

Name:

Class:

Order	Unit	Links	Pre-requisite skills
1	Integers, powers & roots		
2	Lines, angles & shape		
3	Simplifying & substituting	Unit 1	Using powers, listing factors, understanding product / sum.
4	Area and perimeter	Unit 2	Forming expressions for area/perimeter algebraically through use of brackets, correct notation and simplifying expressions.
5	Calculations & Accuracy	Unit 1	Understanding numbers.
6	Construction and LOCI	Unit 2	Measuring angles for bearings, parallel line angle facts.
7	FDP	Unit 1	Using powers, understanding lowest common multiples.
8	Sequences, functions and graphs	Unit 3/5	Substituting into a function applying BIDMAS to calculate coordinates, factorising for roots of quadratics, understanding powers and all 4 operations with negatives.
9	Ratio & Proportion	Unit 1/7	Decimals/powers as multipliers, calculating/understanding fractions as parts.
10	Transformations	Unit 2/8	Identifying 90/180/270 degrees, plotting mirror lines of basic functions.
11	Pythagoras and Trigonometry	Unit 1/2/3/4/5	Powers/surds, types of triangles, use in area/perimeter problems to find required lengths, rounding answers.
12	Forming and solving	Unit 3/4	Properties of 2d shapes, angle facts including polygons & parallel lines, algebraic notation and simplifying, forming expressions.
13	Measures	Unit 1/7	Calculating, multiplying decimals and powers of 10 for metric conversions.
14	Volume and Surface area	Unit 4/5/13	Area of 2d shapes, rounding/calculating with bounds, conversion of units (length/area/volume), calculating missing sides using pythagoras/ trigonometry.
15	Probability	Unit 1/7	Types of numbers, calculating with fractions & decimals.
16	Inequalities	Unit 12/8/5/7	Solving equations, rounding, plotting graphs for regions, calculating with fractions.
17	Statistics	Unit 1/6/9/16	Using a protractor for pie charts, proportion to calculate angles for a pie chart, use of inequality symbols for recording data.

Homework 1 Due

Homework 2 Due

Homework 3 Due



Year 10 - Term 4: Foundation

<u>Overview</u>	<u>Learning Objective</u>		
<p><u>Topic: Ratio and Proportion</u></p> <p><u>Big Questions</u></p> <ul style="list-style-type: none"> - What is the same / different: - 4:5 and £4:500p - 2:3, 34:51 and 3:2 - The answer is '£350 and £450'. What is the question? 	<ul style="list-style-type: none"> - Solve problems involving recipes. - Introduction to proportion. (clip 42) - Calculate the best value of a product. 	<ul style="list-style-type: none"> - Divide quantities by simple ratios. - Write ratios as a fraction. - Use ratio to convert between currencies. Use ratio to solve problems about exchange rates. -Ratio/fractions/graphs. 	<ul style="list-style-type: none"> -Similar shapes length. - Similar shapes with area & volume.
<p><u>Topic: Transformations</u></p> <p><u>Big Questions</u></p> <ul style="list-style-type: none"> - Convince me how to: - reflect a shape into a horizontal mirror line. - reflect a shape into a mirror line where the shape touches the line. - rotate a simple shape or object about its centre. 	<ul style="list-style-type: none"> - Enlarge a shape by a positive scale factor. - Rotate shapes about any point - Reflect shapes in lines such as $x = 2$ and $y = -1$. - Reflect shapes in the lines $y = x$ and $y = -x$. 	<ul style="list-style-type: none"> - Enlarge a shape by a positive integer scale factor from a given centre. - Enlarge a shape by a positive fractional scale factor given a centre. 	
<p><u>Topic: Pythagoras and Trigonometry</u></p> <p><u>Big Questions</u></p> <ul style="list-style-type: none"> - What is the same/different about (Diagram of) a triangle with sides 5cm, 12cm and an unknown hypotenuse and (diagram of) a triangle with sides 5cm, 12cm and an unknown shorter side - True/Never/Sometimes: - Pythagoras's Theorem can be used to find the lengths of sides in a right angle triangles 	<ul style="list-style-type: none"> - Use Pythagoras' Theorem to calculate the length of the hypotenuse of a right-angled triangle. - Use Pythagoras' Theorem to calculate the length of any side of a right-angled triangle. - Use Pythagoras' Theorem to calculate the height of an isosceles triangle. - Use Pythagoras' Theorem in practical problems. 		

Key Facts - Ratio

Ratios are used to show how things are shared.

For example: The ratio of red smarties of blue smarties. For every 3 RED smarties there are TWO blue smarties

Red: Blue  
3 : 2

Keywords

Common denominator	Proportion
Fraction	Ratio
Highest common factor	Simplify
Portion	Share

Common Problems and Misconceptions

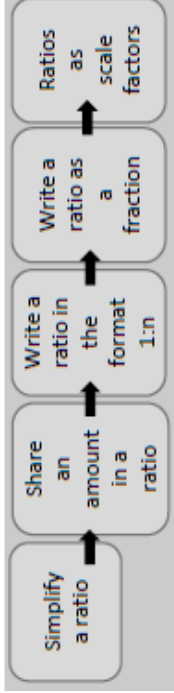
- ☐ Not reading the question correctly and always assuming you divide the total by the total ratio

Key Facts – Sharing an Amount in Part of a Ratio (c)

Sharon and Bob share some money in a ratio 2 : 5
Bob gets £45 more than Sharon. How much does each person get?

- Find the difference between the ratios $5 - 2 = 3$
- Divide: $£45 \div 3 = 15$
- Multiply: $2 \times 15 = 30$ Sharon's share
- Multiply: $5 \times 15 = 75$ Bob's share
Check your answer: $75 - 30 = 45$ ✓

Curriculum Flowchart



Key Facts – Sharing an Amount in a Ratio Sharing the WHOLE

Monty and Mosaurus get A TOTAL of £72 pocket money.

They share it in the ratio 5 : 3

How much do they each get?

- Add the ratios: $3 + 5 = 8$
- Divide 72 by 8 ($72 \div 8 = 9$)

Each ONE portion is worth £9

Monty has 5 portions $5 \times 9 = £45$	Mosaurus has 3 portions $3 \times 9 = £27$
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£72 split into 8 equal portions

Monty's share					Mosaurus's share				
£9	£9	£9	£9	£9	£9	£9	£9	£9	£9

Key Facts – Sharing an Amount in a Ratio (b)

In a school the ratio of boys to girls is 9 : 4.

There are 270 boys in the school. How many students are there in the school altogether?

Divide the total number of boys by the boy's ratio $270 \div 9 = 30$ This gives the number for 1 'portion'	Girls $4 \times 30 = 120$
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Key Facts – Simplifying a Ratio

Ratios can be fully simplified just like fractions.

To simplify a ratio, divide all of the numbers in the ratio by the same number (highest common factor) until they cannot be divided any more.

Simplify: 6 : 12 Simplify: 6 : 1.5

Divide both by 6 Multiply both sides by 2

1 : 2

12 : 3

Divide both by 3

4 : 1

Key Facts – Writing in the Ratio 1 : n

When asked to write a ratio in the format 1 : n, you need to divide BOTH sides by the ratio where the 1 is.

Write 7 : 21 in the ratio 1 : n

7 : 21 divide both sides by 7

1 : 3

Write 16 : 8 in the ratio 1 : n

16 : 8 divide both sides by 16

1 : $\frac{1}{2}$

Key Facts – Write a Ratio as a Fraction

Bill and Mary share £50 in the ratio 2 : 3

Write Bill's share as a fraction: $\frac{2}{5}$
Bill's fraction

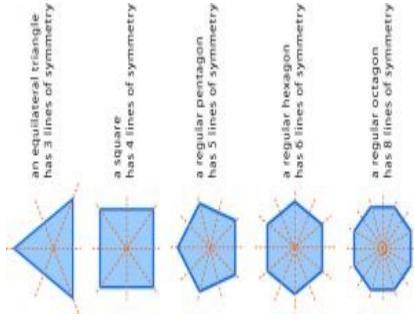
Date Due _____

Score to beat _____

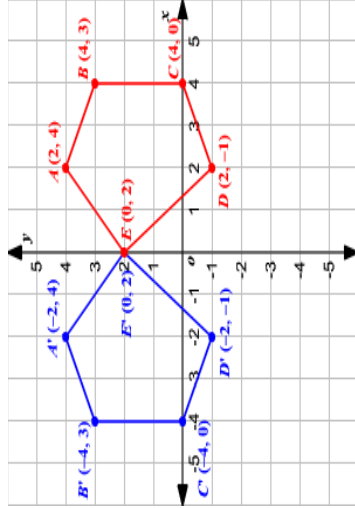
Section A: Number		Section B: Algebra Geometry & measures		Section C: Using and applying	
1. Which is bigger: $\frac{3}{10}$ or $\frac{3}{5}$?		11. Expand: $y(2 - 5y)$		21. Work out the height of a parallelogram of base 5cm and area 60cm^2 .	
2. Which is bigger: 0.96 or $\frac{19}{20}$?		12. Factorise: $9x - 6xy$		22. Add the total internal angles of a triangle and a hexagon.	
3. Increase 1500 by 50%		13. Solve: $3x - 3 = x + 5$		23. Work out the height of a triangle with a base 50cm and area 2m^2 .	
4. Decrease £1200 by 25%		14. Solve: $5(x - 4) = 0$		24. If the probability of a win is 0.02 and the probability of a draw is 0.8, what is the probability of a loss?	
5. Write 12 : 18 in form 1 : n		15. Find the 10th term $7 \quad 6 \quad 5 \quad 4 \quad 3 \quad \dots$		25. Work out the surface area of a cube of edge 0.2m?	
6. 8 bags of plaster cover 32m^2 What will 17 bags cover?		16. If $T(n) = 3 + 2n$, what is the 5th term?			
7. Estimate: 285×32.5		17. If $x + y = 6$, find the value of y when $x = -2$			
8. If $89 \times 25 = 2225$ Work out $222.5 \div 25$		18. If $x + y = 6$, find the value of y when $x = 8$ <u>Use $\pi = 3$</u>			
9. Work out: $\frac{5}{8} \times 2$		19. Calculate the area of a circle with radius of 6m <u>Use $\pi = 3$</u>			
10. Work out: $6 \div \frac{3}{5}$		20. Calculate the length of the circumference of a circle with radius of 4.5cm			
Total (A)		Total (B)		Total (C)	
Test Total (A+B+C)		R (0-9)	Y (10-19)	G (20-25)	

REFLECTION

When an object is transformed by a reflection the object and its image are always the same perpendicular distance from the mirror line.



Perpendicular means 'at right angles to'.



Rotational Symmetry

All 2 dimensional shapes have some rotational symmetry. The degree of rotational symmetry that an object has is known as its **order**. For shapes that have "order 2" rotational symmetry or higher, a single centre of rotation can be located. For shapes that have only "order 1" rotational symmetry a centre of rotation can be found anywhere within it.



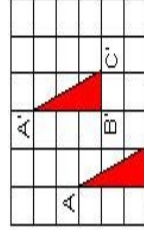
The order of rotational symmetry that an object has is the **number of times that it fits on to itself** during a full rotation of 360 degrees.

Name	Shape	Order of Rotational Symmetry
Parallelogram		2
Regular Polygon with n sides	Examples: 	n
Rhombus		2
Circle		Unlimited
Trapezium		None
Kite		None

TRANSLATION



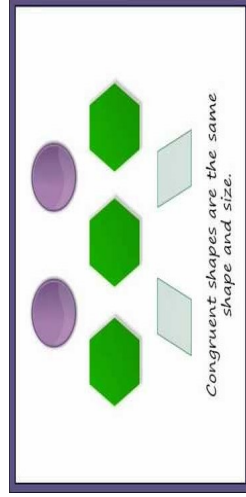
Translation - Slide
The shape moves from one position to another in any direction.



Each point moved 2 to the right and 2 up.

The vector describing this translation is: $\begin{pmatrix} 2 \\ 2 \end{pmatrix}$

translation along x-axis $\rightarrow \vec{v} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$ translation along y-axis



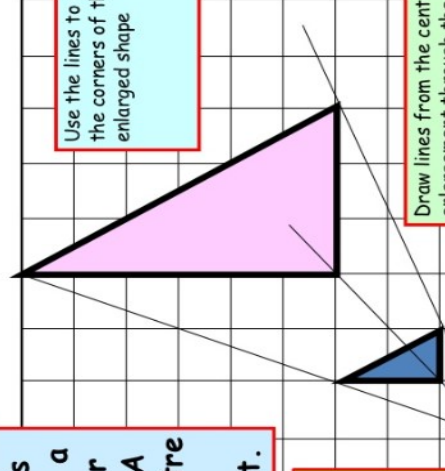
ENLARGEMENT

Enlarge this triangle by a scale factor of 3 using A as the centre of enlargement.

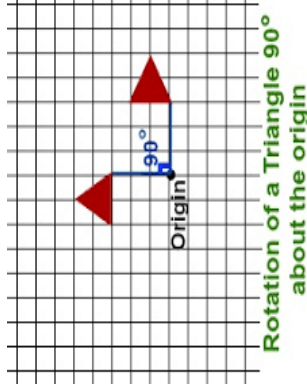
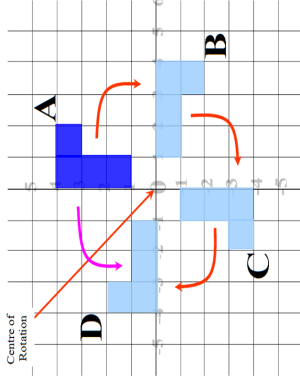
The new lines must be the length of the original distance from the centre of enlargement times the scale factor

Use the lines to find the corners of the enlarged shape

Draw lines from the centre of enlargement through the vertices (corners) of the shape.



ROTATION



Rotation of a Triangle 90° about the origin

Date Due _____

Score to beat _____

Section A: Number	Section B: Algebra Geometry & measures	Section C: Using and applying
1. Which is bigger: $\frac{1}{8}$ or 12%?	11. Expand: $w(3w - 4)$	21. Work out the height of a parallelogram of base 6cm and area 27cm^2 .
2. Which is bigger: $\frac{3}{5}$ or $\frac{2}{3}$?	12. Factorise: $3 + 9x + 6y$	
3. Increase 160km by 30%	13. Solve: $4x + 3 = 2x + 9$	22. Add the total internal angles of a pentagon and an octagon.
4. Decrease £840 by 5%	14. Solve: $7(x - 4) = 7$	
5. Write 25 : 75 in form 1: n	15. Find the 10th term $7 \quad 5 \quad 3 \quad 1 \quad -1 \quad \dots$	23. Work out the height of a triangle with a base 6m and area 27m^2 .
6. If 5 miles = 8km How many km is 40miles	16. If $T(n) = 5 - 2n$, what is the 4 th term?	
7. Estimate: 543×21	17. If $x + y = 8$, find the value of y when $x = -1$	24. If the probability of a win is 0.24 and the probability of a draw is 0.16, what is the probability of a loss?
8. If $89 \times 25 = 2225$ Work out 89×250	18. If $x + y = 8$, find the value of y when $x = 11$	
9. Work out: $\frac{3}{4}$ of 7 kg	19. Calculate the area of a circle with diameter of 14cm <u>Use $\pi = 3$</u>	25. Work out the surface area of a cuboid 2cm by 5cm by 3cm?
10. Work out: $8 \div \frac{2}{3}$	20. Calculate the length of the circumference of a circle with diameter of 14cm <u>Use $\pi = 3$</u>	
Total (A)	Total (B)	Total (C)
Test Total (A+B+C)	R (0-9)	Y (10-19) G (20-25)

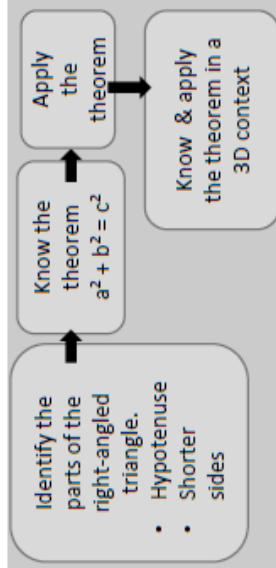
Key Facts - When would I use this?

Pythagoras' Theorem is used to work out the length of any side in a right angle triangle.
The HYPOTENUSE is the longest side.

MathsWatch References and Worksheet Links

150a	Pythagoras Theorem – A simple approach
150b	Pythagoras Theorem – An Algebraic approach
150c	Pythagoras Theorem – Line on a graph
217	Pythagoras in 3D

Curriculum Flowchart



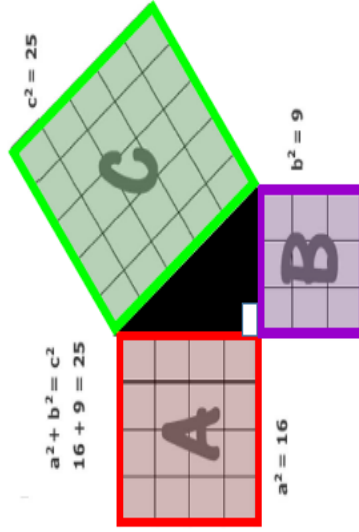
Keywords

Hypotenuse	Shorter side (leg_
Square	Sum (add)
Square root	Side
Right-angled	Opposite

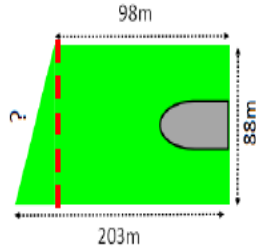
Pythagorean Triples				
(3, 4, 5)	(5, 12, 13)	(7, 24, 25)	(8, 15, 17)	
(9, 40, 41)	(11, 60, 61)	(12, 35, 37)	(13, 84, 85)	
(16, 63, 65)	(20, 21, 29)	(28, 45, 53)	(33, 56, 65)	
(36, 77, 85)	(39, 80, 89)	(48, 55, 73)	(65, 72, 97)	

Key Facts – Pythagoras' Theorem

$a^2 + b^2 = c^2$	Where C is the hypotenuse
$c^2 - a^2 = b^2$	Where the unknown side is the shorter side (aka 'leg')



Length of the roof



Pythagoras is used to find the length of the slanted roof.

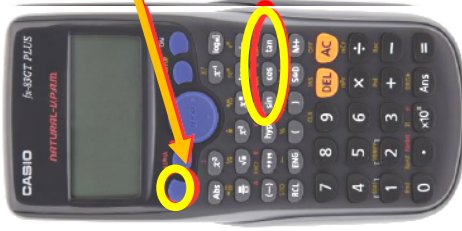
Draw the right angled-triangle and apply Pythagoras.

TEST for a Right-Angled Triangle

$5^2 + 12^2 = 169\text{cm}$
 $\sqrt{169} = 13\text{cm}$

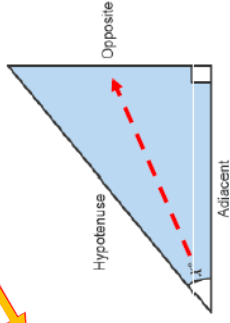
NO, this is NOT a right-angled triangle.
 The answer should be **exactly 13cm**.

(Look at the Pythagorean Triples)



Shift 2nd function is used to find the angle size

Sin, Cos or Tan for length



Important Ideas

Basic trigonometry is used to calculate angles and side lengths in **right-angled triangles**.

Trigonometry involves three ratios: sine, cosine and tangent which are abbreviated to: **sin**, **cos** and **tan**.

How to Calculate a Length OR Angle in a Right-Angled Triangle

1. Label the triangle (*hyp, opp, adj*) – see diagram below
2. Choose the correct ratio (*sin, cos, tan*)
3. Write the equation, then substitute the information given
4. Solve the equation to find the missing length or angle
5. You made need to do some 'rearranging formula' so practise this...

Key Facts – SOH CAH TOA – Learn the Ratios

SOH

$$\sin \theta = \frac{O}{H}$$

CAH

$$\cos \theta = \frac{A}{H}$$

TOA

$$\tan \theta = \frac{O}{A}$$

Cover the term you are looking for.

Example:
Using Cos ratio:

To work out 'A', cover A and my calculation is
 $\cos \theta \times \text{Hypotenuse}$

Date Due _____

Score to beat _____

Section A: Number		Section B: Algebra Geometry & measures		Section C: Using and applying	
1. Which is bigger: $\frac{3}{8}$ or 0.3		11. Expand: $x(3y - 4)$		21. Work out the area of a parallelogram with a base of 12cm and a height of 4cm	
2. Which is bigger: $\frac{7}{9}$ or $\frac{5}{6}$?		12. Factorise: $5 + 10x + 15y$		22. Add the total internal angles of a triangle, quadrilateral an octagon and subtract the internal angles of a nonagon.	
3. Increase £520 by 10%		13. Solve: $4x - 3 = x + 9$		23. Work out the area of a triangle with a height of 6m and a base length of 14m	
4. Decrease £2500 by 1%		14. Solve: $3(2x + 5) = 3$		24. If the probability of a train being on time is 0.24 and the probability of it being late is 0.66 what is the probability of it being early?	
5. Write 150 : 75 in form n : 1		15. Find the 10th term 4 9 14 19 24 ...		25. Work out the surface area of a cuboid 3cm by 3cm by 4cm?	
6. If 5 miles = 8km How many km is 55miles?		16. If $T(n) = 4 + 3n$, what is the 2 nd term?			
7. Estimate: 836.3×42		17. If $y = 2x + 3$, find the value of y when $x = 5$			
8. If $24.5 \times 32 = 784$ Work out 245×320		18. If $x - y = 8$, find the value of y when $x = 11$			
9. Work out: $\frac{2}{5}$ of 16 miles		19. Calculate the area of a circle with radius of 1m <u>Use $\pi = 3$</u>			
10. Work out: $6 \div \frac{5}{9}$		20. Calculate the length of the circumference of a circle with diameter of 10.4cm <u>Use $\pi = 3$</u>			
Total (A)		Total (B)		Total (C)	
Test Total (A+B+C)		R (0-9)	Y (10-19)	G (20-25)	