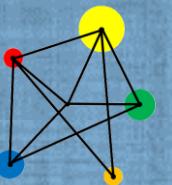


Angle Facts



Recap types of angle – acute, right, obtuse, reflex.

Understand angles around a point, angles on a straight line and angles in a triangle.

Vocabulary

Angle

A measure of turn. Usually measured in degrees.

Corresponding

Angles on parallel lines that are in the same position relative to a line that crosses them.

Vertically Opposite

The angles opposite each other when two lines cross.

Parallel

Lines that are always the same distance apart and never touching.

Alternate

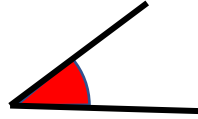
Angles on parallel lines that are in the opposite position relative to a line that crosses them.

Geometry

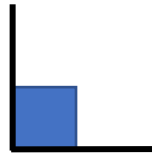
The branch of mathematics that deals with points, lines, shapes and space.

Key Facts

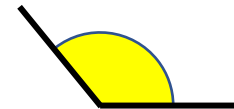
Acute angles are less than 90°



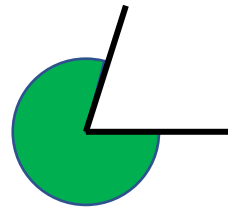
Right angles are equal to 90°



Obtuse angles are greater than 90° but less than 180°



Reflex angles are greater than 180°



Types of Angle

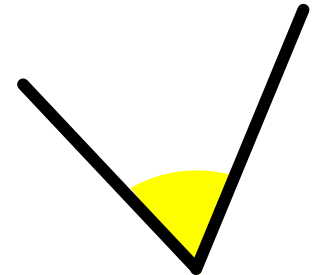
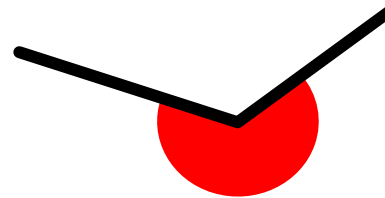
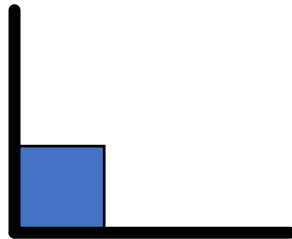
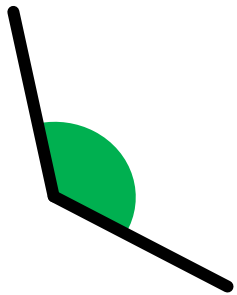
Match each angle with its correct name.

Acute

Obtuse

Reflex

Right



Solutions

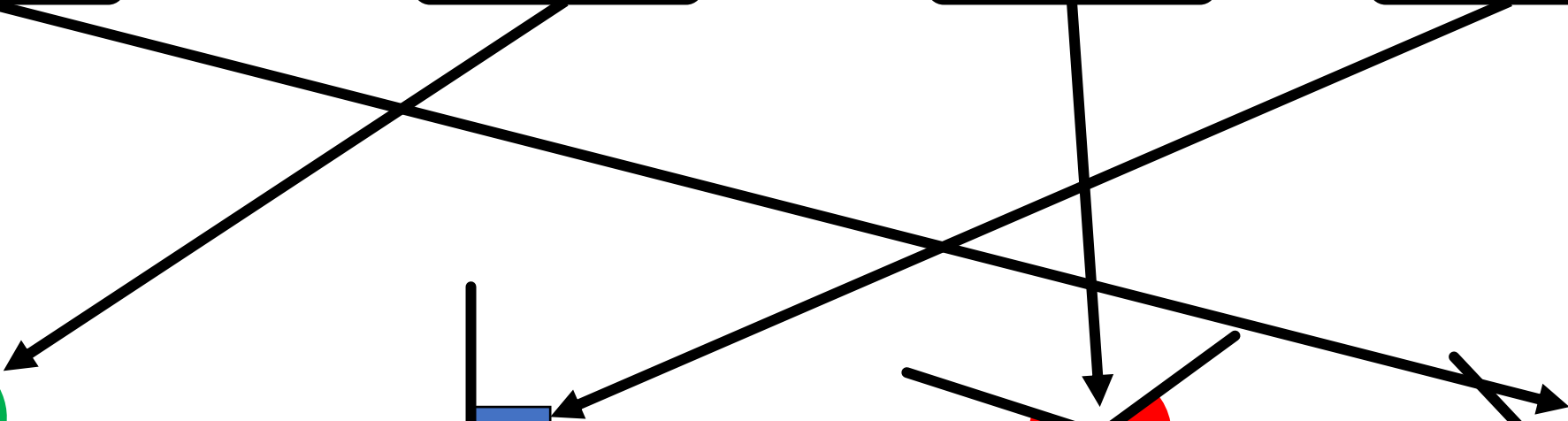
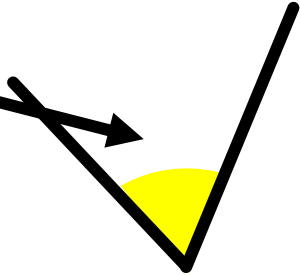
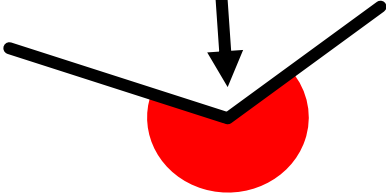
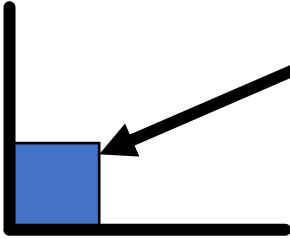
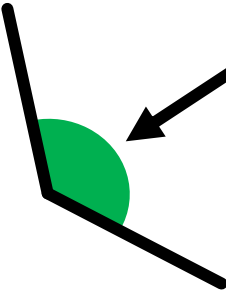
Match each angle with its correct name.

Acute

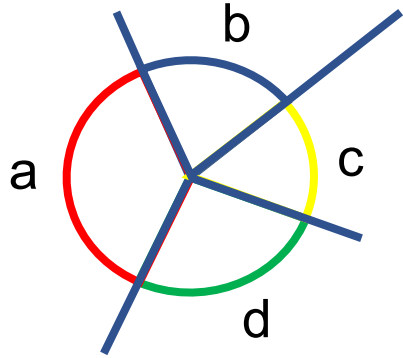
Obtuse

Reflex

Right

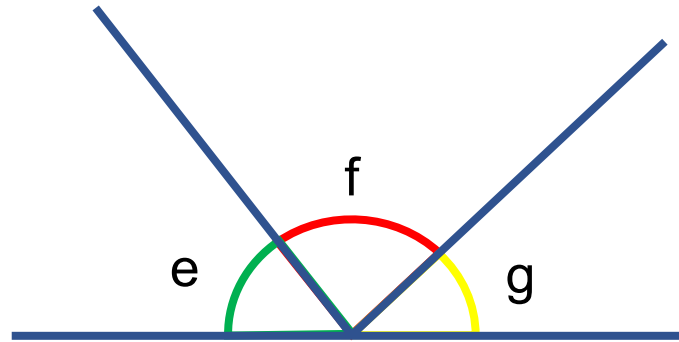


Key Facts



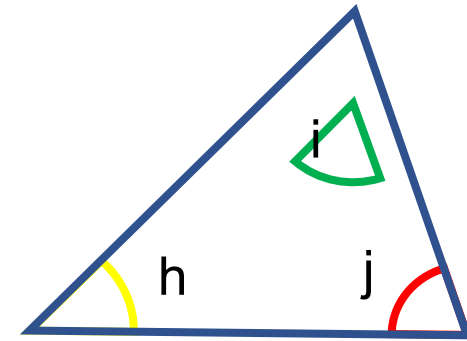
$$a + b + c + d = 360^\circ$$

**Angles around
a point add up
to 360°**



$$e + f + g = 180^\circ$$

**Angles on a
straight line
add up to 180°**

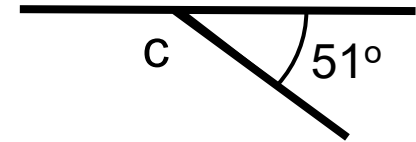
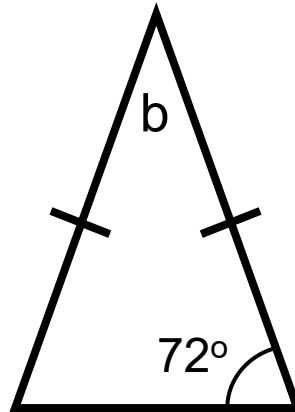
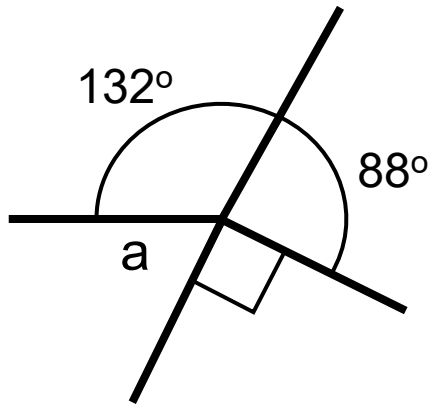


$$h + i + j = 180^\circ$$

**Angles in a
triangle add
up to 180°**

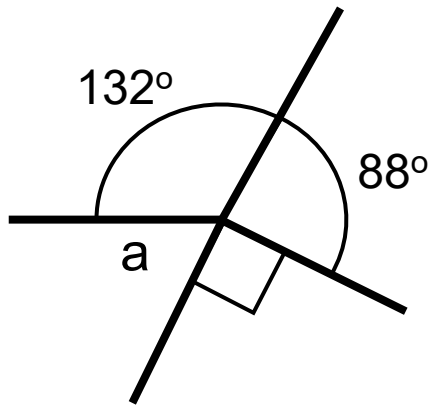
Examples

Find the angle marked with a letter in each diagram.



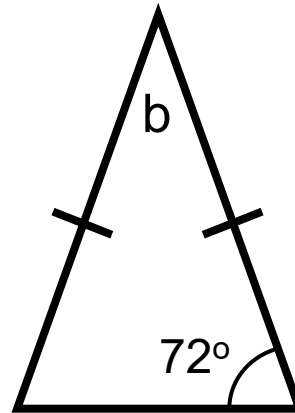
Solutions

Find the angle marked with a letter in each diagram.



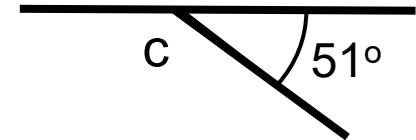
$$a = 360 - 132 - 88 - 90$$

$$= 50^\circ$$



$$b = 180 - 2 \times 72$$

$$= 36^\circ$$

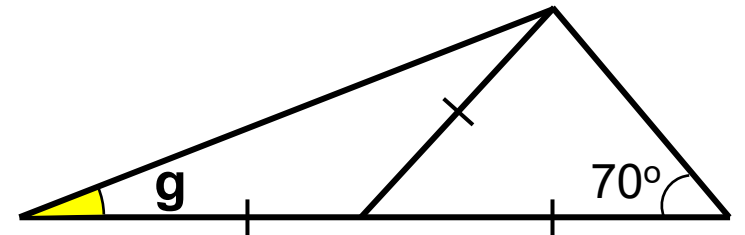
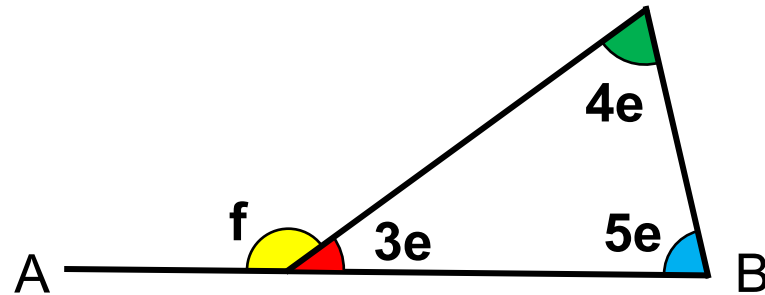
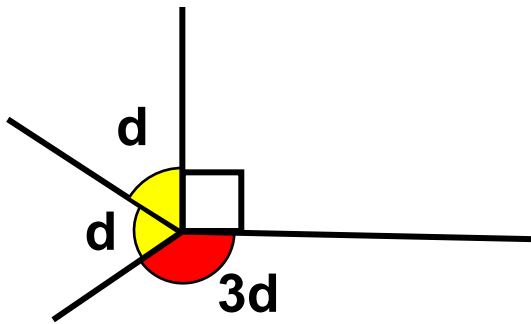
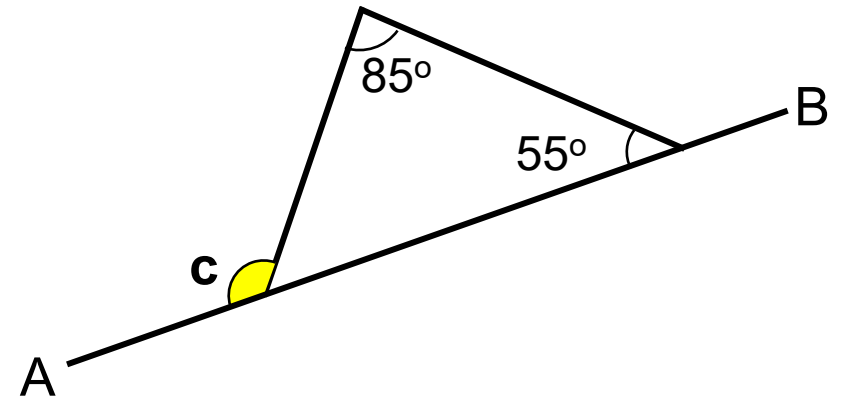
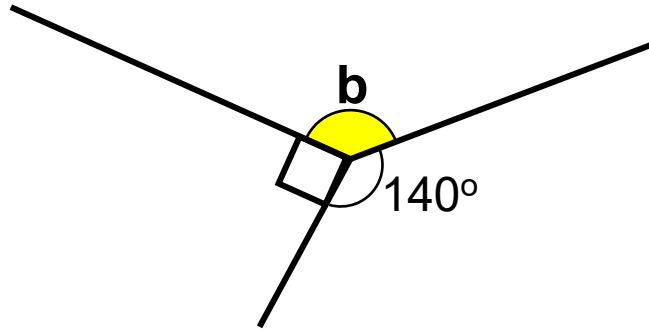
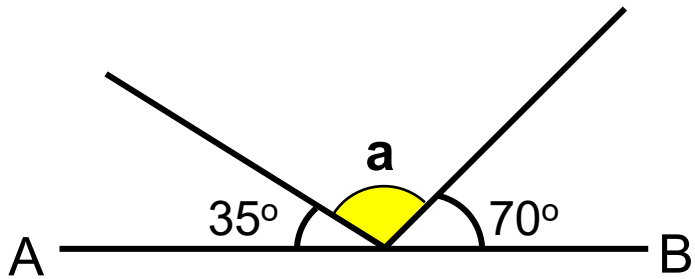


$$c = 180 - 51$$

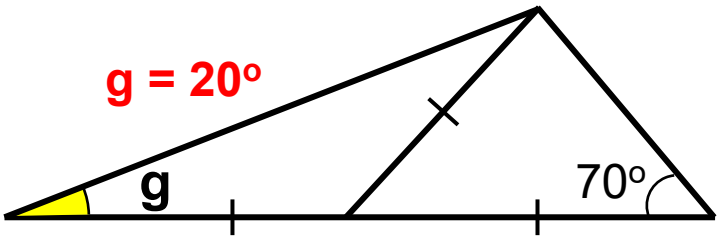
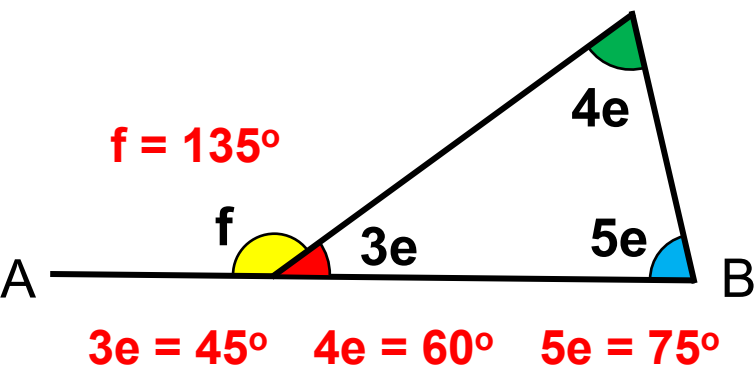
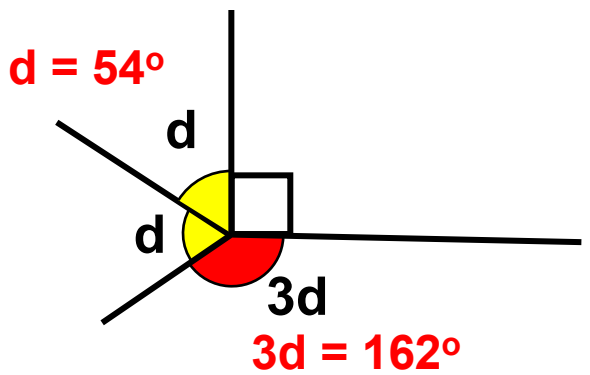
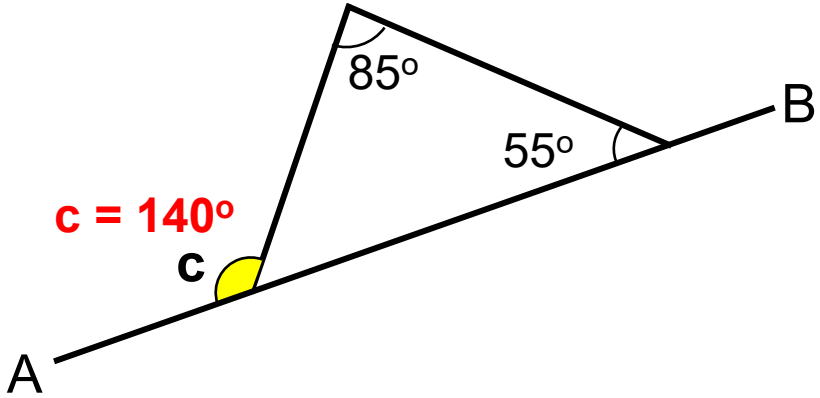
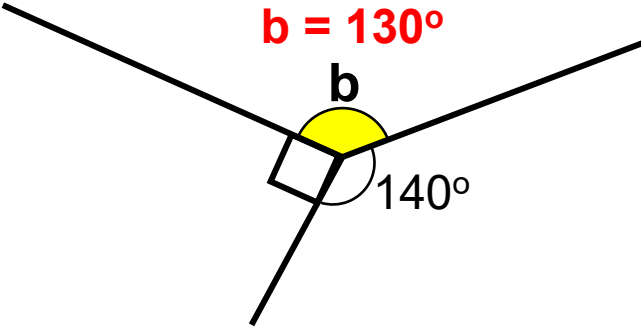
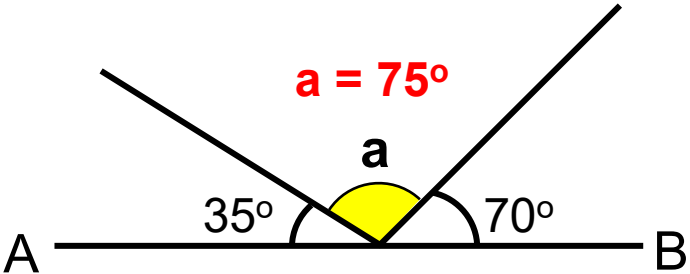
$$= 129^\circ$$

Exercise

Find the angles marked with letters. (AB is always a straight line).

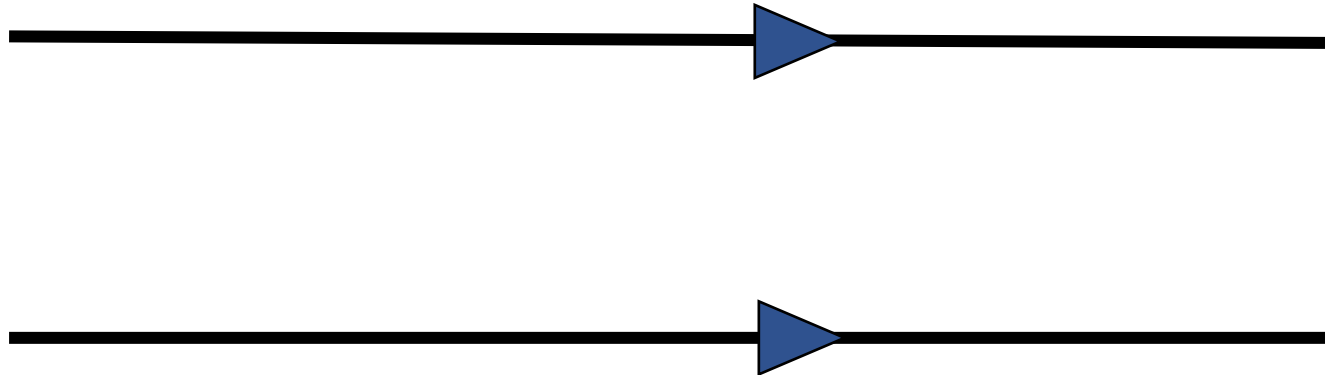


Solutions



Parallel Lines

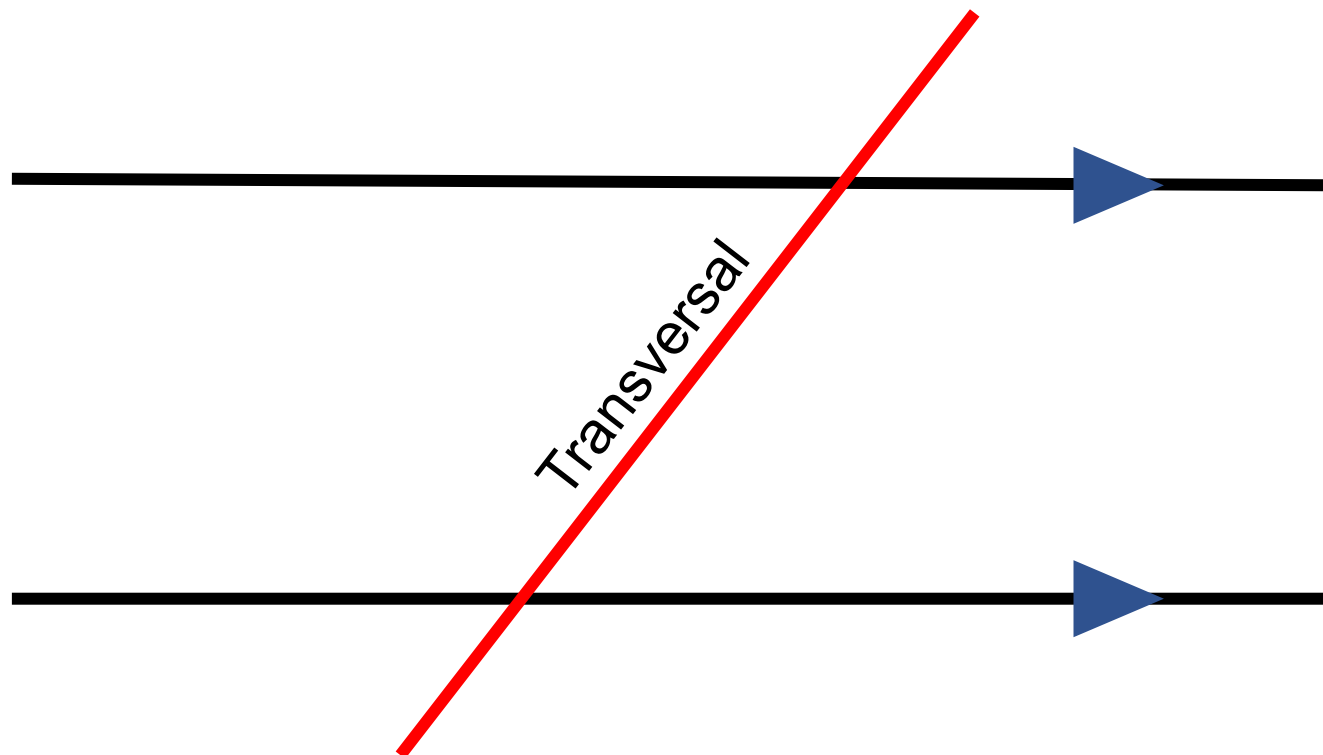
Here are two **parallel** lines.



We show that they are parallel by drawing an arrow on each one.

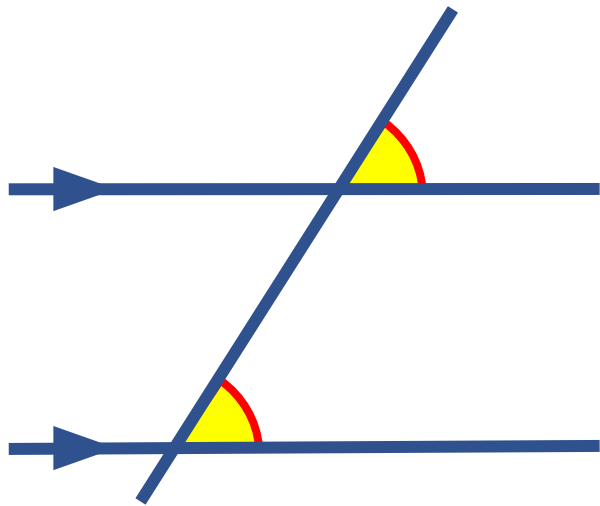
Transversal

A straight line that crosses a pair of parallel lines is called a **transversal**.

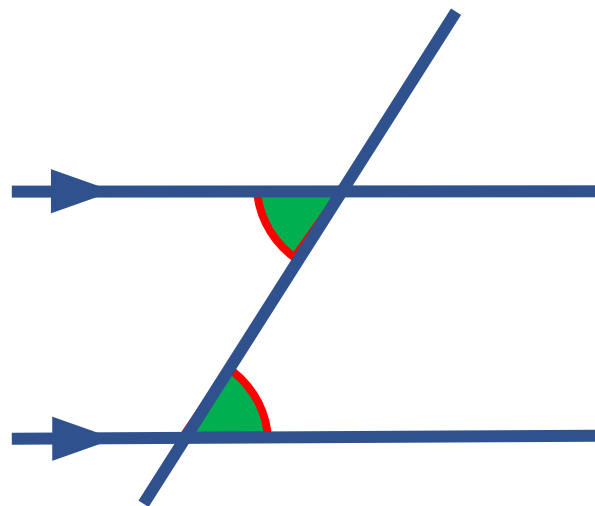


Angle Facts to learn

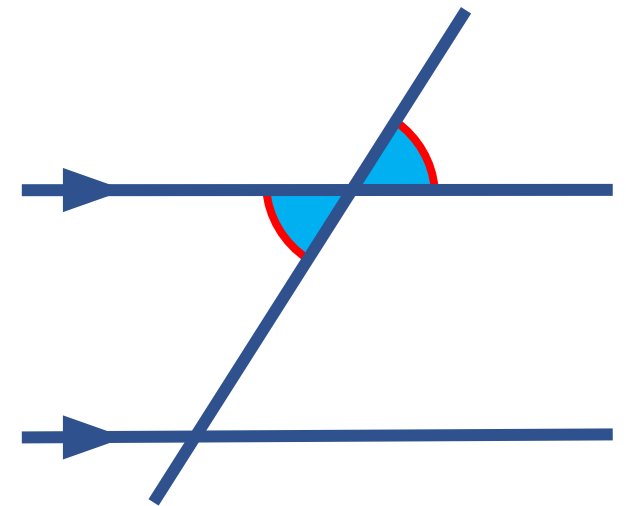
When a transversal is drawn, three types of angle are created.



Corresponding angles

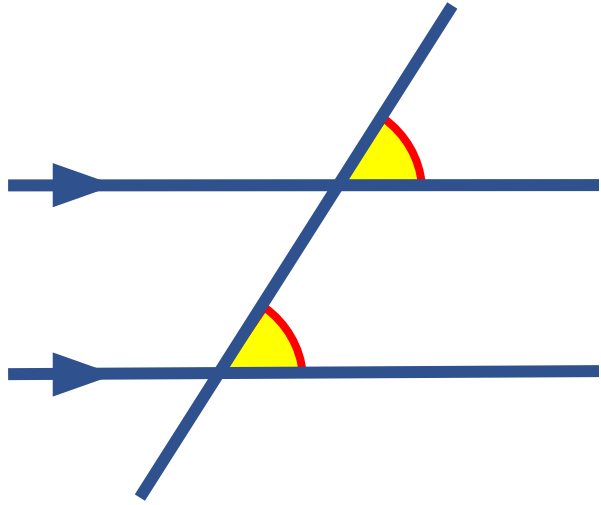


Alternate angles

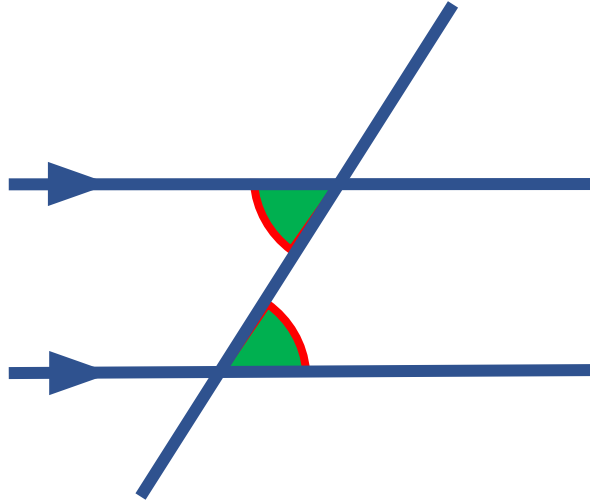


Vertically Opposite angles

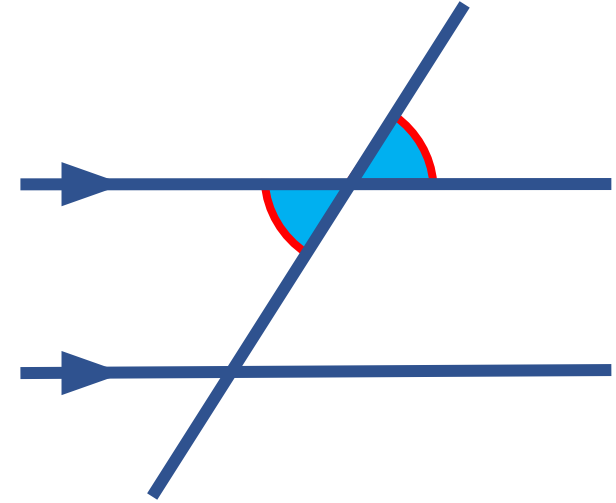
Angle Facts to learn



**Corresponding
angles are equal**



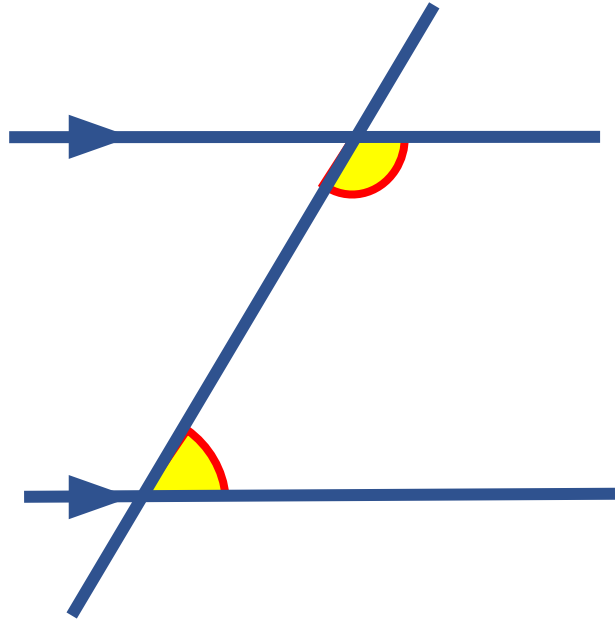
**Alternate angles
are equal**



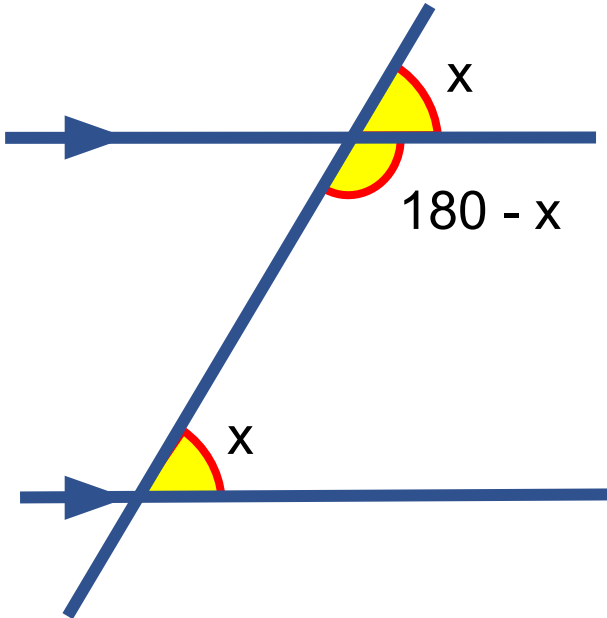
**Vertically opposite
angles are equal**

Co-Interior Angles

What can you say about the pair of angles below ?



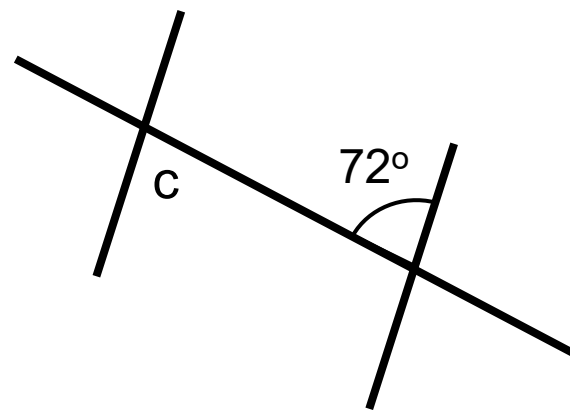
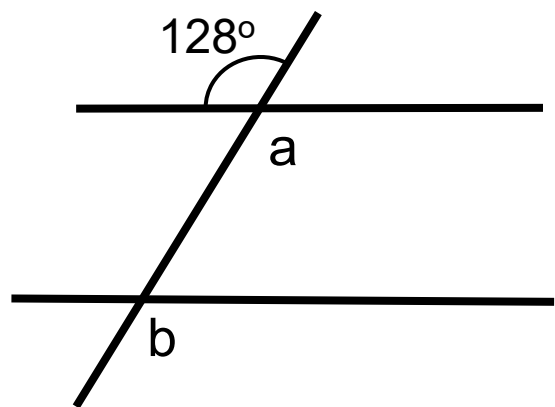
Co-interior Angles



Co-interior angles have a sum of 180° .

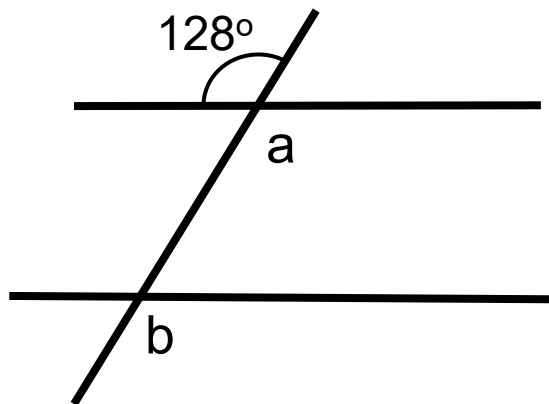
Examples

Find the angles marked with a letter in each diagram.



Solutions

Find the angles marked with a letter in each diagram.

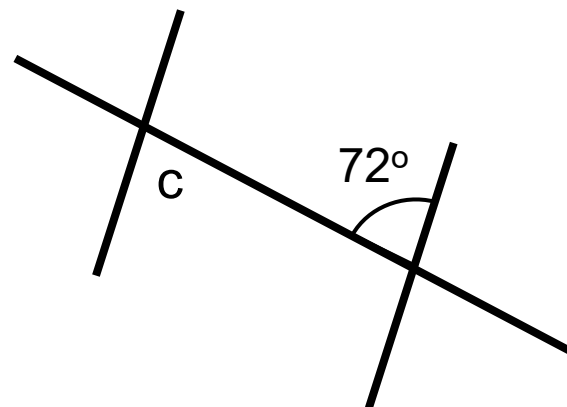


$a = 128^\circ$

It is *vertically opposite* to 126°

$b = 128^\circ$

It is *corresponding* to a .

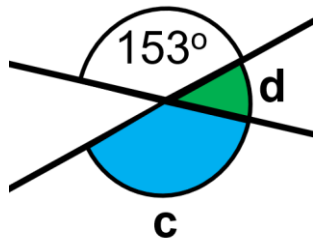
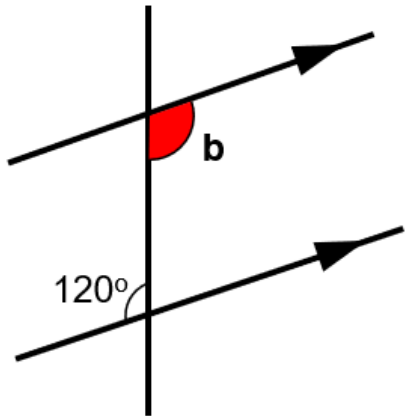
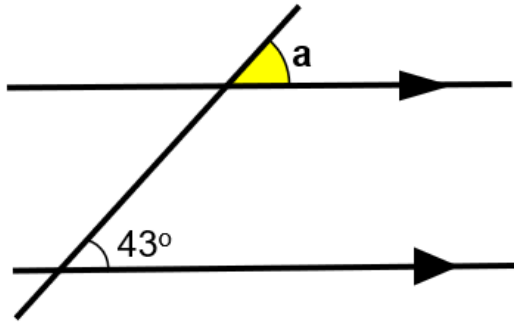


$c = 72^\circ$

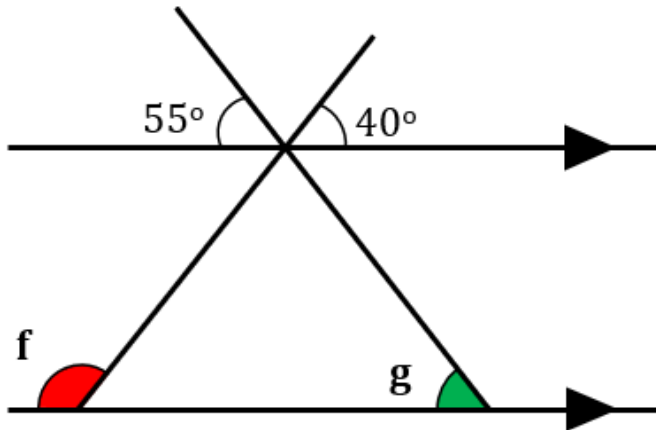
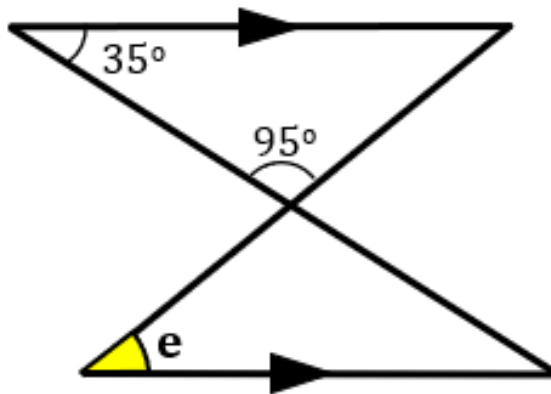
It is *alternate* to 72°

Exercise

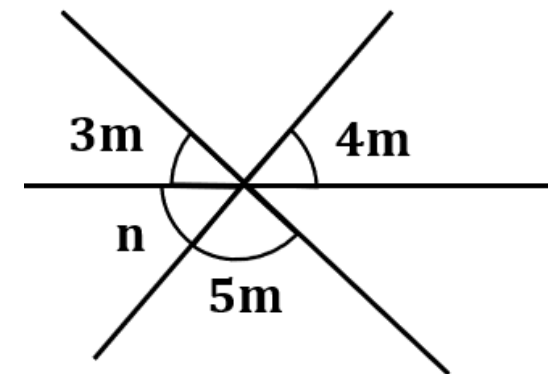
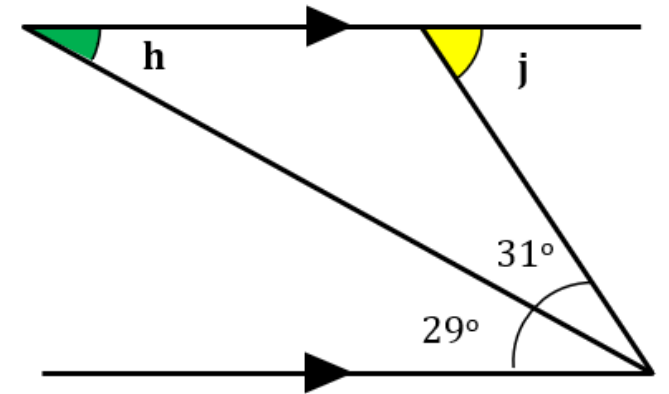
Find angles a, b, c and d



Find angles e, f and g

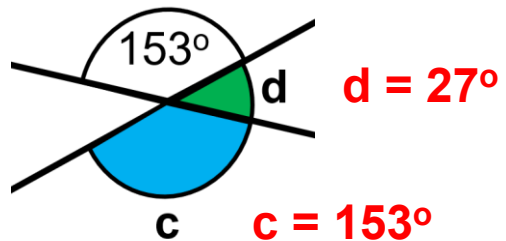
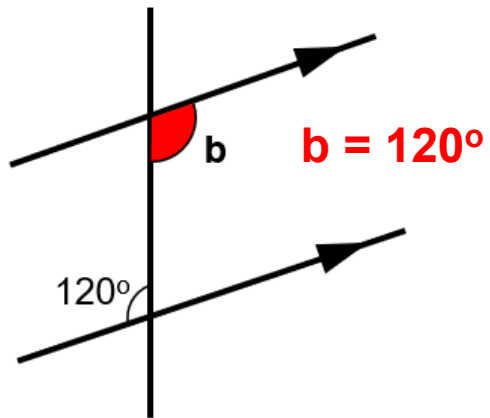
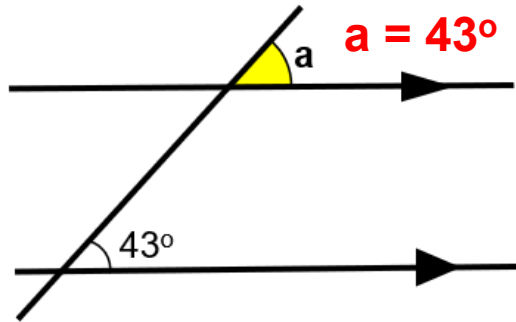


Find angles h, j, m and n

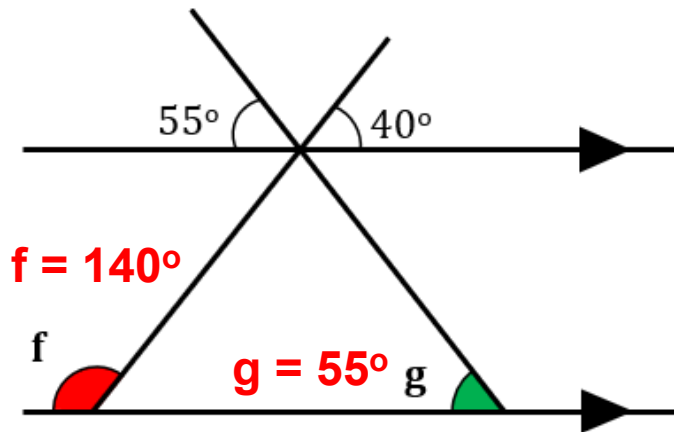
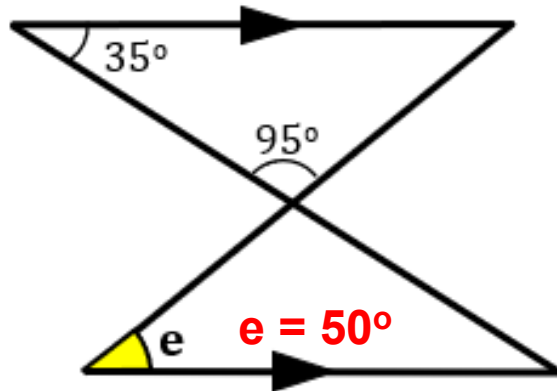


Solutions

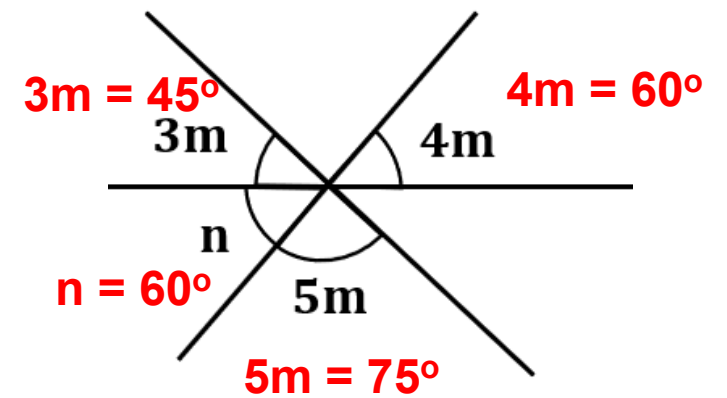
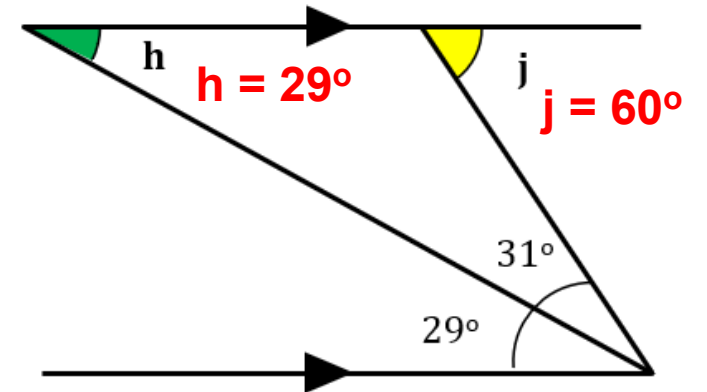
Find angles a, b, c and d



Find angles e, f and g

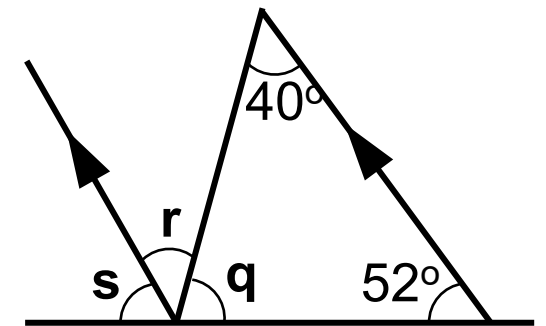
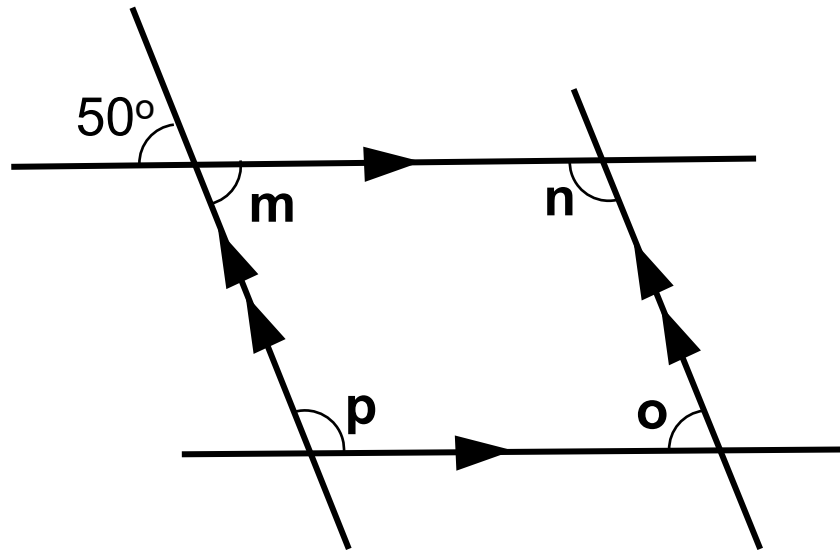
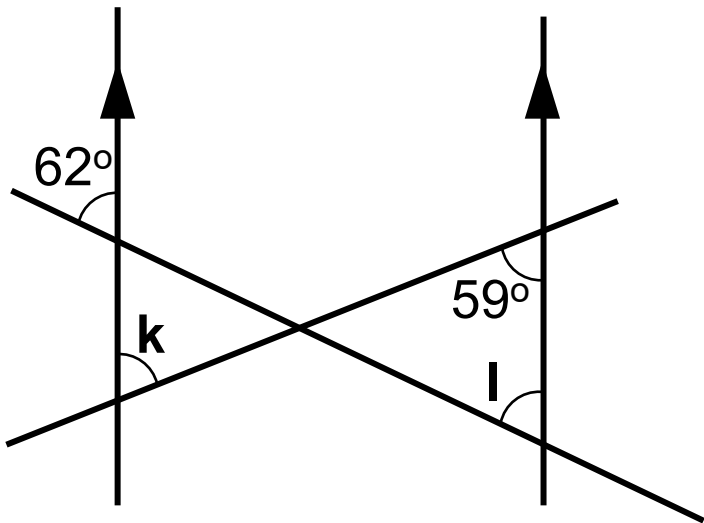
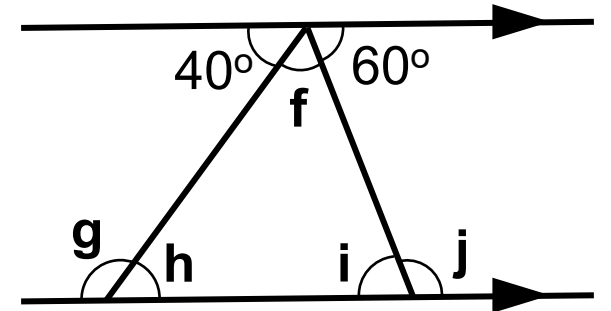
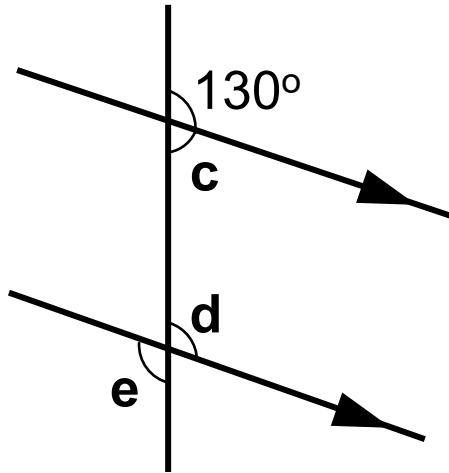
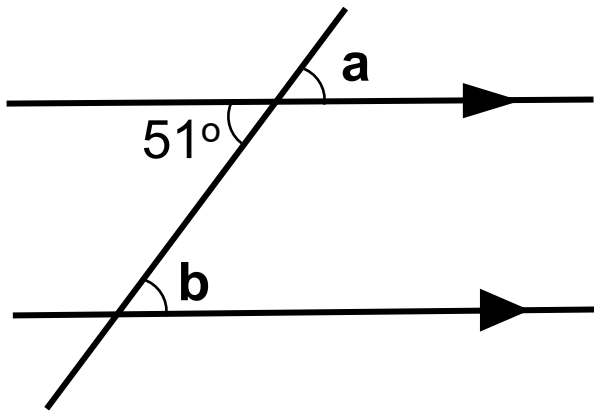


Find angles h, j, m and n



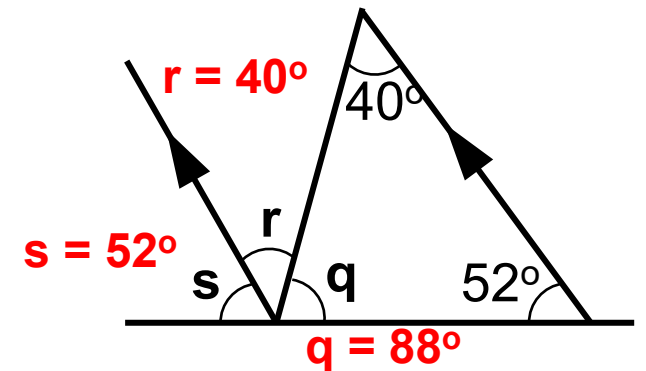
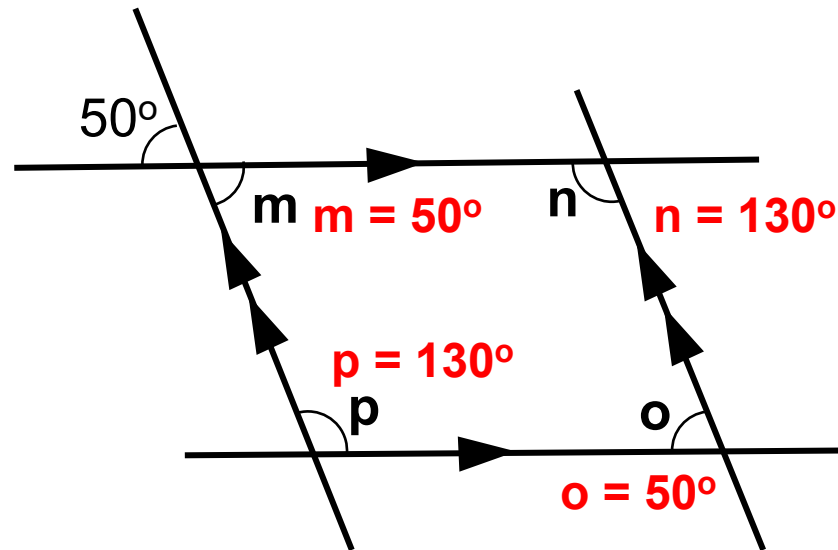
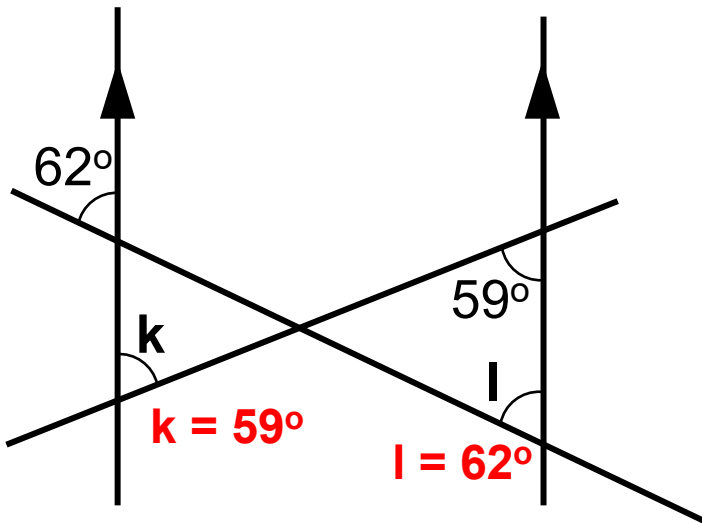
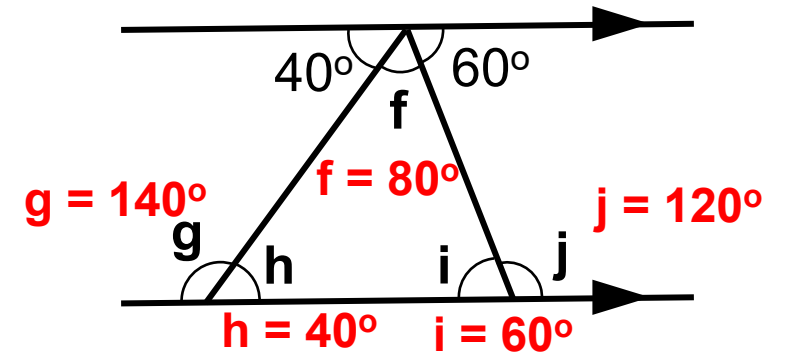
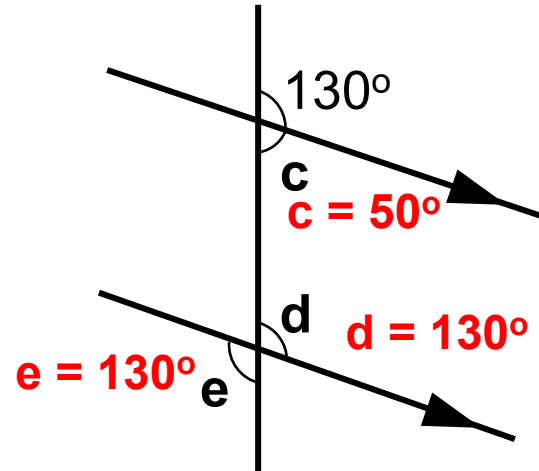
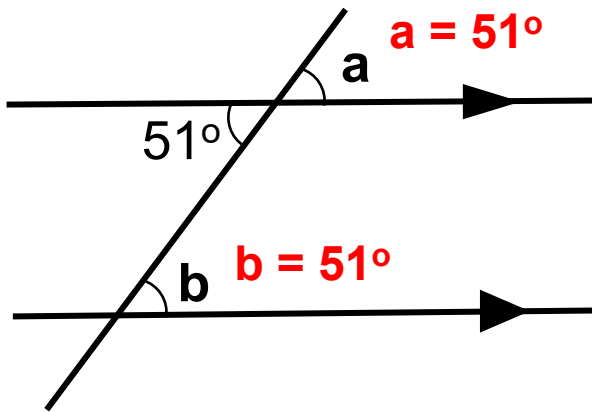
Further Exercise

Find the angles marked with letters.



Further Exercise

Find the angles marked with letters.



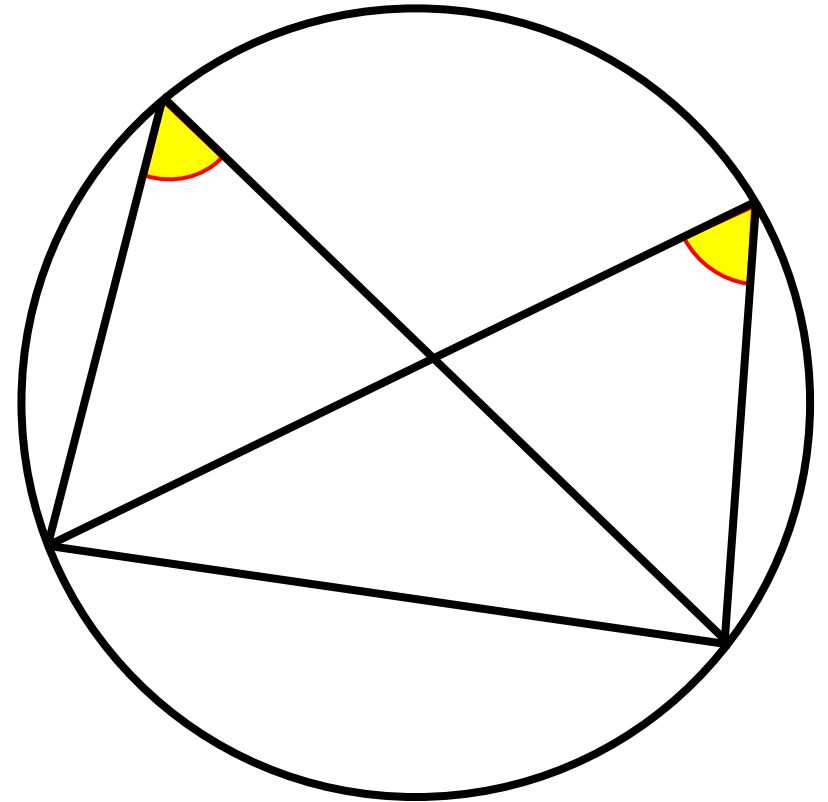
Extension

Draw the diagram and measure the yellow angles.

Draw the same pattern again in a different circle

Can you come up with a conjecture?

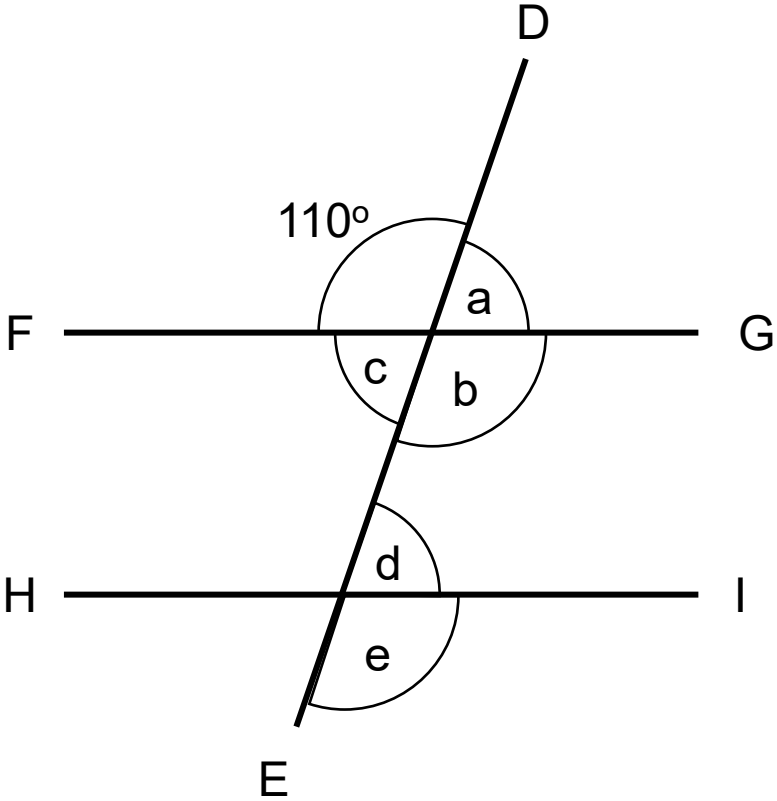
Can you prove it?



Exam Style Question

FG and HI are parallel lines.
DE is a straight line.

a) Write down the letter of one other angle of size 110° .
Give a reason for your answer.



b) Explain why $a + b + c = 250^\circ$.

Solution

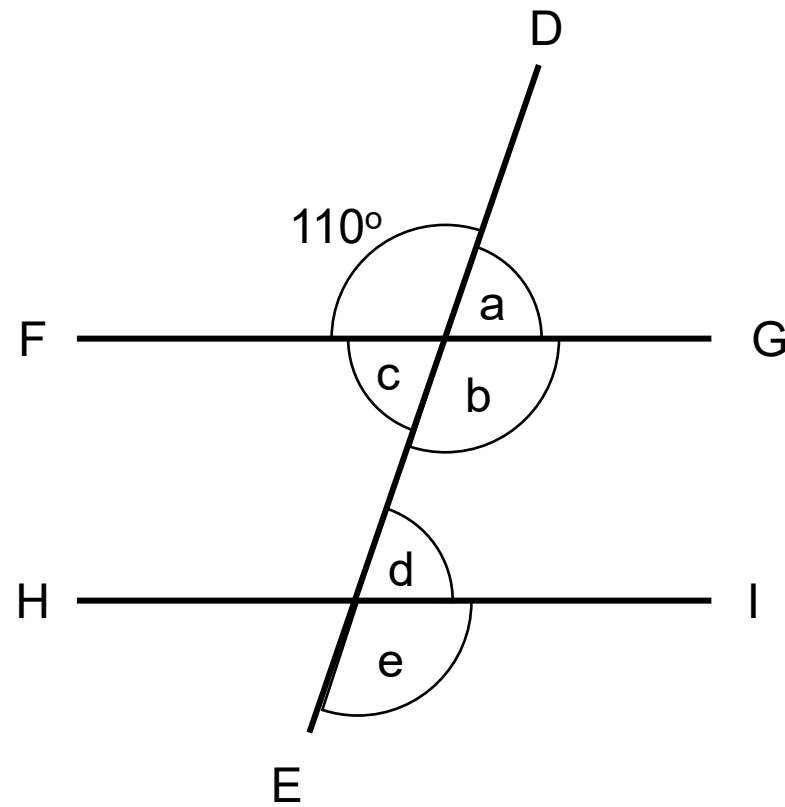
FG and HI are parallel lines.
DE is a straight line.

- a) Write down the letter of one other angle of size 110°
Give a reason for your answer.

Angle b or angle e

- b) Explain why $a + b + c = 250^\circ$.

$a + b + c = 250^\circ$ because the angles around a point equal 360° and $250 + 110 = 360$



Where next?

Constructions

Geometric construction is the process of creating geometric objects using only a compass and a straightedge.

It is possible to create almost any geometric object — including circles, squares & triangles — using only these two tools

Trigonometry

This is the study of angles and sides in right angled triangles. It has been studied for hundreds of years and is useful for navigation, surveying & astronomy.

Circle Theorems

The properties of the circle have been studied beyond recorded history. The invention of the wheel is a fundamental discovery of properties of a circle.

The first known theorems about circles are by Thales of Miletus (modern day Turkey) from 650 BC. Book 3 of Euclid's Elements deals with properties of circles.

Historical links

The study of angles and geometry can be traced back over 5000 years to ancient Babylonia (modern day Iraq). The people of Babylonia started to collect facts about lines, angles, areas and volumes which helped them to advance their knowledge of surveying, building and astronomy.

The people of Egypt and Babylon knew Pythagoras' Theorem about 1500 years before Pythagoras.

Euclid was born in Alexandria in Egypt in about 325 BC (c. 325-265 BC). He wrote 13 books, together called The Elements of Geometry. He wrote a treatise in 13 books (chapters), titled The Elements of Geometry. This was not the first Geometry textbook but it was the best and it was widely studied in schools until the 20th Century. It contained the theorems that we saw earlier.

