respectively.

1. Equilateral triangles

2. Right-angled triangles

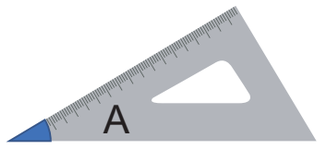


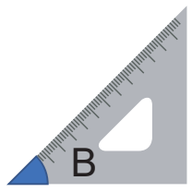
13 - 5 Triangles

Triangles and Angles (1)

Example 1 Which angle is larger?

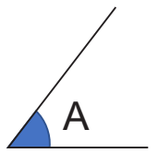
1

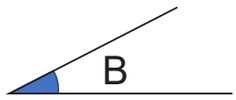


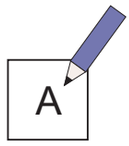


B

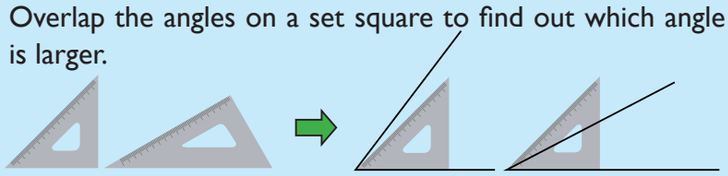
2

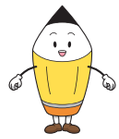




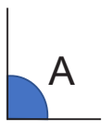


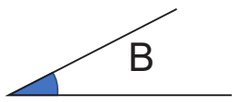
Overlap the angles on a set square to find out which angle is larger.

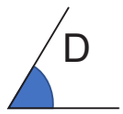




Example 2 Compare the size of angles below and list them from the largest to the smallest.



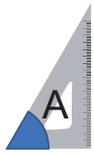




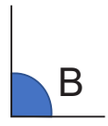
C, A, D, B

1 Which angle is larger?

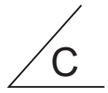
1



2



2 Compare the size of angles below and list them from the largest to the smallest.

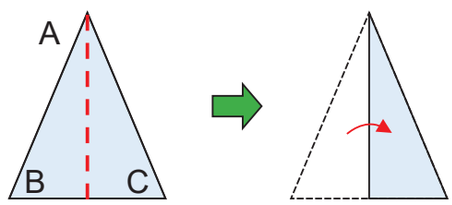


13 - 6 Triangles

Triangles and Angles (2)

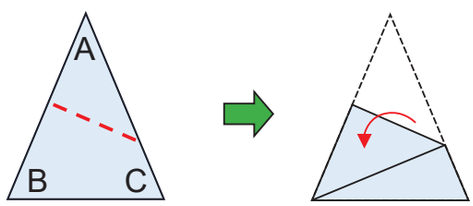
Example How to compare the size of the angles of an isosceles triangle.Cut two isosceles triangles out of paper. Fold the triangles as shown below. Lay the folded triangles on top of each other. Which angles are larger?

1 angle B or angle C



B and C are the same

2 angle A or angle B

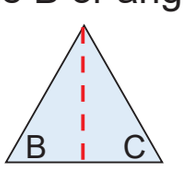


B is larger

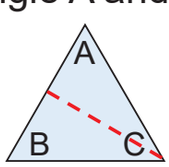
Fold the figures to overlap the two angles for comparison.

1 Look at the size of the angles of the equilateral triangle. Which angles is larger?

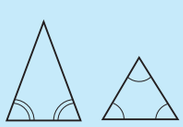
1 angle B or angle C



2 angle A and angle B



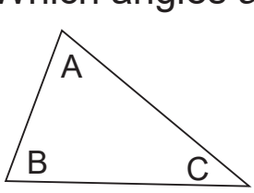
- In an isosceles triangle, two angles are the same size.
- In an equilateral triangle, all three angles are the same size.



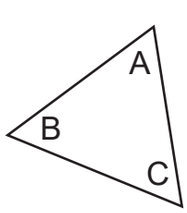
This mark means that the size of these angles are the same.

2 Which angles are the same?

1



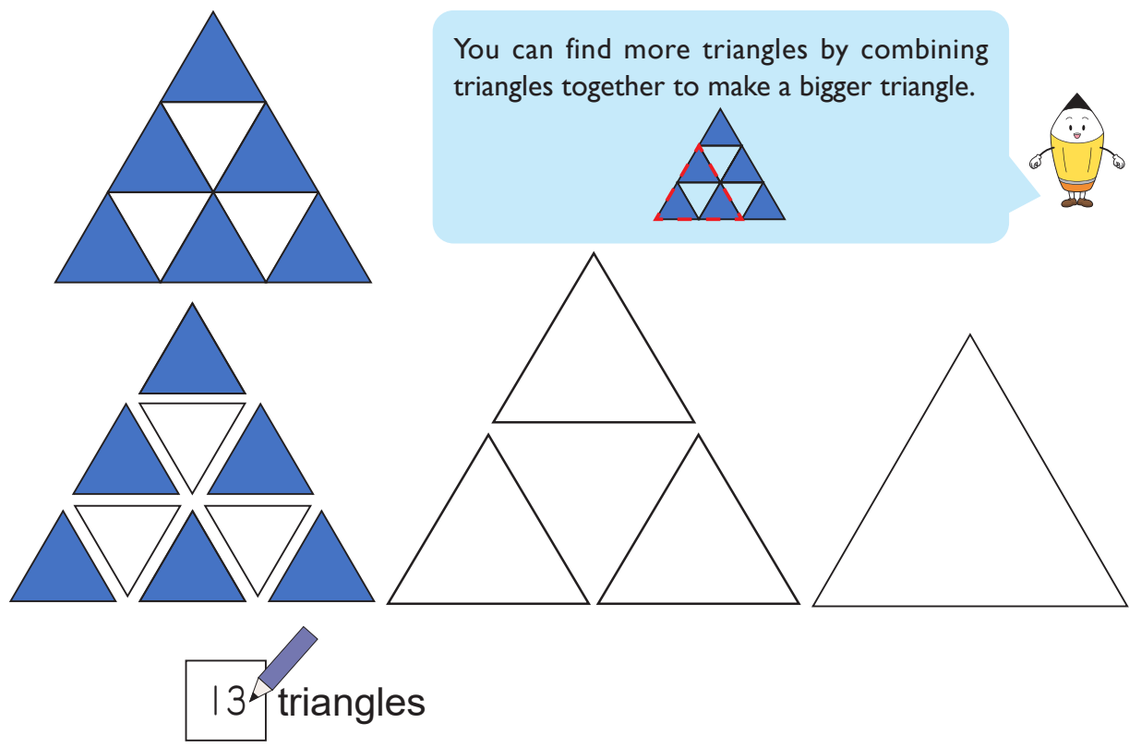
2



13 - 7 Triangles

How many Equilateral Triangles?

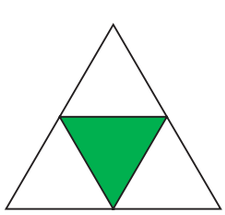
Example How many equilateral triangles are there in total?



13 triangles

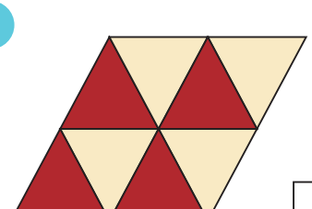
How many equilateral triangles are there in total?

1



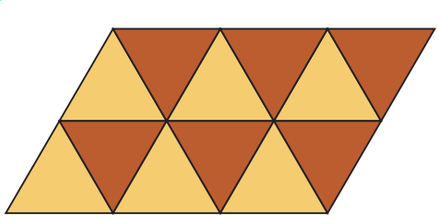
triangles

2



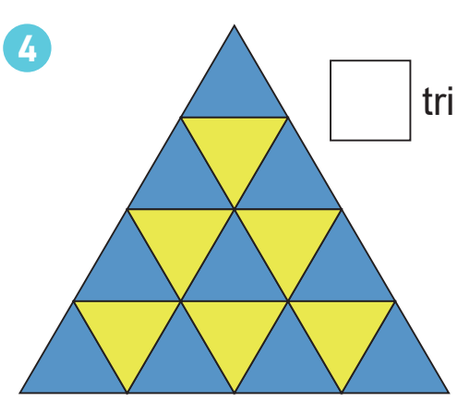
triangles

3



triangles

4



triangles

13 - 8 Triangles

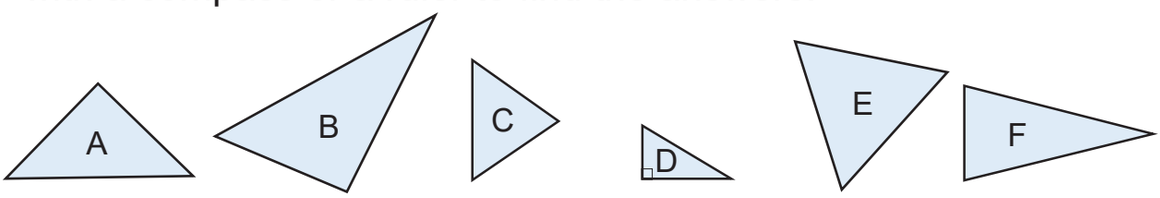
Review

1 Fill in the ☐ with numbers.

1 An isosceles triangle has ☐ sides of the same length and ☐ angles of the same size.

2 An equilateral triangle has ☐ sides of the same length and ☐ angles of the same size.

2 Look at the following triangles. Measure the length of sides with a compass or a ruler to find the answers.



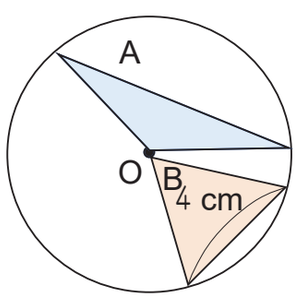
1 Which of these triangles are isosceles triangles?

2 Which of these triangles are equilateral triangles?

3 There are two triangles in the circle with 4 cm radius. Point O is the centre.

1 What kind of triangle is triangle A?

2 What kind of triangle is triangle B?



4 Compare the size of the angles below and list them from the largest to the smallest.