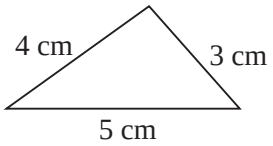
ACTIVITY 5.4 *Constructing Triangles*

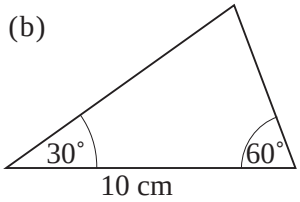
Constructing triangles, using a ruler and protractor, is straightforward when sufficient information is given. Sometimes not enough information is available: at other times you may be given too much information, some of which may be redundant (i.e. not needed).

1. Using the information on the sketches, draw accurately the following triangles.

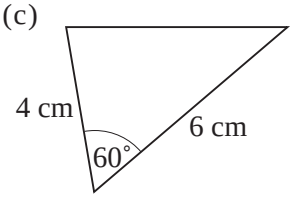
(a)



(b)



(c)

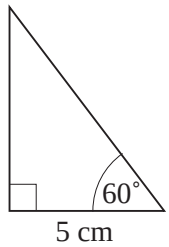


In each case, measure all other sides and angles.

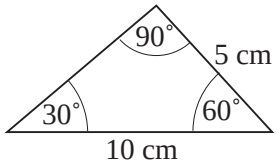
Each of these triangles is exactly defined with sufficient information (but not too much) to enable you to draw the triangle. We refer to these cases as 'SSS' (three side lengths given), 'ASA' (angle, side, angle) and 'SAS' (side, angle, side).

2. (a) Draw accurately the following triangle and then measure all other sides and angles.

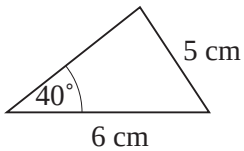
(b) Compare this triangle with triangle (b) in question 1. What do you notice?



So, if you are given the triangle opposite to draw you actually have more information than you need! You will have to decide which information to use.



3. Draw accurately the triangle sketched opposite. Be careful as there are *two* distinct possibilities!

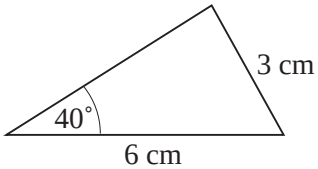


This is the 'ASS' case, and it does not necessarily have a unique (only one) solution. As you saw in question 3, there were two distinct triangles that agreed with the information given, i.e. there was insufficient information given for a unique solution.

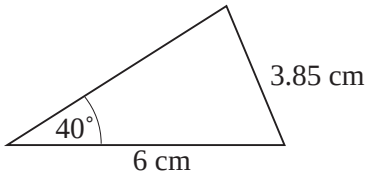
Extension

Can you construct either of the triangles below?

(a)

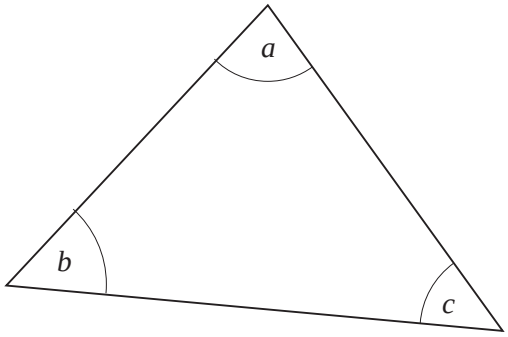
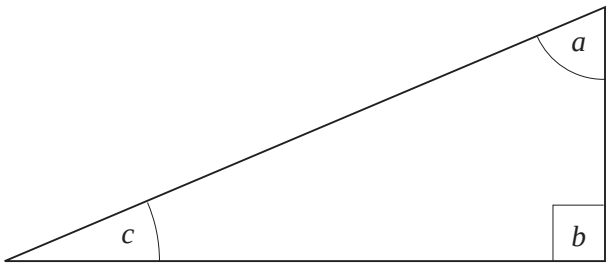
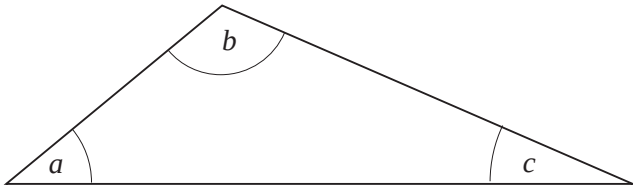


(b)



ACTIVITY 5.5 *Angles in Triangles*

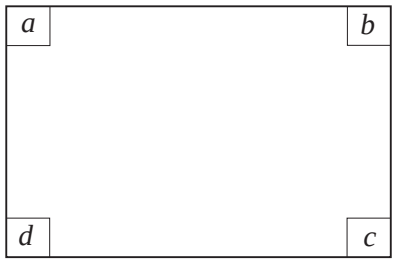
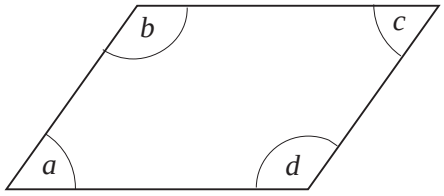
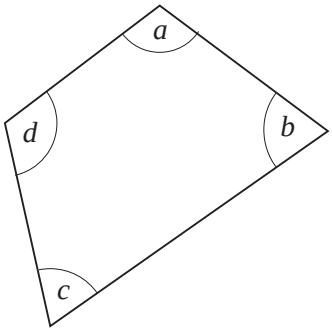
In each of the three triangles, measure all the angles as accurately as possible, and add up the values.

Triangle	*Angles*			
	a	*b*	*c*	*a* + *b* + *c*
				
				
				

What do you notice? Repeat the exercise with your own triangles.

ACTIVITY 5.6 *Angles in Quadrilaterals*

In each of the three quadrilaterals, measure all the angles as accurately as possible, and add up the values.

Quadrilateral	*Angles*				
	a	*b*	*c*	*d*	$a + b + c + d$
					
					
					

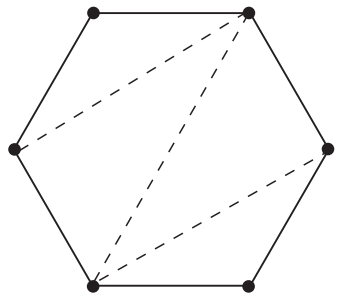
What do you notice? Repeat the exercise with your own quadrilaterals.

Extension

Given that the interior angles of a triangle sum to $180°$, show that the interior angles of a quadrilateral sum to $360°$.

ACTIVITY 5.7 *Interior Angles in Polygons*

You can find the sum of the interior angles in any polygon, by dividing it up into triangles with lines connecting the vertices.



For example, the hexagon shown opposite has been divided into 4 internal triangles.

The sum of all the interior angles of the hexagon is equal to the sum of all the angles in each triangle, so:

$$\text{sum of interior angles} = 4 \times 180\,° = 720\,°$$

1. Repeat the same analysis for the following shapes:

   (a) quadrilateral (b) pentagon (c) heptagon

   (d) octagon (e) nonagon (f) dodecagon.

2. Copy and complete the table.

Name of Polygon	**Number of Sides**	**Number of Triangles**	**Sum of Interior Angles**
Triangle	3	1	180 °
Quadrilateral			
Pentagon			
Hexagon	6	4	720 °
Heptagon			
Octagon			
Nonagon			
Dodecagon			

Extension

What is the formula for the sum of the interior angles of a polygon with n sides?