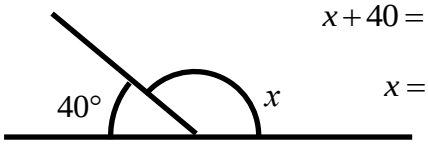
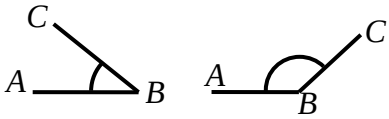
Angle facts

1. Angles on a straight line add to 180°.



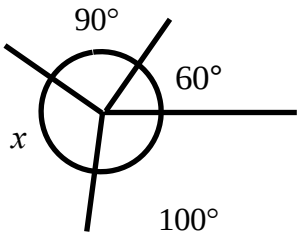
$x + 40 = 180°$

$x = 180 - 40 = 140°$



Angle $\angle ABC$ is the acute or obtuse (not reflex) angle between lines AB and BC.

2. Angles around a point add to 360°. Whenever possible show your working by writing an equation and solving it.

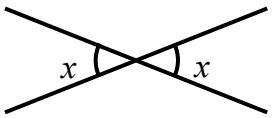


$x + 100 + 60 + 90 = 360°$

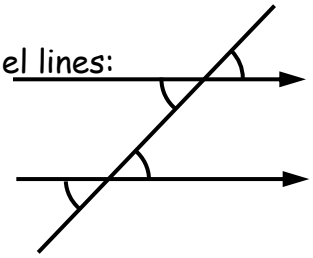
$x + 250 = 360°$

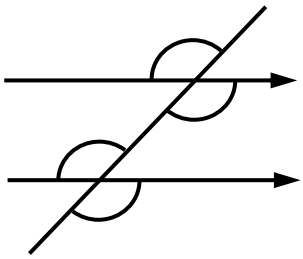
$x = 360 - 250 = 110°$

3. When straight lines cross, the "vertically opposite" angles are equal:



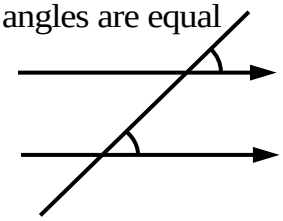
4. When a straight line cuts a pair of parallel lines:
   (a) all the acute angles are equal
   (b) all the obtuse angles are equal

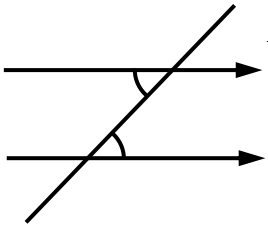




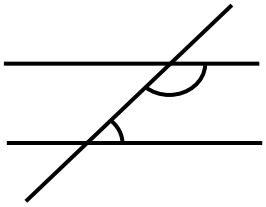
Names for pairs of angles:

Corresponding (F) angles are equal





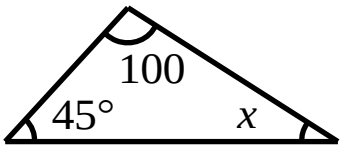
Alternate (Z) angles are equal



Supplementary angles add to 180°

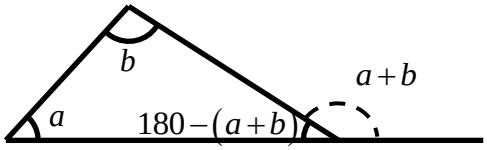
Angles in a triangle

The angles in a triangle add to 180°.
Given two angles, we can find the third

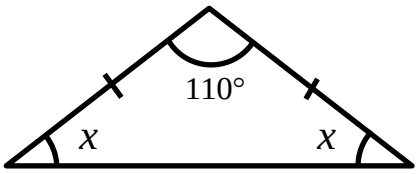


$$x+45+100=180$$
$$x=180-145=35°$$

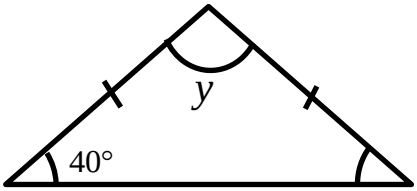
Each exterior angle is the sum of the <u>opposite two</u> interior angles



If the triangle is isosceles (*look for tick marks*), if I know one angle I can find both the others



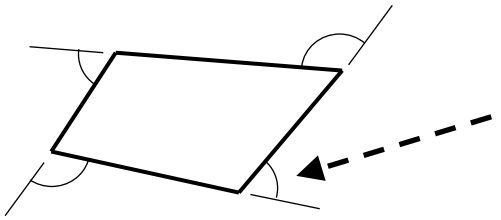
$$2x+110=180$$
$$2x=180-110=70$$
$$x=35°$$



$$y+40+40=180$$
$$y=180-80=100°$$

Exterior angles

The exterior angles of any polygon add to 360°, regardless of the number of sides.



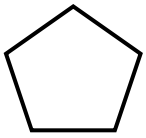
exterior angles
are less than 180°

A regular polygon has ***n*** sides of equal length and rotation symmetry of order *n* about its centre point.

The exterior angles are all = $\frac{360°}{n}$.

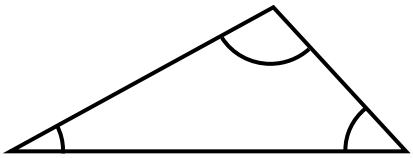
e.g. A regular polygon has an exterior angle = 72°. How many sides does it have?

$72 = \frac{360°}{n}$, $n = \frac{360}{72} = 5$ sides, it is a pentagon.

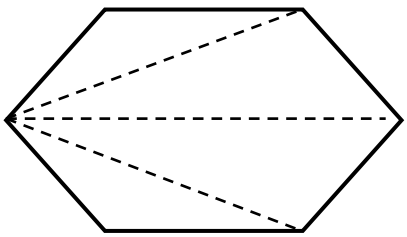


Interior angles

Angles inside a triangle add to 180°



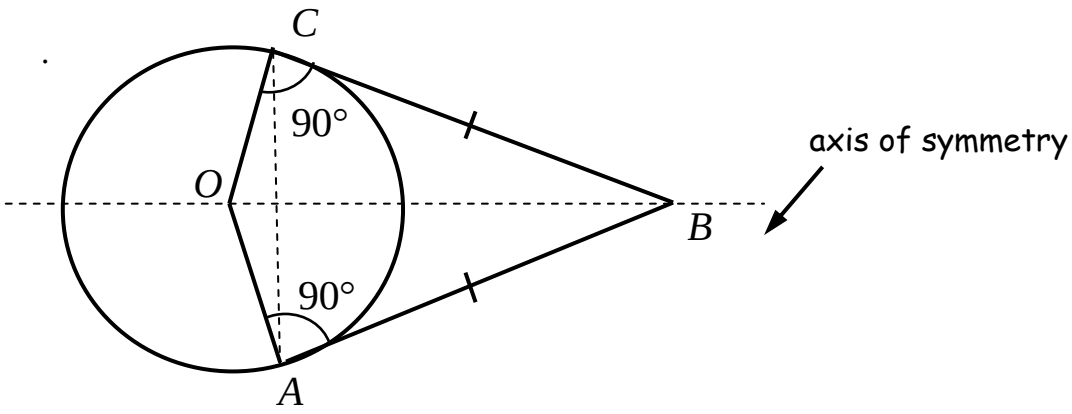
The <u>sum of all the interior angles</u> inside any polygon with n sides is $180(n-2)°$ since one can draw n-2 triangles inside it, e.g. for a hexagon (n = 6) one can draw n-2 = 6-2 = 4 triangles and they add up to 4×180 = 720°.



If it is a <u>regular</u> polygon, each interior angle will be $\frac{180(n-2)^\circ}{n}$.

(One can more easily get the same result using 180° - exterior angle).

Tangents to a circle



- Atangent is perpendicular (at 90°) to the radius that meets it.
- Tangents are equal length, to the point where they intersect
  - hence triangle ABC is isosceles.
- Line OB is an axis of symmetry, so:
  - line AC cuts it at 90°
  - triangles OBC and OBA are mirror images of each other.
- Triangle OAC is isosceles because OA and OC are equal length (= radius).