

Maths

Key Stage 3

Module 5

Angles

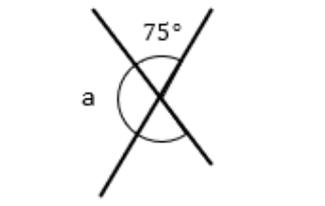
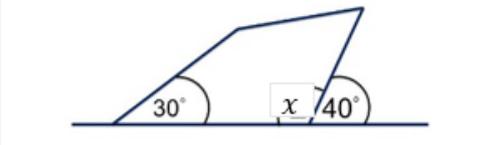
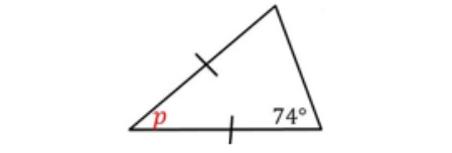


Tutorial	Topic
Tutorial 5.1	Basic angle rules
Tutorial 5.2	Triangles and quadrilaterals
Tutorial 5.3	Parallel lines
Tutorial 5.4	Polygons

Knowledge Check #1

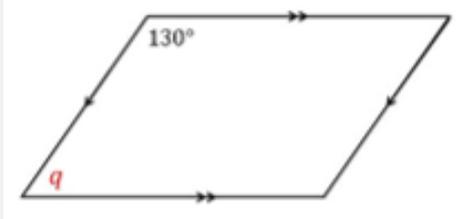
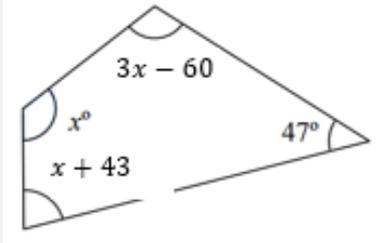
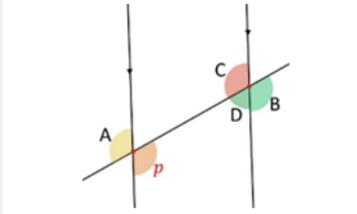
<https://forms.office.com/r/HUaiGPUHMe>



	Question	
1	What is the size of angle a ?	
		15° 75° 285° 105°
2	What is the value of the angle marked x ?	
		140° 70° 110° 150°
3	This is an isosceles triangle. Calculate the size of angle p .	
		32° 74° 106° Not enough information

Knowledge Check #1



	Question			
4	This is a parallelogram Calculate the size of angle q .			
	65°	130°	50°	Not enough information
5	What is the value of x ?			
	30	66	90	300
6	Which angle is not equal to p ?			
	A	B	C	D

Knowledge Check #1



	Question			
7	Find missing angle a .			
	77°	103°	257°	Not enough information
8	This is part of a regular polygon. How many sides does it have?			
	30	66	90	300
9	These are both regular polygons. Calculate the unknown angle x .			
	210°	180°	225°	150°

Tutorial 5.1 – Basic Angle Rules



Learning objectives

In this tutorial, we will look at:

1. Using basic angle rules to find missing angles
2. Using algebra to find missing angles

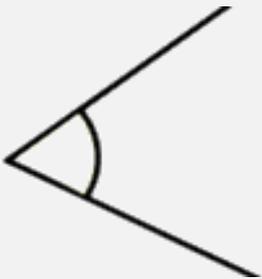




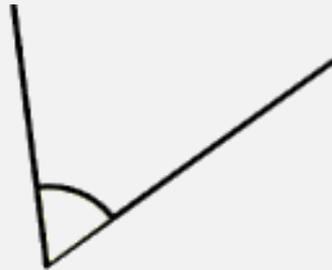
Warm up

Estimate the following angles

1.



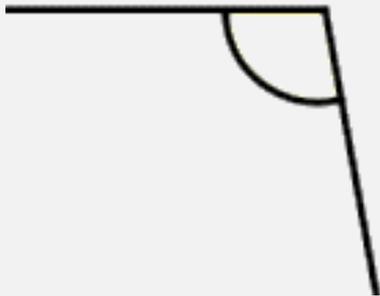
2.



3.



4.



5.



6.

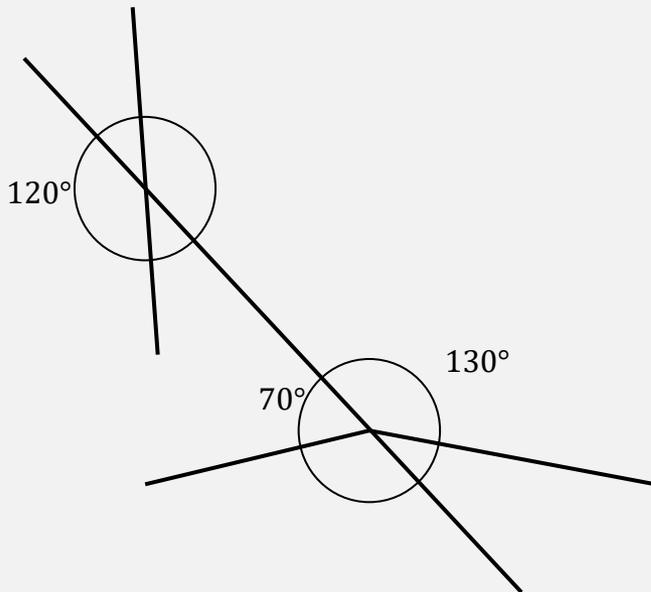


Learning activity

EXAMPLE



Find the missing angles



Decide which angle rule to use



Decide which angles are relevant



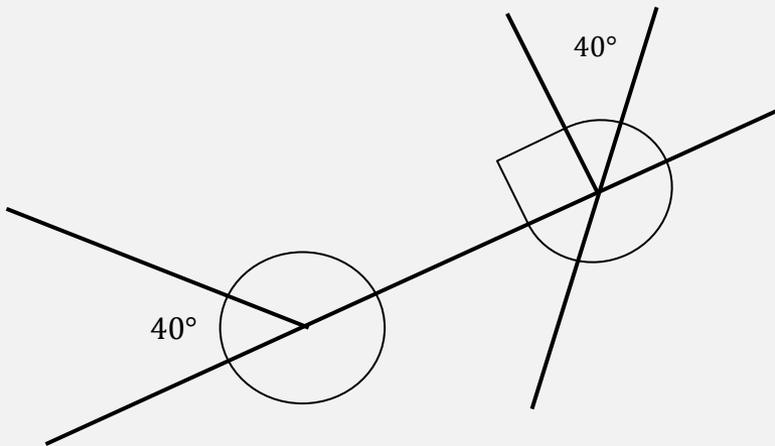
Use angle rule to calculate missing angles

Learning activity

GUIDED PRACTICE



Find the missing angles



Decide which angle rule to use



Decide which angles are relevant



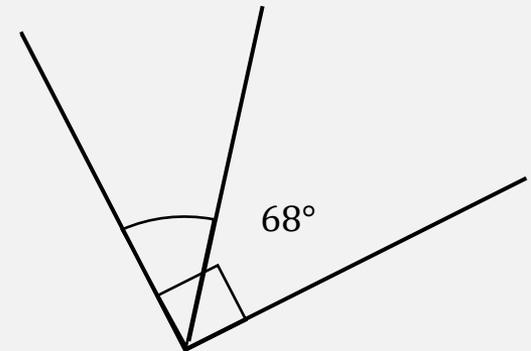
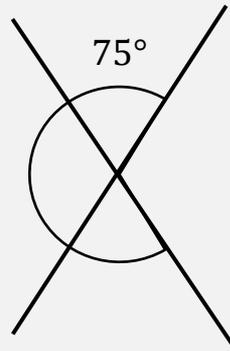
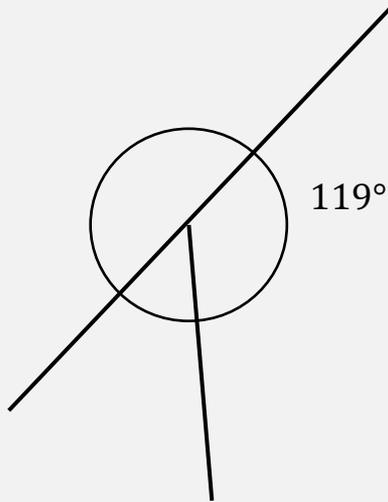
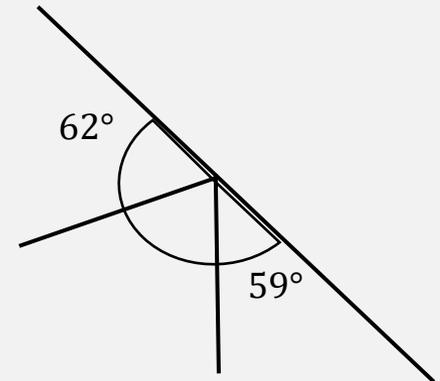
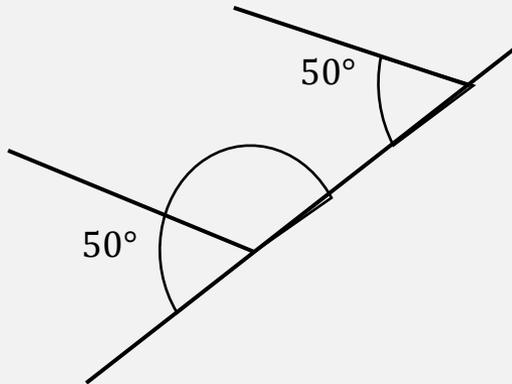
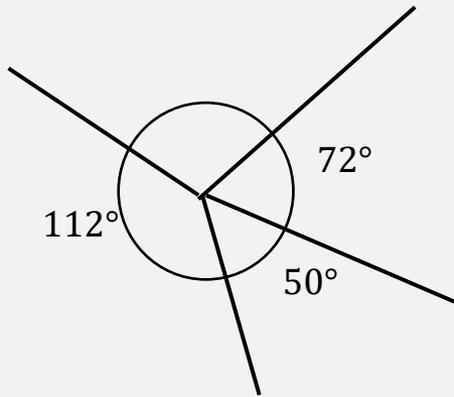
Use angle rule to calculate missing angles

Learning activity

YOUR TURN



Find the size of each missing angle



Learning activity

YOUR TURN



1. Three of these angles together make a straight line. Which three?

24°, 36°, 42°, 58°, 60°, 120°, 175°

2. Which of these are impossible?

- a. Acute + acute = right angle
- b. Obtuse + obtuse = right angle
- c. Obtuse + obtuse = straight line
- d. Acute + obtuse = full turn
- e. Acute + right = obtuse angle



Warm up

Solve the following equations

1. $2x = 180$

2. $3x = 360$

3. $x + 140 = 360$

4. $5x + 40 = 180$

5. $2x - 30 = x + 40$

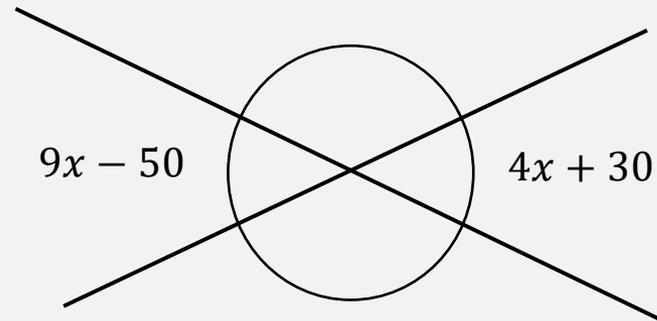
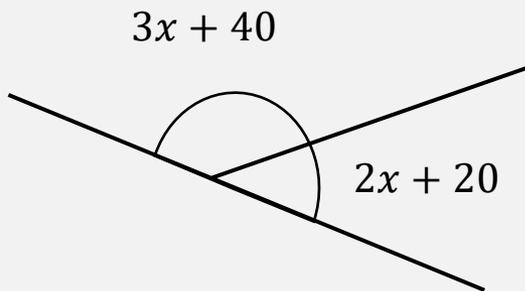
6. $5x - 40 = 2x + 80$

Learning activity

EXAMPLE



Find the value of x , then calculate all the missing angles



Decide which angle rule to use



Write the equation matching the angle rule



Simplify the equation



Solve to find x



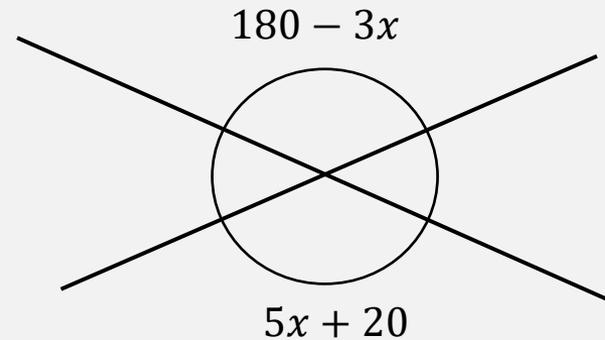
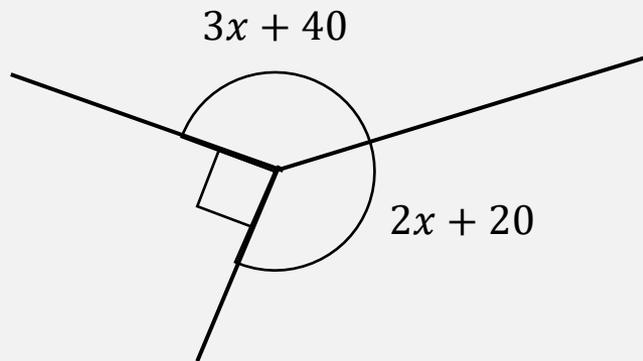
Substitute the value back in to find the angles

Learning activity

Guided Practice



Find the value of x , then calculate all the missing angles



Decide which angle rule to use



Write the equation matching the angle rule



Simplify the equation



Solve to find x



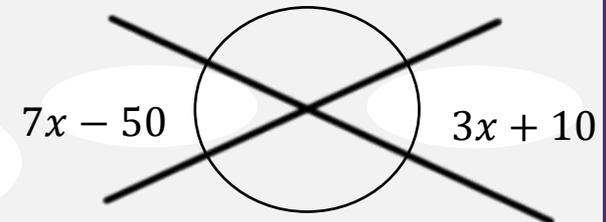
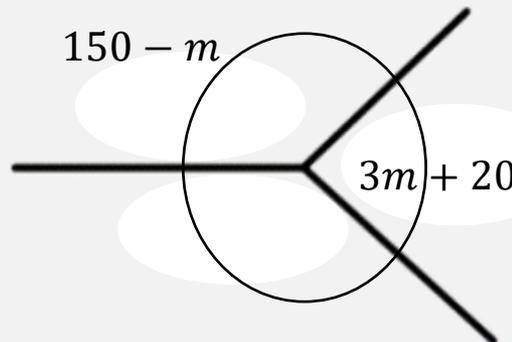
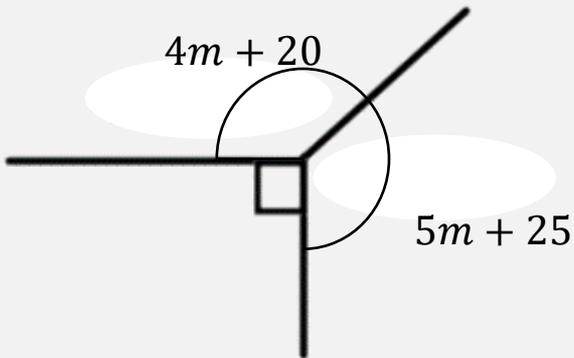
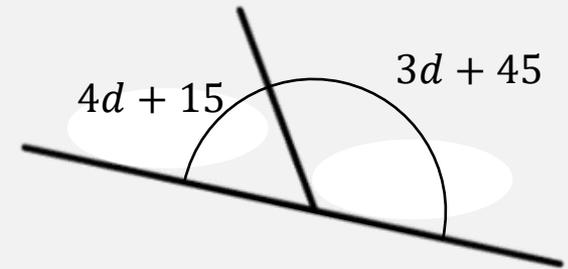
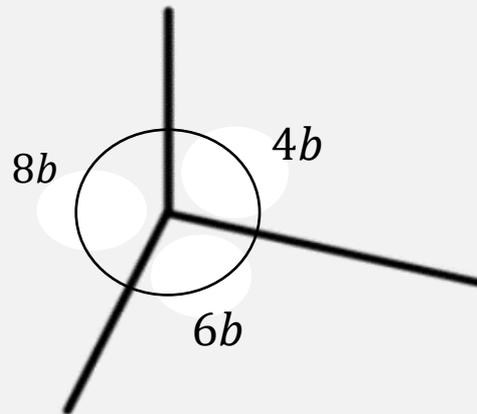
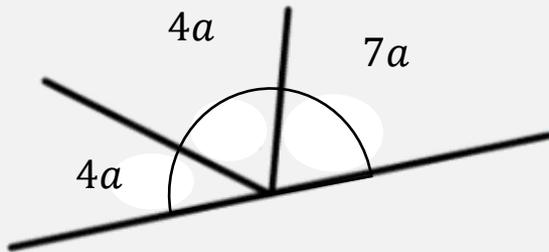
Substitute the value back in to find the angles

Learning activity

YOUR TURN



Work out the value of the letters, then find the missing angles



Learning activity

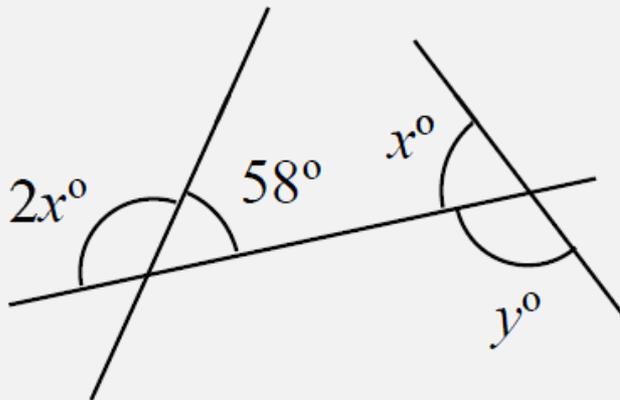
YOUR TURN



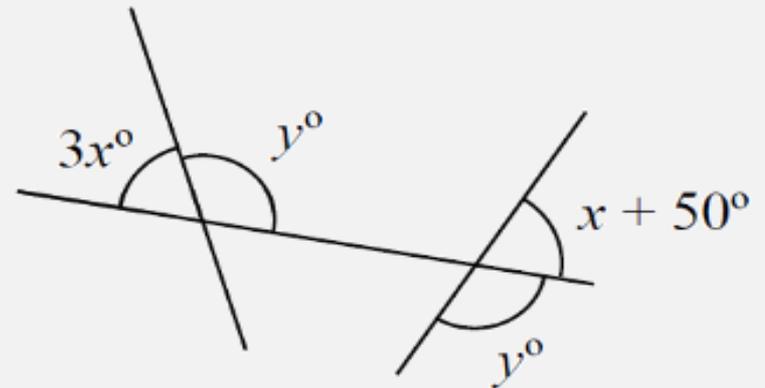
1. Three angles fit around a point.
The second angle is 20° more than the first.
The third angle is twice the size of the second.
Find the size of all three angles.

2. Find the values of x and y :

a.



b.





Tutorial 5.1 – Basic Angle Rules

Learning objectives review

In this tutorial, we looked at:

1. Using basic angle rules to find missing angles
2. Using algebra to find missing angles





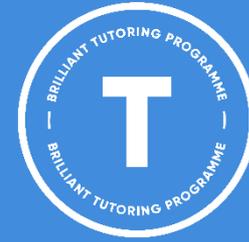
Title/subheading

Over to you!

<<Insert learning activities here>>



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Maths

Key Stage 3

Tutorial 5.2 – Triangles and quadrilaterals



Learning objectives

In this tutorial, we will look at:

1. Using angle rules to find missing angles in triangles and quadrilaterals
2. Using algebra to find missing angles in triangles and quadrilaterals

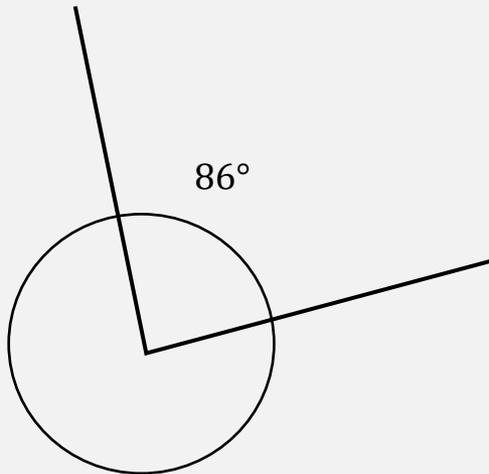




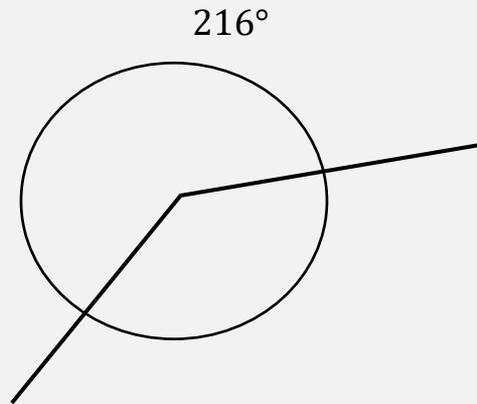
Warm up

Find the missing angles

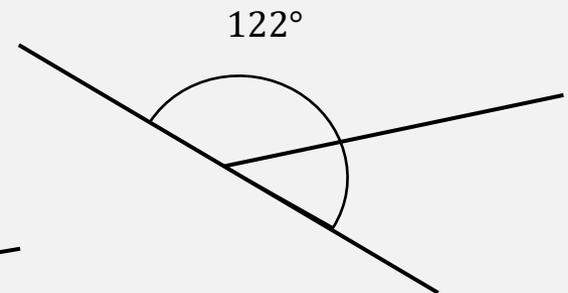
1.



2.



3.

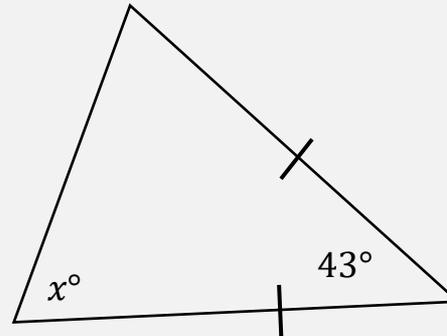
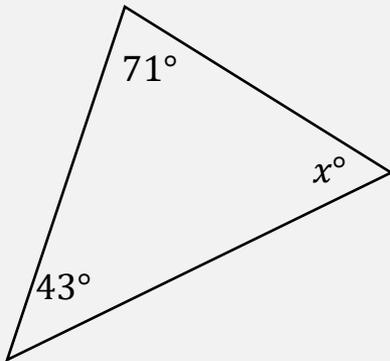


Learning activity

EXAMPLE



Find the size of angle x in the following



Decide which angle rule to use



Work out if any of the angles are equal



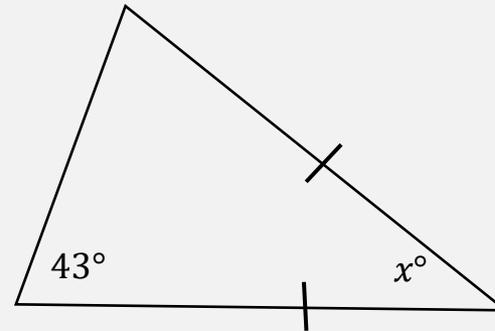
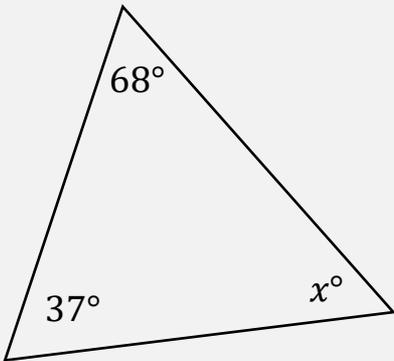
Use angle rule to calculate missing angles

Learning activity

GUIDED PRACTICE



Find the size of angle x in the following



Decide which angle rule to use



Work out if any of the angles are equal



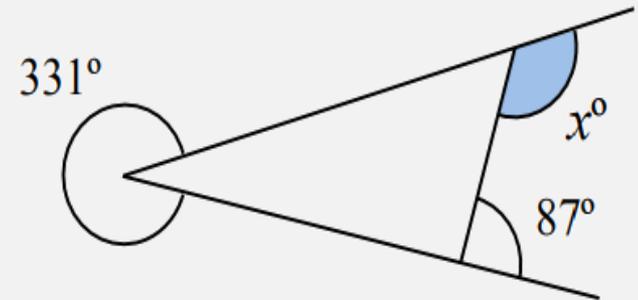
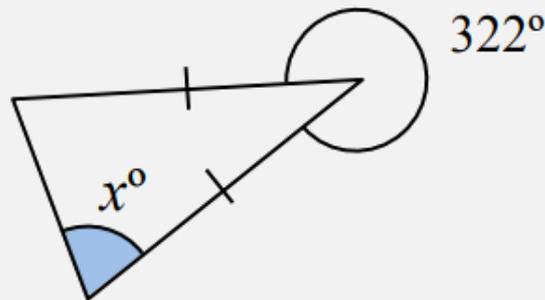
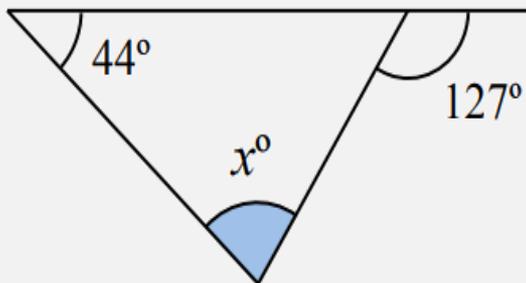
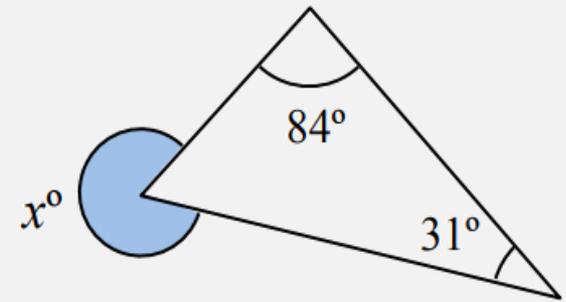
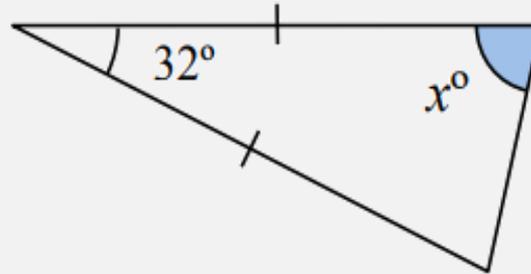
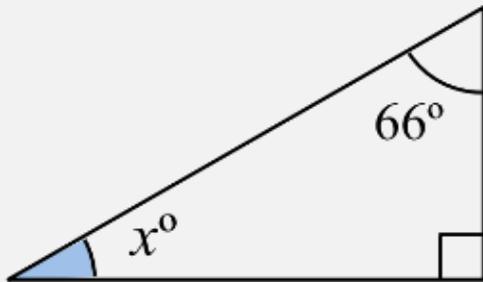
Use angle rule to calculate missing angles

Learning activity

YOUR TURN



Find the size of angle x in each of the following

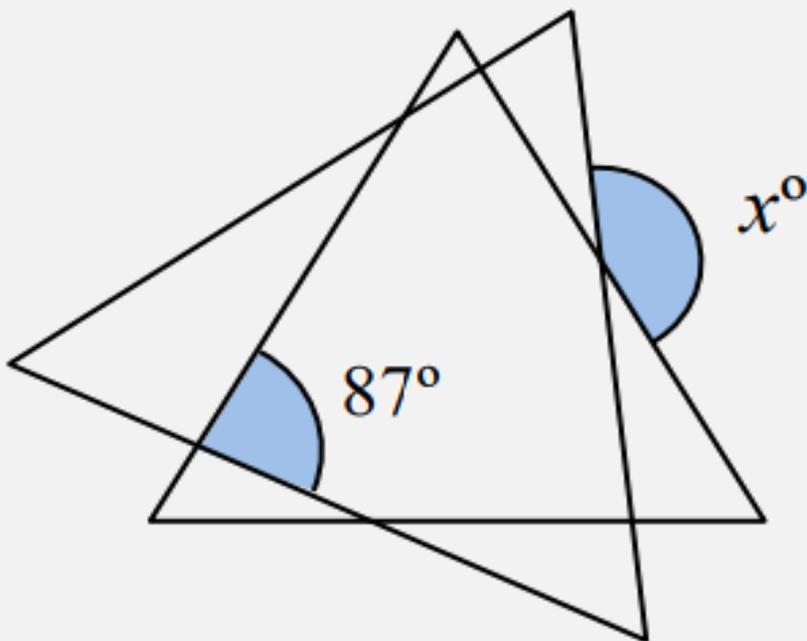


Learning activity

YOUR TURN



These two triangles are equilateral. Find the value of x





Warm up

Name each shape and label their equal angles with the same letter

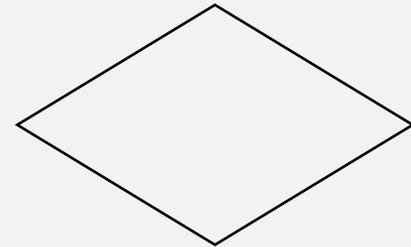
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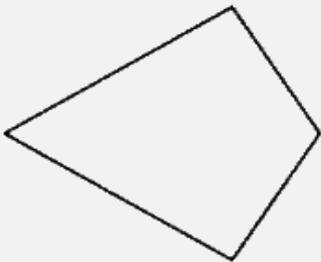
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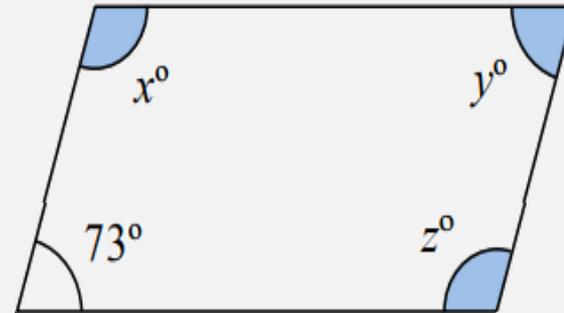
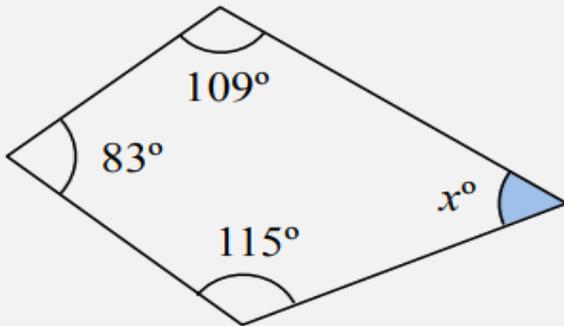


Learning activity

EXAMPLE



Work out the missing angles



Identify the shape
and any equal
angles



Decide which angle
rule to use



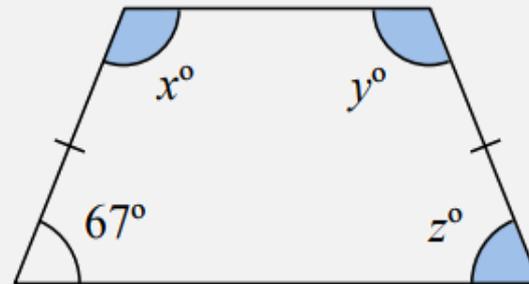
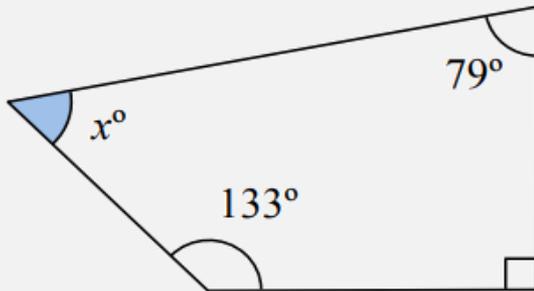
Use angle rule to
calculate missing
angles

Learning activity

GUIDED PRACTICE



Work out the missing angles



Identify the shape
and any equal
angles



Decide which angle
rule to use



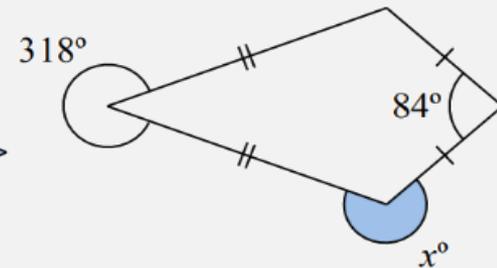
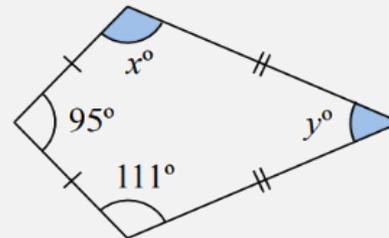
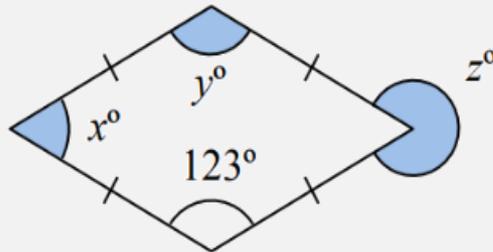
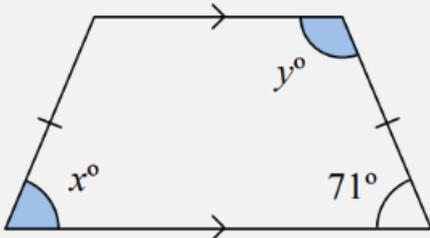
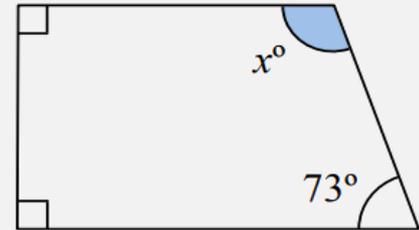
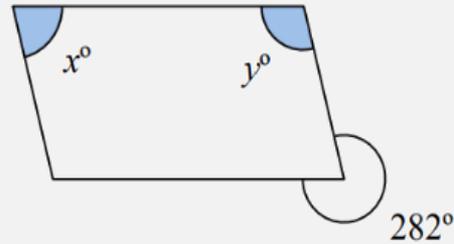
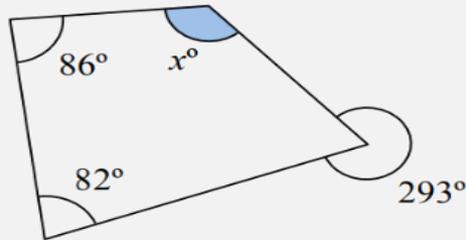
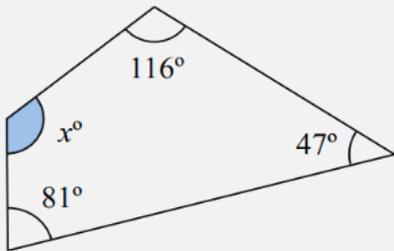
Use angle rule to
calculate missing
angles

Learning activity

YOUR TURN



Work out the missing angles

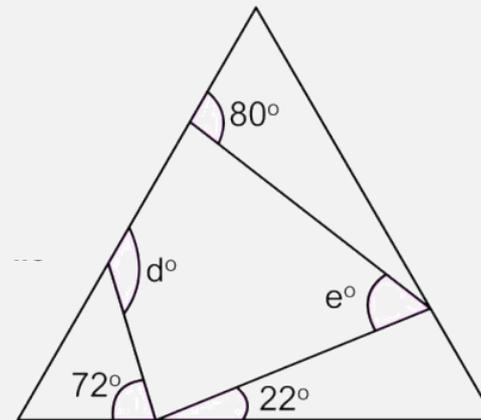
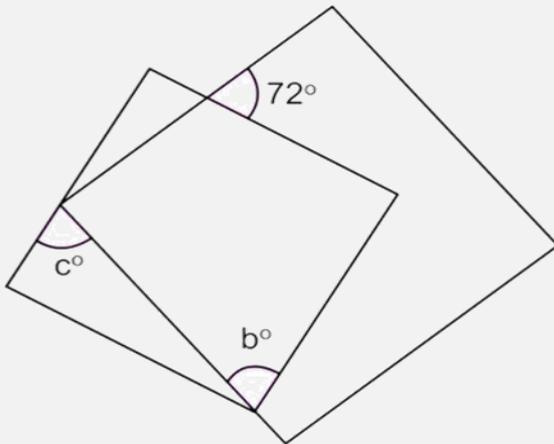


Learning activity

YOUR TURN



Find the missing angles in the following shapes





Warm up

Solve the following equations

1. $4x = 180$

2. $9x = 360$

3. $x + 70 = 180$

4. $5x + 40 = 360$

5. $3x - 70 = 2x + 80$

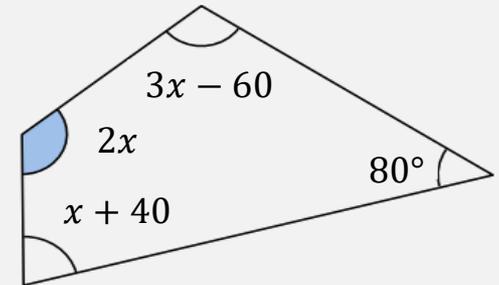
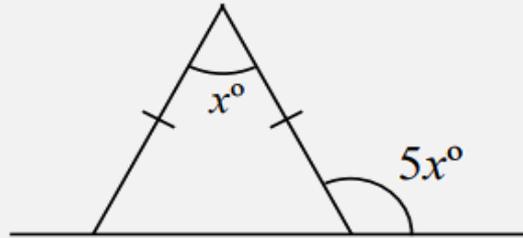
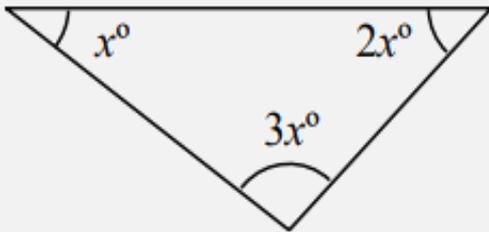
6. $5x - 80 = x - 20$

Learning activity

EXAMPLE



Find the value of x



Identify the shape and any equal angles



Decide which angle rule to use



Write the equation matching the angle rule



Simplify any expressions



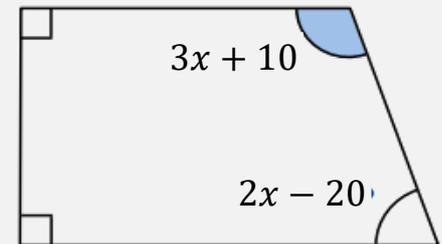
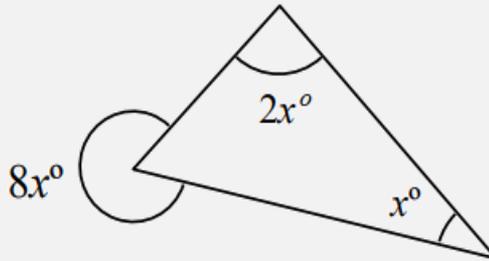
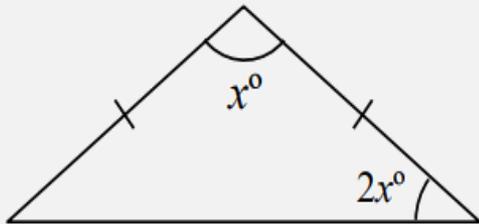
Solve the equation

Learning activity

GUIDED PRACTICE



Find the value of x



Identify the shape and any equal angles



Decide which angle rule to use



Write the equation matching the angle rule



Simplify any expressions



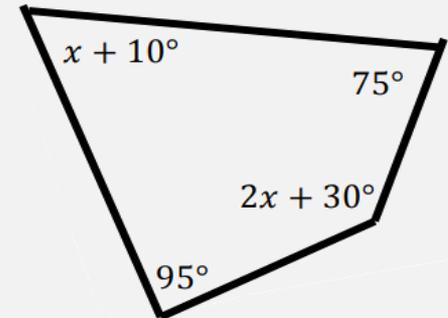
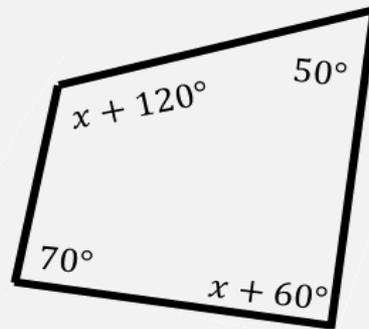
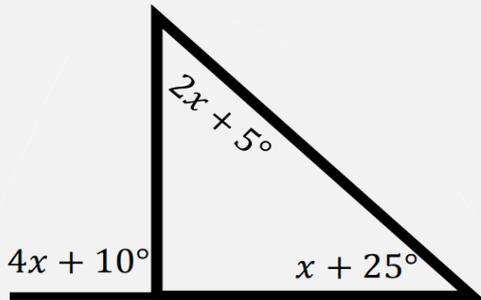
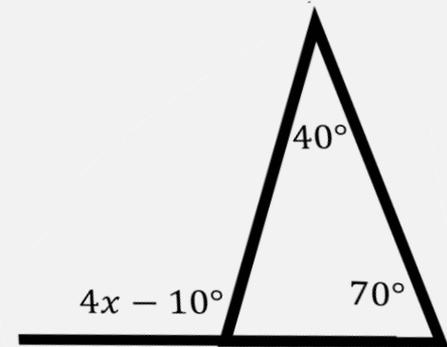
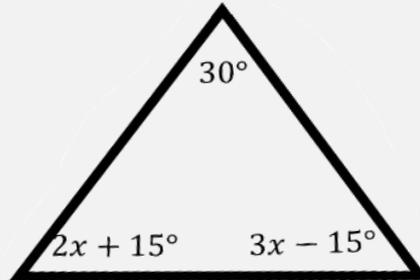
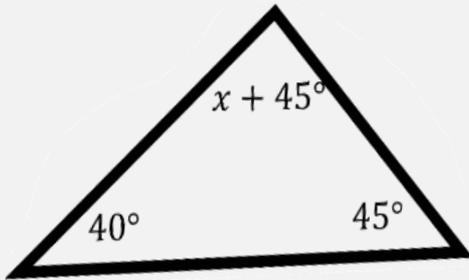
Solve the equation

Learning activity

YOUR TURN



Find the values of x in each of the following



Learning activity

YOUR TURN



The interior angles of a triangle are x° , $2x^\circ$ and $3x^\circ$.
Show that this is a right-angled triangle.

Tutorial 5.2 - Triangles and quadrilaterals



Learning objectives review

In this tutorial, we looked at:

1. Using angle rules to find missing angles in triangles and quadrilaterals
2. Using algebra to find missing angles in triangles and quadrilaterals





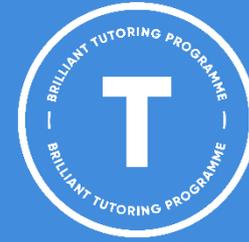
Title/subheading

Over to you!

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Maths

Key Stage 3

Tutorial 5.3 – Parallel lines



Learning objectives

In this tutorial, we will look at:

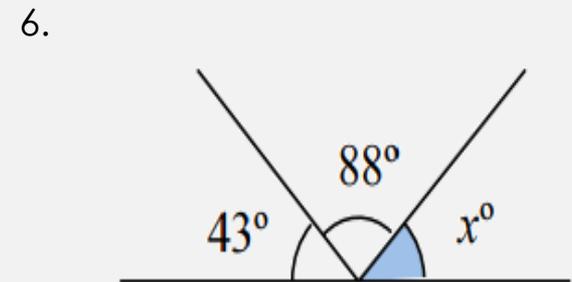
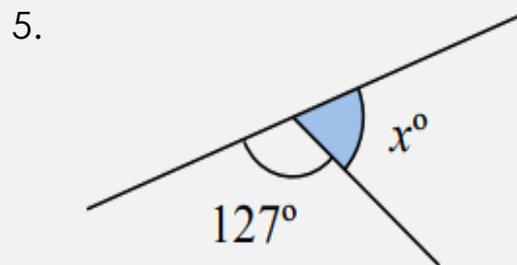
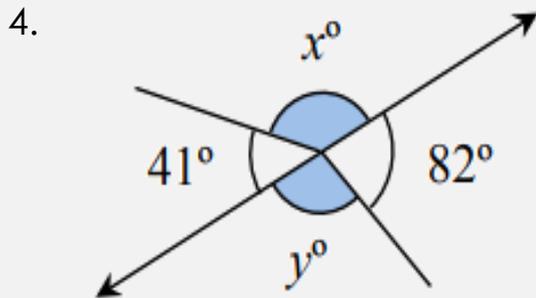
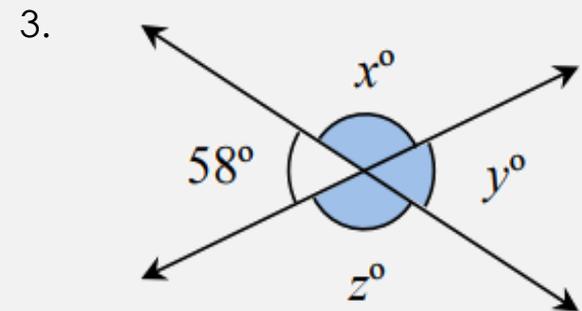
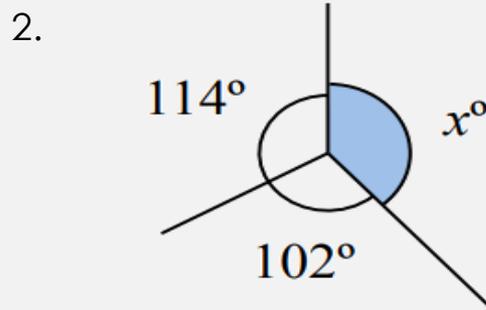
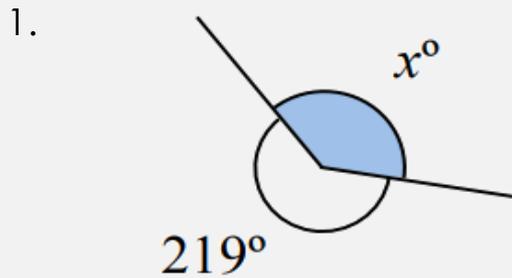
1. Using angle rules to find missing angles on parallel lines
2. Using algebra to find missing angles on parallel lines



Warm up



Find the missing angles

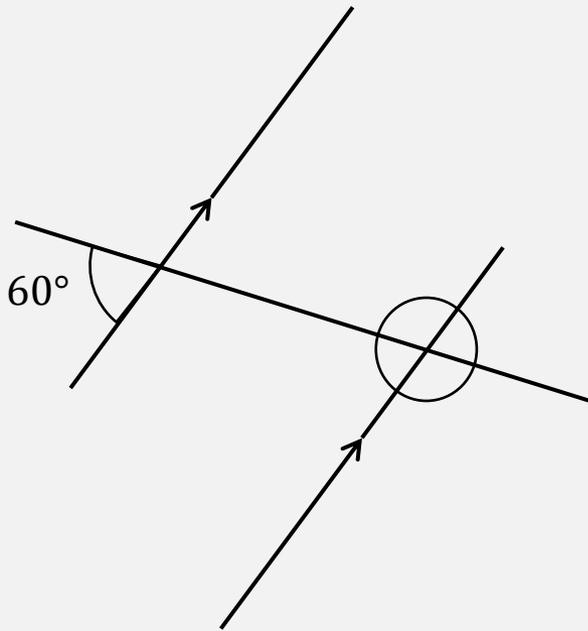


Learning activity

EXAMPLE



Find the missing angles, giving a reason for your answer



Identify the parallel lines



Match up the angles on each line



Decide which angle rule to use



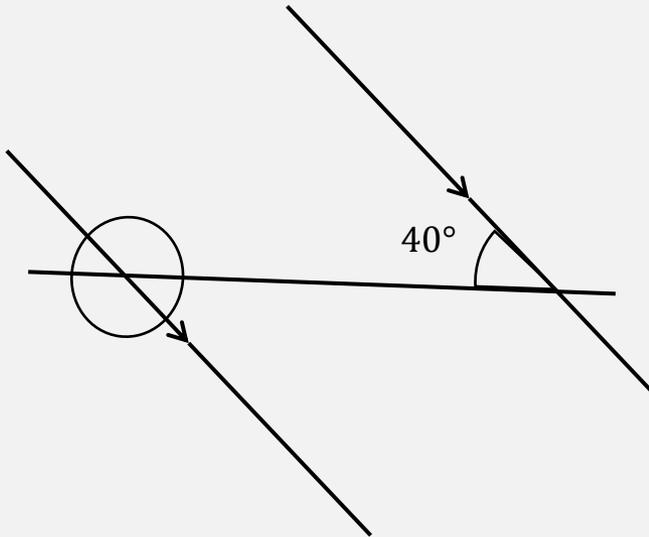
Check the angles fit the other angle rules

Learning activity

GUIDED PRACTICE



Find the size of angle x in the following



Identify the parallel lines



Match up the angles on each line



Decide which angle rule to use



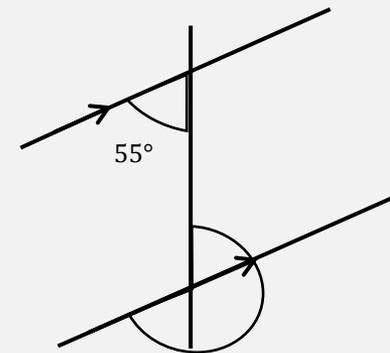
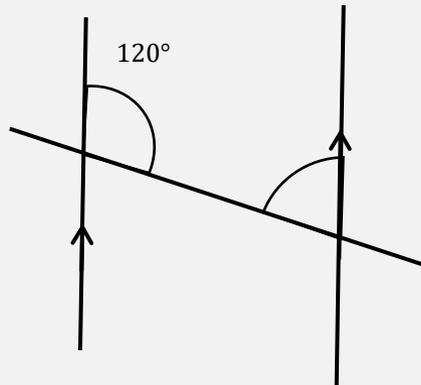
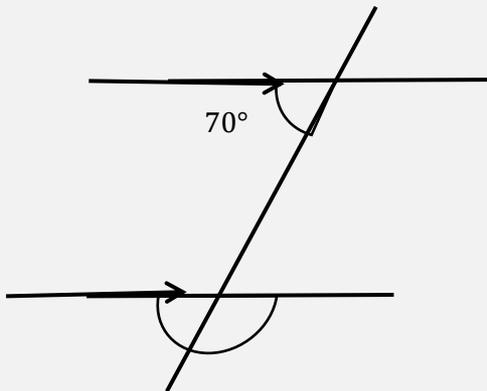
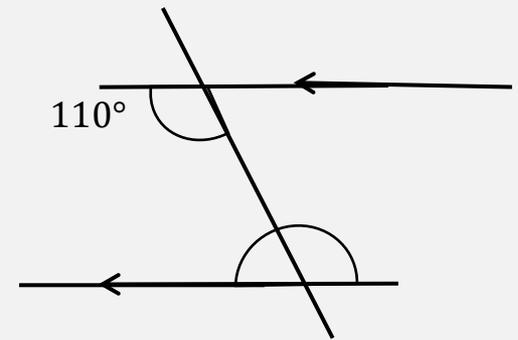
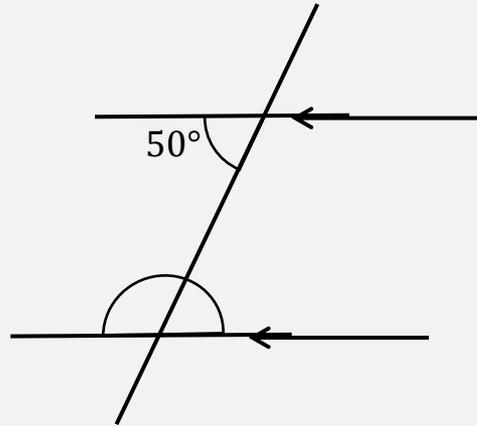
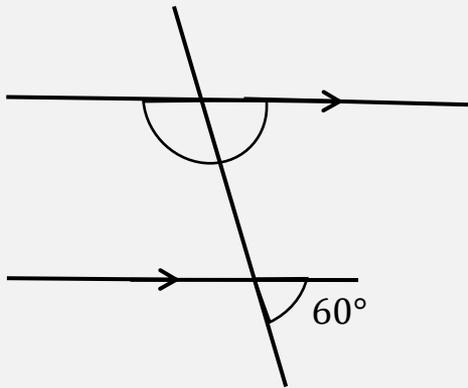
Check the angles fit the other angle rules

Learning activity

YOUR TURN



Find the missing angles, giving a reason for your answer

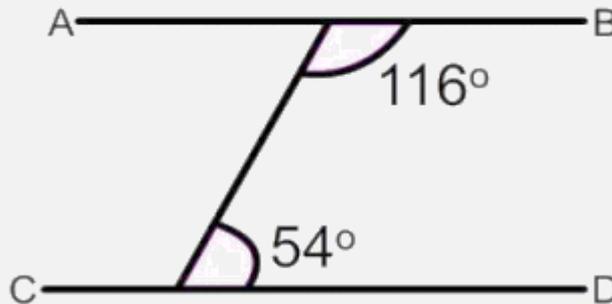


Learning activity

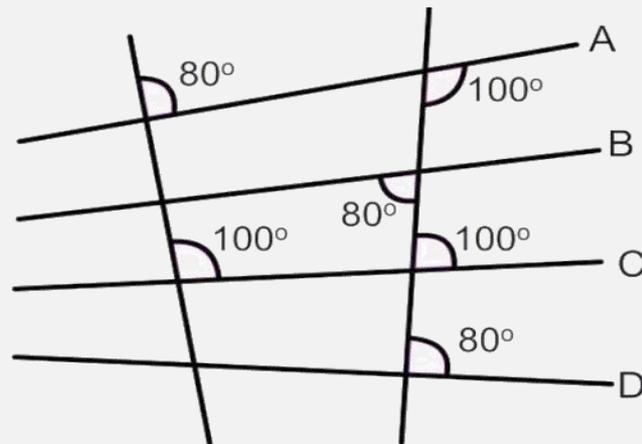
YOUR TURN



Are lines AB and CD parallel? Give a reason for your answer.



Which of the lines A, B, C and D are parallel to each other?

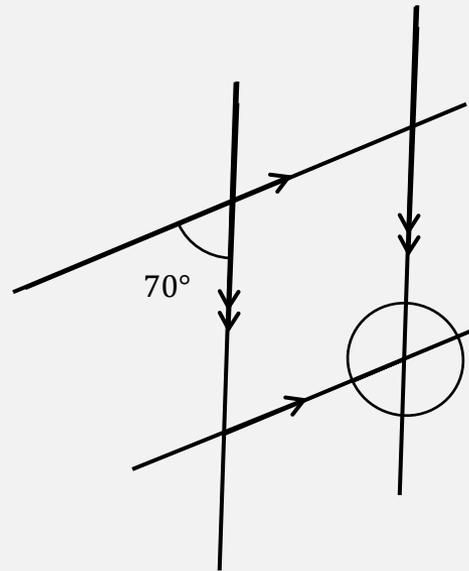
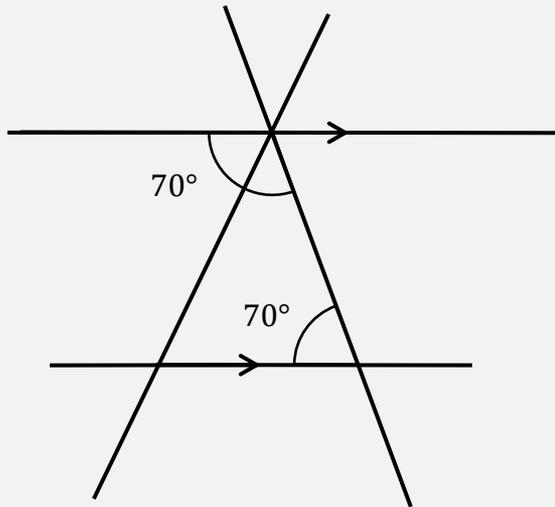


Learning activity

EXAMPLE



Work out the missing angles. Give a reason for your answers.



Identify the parallel lines



Match up the angles on each line



Decide which angle rule to use



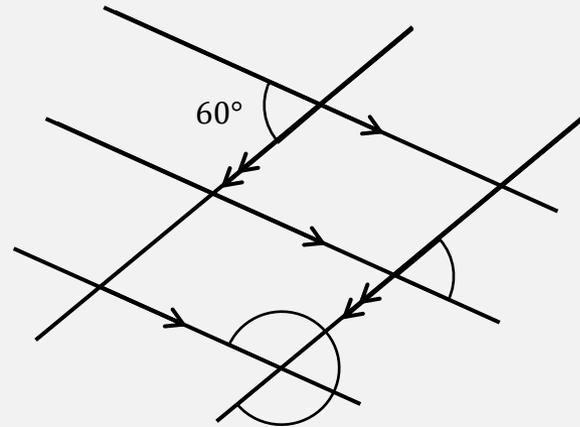
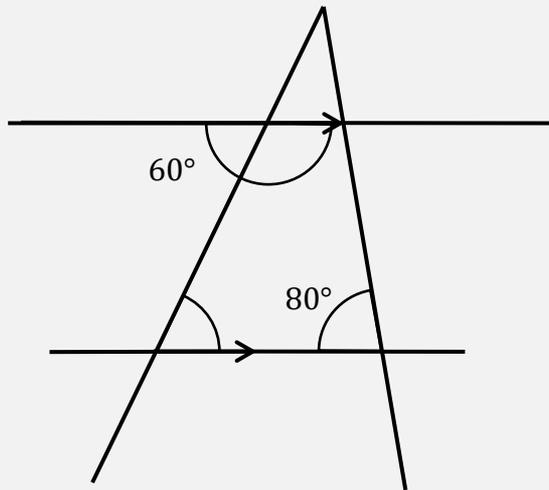
Check the angles fit the other angle rules

Learning activity

GUIDED PRACTICE



Work out the missing angles. Give a reason for your answers.



Identify the parallel lines



Match up the angles on each line



Decide which angle rule to use



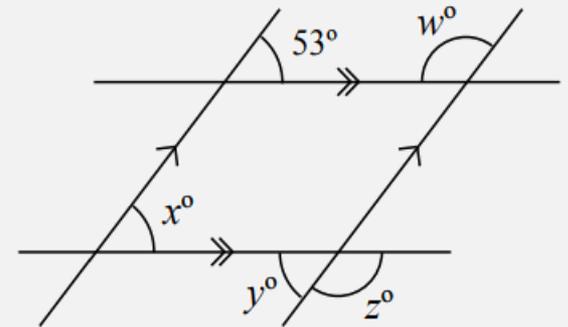
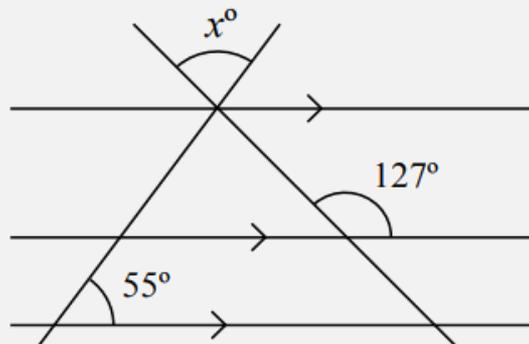
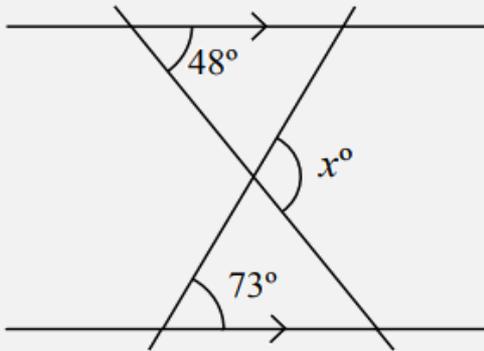
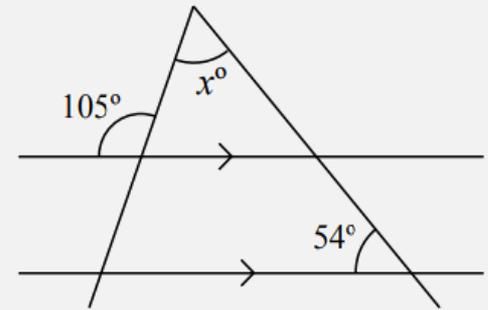
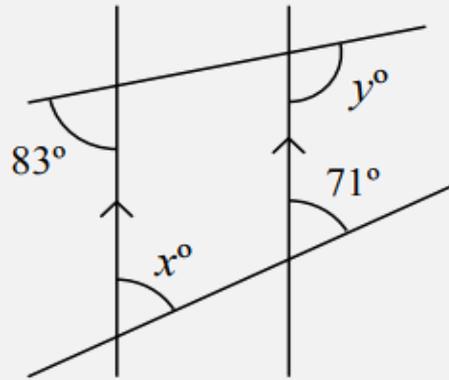
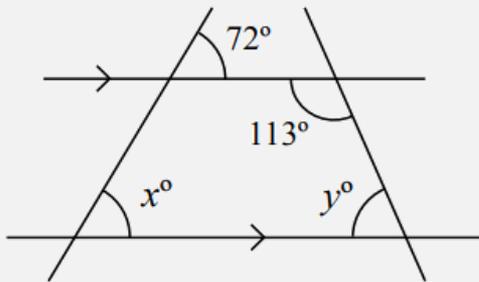
Check the angles fit the other angle rules

Learning activity

YOUR TURN



Find the values of the missing angles

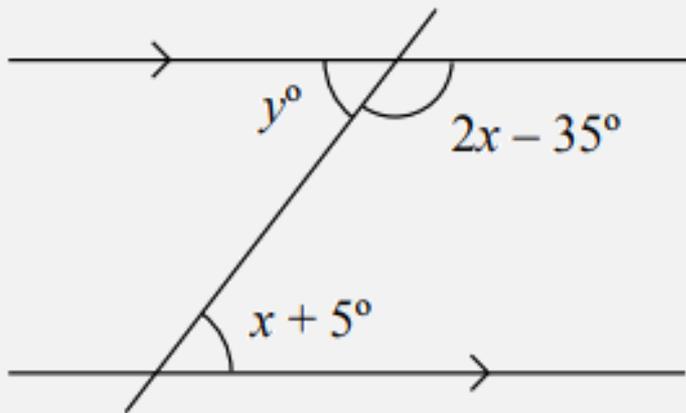


Learning activity

YOUR TURN



Find the values of x and y





Tutorial 5.3 – Parallel lines

Learning objectives review

In this tutorial, we looked at:

1. Using angle rules to find missing angles on parallel lines
2. Using algebra to find missing angles on parallel lines





Title/subheading

Over to you!

<<Insert learning activities here>>



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Maths

Key Stage 3

Tutorial 5.4 – Polygons



Learning objectives

In this tutorial, we will look at:

1. How to calculate the interior angles of regular polygons
2. How to calculate the exterior angles of regular polygons





Warm up

Draw a sketch of the following polygons

1. Equilateral triangle
2. Regular pentagon
3. Irregular hexagon

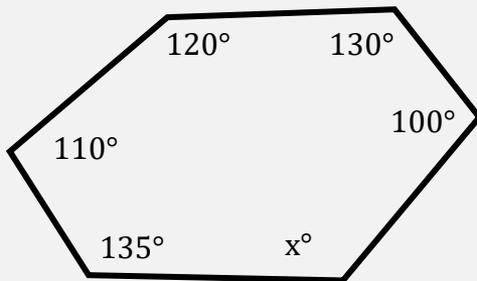
Learning activity

EXAMPLE



Calculate the interior angle sum of a hexagon

Find the missing angle in the following polygon



Work out how many sides the shape has



Calculate the number of triangles that make it



Find the total angle sum using the triangles



Work out angle missing angles

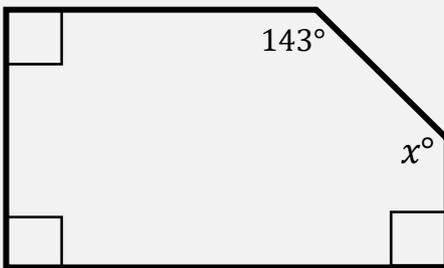
Learning activity

GUIDED PRACTICE



Calculate the interior angle sum of a pentagon

Find the missing angle in the following polygon



Work out how many sides the shape has



Calculate the number of triangles that make it



Find the total angle sum using the triangles



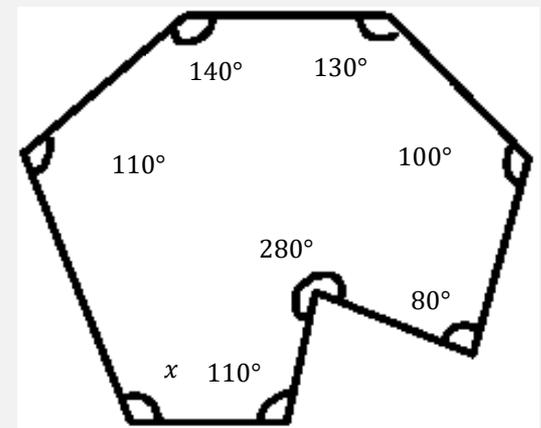
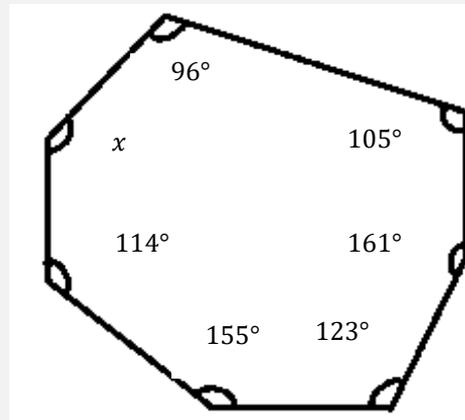
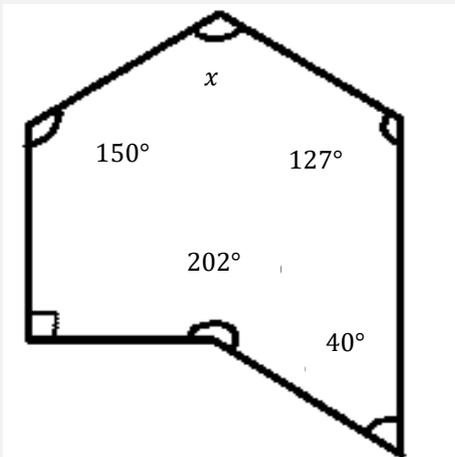
Work out angle missing angles

Learning activity

YOUR TURN



1. Calculate the interior angle sum of:
 - a) A heptagon
 - b) An octagon
 - c) A nonagon
 - d) A decagon
 - e) A dodecagon
2. Find the missing angles in the following polygons



Learning activity

YOUR TURN



The sum of the interior angles of a polygon is 2700° . Work out the number of sides the polygon has.

Learning activity

EXAMPLE



Work out the exterior angle of a regular hexagon.

Work out the interior angle of a regular hexagon.

Write down the total of the angles (interior or exterior)



Divide by the number of sides of the polygon



Do your answers fit the other angle rules?

Learning activity

EXAMPLE



Work out the exterior angle of a regular pentagon.

Work out the interior angle of a regular pentagon.

Write down the total of the angles (interior or exterior)



Divide by the number of sides of the polygon



Do your answers fit the other angle rules?

Learning activity

YOUR TURN



1. For a regular octagon, decagon and dodecagon:
 - i. calculate the sum of the interior angles using the triangle method
 - ii. Work out the size of one interior angle
 - iii. Work out the size of one exterior angle using “angles around a point”

2. For each regular polygon in Q1:
 - i. Work out the size of one exterior angle using the total of the exterior angles
 - ii. Work out the size of one interior angle using “angles around a point”
 - iii. Work out the sum of the interior angles using your answer to part ii

Learning activity

YOUR TURN



The size of each interior angle of a regular polygon is 140° bigger than the size of each exterior angle.

Work out the number of sides the polygon has.

Tutorial 5.4 - Polygons



Learning objectives review

In this tutorial, we looked at:

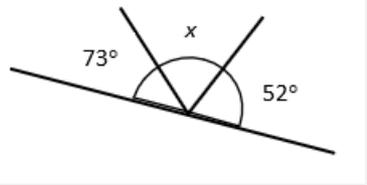
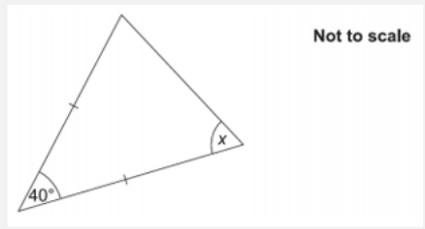
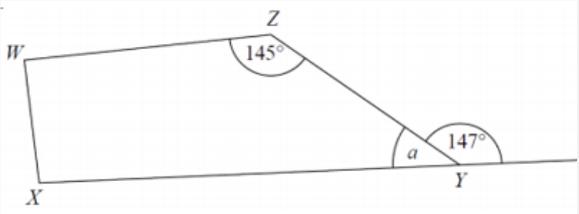
1. How to calculate the interior angles of regular polygons
2. How to calculate the exterior angles of regular polygons



Knowledge Check # 2

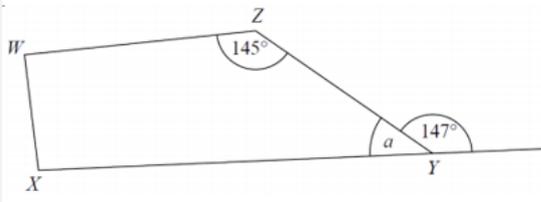
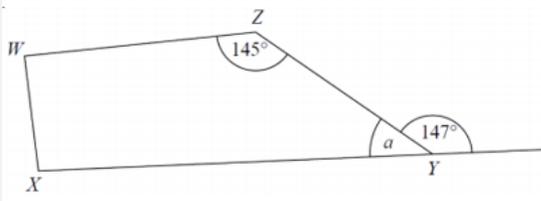
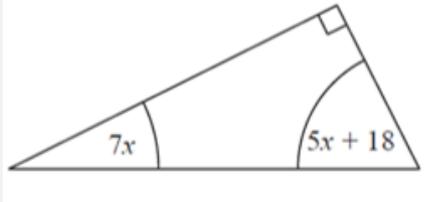
<https://forms.office.com/r/5BHKVGCNSQ>



	Question
1	<p>What is the size of the angle marked x?</p>  <p>55° 60° 235° 90°</p>
2	<p>This diagram shows a triangle. What is the value of x?</p>  <p>160° 70° 40° Not enough information</p>
3	<p>WXYZ is a quadrilateral. XYV is a straight line.</p> 

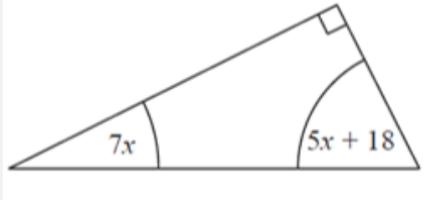
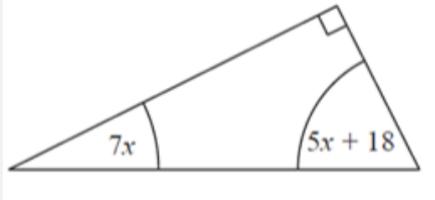
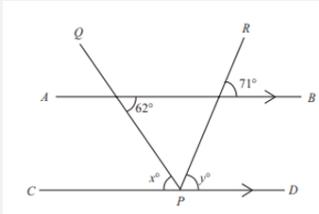
Knowledge Check #2



	Question
<p>3 cont.</p>	<p>a) What is the size of the angle marked a?</p>  <p> 33° 213° 75° 35° </p>
	<p>b) Angle x is equal to angle y. What is the size of angle x?</p>  <p> 72° 33° 91° 101° </p>
<p>4</p>	<p>The diagram shows a right-angled triangle. All angles are in degrees.</p> 

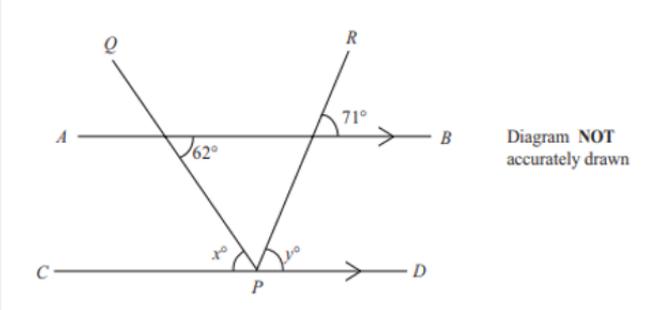
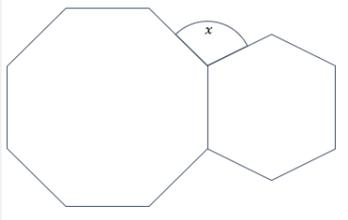
Knowledge Check #2



	Question
<p style="text-align: center;">4 cont.</p>	<p>a) What is the value of x?</p> <div style="text-align: right; margin-right: 50px;">  </div> <p style="text-align: center;"> 3 6 9 21 </p>
	<p>b) What is the size of the smallest angle?</p> <div style="text-align: right; margin-right: 50px;">  </div> <p style="text-align: center;"> 21° 42° 47° 90° </p>
<p style="text-align: center;">5</p>	<p>AB and CPD are parallel straight lines. PQ and PR are straight lines.</p> <div style="text-align: right; margin-right: 50px;">  <p style="font-size: small;">Diagram NOT accurately drawn</p> </div>

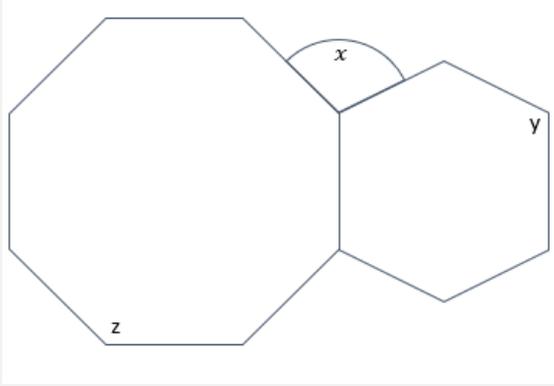
Knowledge Check #2



	Question
<p style="text-align: center;">5 cont.</p>	<div style="text-align: center;">  </div> <p>a) What is the size of the angle marked x?</p> <p style="text-align: center;"> <input type="radio"/> 118° <input type="radio"/> 71° <input type="radio"/> 109° <input type="radio"/> 62° </p>
	<p>b) What is the size of the angle marked y?</p> <p style="text-align: center;"> <input type="radio"/> 118° <input type="radio"/> 71° <input type="radio"/> 109° <input type="radio"/> 62° </p>
<p style="text-align: center;">6</p>	<p>The diagram shows a regular octagon and a regular hexagon.</p> <div style="text-align: center;">  </div>

Knowledge Check #2



	Question			
6 cont.				
	a) What is the size of angle y ?			
	60°	135°	108°	120°
	b) What is the size of angle z ?			
60°	135°	108°	120°	
c) What is the size of angle x ?				
105°	60°	75°	115°	



Title/subheading

Over to you!

<<Insert learning activities here>>



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