Stewards Academy

Maths Spring 1

Year 9

Blended Learning Booklet

Name:

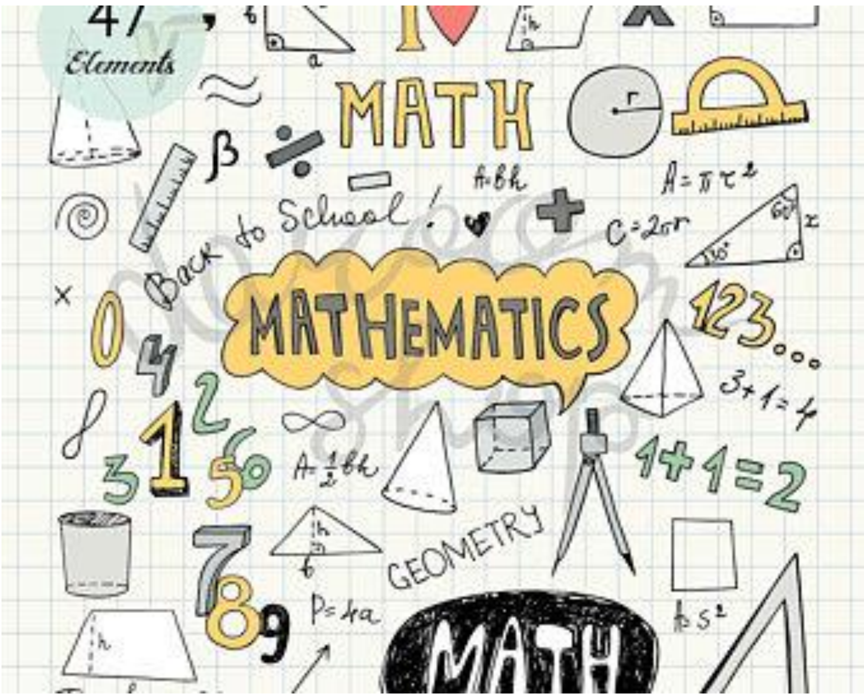
Form:

Each week covers topics you would complete in your 3 Maths lessons that week. Write out the title and LI and then complete the tasks.

All video links are online using the ClassCharts link.

The Knowledge Organiser on page 4 has further practice questions and page numbers linking to your pocket revision guides for all the key information and examples to help you with this unit.

Upload all work onto ClassCharts for feedback.



Contents

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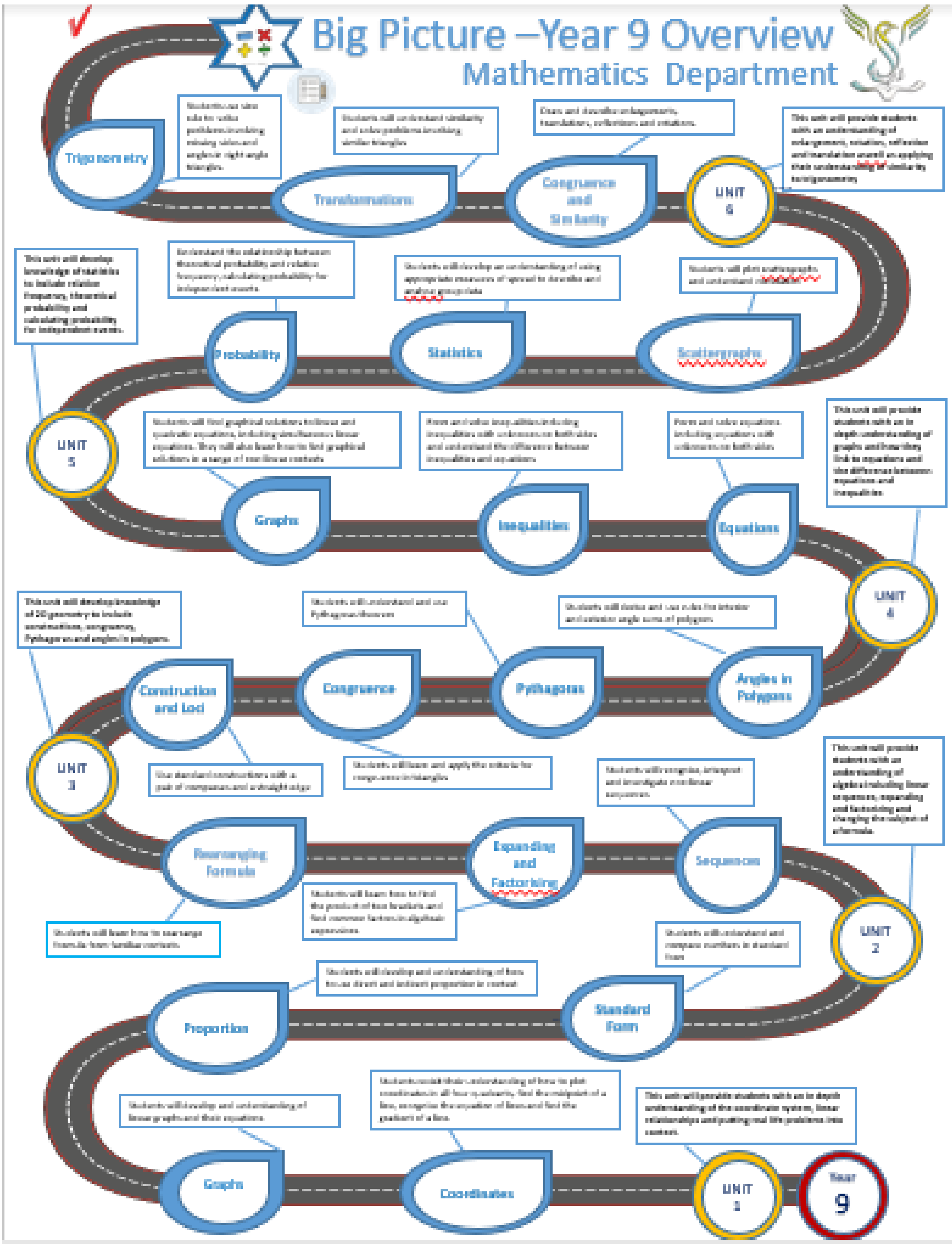


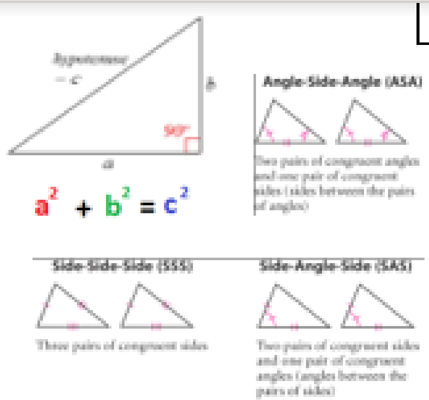
Year 9 Unit 3

Geometry

Revision guide reference pages

Foundation Pages 78, 80-81, 83, 87, 96-99, 100, 102-103.

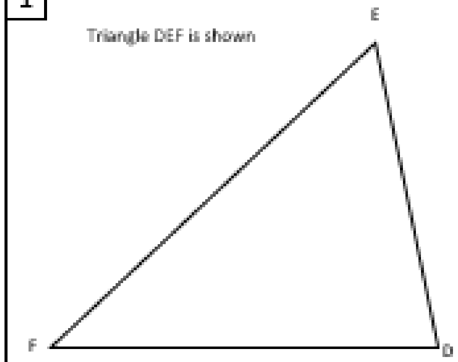
Higher Pages 80, 82-83, 85, 89, 100-103, 105.



$a^2 + b^2 = c^2$

1

Triangle DEF is shown

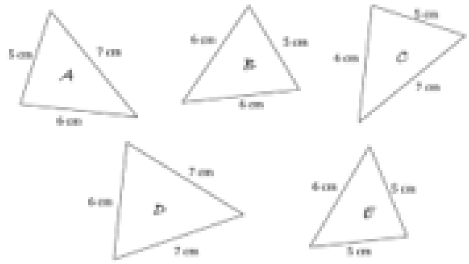


a) Measure $\angle EDF$.

b) Use a ruler and pair of compasses to construct the angle bisector of $\angle EDF$.
You must show your construction lines.

2

The diagram shows five triangles.



a) Write the letters of two triangles that are congruent to each other.

.... and ....

b) Give a reason for your answer.

....

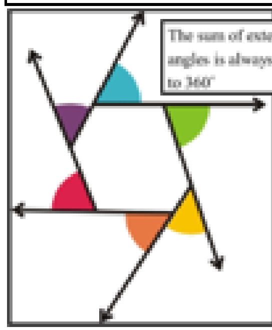
3

Work out the size of an exterior angle of a regular hexagon.

....

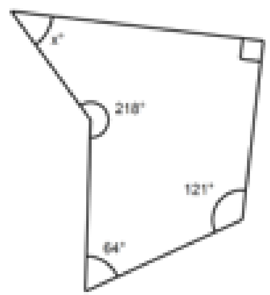
Work out the size of an exterior angle of a regular pentagon.

....

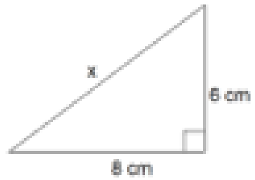


4

Calculate x



5



(a) Find the area of this triangle.

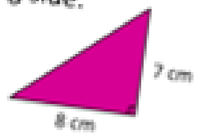
(b) Find x.

6

Use a ruler and a pair of compasses to construct the perpendicular bisector of the line AB.
You must show your construction lines.

7

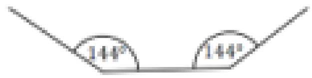
Calculate the length of the missing side.



Give your answer correct to 2 decimal places

8

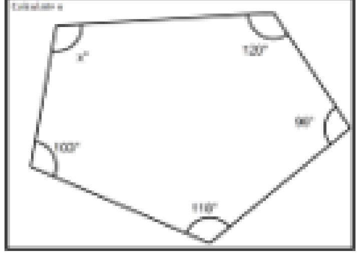
The diagram shows part of a regular polygon.



Work out the number of sides of this regular polygon.

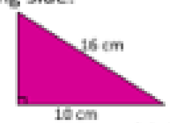
9

Calculate x



10

Calculate the length of the missing side.



Give your answer correct to 2 decimal places

Week 1:

- **LI:** : To construct a perpendicular bisector of a line segment
  To construct a perpendicular to a given line from and at a given point
  To bisect a given angle

Demonstration Videos:

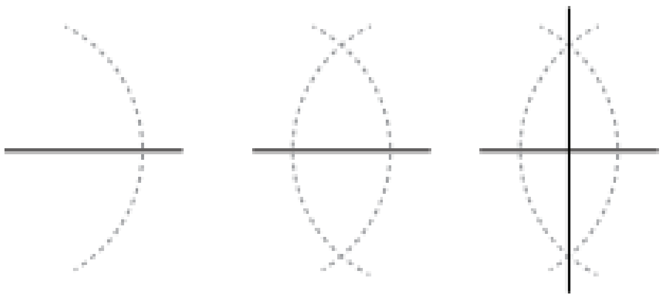
Perpendicular bisector - https://www.youtube.com/watch?v=1beKcgU9ogE
Perpendicular from point - https://www.youtube.com/watch?v=XjluAXtpbPI
Bisect angle - https://www.youtube.com/watch?v=fBGOshZk94U

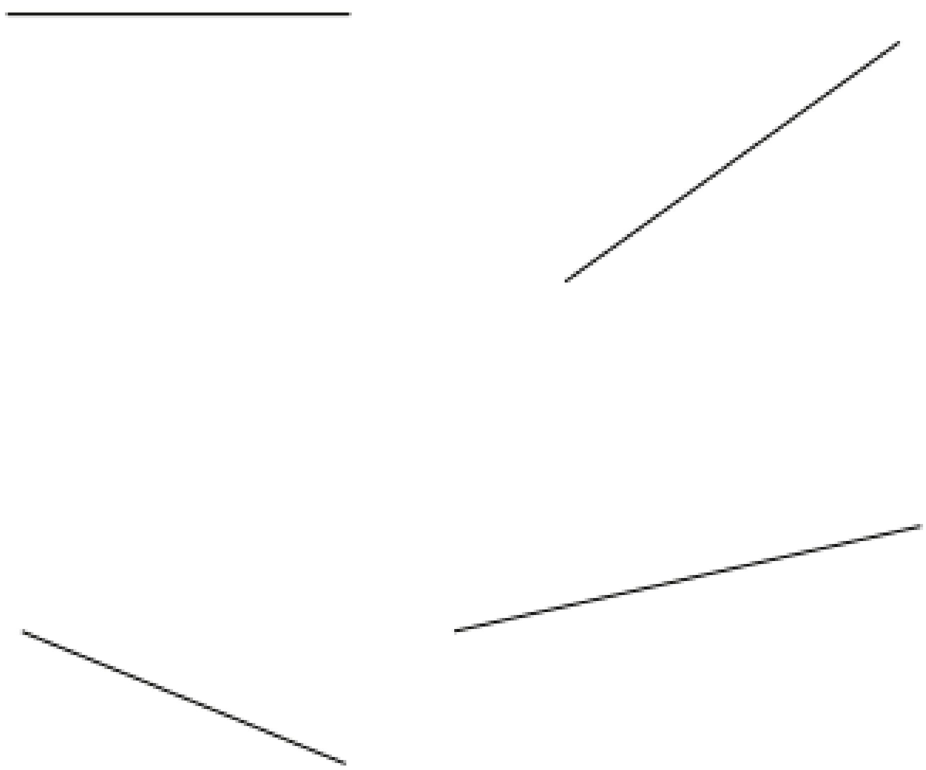
Constructing Perpendicular Bisector

Tasks:

Draw the perpendicular bisectors of these lines

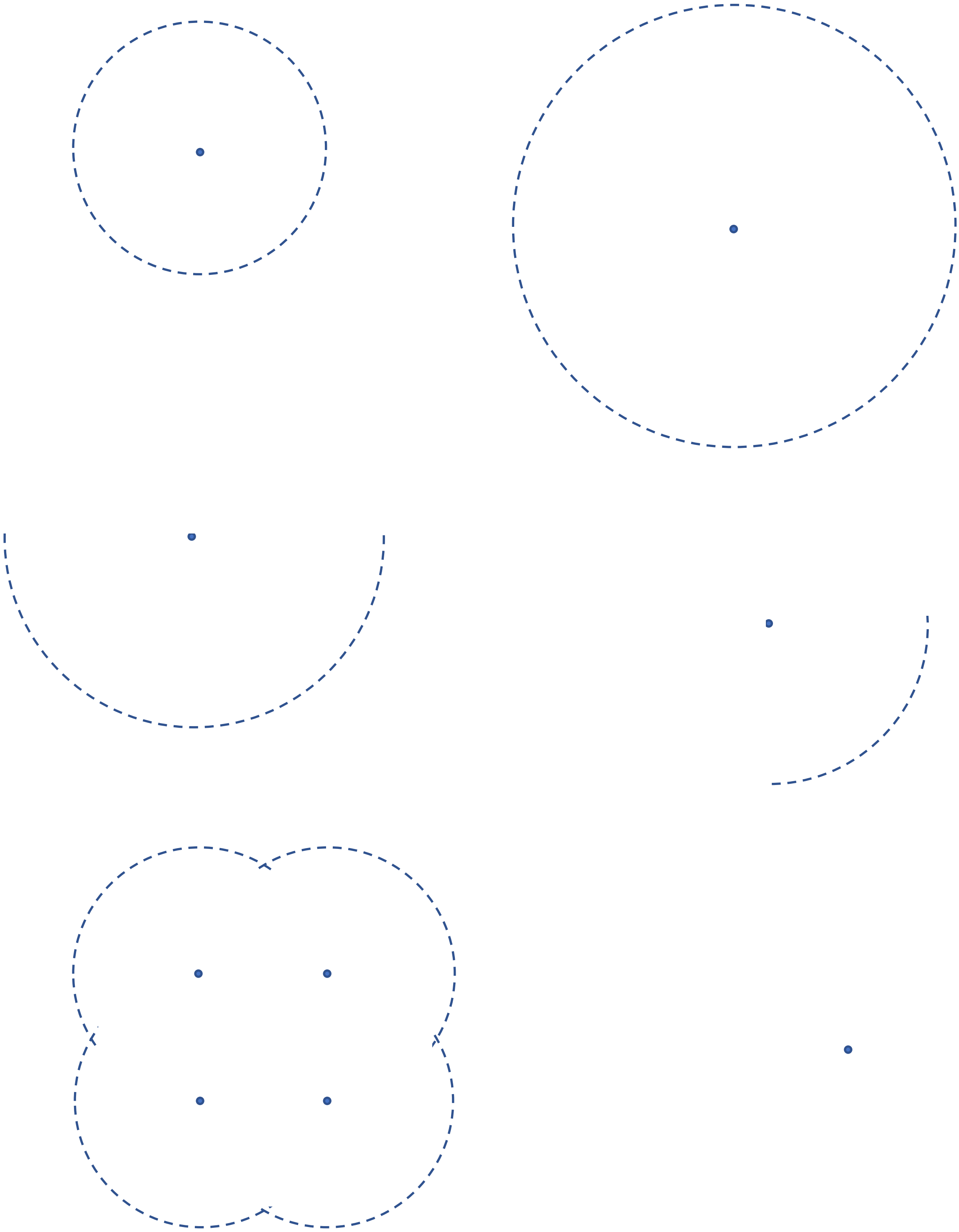
Example:





Using Compasses Effectively

1. Set the point of your pair of compasses on the dot and open them to the correct distance for the dotted line.
2. Use your compasses to trace over the dots.
3. Use your ruler to measure the setting of your compasses and write it next to the diagram.



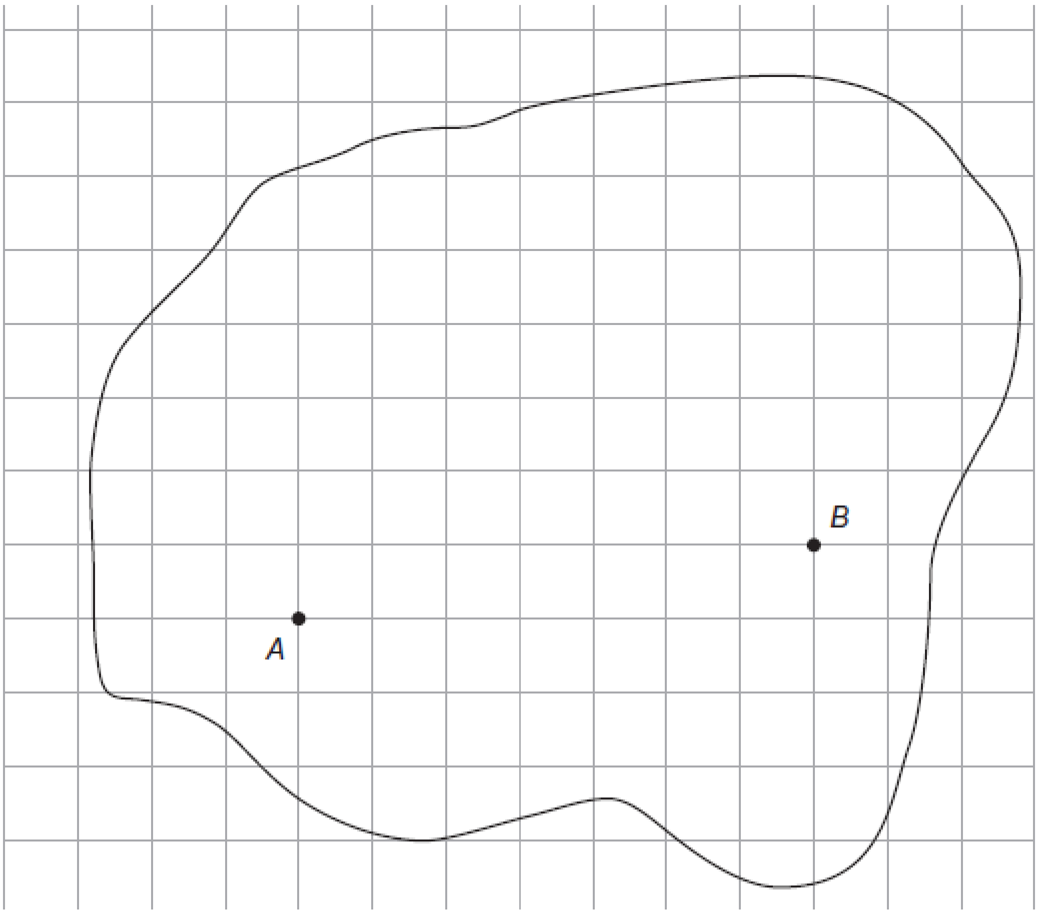
Make up your own design for someone else to copy

Exam Questions

O1. Construct the perpendicular bisector of *AB*.

(Total 2 marks)

Q2. A map of an island is shown on the grid.



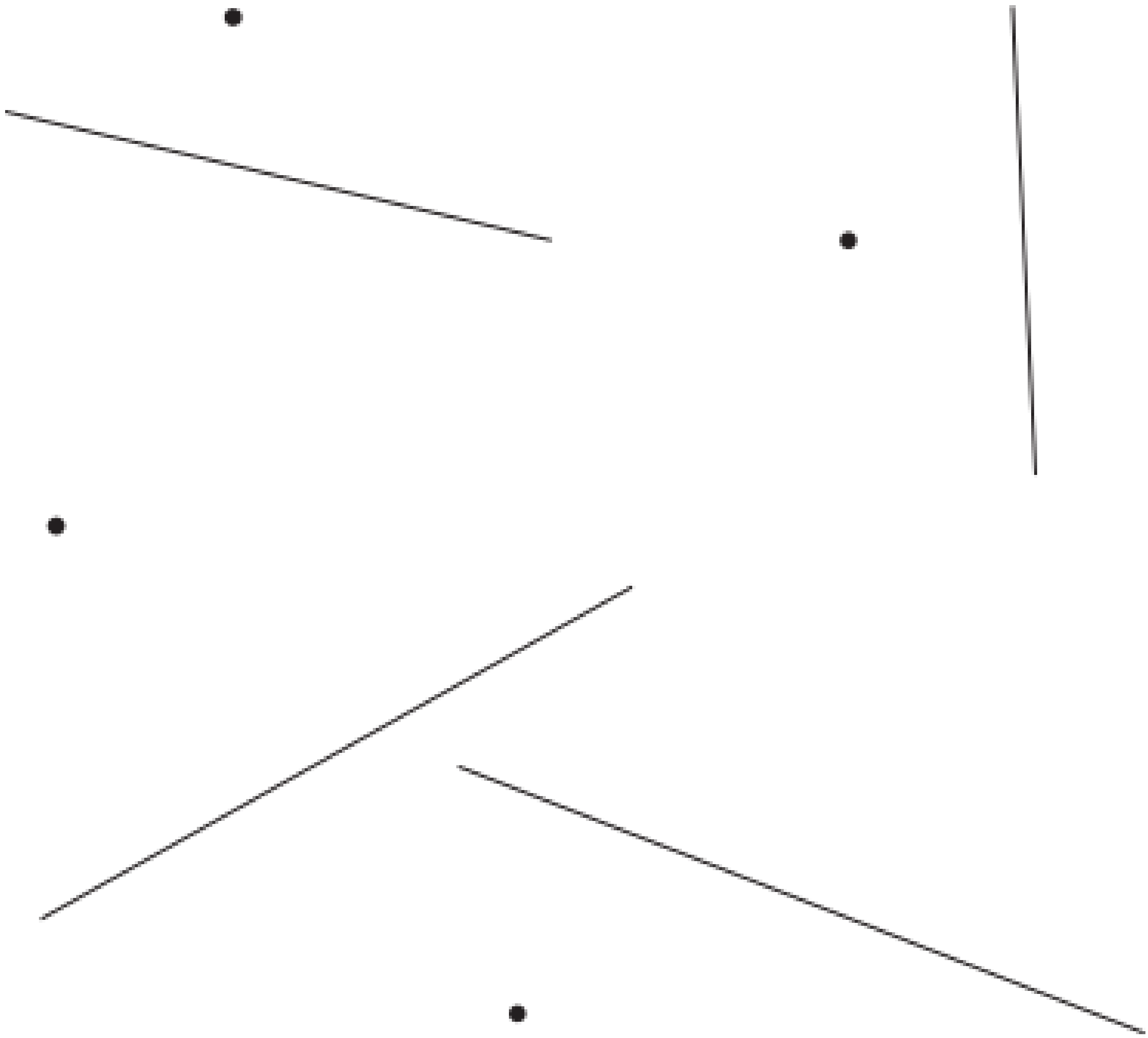
Treasure is buried on the island.
The treasure is the same distance from *A* as it is from *B*.

Construct a line on the map to show **all** the places where the treasure could be.

(Total 3 marks)

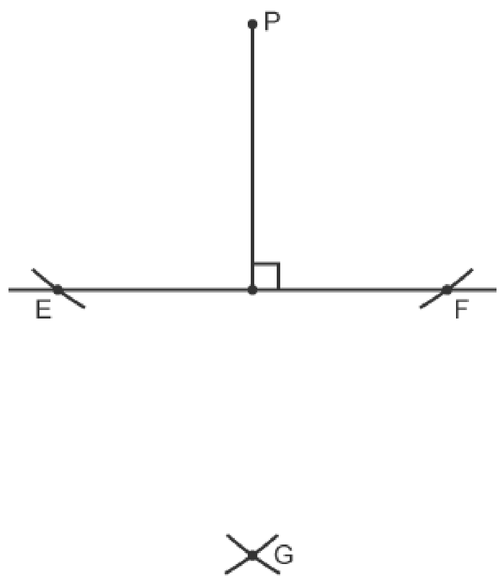
Construct a perpendicular line through the point.

Example:



The shortest distance from a point to a line is the perpendicular distance.

Example



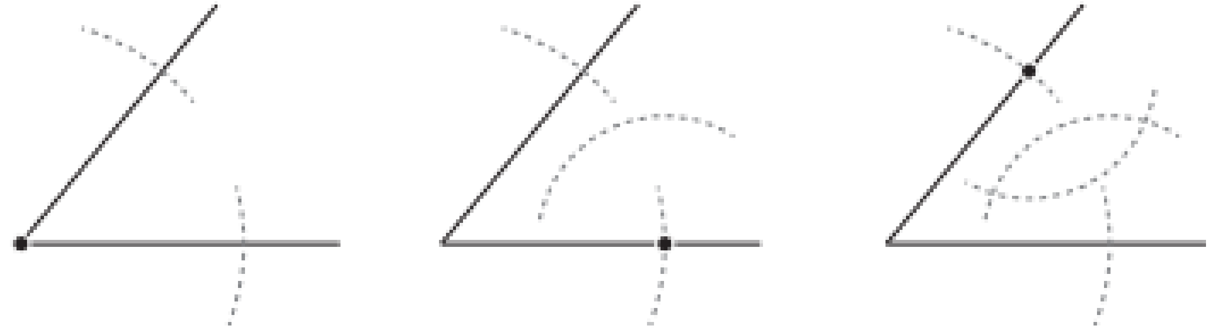
Exam Question

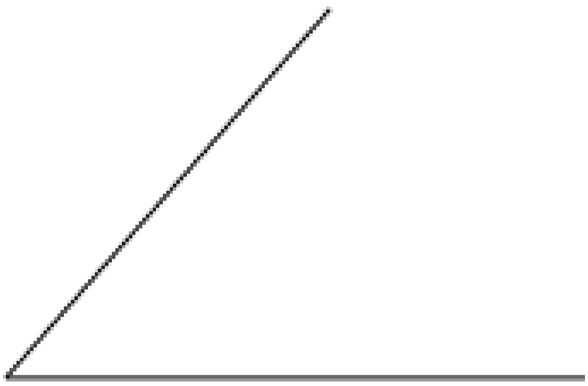
Use ruler and a pair of compasses to construct the shortest possible line from the point W (marked with a cross) to the line XY.

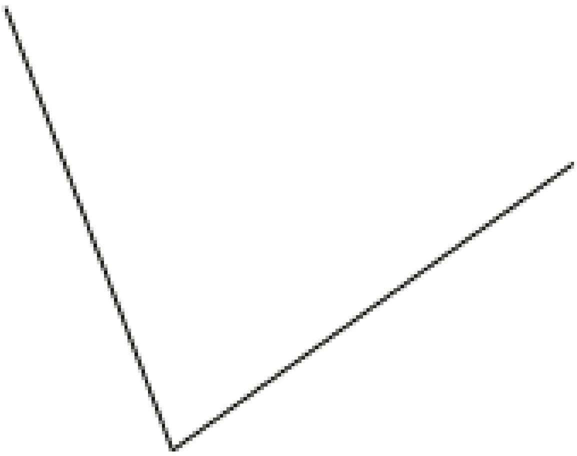
You must show your construction lines.

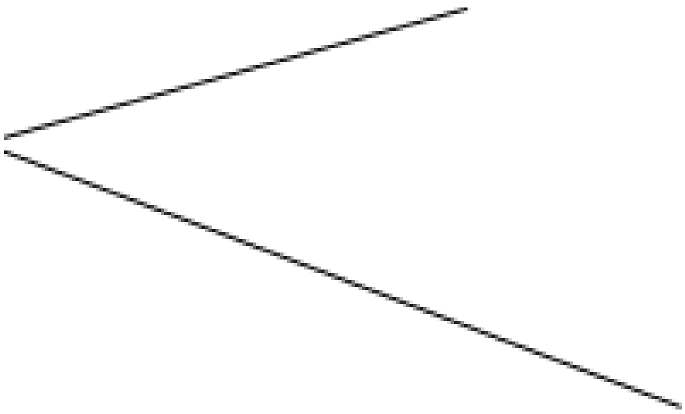
Bisecting Angles

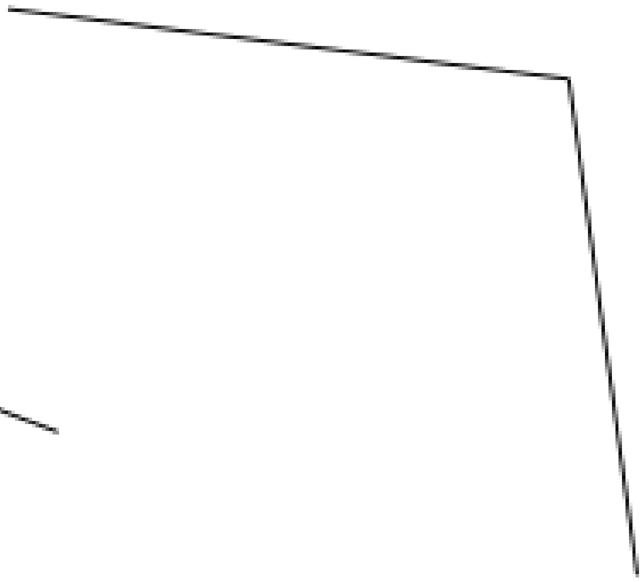
Example:



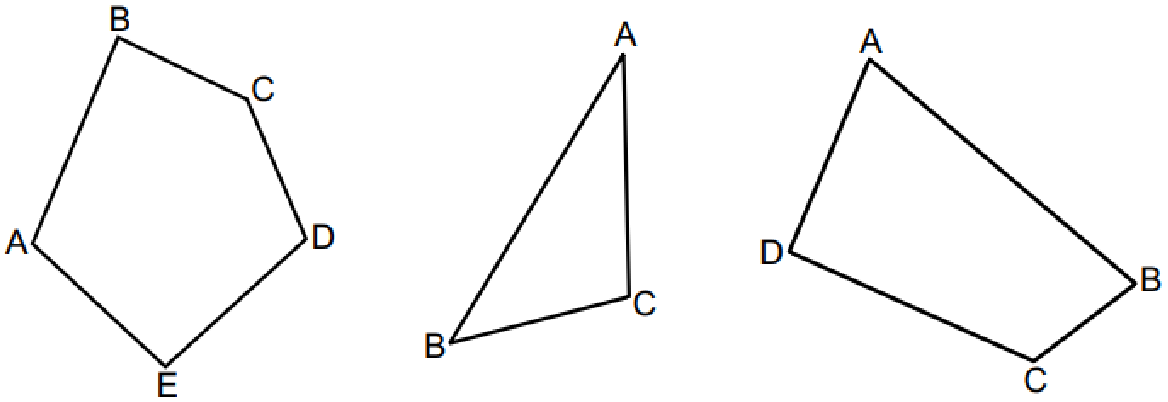








' Construct the angle bisector of $\angle$**ABC** for each of the following shapes..



Q10 Draw a near vertical line of length 6cm. Using a compass and ruler only, construct its perpendicular bisector.

Q11 Draw a line 8cm in length. Using a compass and ruler only, construct its perpendicular bisector.

Q12 Using a protractor, draw an angle of 64^{o}. Using a compass and ruler only, construct its angle bisector. Check your answer by measuring the two angles formed.

Q13 Using a protractor, draw an angle of 120^{o}. Using a compass and ruler only, construct its angle bisector. Check your answer by measuring the two angles formed.

Q14 Draw a triangle and construct the perpendicular bisector of each side. Draw the smallest possible circle that **does not enter** the triangle.

Q15 Draw another triangle and construct the angle bisector of each vertex. Draw the largest possible circle that **does not exit** the triangle.

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Week 2:

- **LI:** To determine when two shapes are congruent
  To understand and use the criteria for congruent triangles
  To give detailed reasons to justify congruence in increasingly complex situations

Demonstration Videos:

Congruency - https://classroom.thenational.academy/lessons/congruence-75gk0d?activity=video&step=1
Congruent Triangles - https://www.mathsgenie.co.uk/congruence.html

Tasks:

1) Identify 2 pairs of congruent shapes from the options below.

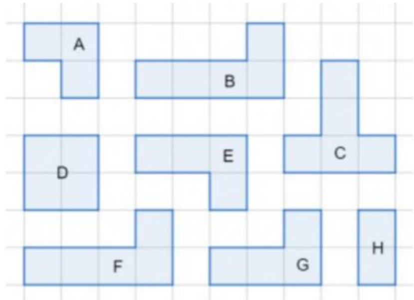


Image from Maths Made Easy

3) Draw 2 more shapes that will be congruent to F.

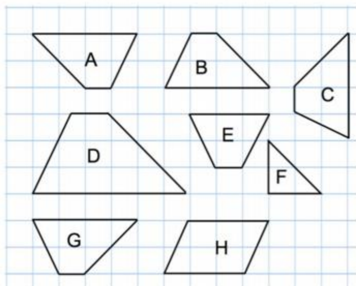


Image from Corbett Maths

2) The grid shows eight shapes, A, B, C, D, E, F, G and H

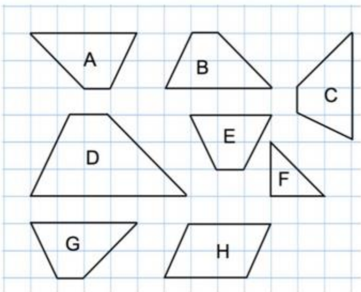
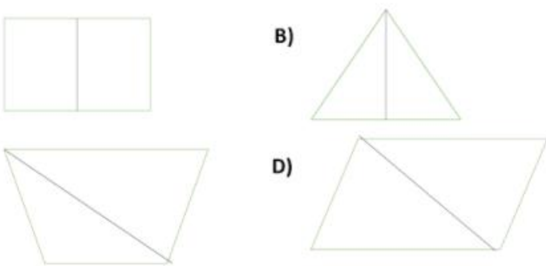


Image from Corbett Maths

Write down the letters of the shapes that are congruent to shape A.

Which of the following shapes is **not** being split into 2 congruent halves?

A) B) C) D)



Which two shapes are congruent?

O P Q R

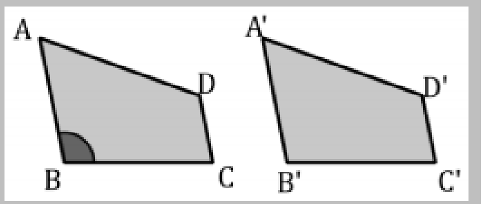
A	B	C	D
O and Q	P and R	P and Q	O and R

Properties of congruence

Quadrilateral $ABCD$ and quadrilateral $A'B'C'D'$ are congruent.

This can be written as $ABCD \equiv A'B'C'D'$, where the symbol '≡' means 'congruent'.

The angle marked in the diagram below can be written as $A\hat{B}C$ or $\angle ABC$.



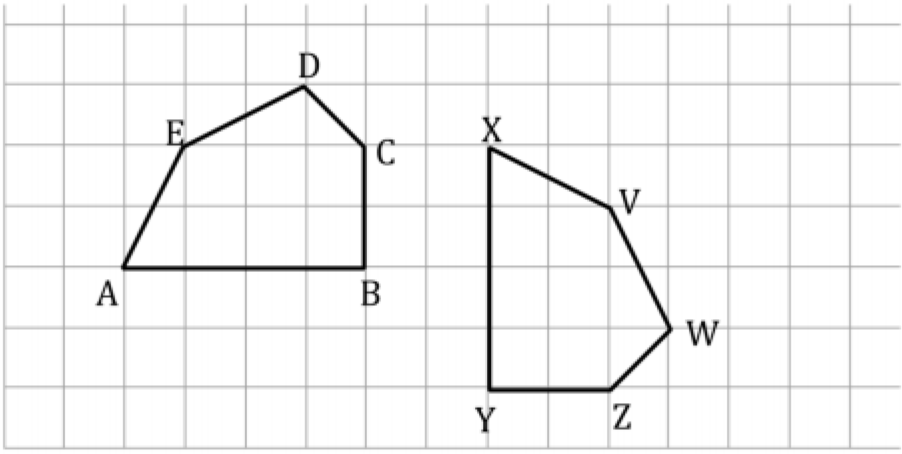
Complete the statements below:

A and A' are corresponding **v**....................

AB and A'B' are corresponding **s**................

$\angle ABC$ and $\angle A'B'C'$ are corresponding **a**................

The two pentagons below are congruent.



a) Name two pairs of corresponding vertices

....

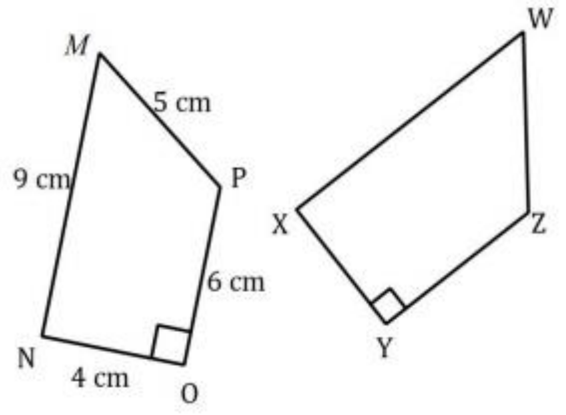
b) Name two pairs of corresponding sides

....

c) Name two pairs of corresponding angles

....

Given that $MNOP \equiv WXYZ$, complete the following:



a) $ZY = PO =$ ....cm

b) WZ = ... = ...cm

c) XY = ... = ...cm

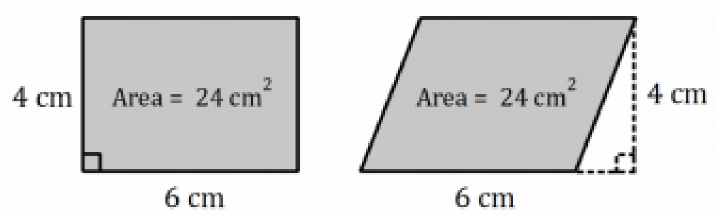
d) WX = ... = ... cm

e) $X\hat{Y}Z$ = ... = ... °

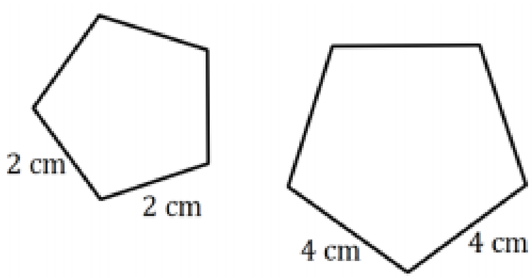
True or False

Use the diagrams to help you decide if the following statements are true or false:

a) The two quadrilaterals below are congruent. **True/False**



b) The two regular pentagons below are congruent. **True/False**



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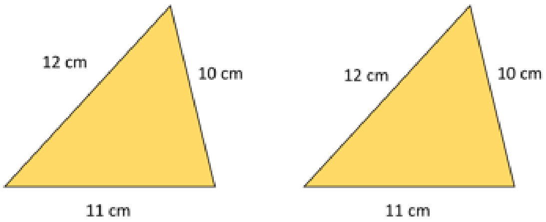
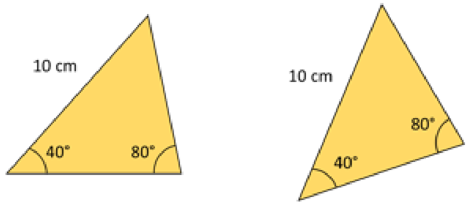
Conditions to prove Congruency.

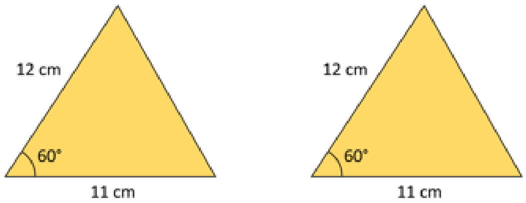


SSS: Side, Side, Side



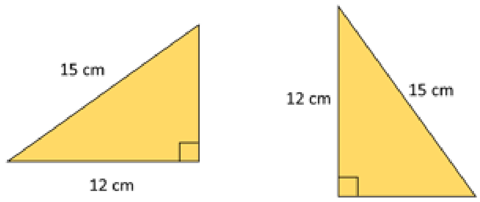
2 angles and **any** corresponding side.

ASA: Angle, Side, Angle



An angle **between** two sides.

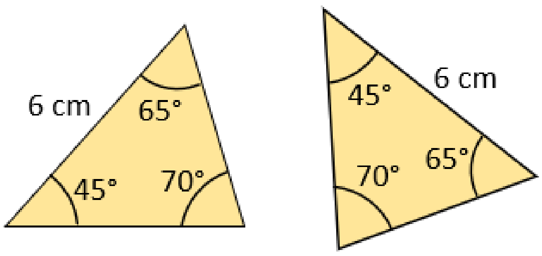
SAS: Side, Angle, Side

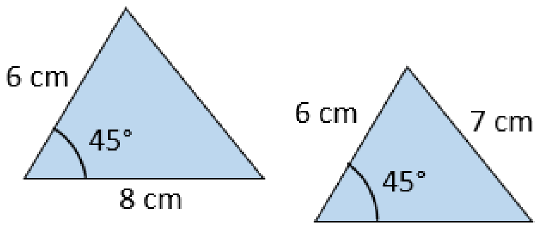


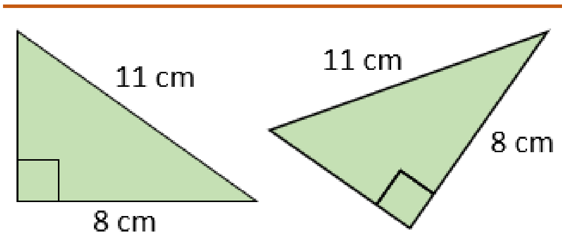
RHS: Right angle, Hypotenuse, Side

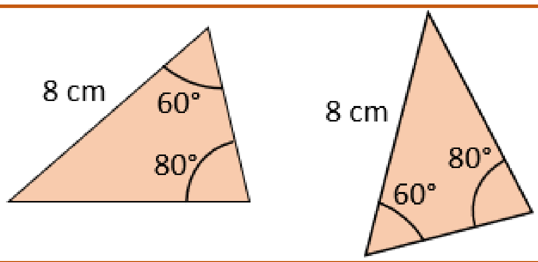
Are these pairs of triangles congruent?
How can you prove it?

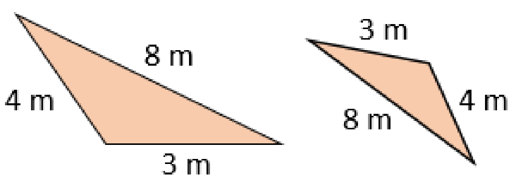
Not drawn accurately

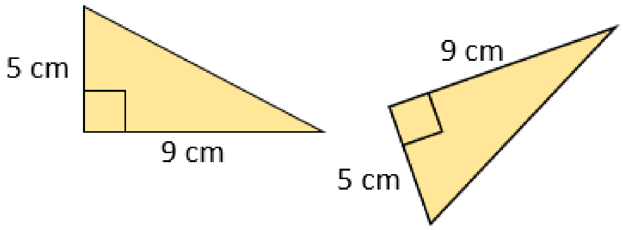












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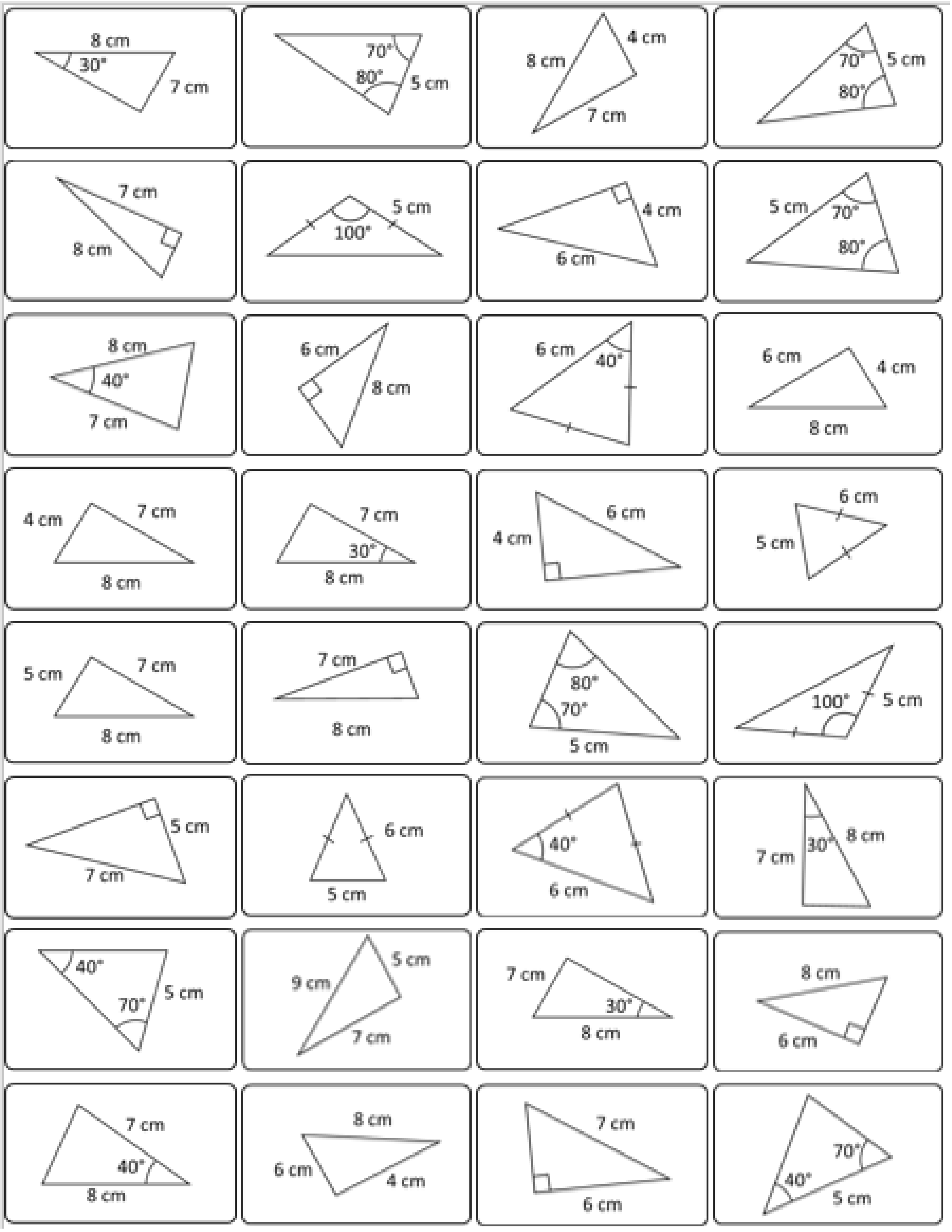
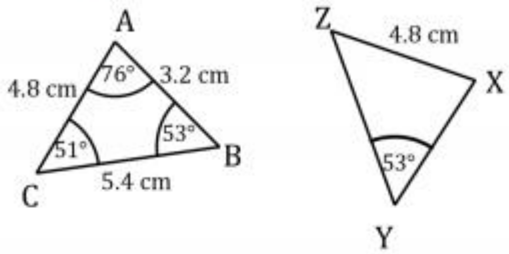
Find pairs of congruent triangles and state what condition can be used to prove their congruency.



1. These two triangles are congruent:



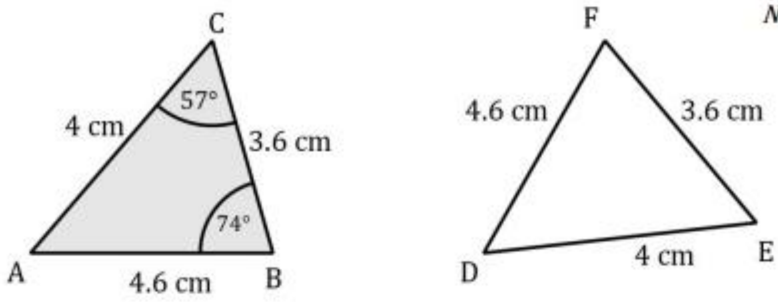
Not drawn to scale.

a) What is the size of $\angle ZXY$? ....

b) What is the length of XY? ....

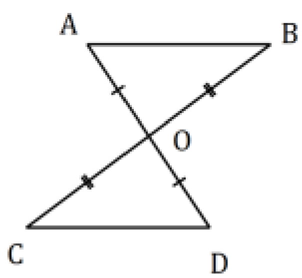
2. Which of the triangles below are congruent to the ΔABC, and why?

Not drawn to scale.

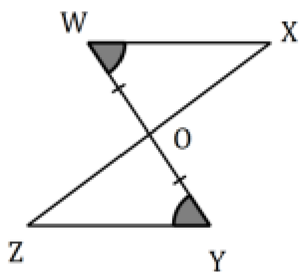


In each diagram below, identify a pair of congruent triangles and give reasons for your answers.

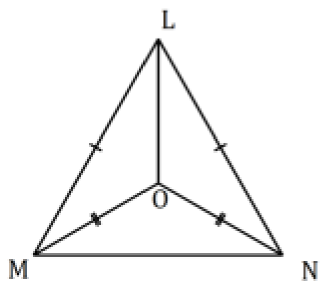
a)



b)



c)



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Week 3:

- **LI:** To prove and use Pythagoras' theorem to find missing sides in right-angled triangles

Demonstration Videos:

Finding hypotenuse - https://www.youtube.com/watch?v=vPLuCCwcZUA
Finding shorter side - https://www.youtube.com/watch?v=vPLuCCwcZUA
Proving theorem - https://www.youtube.com/watch?v=uaj0XcLtN5c

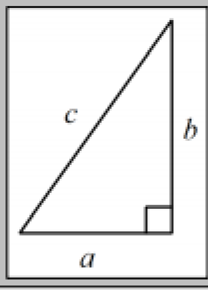
Tasks:

Concept corner

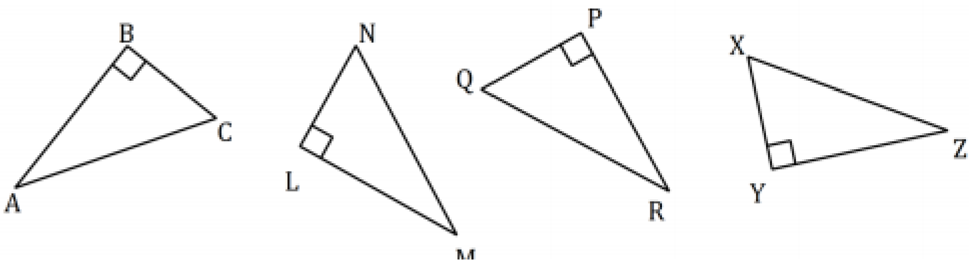
If we use the letters a, b and c for the sides of a right-angled triangle, then Pythagoras' Theorem states that

$$a^2 + b^2 = c^2$$

where c is the length of the hypotenuse.

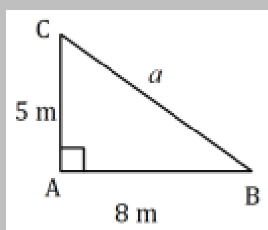


1. Mark the hypotenuse on each of the following right angled triangles:



Example

Calculate the length of the hypotenuse of a triangle in which the other two sides are 8 m and 5 m.



Solution

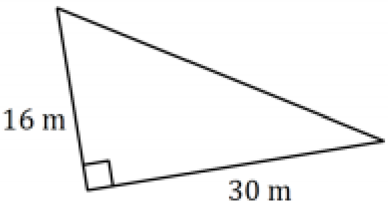
$a^2 = 8^2 + 5^2$

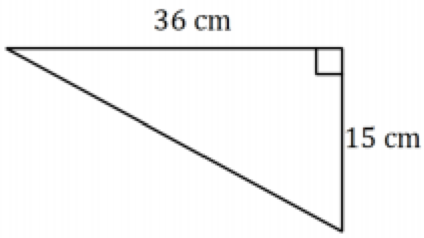
$a^2 = 64 + 25$

$a^2 = 89$

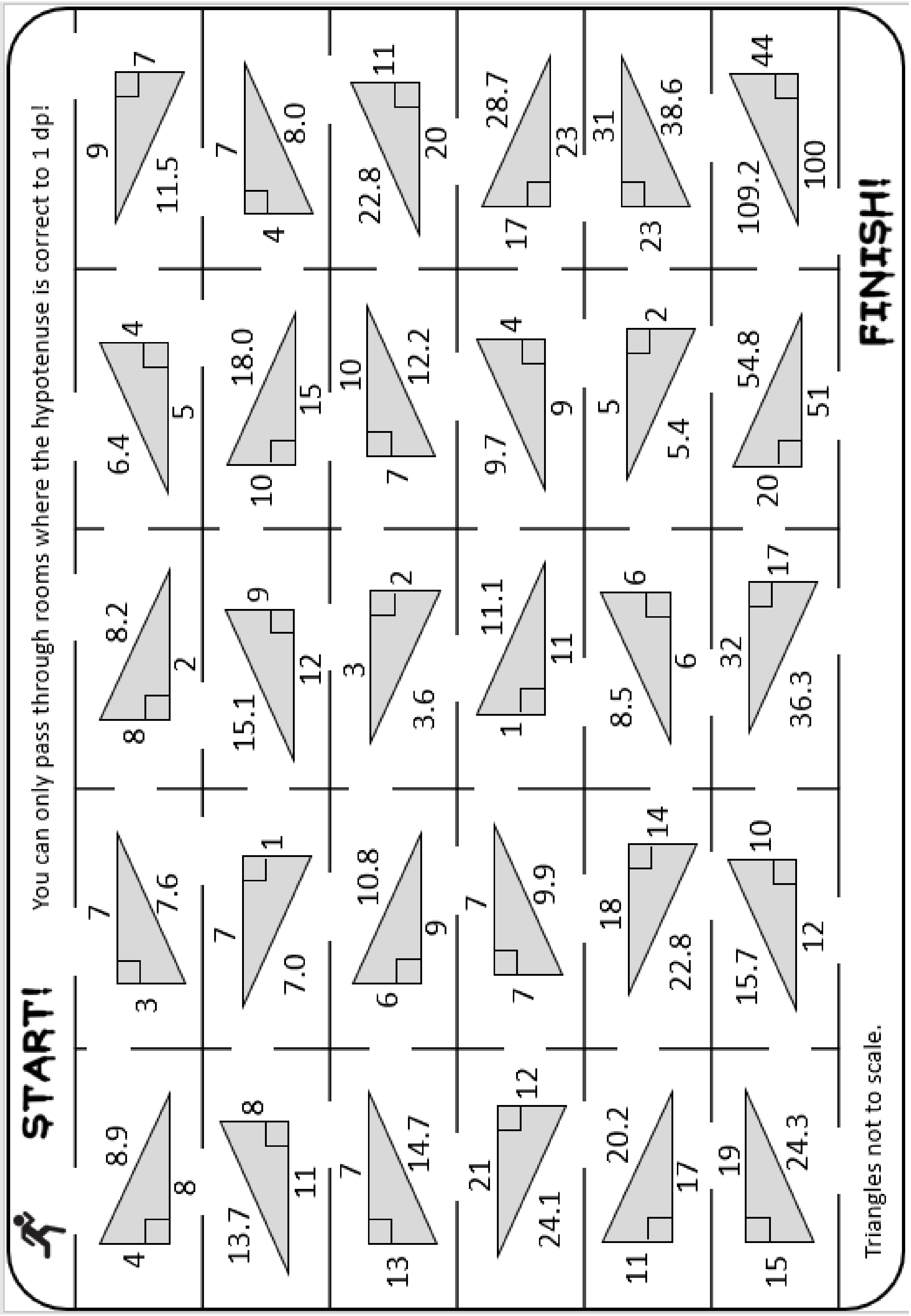
$a = \sqrt{89}$ metres

1. Calculate the length of the hypotenuse of each of these triangles:





$^2 = c^2$


START!
You can only pass through rooms where the hypotenuse is correct to 1 dp!
FINISH!
Triangles not to scale.

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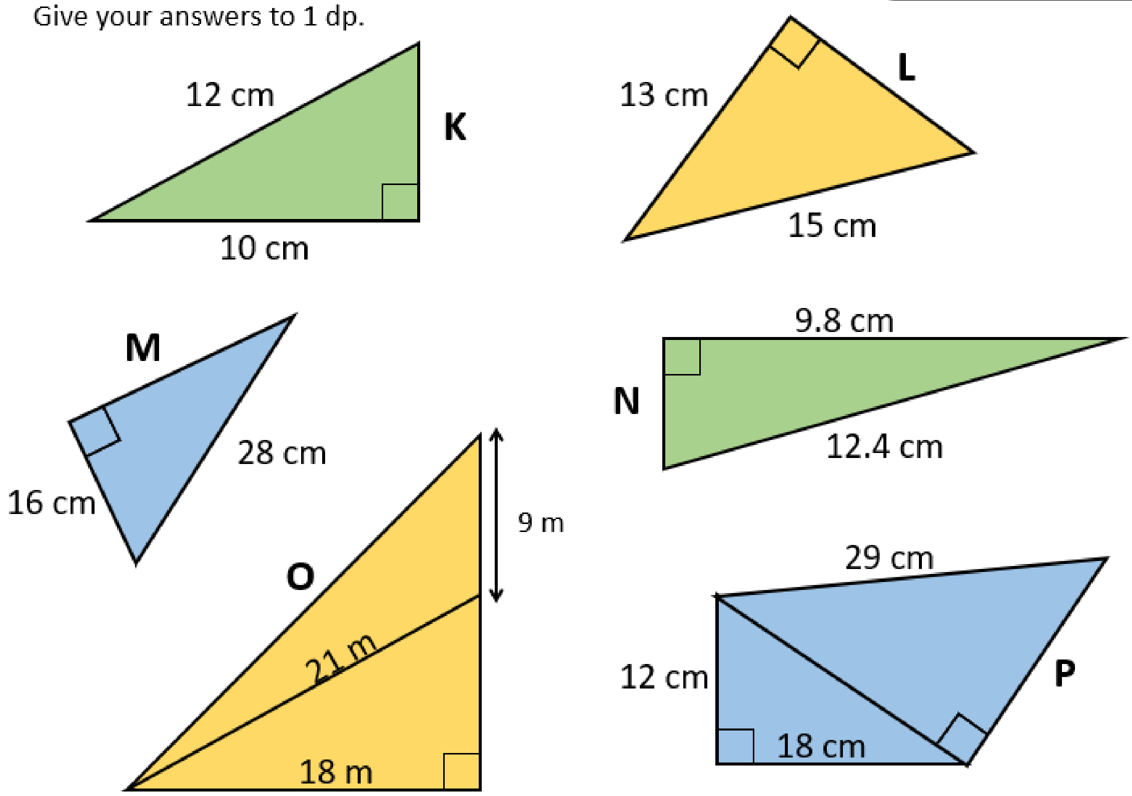
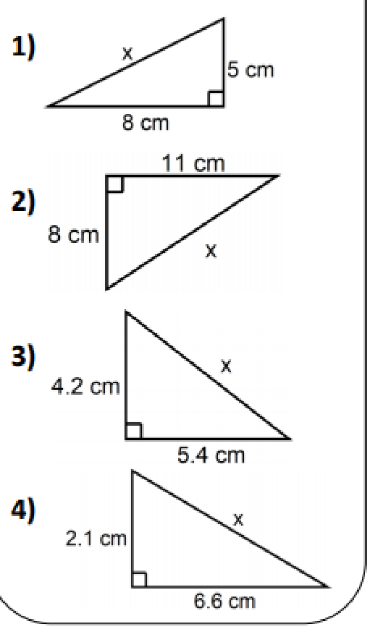
$a^2 + b^2 = c^2$

Find the length of each side (**K** to **P**)
Give your answers to 1 dp.



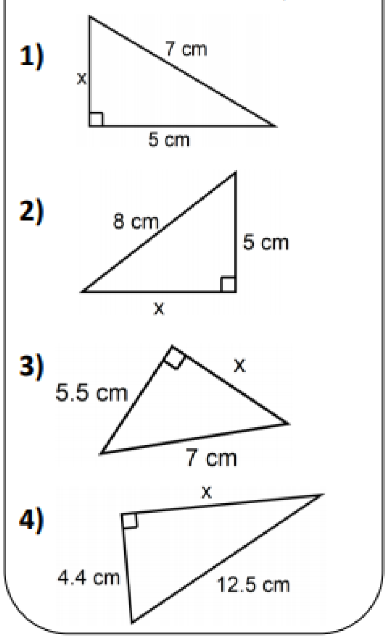
☆

Calculate x correct to 1 decimal place



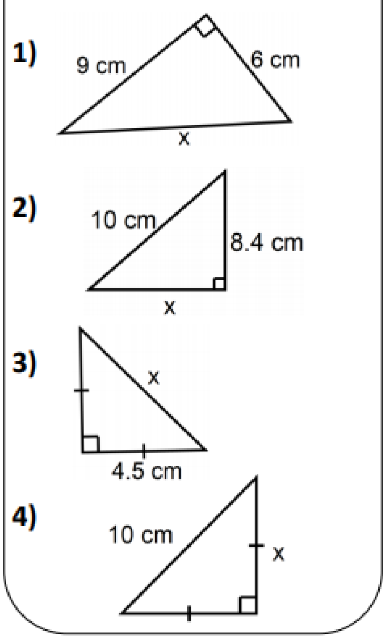
☆☆

Calculate x correct to 1 decimal place



☆☆☆

Calculate x correct to 1 decimal place

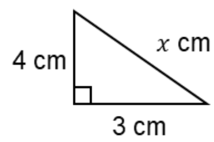


Pythagoras' Theorem

Start where you feel is appropriate for you and continue to work through the questions.

1. Calculate the length of the longest side in these questions. Some of the working out has been started for you. Give your answers correct to 1 decimal place.

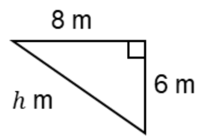
a)



$3^2 + 4^2 = 25$

$\sqrt{25} =$

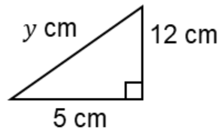
b)



$8^2 + 6^2 =$

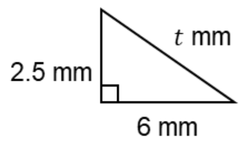
$\sqrt{\quad} =$

c)



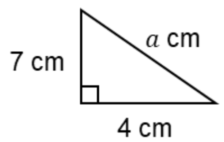
$\_\_\_^2 + \_\_\_^2 =$

d)

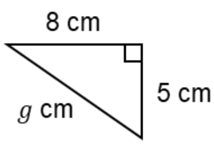


2. Calculate the length of the hypotenuse in these questions. Give your answers correct to 1 decimal place.

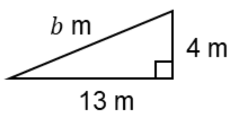
a)



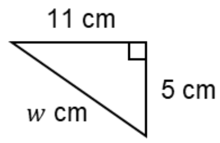
b)



c)

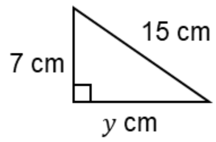


d)

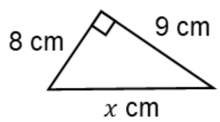


3. Look carefully at whether you need to calculate the hypotenuse or one of the other sides. Give your answers correct to 1 decimal place.

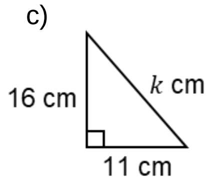
a)



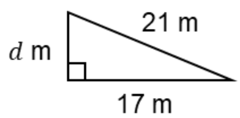
b)



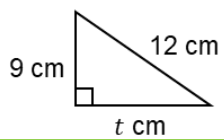
c)



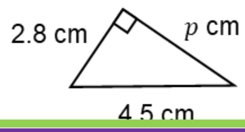
d)



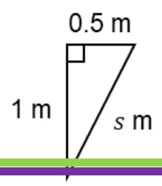
e)



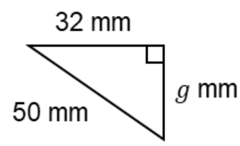
f)



g)



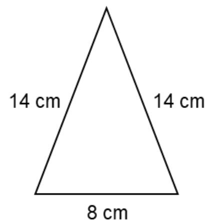
h)



4. A man walks 10km north then 24km east. How far is he from his starting position? (Draw a diagram to help you).

5. A rectangular door measures 2.5m by 1m. How long is the diagonal of the door? Give your answer to 1 decimal place.

6. To the right is an isosceles triangle. Use Pythagoras' Theorem to calculate the height of the triangle. Give your answer to 1 decimal place. (Hint: you will need to cut the triangle in half to get a right-angled triangle first).



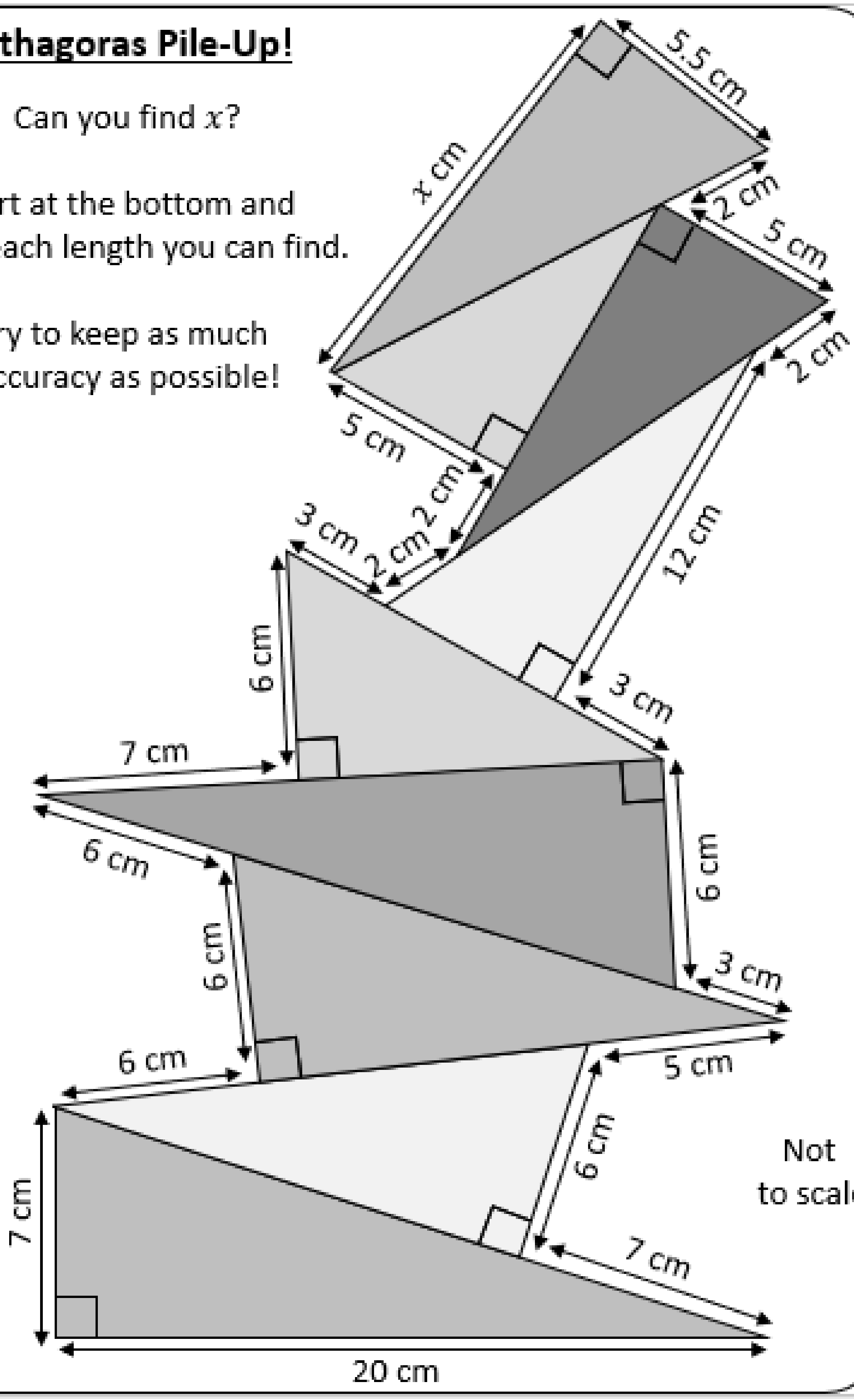
7. A cylindrical container has diameter 8cm and height 15cm. My pencil measures 18cm. Can the pencil fit completely inside the container?

Pythagoras Pile-Up!

Can you find x?

Start at the bottom and label each length you can find.

Try to keep as much accuracy as possible!



Not to scale

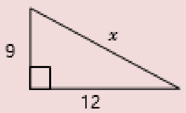
Stewards Academy

Pythagoras' Theorem

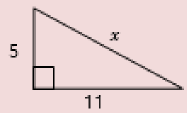
Literacy	Research	Memory
Hypotenuse: the longest side of a right-angled triangle, opposite the right angle.	What is a Pythagorean Triple? Find three examples.	Learn the formula: $a^2 + b^2 = c^2$ where c is the hypotenuse

Skills

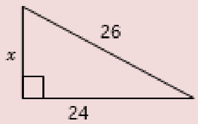
1. Find x.



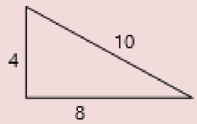
2. Find x to 1 dp.



3. Find x.

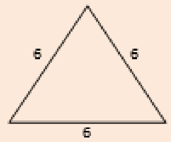


4. Is this triangle right-angled?



Stretch

1. Find the vertical height of this equilateral triangle.

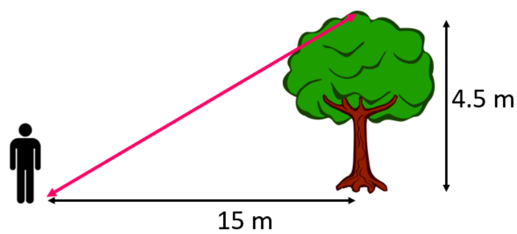


2. A ladder of length 4m leans against the wall of a house. The foot of the ladder is 2m from the wall. Will the ladder reach a window 3.5m high?

These triangles aren't drawn to scale!

How far away is the top of the tree?

$a^2 + b^2 = c^2$

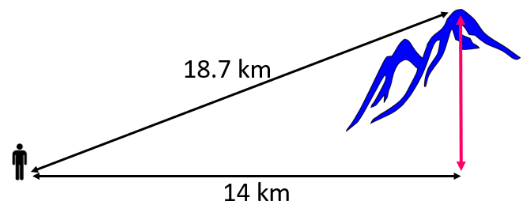


(not to scale)

How tall is the mountain?

$a^2 + b^2 = c^2$

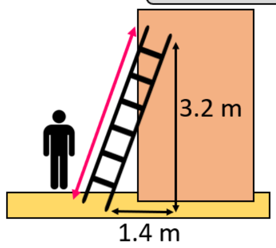
$b^2 = c^2 - a^2$



(not to scale)

How long is the ladder?

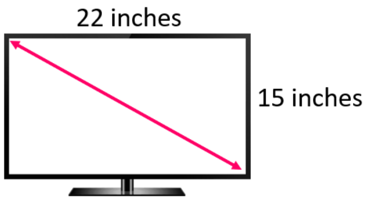
$a^2 + b^2 = c^2$



(not to scale)

What size is the TV?

$a^2 + b^2 = c^2$



(not to scale)

Stewards Academy

Week 4:

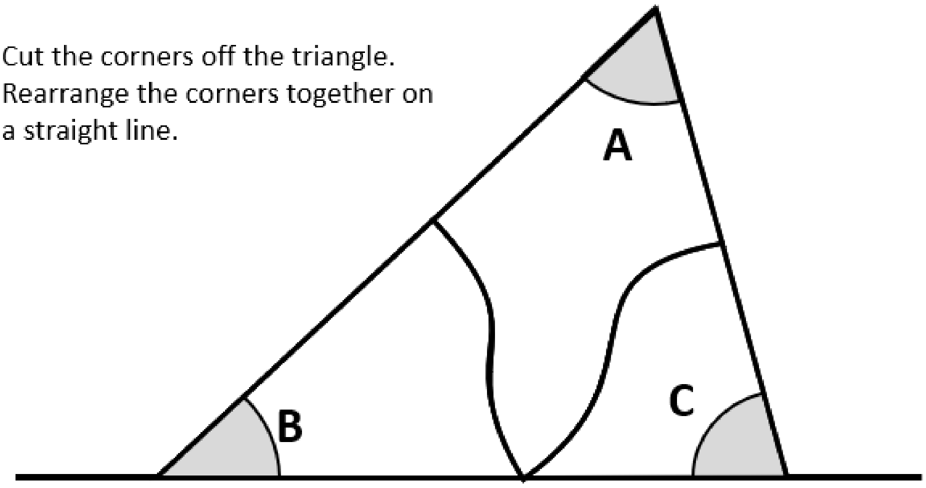
- **LI:** To prove that the sum of the angles in a triangle is 180°
  To find the formula for sum of the angles of any polygon

Demonstration Videos:
Proof of angles in a triangle - https://www.youtube.com/watch?v=RDNEMvEwrYI
Interior angles of polygon - https://classroom.thenational.academy/lessons/finding-the-sum-of-interior-angles-in-a-polygon-ctk30e?activity=video&step=1
Number of sides when given angles - https://classroom.thenational.academy/lessons/find-the-number-of-sides-when-given-the-sum-of-interior-angles-68w3jc?activity=video&step=1

Tasks:

Proving angles in a triangle sum 180°

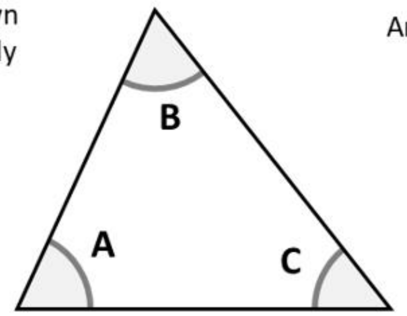
1) Cut the corners off the triangle.
2) Rearrange the corners together on a straight line.



DIGIT Puzzle

How many ways can you complete these three angles?

Not drawn accurately



Angle **A** = ☐☐ °

Angle **B** = ☐☐ °

Angle **C** = ☐☐ °

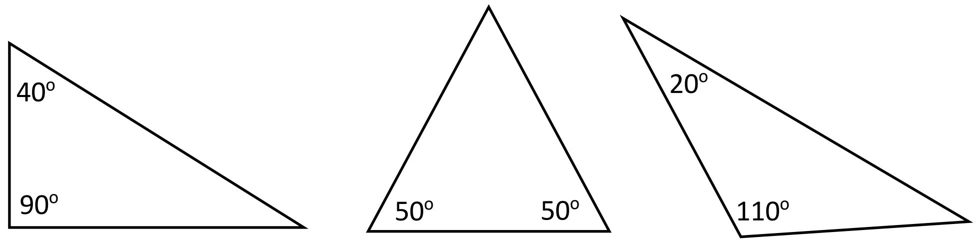
★ Use any digits

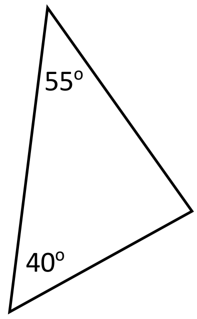
★★ Use digits only once

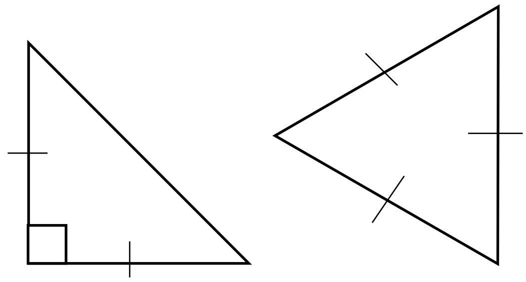
What are the largest & smallest angles you can make?

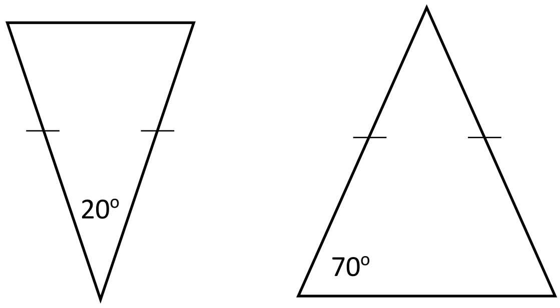
ANGLE RULE: Interior angles in a triangle total 180°

Exercise 1: Find the missing angle

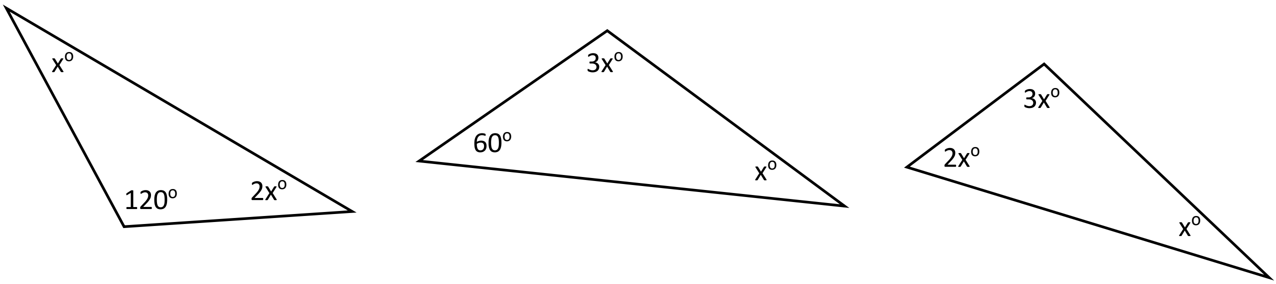








Exercise 2: Find the value of x.



Exercise 3: Which of these sets of angles could make a triangle?

a) 120°, 40°, 20° b) 50°, 60°, 70° c) 90°, 80°, 15° d) 170°, 4°, 6°

e) 62°, 77°, 41° f) 104°, 62°, 12° g) 39°, 88°, 52° h) 14°, 100°, 20°, 46°

Exercise 4: What additional angles would make these into an **ISOSCELES** triangle?

1) 80°, 80°, ___ 2) 45°, 45°, ___ 3) 65°, 65°, ___ 4) 80°, 50°, ___

5) 42°, ___, ___ 6) 88°, ___, ___ 7) 100°, ___, ___ 8) 12°, ___, ___

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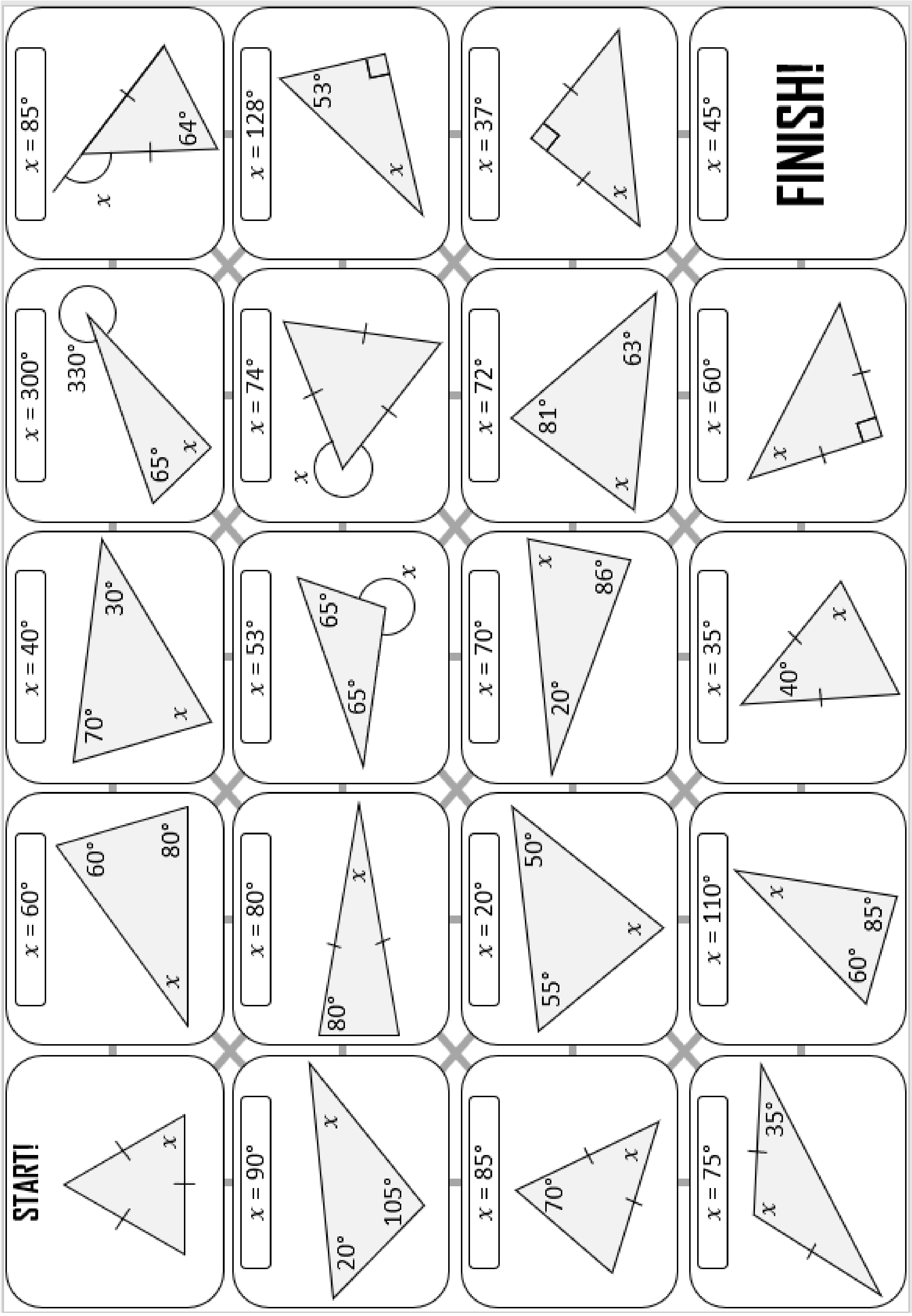
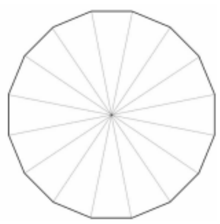


Finding the Sum of Interior Angles in a Polygon

1. Complete the table.

Shape	Number of sides	Number of triangles	Sum of Interior angles
Quadrilateral	4	2	360°
Pentagon			
Nonagon			
		8	
	6		
		6	
			1800°
	20		

2. Nick is working out the sum of interior angles of a 16 sided shape.



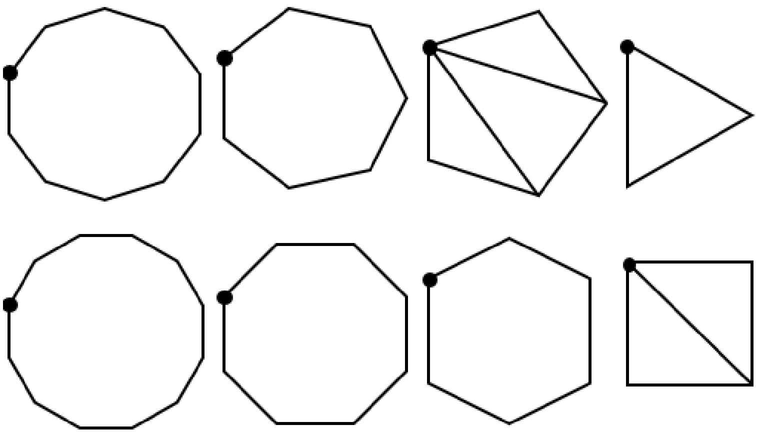
"I've split the shape into 16 triangles"

$16 \times 180 = 2880$

The interior angles add up to 2880°.

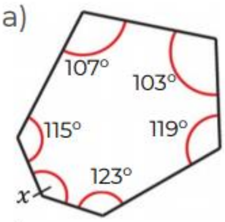
Nick is wrong.

What mistake has he made?

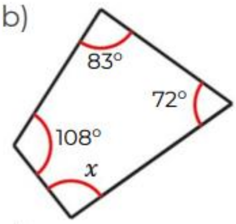


3. Find the angle labelled x.

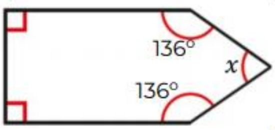
a)



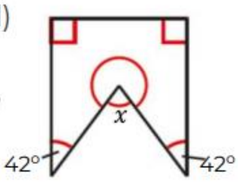
b)



c)



d)

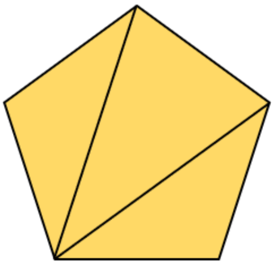


4. A polygon has n sides

a) Write an expression, in terms of n, to represent the number of triangles inside the polygon.

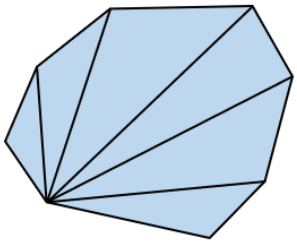
b) Write an expression, in terms of n, to represent the sum of interior angles of the polygon.

5. Calculate the size of each interior angle in a regular hexagon.



Regular Pentagon

Total Interior Angles
= 3 × 180° = 540°



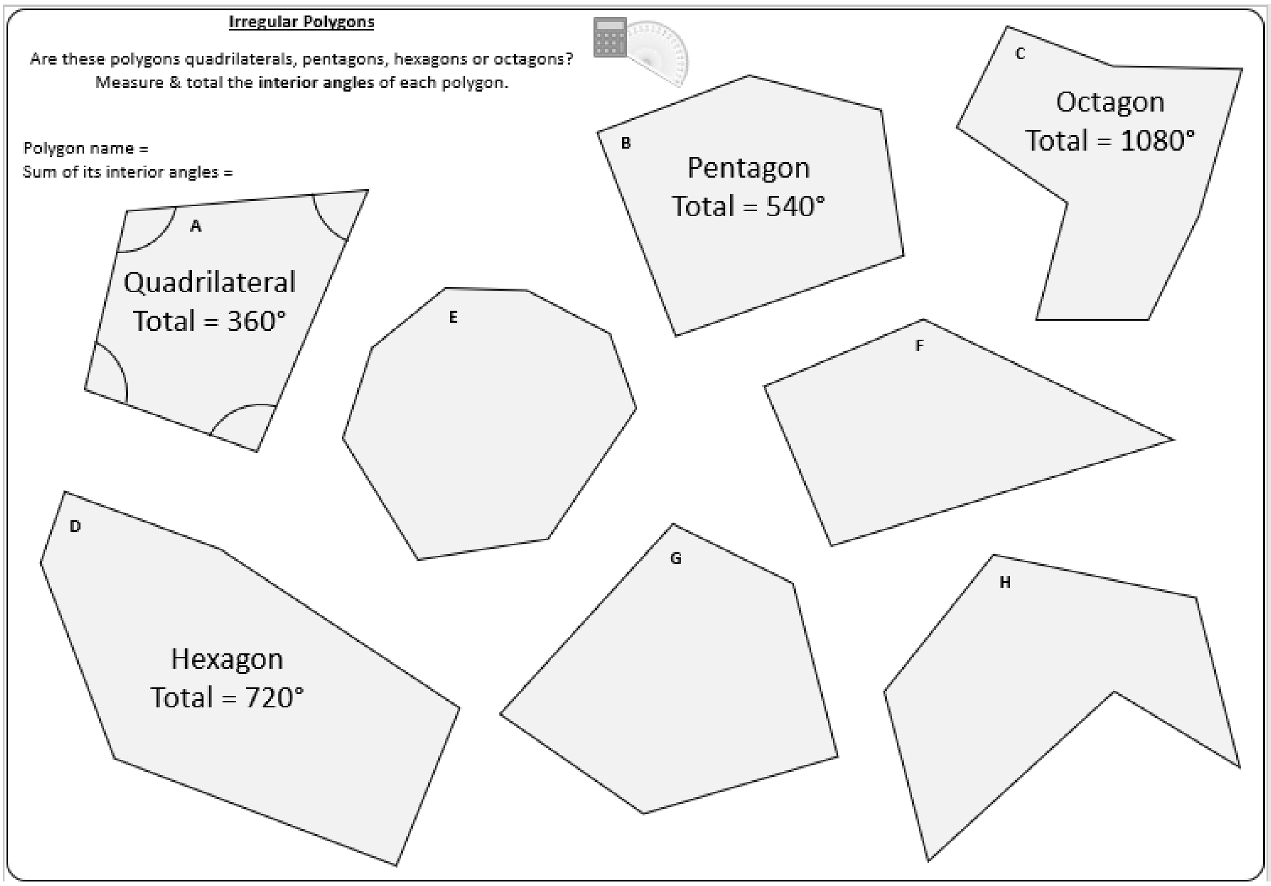
Irregular Octagon

Total Interior Angles
= 6 × 180° = 1080°

The formula for <u>any</u> regular or irregular polygon is:

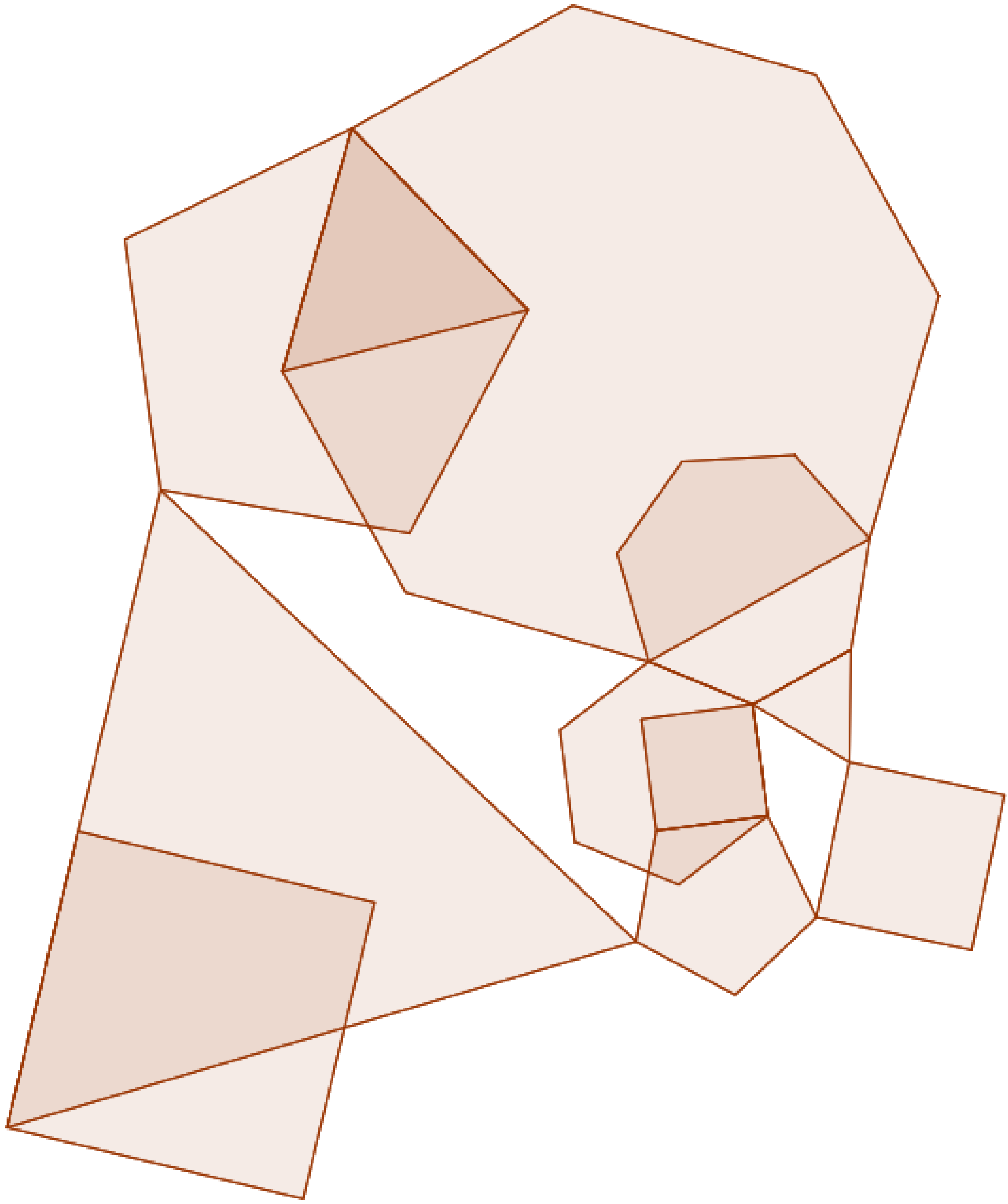
Sum of Interior Angles = $(n-2) \times 180$

1. Calculate the sum of the interior angles of a 12-sided polygon.
2. The sum of the interior angles of a polygon is 3060°. How many sides does it have?
3. Is it possible to draw a polygon whose total interior angles add to 4230°? Explain your answer.
4. Find the size of each interior angle of a regular polygon with 36 sides.
5. Find the number of sides of a regular polygon if each interior angle of the polygon is 140°.



Angles in Polygons Challenge

This image has been created by layering lots of regular polygons on top of each other. Find ALL the angles contained within the diagram (be careful, some lines look straight where one polygon ends and another begins). There are some irregular polygons created by the layering so you may need to look out for these.



If you manage all the angles within the polygons, what about those that are in the white polygons?

Number of sides = n	Sum of Interior Angles = A

To find angles in a polygon ➡ $A = (n - 2) \times 180$

$$\frac{A}{180} = (n - 2)$$

To find number of sides ➡ $\left(\frac{A}{180}\right) + 2 = n$

Finding the Number of Sides of a Polygon

1. Calculate the number of sides of the polygons given the sum of interior angles.

a) 1080° **b) 1800°**

c) 720° **d) 3960°**

e) 15840° **f) 6840°**

2. Kris says "I know that there are 540° in a pentagon, so a 50 sided shape must have 5400°".
Is Kris right? Explain your answer.

3. Calculate the size of each interior angle of a regular polygon, given the sum of interior angles.

a) 900° **b) 1260°**

c) 2340° **d) 3240°**

4. Calculate the exterior angle of a regular polygon, given the sum of interior angles.

a) 540° **b) 1440°**

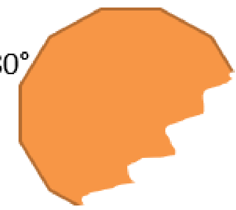
c) 2520° **d) 6120°**

1. The sum of interior angles of a polygon is 720°. How many sides does the polygon have? *

2. The sum of interior angles of a polygon is 2880°. How many sides does the polygon have? *

3. The sum of interior angles of a regular polygon is 3960°. What is the size of each interior angle of the regular polygon? *

The sum of the interior angles of a polygon is 1980°



How many sides does this polygon have?

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Week 5:

- **LI:** To understand and use the sum of the exterior angles of a polygon
  To understand the difference between regular and irregular polygons
  To solve problems involving the angles/number of sides in a regular polygon

Demonstration Videos and Examples:

Finding exterior angles - https://classroom.thenational.academy/lessons/find-missing-exterior-angles-of-polygons-64t38r?step=1&activity=video

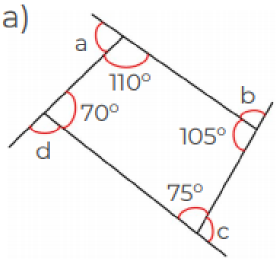
Interior and exterior - https://www.mathsgenie.co.uk/angles-polygons.html

Tasks:

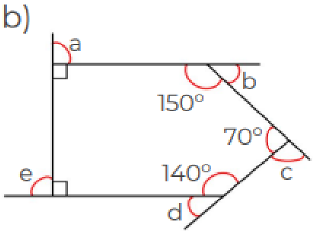
Find Missing Exterior Angles of Polygons

1. Work out the size of each exterior angle of the polygons.

a)



b)

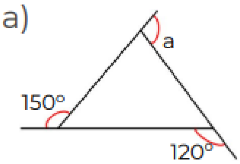


What is the sum of the exterior angles in part a and b

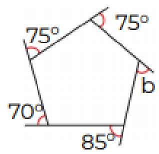
2. What is the sum of the exterior angles of any polygon?

3. Find the missing angles.

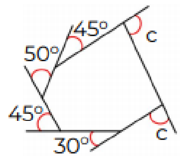
a)



b)



c)



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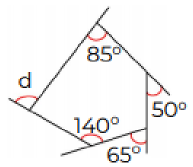


Find Missing Exterior Angles of Polygons

4. Work out the exterior angles of regular polygons with the given number of sides.

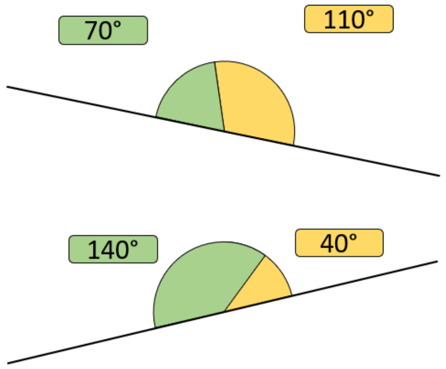
Number of sides	Size of the exterior angle
3	
4	
5	
6	
10	
36	

5. A regular polygon has n sides. Write an expression to represent the size of each exterior angle.

6. A regular polygon has an exterior angle of 45°.
How many sides does the regular polygon have?

Stewards Academy

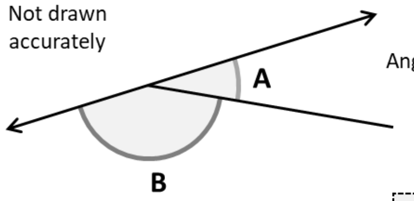
ANGLE RULE: Angles on a straight line total 180°



DIGIT Puzzle

How many ways can you complete these two angles?

Not drawn accurately



Angle **A** = ☐☐☐ °

Angle **B** = ☐☐☐ °

☆ Use any digits

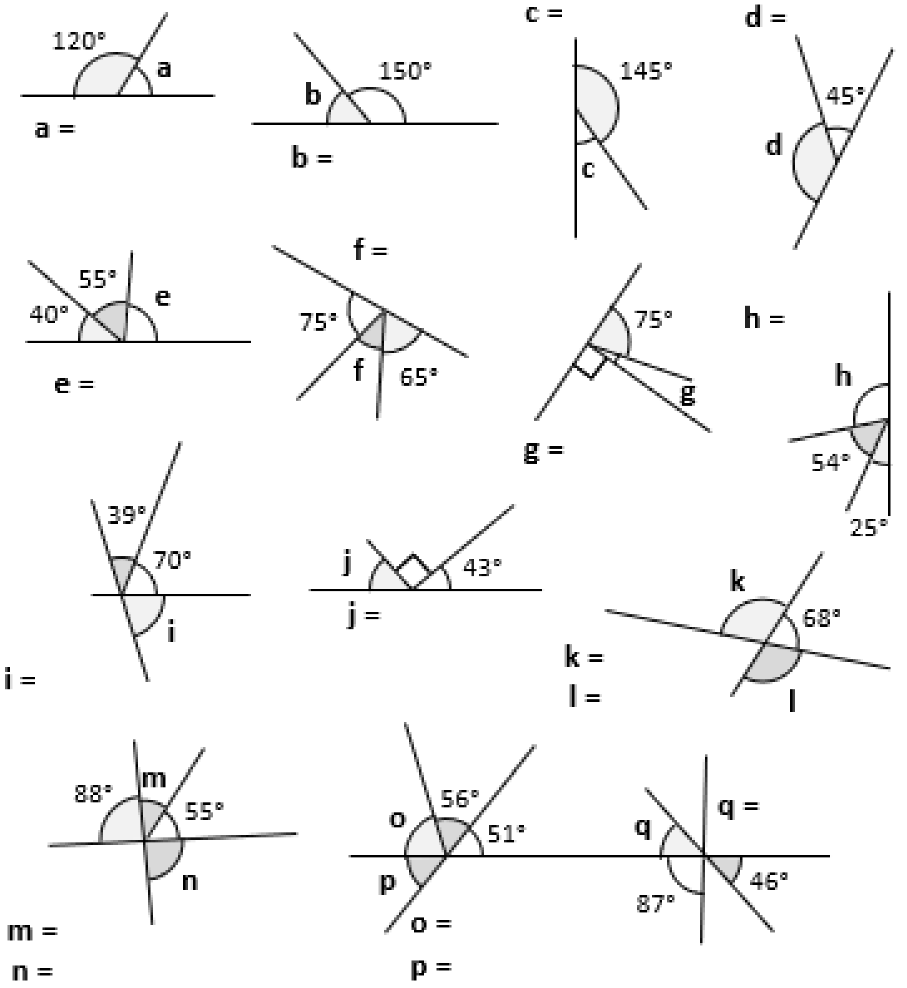
☆☆ Use digits only once

What are the largest & smallest angles you can make?

Angles on Straight Lines

"Angles on a straight line total ______________ ."

Calculate the missing angles. All the answers are at the bottom.



112°	47°	101°	40°	41°	112°	15°	155°	49°	60°	73°
62°	30°	35°	71°	37°	88°	51°	46°	85°	135°	77°

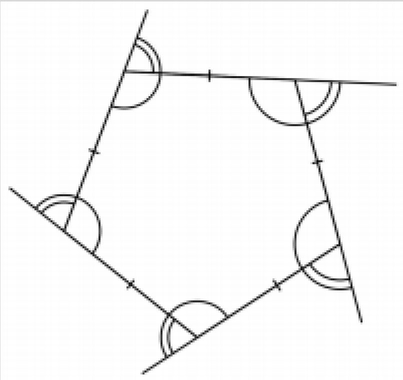
From the answers you have **not used**…

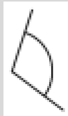
which **three angles** can you put together to form a straight line?

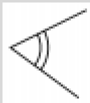
Stewards Academy

Concept corner

The following diagram shows a regular pentagon:

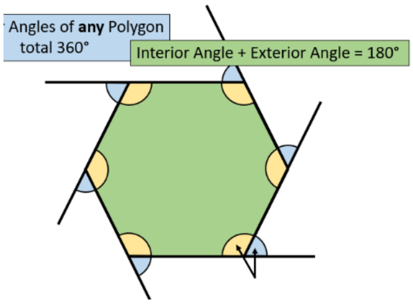


In this diagram, the angles marked  are the **interior** angles of the pentagon.

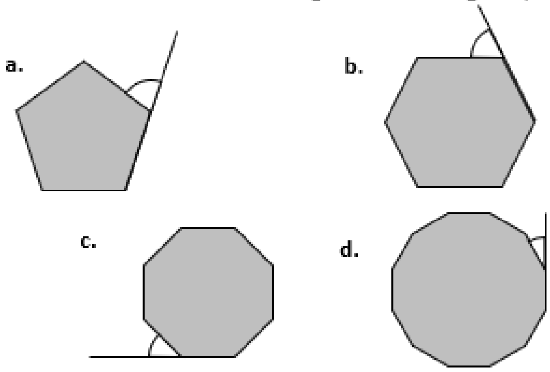
The angles marked  are the **exterior** angles of the pentagon.

In a regular polygon the sides are the same length and the interior angles are all the same size.

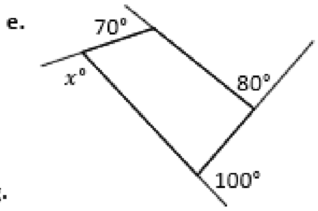
For any regular polygon: interior angle + exterior angle = 180°

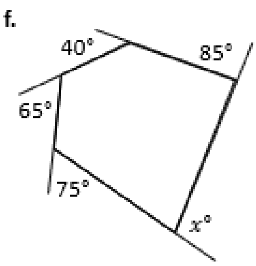


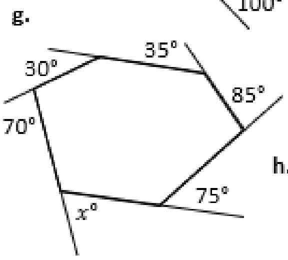
1) Find the size of one exterior angles of these regular polygons.



2) Find the value of x for each irregular shape.





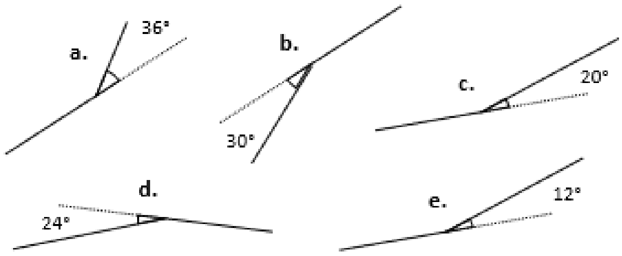


h. What size is one exterior angle of a regular icosagon?
(An icosagon has 20 sides)

3. Complete the table for regular polygons.
Remember! Interior angle + Exterior angle = 180°

Shape	Sides	Exterior Angle	Interior Angle
	3		60°
	4		
	5		
	6		
Heptagon	7		
	8		
Nonagon	9		
	10		

4. These are exterior angles of regular polygons.
How many sides does each polygon have?

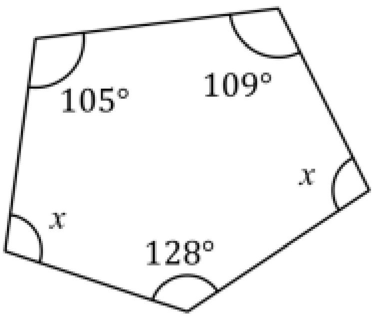


For each of the shapes:
What is the size of the interior angle?
What is the sum of interior angles?

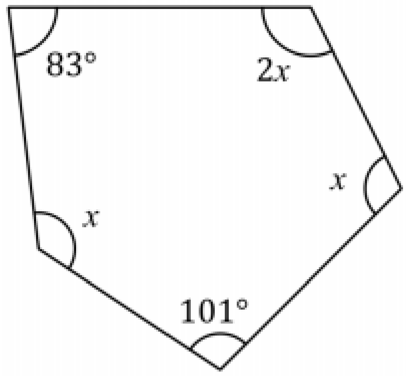
The £1 coin is a regular dodecagon, it has 12 sides. Work out the exact size of the interior angle of a regular dodecagon.

8. For each of the following polygons (not drawn to scale), work out the value of x:

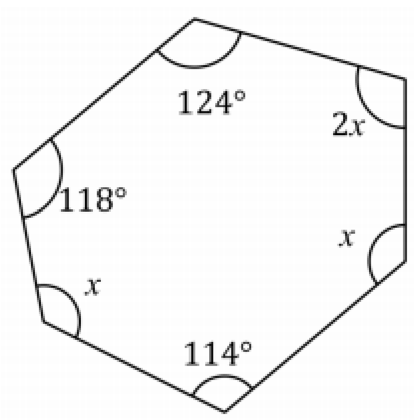
a)



b)



c)



9. The interior angles in a quadrilateral are x, $2x$, $3x$ and $3x$.
Work out the value of x.
What are the values of each of the angles in degrees?

Exam Questions

Q1.

The sum of the angles in any quadrilateral is 360°

For example, in a rectangle 4 × 90° = 360°

Zak writes,

5 × 90° = 450° so the sum of the angles in any pentagon must be 450°

Is he correct?

Tick a box.

☐ Yes ☐ No

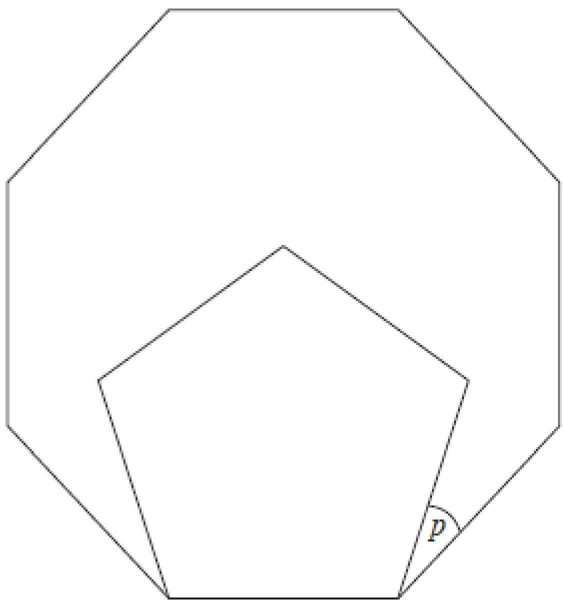
Show working to support your answer.

(Total 2 marks)

Q2.

A regular pentagon is drawn inside a regular octagon as shown.

Not drawn accurately



Calculate the size of angle p.
You **must** show your working.

(Total 3 marks)

Week 6:

- LI: To construct a 60° angle
  To construct a 45° angle
  To construct a SSS triangle

Demonstration Videos:
Constructing 60 degrees - https://www.youtube.com/watch?v=hMcTg4ZfOm8
Construct all angles - https://www.youtube.com/watch?v=5l8bltVe_IE&t=46s
Constructing SSS triangle - https://www.youtube.com/watch?v=o13HKzmYSUA

Tasks:

Construct an angle of 60°	Construct an angle of 30°	Construct an angle of 45°
1. Draw base line AB of any length.	1. Draw base line AB of any length.	1. Draw base line AB of any length.
2. Place compass at A, set to distance AB and draw arc.	2. Construct an angle of 60° at A.	2. Mark a point P anywhere on AB.
3. Place compass at B, with same distance set and draw an arc to intersect first one.	3. Bisect angle BAC.	3. Construct the perpendicular to P.
4. Draw straight line from A through point of intersection. Angle BAC = 60°.	4. Angle BAD = 30°	4. Bisect angle BPD.
		5. Angle BPE = 45°.

Construct a 60° angle, a 30° angle and a 45° angle below using only a compass and a straight edge

60°

30°

45°

1. Construct the following angles using a ruler and compass:

a. 30° b. 45° c. 135° d. 225°

e. 120° f. 150° g. 210° h. 245°

2. Use a ruler and compass to construct the triangle PQR with PQ = 8 cm, PR = 7.5 cm and $\angle QPR$ = 60°.

3. Use a ruler and compass to construct a square $ABCD$ of side 6 cm.

4a. Use a ruler and compass to construct a triangle PQR with PQ = 7 cm, $\angle QPR$ = 30° and $\angle PQR$ = 60°.

b. Calculate the size of $\angle PRQ$ and check your answer with a protractor.

c. Measure PR and QR to the nearest millimetre. Hence find the perimeter of triangle PQR in millimetres.

5a. Use a ruler and compass to construct a triangle ABC with AB = 8 cm, BC = 6 cm and $\angle ABC$ = 90°.

b. Measure the size of $\angle BAC$ and hence calculate the size of $\angle ACB$.

c. Measure AC to the nearest millimetre. Hence find the perimeter of triangle ABC in millimetres.

6a. Use a ruler and compass to construct a trapezium $PQRS$ with PQ = 8 cm, PS = 7 cm, QR = 7 cm, $\angle QPS$ = 60° and $\angle PQR$ = 60°.

b. Measure RS to the nearest millimetre. Hence find the perimeter of the trapezium $PQRS$.

7a. Use a ruler and compass to construct a triangle PQR with PQ = 6 cm, $\angle QPR$ = 30° and $\angle PQR$ = 120°.

b. Calculate the size of $\angle PRQ$ and check your answer with a protractor.

c. Measure PR and QR to the nearest millimetre. Hence find the perimeter of triangle PQR in millimetres.

8a. Use a ruler and compass to construct a trapezium $DEFG$ with DE = 6.5 cm, $\angle DEF$ = 90°, EF = 5.5 cm, $\angle EFG$ = 90° and $\angle EDG$ = 60°.

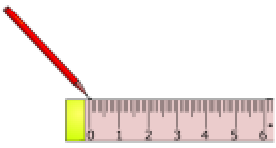
b. Calculate the size of $\angle DGF$ and check your answer with a protractor.

c. Calculate the sum of the interior angles of the trapezium.

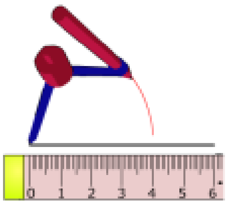
d. Measure DG and FG to the nearest millimetre. Hence find the perimeter of trapezium $DEFG$ in millimetres.

Constructing a triangle given three sides (SSS)

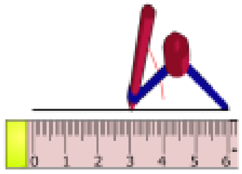
Constructing a Triangle from 3 Sides.
Draw a triangle with sides 6cm, 4cm and 3 cm.
Step 1 - Draw a 6cm line.



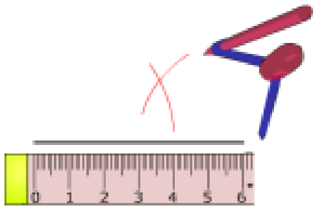
Constructing a Triangle from 3 Sides.
Draw a triangle with sides 6cm, 4cm and 3 cm.
Step 2 - Move the compasses to the end of the line and set them to 4cm.



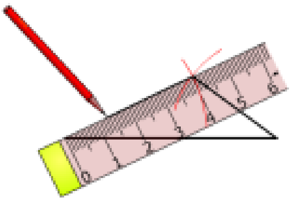
Constructing a Triangle from 3 Sides.
Draw a triangle with sides 6cm, 4cm and 3 cm.
Step 3 - Set the compasses to 3cm and move them to the other end.



Constructing a Triangle from 3 Sides.
Draw a triangle with sides 6cm, 4cm and 3 cm.
Step 4 - Make another arc.



Constructing a Triangle from 3 Sides.
Draw a triangle with sides 6cm, 4cm and 3 cm.
Step 5 - Join the ends of the line to the arc.



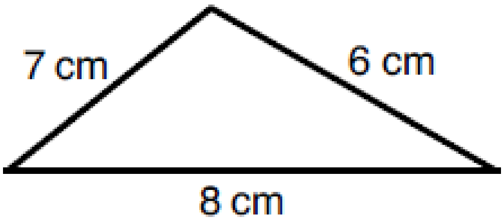
Using the steps above, construct a triangle with sides 5cm, 6cm, 8cm below.

Stewards Academy

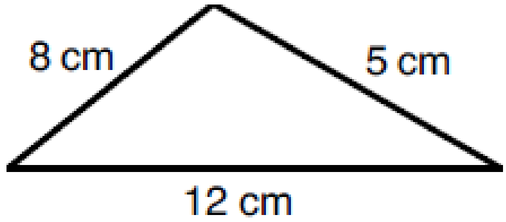
Side Side Side Triangles

Construct (draw) accurate triangles given the lengths of all three sides – **S**ide-**S**ide-**S**ide.

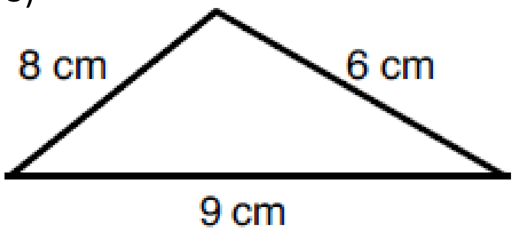
1)



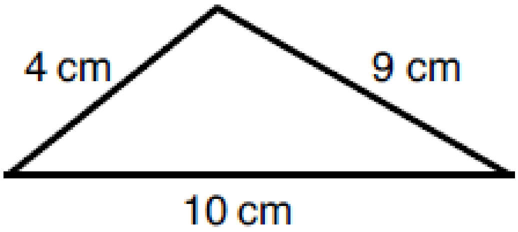
2)



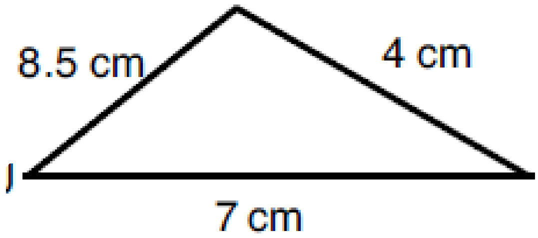
3)



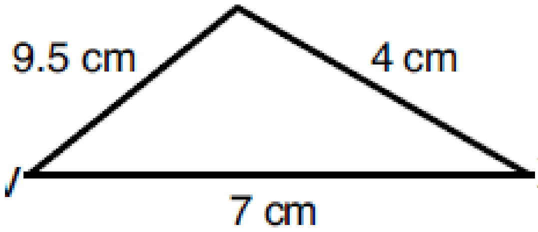
4)



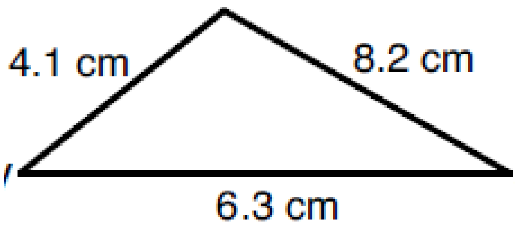
5)



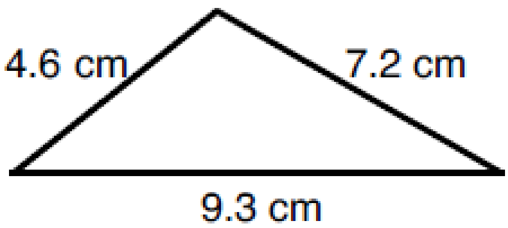
6)



7)

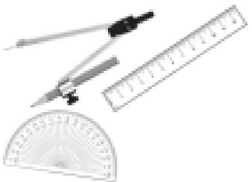


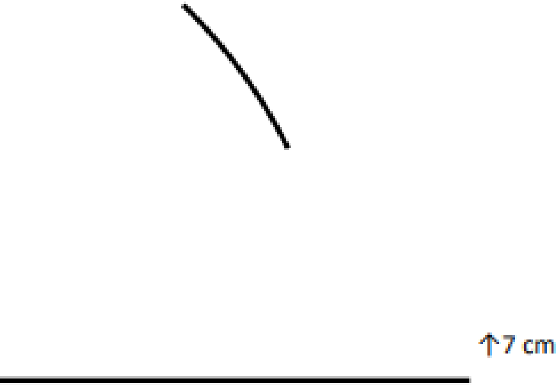
8)



Constructing Triangles: Lengths

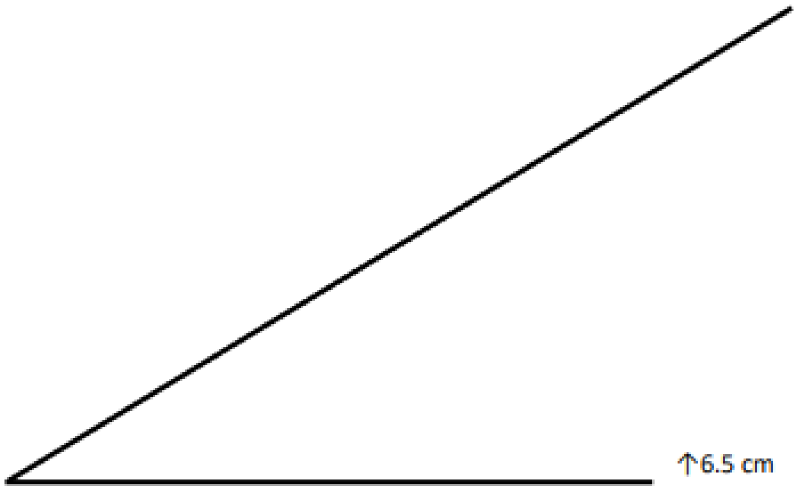
2





A) Complete this triangle using the given lengths.
One arc with the compass has been done for you.
Measure the angles.

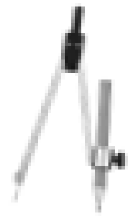
B) Complete this triangle using the given lengths.
Measure the top angle.



C) Complete this triangle using the given length.
What is the problem?

D) Draw a triangle with lengths: 9cm, 8,5cm & 7.5 cm.
Measure all three angles.

Congruent Triangles



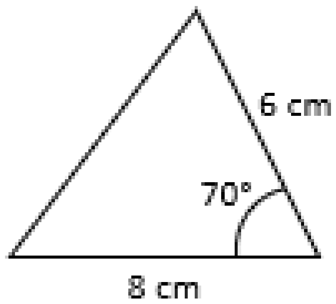
Which of these triangles can you construct a congruent (identical) copy of?

Why can't you make a congruent copy of the others?

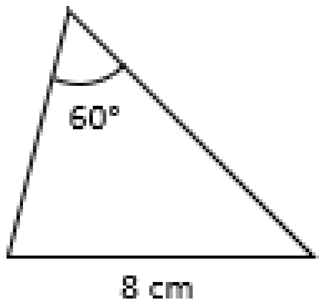
What is the minimum amount of information you need to make a congruent copy?

Not drawn accurately.

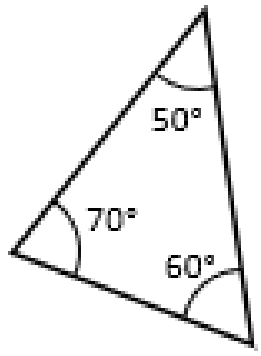
a)



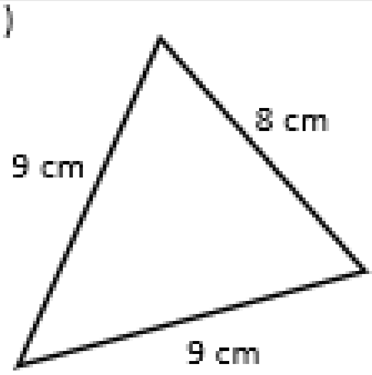
b)



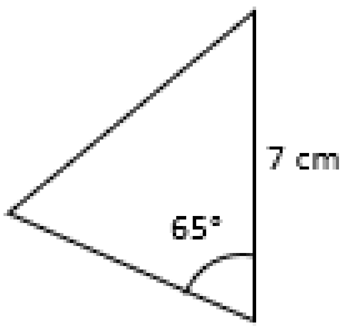
c)



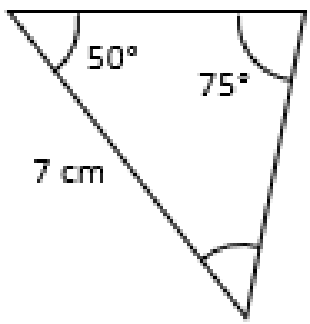
d)



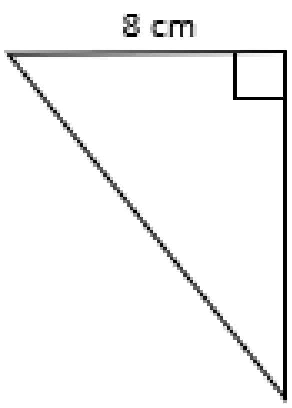
e)



f)



g)



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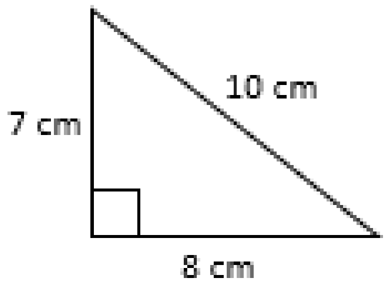
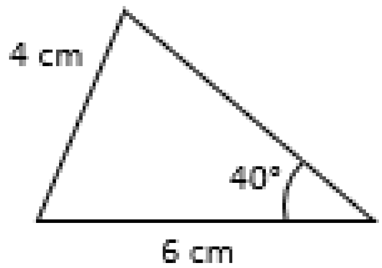
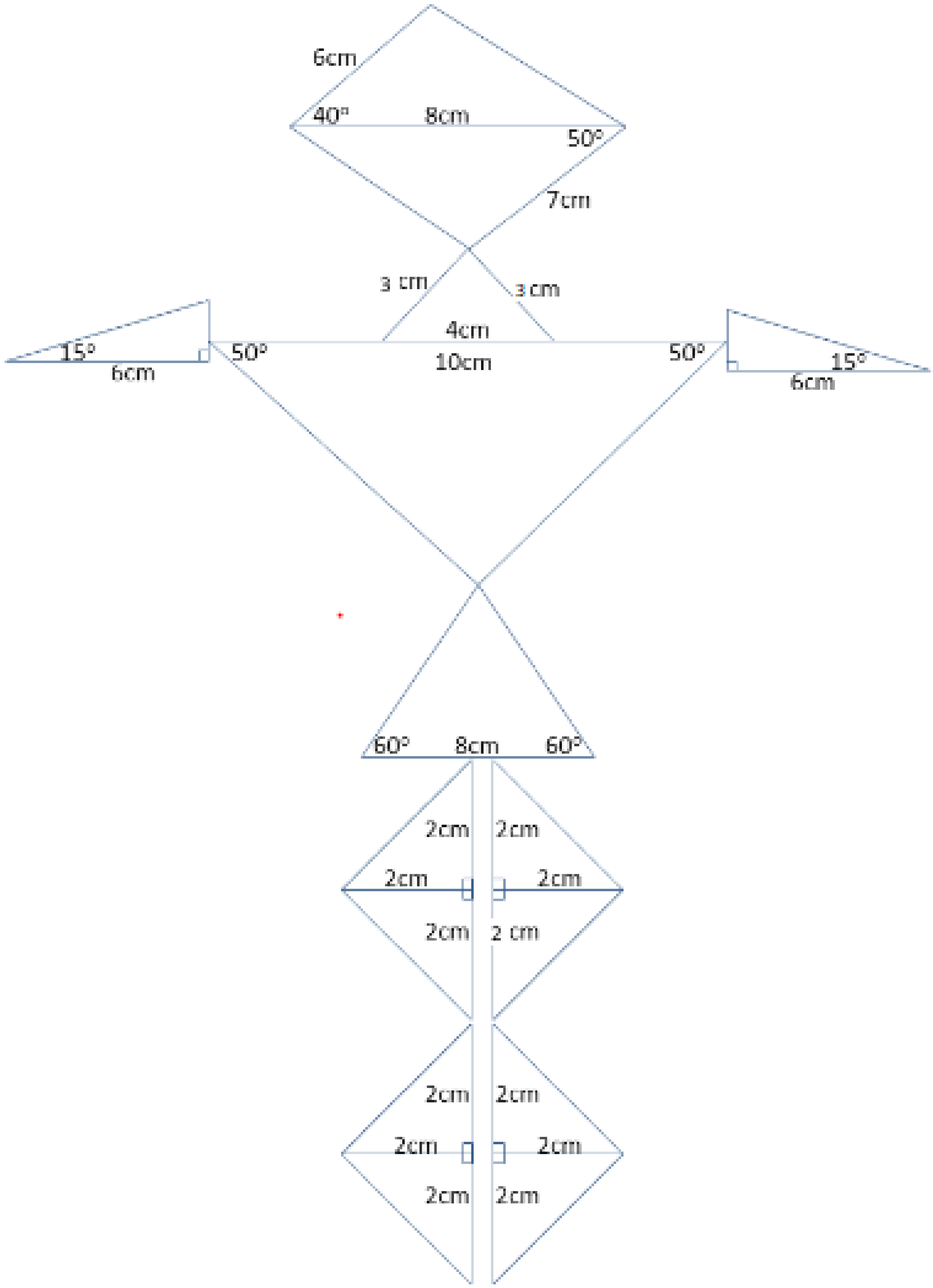


i)



Use all your knowledge of constructing triangles (SSS, SAS, ASA) to accurately construct this picture.



Attainment Band :	Unit 3 - Constructions and loci, Congruence and Similarity, Pythagoras and Angles in polygons	
	Knowledge and Understanding	**Skills**
Yellow Plus	Understands how to find missing sides of compound shapes 14* Can use mathematical explanations to prove a statement is correct or incorrect 7*	Calculates the shorter side of a right angled triangle using the hypotenuse and another side and uses this information to solve a perimeter problem 6 Use Pythagoras' theorem to prove whether a triangle is right angled or not 7 Uses the rule for exterior angles in polygons to work out the number of sides when given the interior angle 10 Uses Pythagoras' theorem to find missing sides in compound shapes 14
Yellow	Knows how to find the amount Of degrees in a polygon 8* Understands the rule for finding Exterior angles in regular polygons 9*	Calculates the hypotenuse of a right angled triangle given the two shorter sides 5b Calculates the exterior angle of a regular octagon Uses a ruler and a pair of compasses to construct a perpendicular through a point 12 Calculates the interior angle of a regular pentagon 13a Uses angle fact on a straight line and in a triangle to solve problems 13b
Blue	Understands how to describe congruency and provide explanations 3b* Understands how to round an answer to three significant figures 5b	Identifies congruent triangles 3a Recognises vertically opposite angles 4a Calculates the area of a triangle 5a Explain why the interior angles of a pentagon sum to 540 degrees 8a Uses congruent triangles to find a missing side 11a Uses congruent triangles to find a missing angle 11b
Green	Understands the properties of congruent triangles – ASA/SAS 4* Understands how to find the perimeter of shapes 6*	Uses a ruler and pair of compasses to construct an angle bisector 1b Uses a ruler and a pair of compasses to construct a perpendicular bisector 2 Uses the properties of congruent triangles to prove why two triangles are congruent 4b Uses the sum of the internal angles in a pentagon to find missing angles 8b
White	Can use mathematical equipment effectively 1*	Measures an angle using a protractor 1a Identifies the name of a polygon given the number of sides 9/ 10*