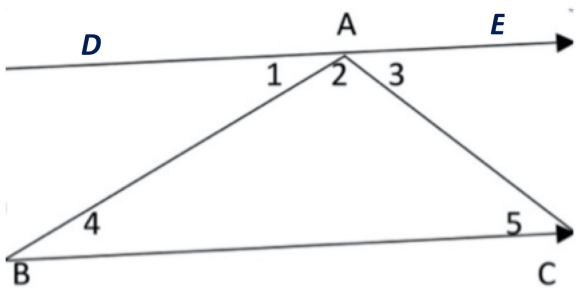
ANGLE SUM

For any triangle you can draw a line through one of the vertices **parallel to the opposite edge**.



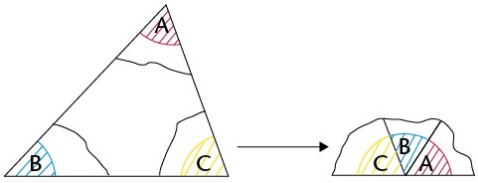
Here DE is parallel to BC.

What do you notice about the angles in the diagram?

What do you know about angles and parallel lines?

Can you use this diagram to prove that the angles of the triangle add up to 180 degrees?

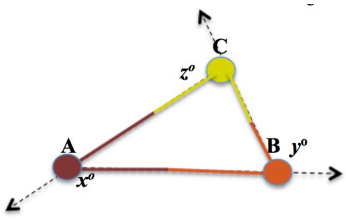
HELP



Draw triangles, carefully measure the angles and add them up. If you don't get a total even close to 180° then you need more practice in how to use a protractor, or you need to ask for help so that you can understand angles better.
Now cut out your triangles. Tear the corners off. Arrange the three angles of the triangle together as shown. The angles appear to lie on a straight line, therefore adding up to 180°. This is NOT A PROOF but it is convincing evidence.

[NB To make it obvious which are the **three angles tear edges, don't cut them.**]

NEXT – People maths



Explore the path around a triangle. Three people A, B and C make a triangle holding their arms out and holding hands with each other with their heads at A, B and C. A fourth person walks around the triangle, making a turn to change direction at each corner and ending up facing the same way as at the start. What total turn did he or she make? Do this as a 'people maths' enactment if you can.

Start at A and face along CA as shown by the dotted arrowline, then turn through angle x^o at A to go along AB, turn through y^o at B to go along BC and finally turning through z^o at C to face the direction started in. The angles x, y and z are called the **exterior angles** of the triangle. What is the total turn $x + y + z$? Can you explain why the sum of the exterior angles (otherwise called the total turn) is 360° (4 right angles)?

Also imagine an insect crawling around the triangle and ask the same questions about changes of direction. Think about the insect, it will help you to re-capture this idea at a later date, and to remember that the exterior angles add up to 360°.

At each vertex there is an exterior and an interior angle adding up to 180° (2 right angles).
What is the sum of **all** the exterior plus **all** the interior angles?
You know the sum of the exterior angles is 360° (4 right angles). What is the sum of the interior angles?
As a further extension you could do the same people maths enactment with 4 people for a quadrilateral, five for a pentagon etc. etc. … and use the same method to find the sum of the interior angles of any polygon.