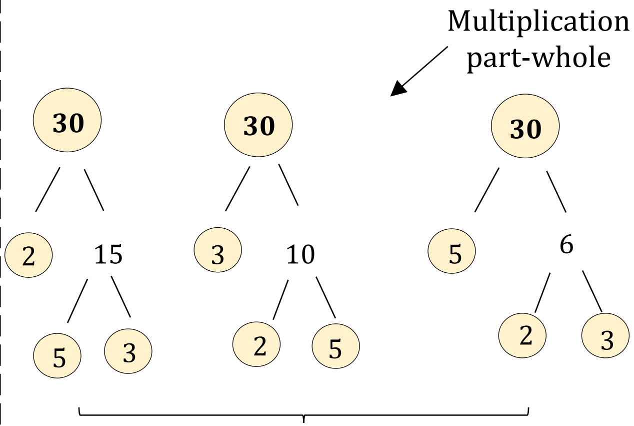
Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	9	1	1A	Ch 1 Whole Number and Decimals

Product of prime factors

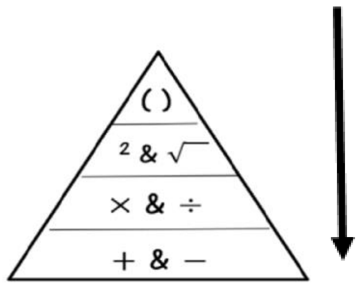


All three prime factor trees represent the same decomposition

30 = 2 x 3 x 5

Order of Operations

Brackets
Indices and roots
Multiplication and division
Addition and subtraction



Common factors and HCF

Common factors are factors two or more numbers share

1 is a common factor of all

HCF – Highest common factor

HCF of 18 and 30

18 1, 2, 3, 6, 9, 18

30 1. 2. 3. 5. 6. 10. 15.

Common factors (factors of both numbers)
1, 2, 3, 6

HCF = 6

LCM – Lowest common multiple

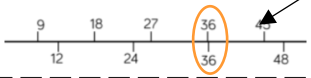
LCM of 9 and 12

9 9. 18. 27. 36. 45.

12 12. 24. 36. 48.

LCM = 36

The first time their multiples match



Multiples

The "times table" of a given number

All the numbers in this list below are multiples of 3.

3, 6, 9, 12, 15…

This list continues and doesn't end

$3x$. $6x$. $9x$ …

x could take any value and as the variable is a multiple of 3 the answer will also be a multiple of 3

Factors

Arrays can help represent factors

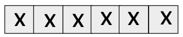
5 x 2 or 2 x 5

Factors of 10
1, 2, 5, 10

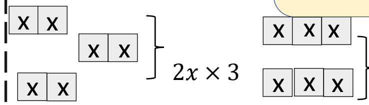
10 x 1 or 1 x 10

The number itself is always a factor

Factors and expressions



$6x \times 1$ OR $6 \times x$



$2x \times 3$

$3x \times 2$

Factors of $6x$
$6, x, 1, 6x, 2x, 3, 3x, 2$

Powers of 10

Multiplying by 0.1 is the same as dividing by 10

3 × 0.1 = 0.3, which is the same as 3 ÷ 10

Dividing by 0.1 is the same as multiplying by 10

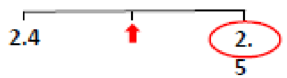
3 ÷ 0.1 = 30 which is the same as 3 × 10

Round to decimal places

"To 1.d.p" –to one number after the decimal.
"To 2.d.p" –to two numbers after the decimal

Focus on the numbers **after** the decimal point

2 ● 46192 (to 1.d.p) - Is this closer to 2.4 or 2.5



2 ● 46192 (to 12d.p) - Is this closer to

This shows the number is closer to 2.46

Square numbers

Representations are useful to understand a square number n^2

1, 4, 9, 16, 25, 36, …

Comparing decimals

Ones	Tenths	Hundredths
	0.1 0.1 0.1	
Ones	Tenths	Hundredths
	0.1 0.1	0.01 0.01 0.01

0.30

0.23

0.3 > 0.23

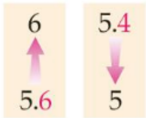
"There are more counters in the furthest column to the left"

Comparing the values both with the same number of decimal places is another way to compare the number of tenths and hundredths

Subject	Year	Term	KO n.o.	Title
Mathematics	9	1	1B	Ch 1 Whole Number and Decimals

Rounding

When you round a number, look at the next digit to see whether you round up or down. If the next digit is a 5 or more you round up. If less than a 5 you round down.



To round a number to 1 significant figure (1SF) you look at the value of the first non zero digit in the number

The first digit is in the thousands column **2**456
so look at the hundreds digit: 2**4**56.
Round down to nearest 1000.
2456 ≈ 2000 (1 sf)

Square and Triangular numbers

Representations are useful to understand a square number n^2

1, 4, 9, 16, 25, 36, ...

Representations are useful – an extra counter is added to each new row. Add two consecutive triangular numbers and get a square number

1, 3, 6, 10, 15, 21, 36,.....

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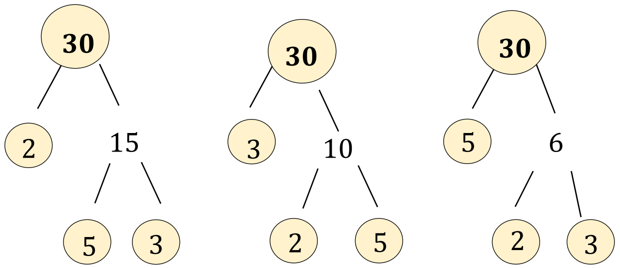

Multiplication part-whole models

All three prime factor trees represent the same decomposition

30 = 2 x 3 x 5 ← Multiplication of prime factors

Using prime factors for predictions

e.g. **60** 30 x 2 2 x 3 x 5 **x**
150 30 x 5 2 x 3 x 5

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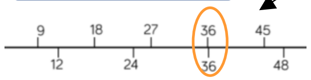

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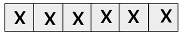

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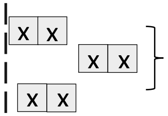
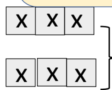
Factors of $6x$
$6, x, 1, 6x, 2x, 3, 3x, 2$



$2x \times 3$



$3x \times 2$

Powers of 10 index form

1 thousand (kilo)	= 1000	= 10 × 10 × 10	= 10^3
1 hundred	= 100	= 10 × 10	= 10^2
1 ten	= 10		= 10^1
1 unit	= 1		= 10^0
1 tenth	= $\frac{1}{10}$	= $\frac{1}{10^1}$	= 10^{-1}
1 hundredth (centi)	= $\frac{1}{100}$	= $\frac{1}{10^2}$	= 10^{-2}
1 thousandth (milli)	= $\frac{1}{1000}$	= $\frac{1}{10^3}$	= 10^{-3}

You can multiply and divide numbers in **index form (with the same base)** using these rules:

Indices are **add** when **multiplying**

Indices are **subtracted** when **dividing**.

Prime numbers

2

- Integer
- Only has 2 factors
- 1 and itself

The first prime number
The only even prime number

Learn or how-to quick recall…

2, 3, 5, 7 , 11, 13, 17, 19,

Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
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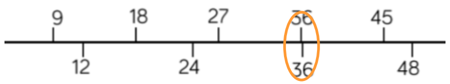

Addition/ Subtraction laws for indices

$3^5 \times 3^2$

$(3 \times 3 \times 3 \times 3 \times 3) \times (3 \times 3) = 3^7$

Addition law for indices $a^m \times a^n = a^{m+n}$

$\frac{3 \times 3 \times 3 \times 3 \times 3}{3 \times 3} = \frac{3^5}{3^2} = 3^3$

Subtraction law for indices $a^m \div a^n = a^{m-n}$

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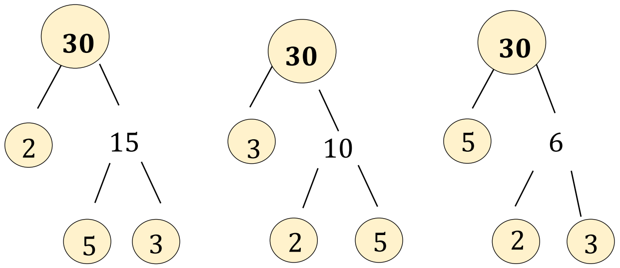

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150 30 x 5 2 x 3 x 5

Significant figures and Estimation

The position of a digit in a number is called its **place value**.

The first non-zero digit in a number is called the first **significant figure** because it has the greatest value.

1st significant figure is 2 (20)

3rd significant figure is 4 (0.4)

23.456

2nd significant figure is 3

You can use significant figures to **round** numbers and **estimate**.

Estimate $\frac{23 \times 189}{3.9}$

Round each number in the calculation to 1 significant figure.

$\frac{23 \times 189}{3.9} \approx \frac{20 \times 200}{4} \approx \frac{4000}{4} \approx 1000$

Upper and Lower Bounds

When you measure something, it is rarely **accurate**. The accuracy will depend on the units you use to measure. The highest and lowest value that a measured quantity can be are called the **upper and lower bounds**.

156 cm

2.02 m

Lower bound 155.5 cm
Upper bound 156.5 cm
$155.5 \le$ height (cm) < 156.5

Lower bound 2.015 m
Upper bound 2.025 m
$2.015 \le$ height (m) < 2.025

You can use the upper and lower bounds in calculations to place bounds on the answer

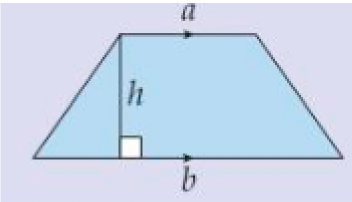
A regular pentagon has sides of length 6 cm.
Find the upper and lower bounds of its perimeter.

A length of 6 cm has been rounded to 1 sf.
The bounds on the side lengths are 5.5 cm and 6.5 cm
The perimeter of a regular pentagon is 5 × side length.

Upper bound $5 \times 6.5 = 32.5$ cm
Lower bound $5 \times 5.5 = 27.5$ cm

Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	9	1	2A	Ch 2 Measure. Perimeter and Area

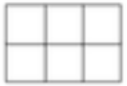
Area of trapeziums

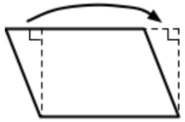


Area of a trapezium

= ½ (a +b) x h

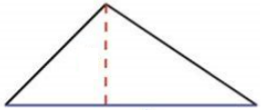
Area of Rectangles, Triangles and Parallelograms





Area = base x height

Area = base x perpendicular height



Area = ½ x base x height

Circle Formulae

Diameter = 2r

Circumference = π x diameter

Or = 2 x π x r

Area of a circle = πr^2

Π = 3.141592……….

Converting between different Metric units

Length	
1 cm	= 10 mm
1 m	= 100 cm
1 km	= 1000 m

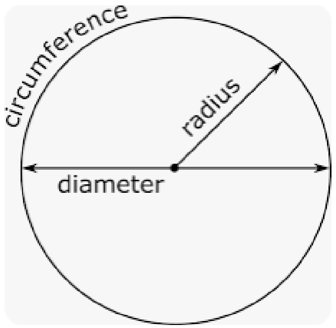
Area	
1 cm^2	= 100 mm^2
1 m^2	= 10 000 cm^2
1 ha	= 10 000 m^2
1 km^2	= 1 000 000 m^2

Capacity and Volume	
1 cl	= 10 ml
1 litre	= 100 cl
1 litre	= 1000 ml
1 litre	= 1000 cm^3
1 ml	= 1 cm^3

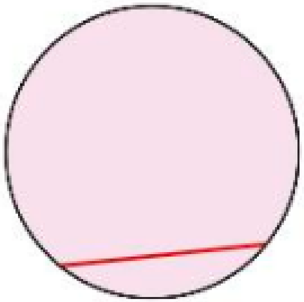
Time	
1 minute	= 60 seconds
1 hour	= 60 minutes
1 day	= 24 hours
1 week	= 7 days
1 year	= 365 days

Mass	
1 kg	= 1000 g
1 tonne	= 1000 kg

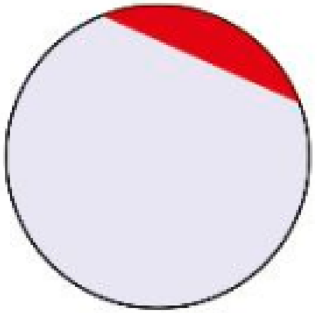
Circle parts



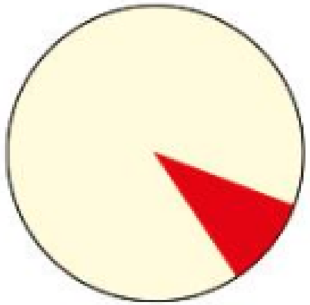
Circumference is the distance around the outside of the shape. The **Diameter** is across the circle through the Centre. The **Radius** is from the centre to the edge.



The **Chord** is a line joining two points on the circumference.



A **segment** is the region enclosed between a chord and an arc.



A **sector** is the region enclosed by an arc and two **Radii**.

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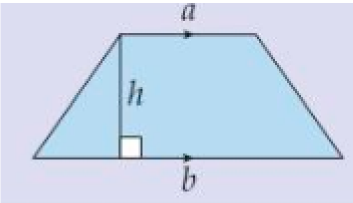
	Mathematics	9	1	2B	Ch 2 Measure. Perimeter and Area

Area of trapeziums



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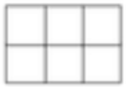

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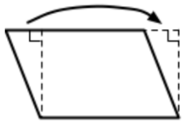
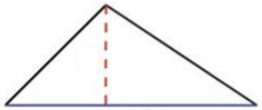


Area = base x perpendicular height



Area = ½ x base x height

Compound Measure

$$\text{Speed}\ (S) = \frac{\text{Distance travelled}\ (D)}{\text{Time taken}\ (T)}$$

$$\text{Density}\ (D) = \frac{\text{Mass}\ (M)}{\text{Volume}\ (V)}$$

$$\text{Pressure}\ (P) = \frac{\text{Force}\ (F)}{\text{Area}\ (A)}$$

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1 cm = 10 mm
1 m = 100 cm
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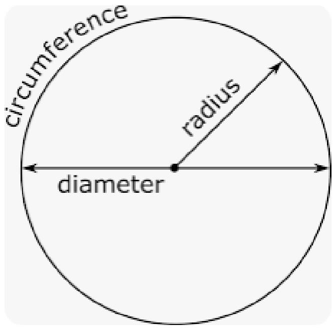

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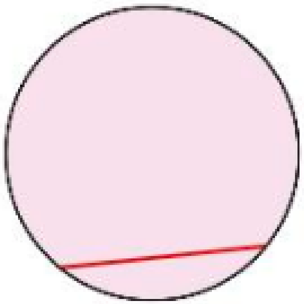

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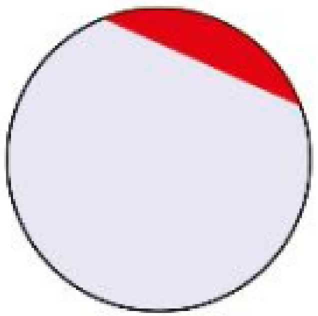

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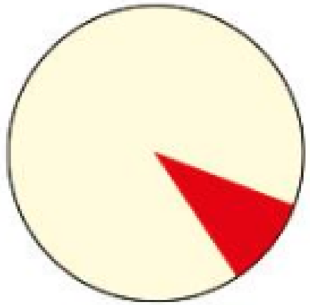

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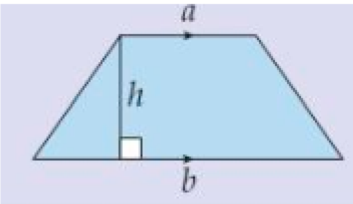

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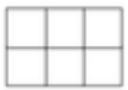

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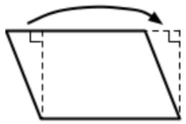

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A **length** has one dimension: **length**

An **area** has two Dimensions: **length x length**

A **volume** has three dimensions: **length x length x length**

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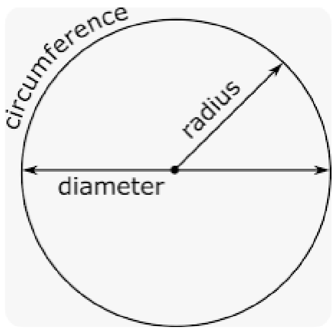

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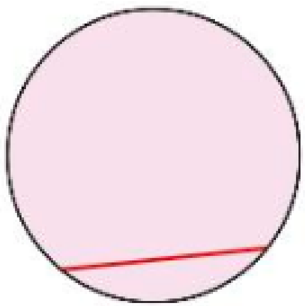

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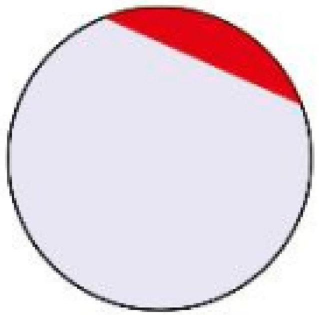

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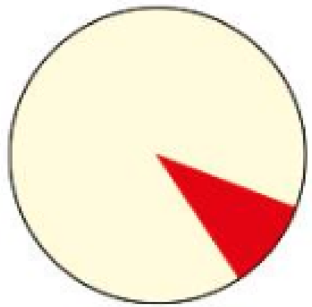

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	Mathematics	9	1	3A	Ch 3 Expressions and Formulae

Algebraic and verbal expressions

5 more than x	x + 5
5 less than x	x – 5
5 lots of *x*	*5x*
x divided by 5	$\frac{x}{5}$

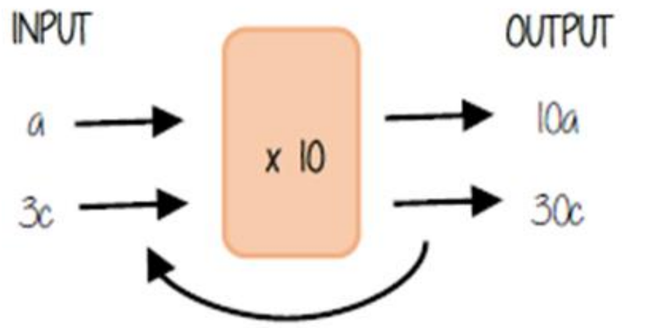
Collecting Like terms

$x + 4y + 6x + 2y = 7x + 6y$

$3x + y - 2x + 4y = x + 5y$

Terms must be exactly the same to be able to collect them. 2x and x are the same but 3x and x^2 are not the same.

Single Function Machines



To find the **input** from the **output inverse** the operation.

Simplifying Algebraic expression

Simplify these expressions:

a) 3e + 5e – 7e
b) 4t – 5u + 5t + 6u
c) 5 x t
d) 5g x 3k
e) 24d ÷ 6

a) 3e + 5e – 7e = e
b) 4t – 5u + 5t + 6u = 9t + u
c) 5x t = 5t
d) 5g x 3k = 5 x 3 x g x k = 15gk
e) 24d ÷ 6 = (24÷ 6)d = 4d

Substitution

Find the value of a) $2y^2$ and b) $y^3 + 2$ given that y = -3.

a) $2y^2$ = 2 x y x y = 2 x (-3) x (-3)
= **18**

b) $y^3 + 2$ = (y x y x y) + 2
= (-3) x (-3) x (-3) + 2

If y = 7 then 4y = 4 x7 = 28

If y = -7 the 4y = 4 x -7 = -28

Minus signs are important!

Expanding Brackets

Expand the brackets of these expressions

a) 3(x + 5)

3 x (x + 5) = 3 x X + 3 x 5 = 3x + 15

	x	+ 5
3	3x	+15

b) 10(y – 2)

10 x (y – 2) = 10 x y + (10 x -2) = 10y – 20

	x	-2
10	10x	-20

Knowledge Organiser	Mathematics	Year 9	Term 1	KO n.o. 3B	Title Ch 3 Expressions and Formulae

Simplifying Algebraic Fractions

Simplify

a $\frac{6x}{9xy}$

b $\frac{4a^2b}{6ac}$

In part a: cancel 3 into 9 and 6, then cancel x. In part b: cancel 2 into 4 and 6, then cancel a.

a $\frac{6x}{9xy} = \frac{\overset{2}{\cancel{6}} \times \cancel{x}}{{}_{3}\cancel{9} \times \cancel{x} \times y} = \frac{2}{3y}$

b $\frac{4a^2b}{6ac} = \frac{\overset{2}{\cancel{4}} \times \cancel{a} \times a \times b}{{}_{3}\cancel{6} \times \cancel{a} \times c} = \frac{2ab}{3c}$

Simplifying Algebraic Expressions

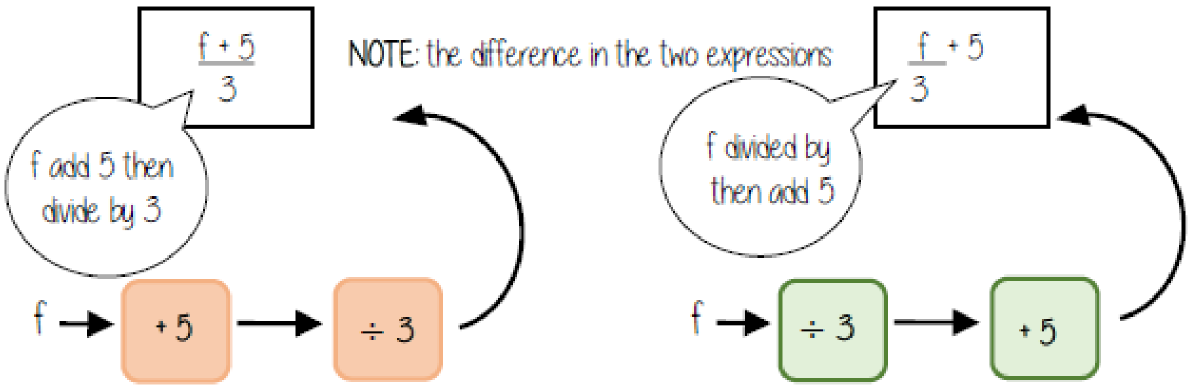
Simplify

a) $2t \times 3t^2$
b) $4ab \times 5b^2$

a) $2 \times t \times 3 \times t \times t$
$= 6 \times t^3 = 6t^3$

b) $4 \times a \times b \times 5 \times b \times b$
$= 20 \times a \times b^3 = 20ab^3$

Finding Functions from Expressions



Sometimes it helps to try to explain the expression in words – and consider what has happened to the input

Simplifying Algebraic Expressions

Factorise a) $10x + 15$ b) $x^2 + 7x$

a) 5 is a factor to both 10x and 15.
Write the common factor 5 outside the brackets.
5(   )
Now find the factors which need to inside the bracket.
$10x + 15 = 5(2x + 3)$

b) X is a factor common to both x^2 and 7x.
Write the common factor outside the bracket.
$x^2 + 7x = x(x + 7)$

Check your answer by expanding the brackets.
$5(2x + 3) = 10x + 15$ ✓

Knowledge Organiser	Mathematics	Year 9	Term 1	KO n.o. 3C	Title: Ch 3 Expressions and Formulae

Simplifying Algebraic Fractions

Simplify

a $\frac{6x}{9xy}$

b $\frac{4a^2b}{6ac}$

In part a: cancel 3 into 9 and 6, then cancel x. In part b: cancel 2 into 4 and 6, then cancel a.

a $\frac{6x}{9xy} = \frac{6 \times x}{9 \times x \times y} = \frac{2}{3y}$

b $\frac{4a^2b}{6ac} = \frac{4 \times a \times a \times b}{6 \times a \times c} = \frac{2ab}{3c}$

Simplifying Algebraic Expressions

Simplify

a) $2t \times 3t^2$

b) $4ab \times 5b^2$

a) $2 \times t \times 3 \times t \times t$
$= 6 \times t^3 = 6t^3$

b) $4 \times a \times b \times 5 \times b \times b$
$= 20 \times a \times b^3 = 20ab^3$

Index Laws

Evaluate

a $3^2 \times 3^4$ b $5^6 \div 5^4$ c $(4^2)^3$

a $3^2 \times 3^4$
$= (3 \times 3) \times (3 \times 3 \times 3 \times 3)$
$= 3^6$

Add the indices
$2 + 4 = 6$

b $5^6 \div 5^4$
$= \frac{5 \times 5 \times 5 \times 5 \times 5 \times 5}{5 \times 5 \times 5 \times 5}$
$= 5^2$

Subtract the indices
$6 - 4 = 2$

c $(4^2)^3$
$= (4^2) \times (4^2) \times (4^2)$
$= (4 \times 4) \times (4 \times 4) \times (4 \times 4)$
$= 4^6$

Multiply the indices
$2 \times 3 = 6$

Evaluate

a 10^0 b 3^{-2} c $32^{\frac{1}{5}}$ d $(x^3)^{-5}$

a $10^0 = 1$

b $3^{-2} = \frac{1}{3^2}$
$= \frac{1}{9}$

c $32^{\frac{1}{5}} = \sqrt[5]{32}$
$= 2$
$2 \times 2 \times 2 \times 2 \times 2 = 32$

d $(x^3)^{-5} = x^{-15}$
$= \frac{1}{x^{15}}$

Simplifying Algebraic Expressions

Factorise a) $10x + 15$ b) $x^2 + 7x$

a) 5 is a factor to both 10x and 15.
Write the common factor 5 outside the brackets.
5(   )
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Write the common factor outside the bracket.
$x^2 + 7x = x(x + 7)$

Check your answer by expanding the brackets.
$5(2x + 3) = 10x + 15$ ✓

Knowledge Organiser

Subject	Year	Term	KO n.o.	Title
Mathematics	9	1	4A	Ch 4 Fractions, Decimals and Percentages

Multiplying non-unit fractions

Shade in 3 parts

Repeat it on this many rows

$\frac{3}{4} \times \frac{2}{3}$

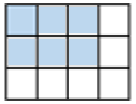
This many columns

This many rows

$$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$$

Parts shaded

Total number of parts in the diagram



Dividing any fractions

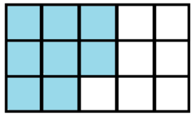
(Remember to use reciprocals)

$$\frac{2}{5} \div \frac{3}{4}$$

$$\frac{2}{5} \times \frac{4}{3}$$

Multiplying by a reciprocal gives the same outcome

Represented



$$= \frac{8}{15}$$

Decimals to Fractions

Write the decimal as a fraction with a denominator of 10,

$$0.4 = \frac{4}{10} = \frac{2}{5} \quad (\div 2)$$

$$0.65 = \frac{65}{100} = \frac{13}{20} \quad (\div 5)$$

Fractions to Decimals

Rewrite the fraction as an **equivalent fraction** with a denominator of 10, 100, or 1000

$$\frac{3}{5} = \frac{6}{10} = 0.6 \quad (\times 2)$$

$$\frac{7}{20} = \frac{35}{100} = 0.35 \quad (\times 5)$$

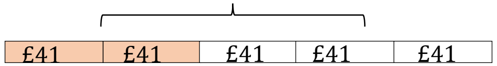
Fractions of amount

$\frac{2}{5}$ of of 205 .

The bar represents the whole amount

205

£205 ÷ 5 = £41



2 out of the 5 equal parts

2 x £41 = **£82**

Add/Subtraction fractions

$$\frac{4}{9} + \frac{2}{9} = \frac{6}{9} = \frac{2}{3}$$

We add/subtract the numerators

Simplify the answer (if possible)

Denominators need to be the same before we can add/subtract fractions

The denominator stays the same. We **never** add/subtract the denominator

Fractions to Decimals (with a calculator)

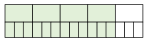
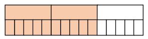
Divide the numerator by the denominator

$$\frac{5}{9} = 5 \div 9 = 0.5555.. = \mathbf{0.\dot{5}}$$

$$\frac{4}{11} = 4 \div 11 = 0.3636.. = \mathbf{0.\dot{3}\dot{6}}$$

Add/Subtraction any fractions

$$\frac{4}{5} - \frac{2}{3} =$$

 - 

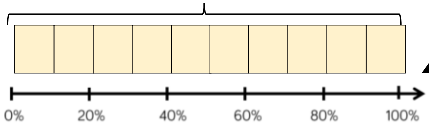
$$\frac{12}{15} - \frac{10}{15}$$

$$= \frac{2}{15}$$

Use **equivalent fractions** to find a **common multiple** for both denominators before you add/subtract the numerators

Find the percentage of an amount

The **whole** represents 100%



$10\% = \frac{1}{10}$ of the whole

$10\% = \frac{1}{10}$ of the whole

$50\% = \frac{5}{10} = \frac{1}{2}$ of the whole

$20\% = \frac{2}{10} = \frac{1}{5}$ of the whole

$5\% = \frac{1}{20}$ of the whole

Find 65% of 80

65% = 10% x 6 + 5%

= (8 x 6) + 4 = **52**

Find the percentage of an amount (Calculator methods)

Using a multiplier

Find 65% of 80

Fraction, decimal, percentage conversion

$65\% = \frac{65}{100} = \mathbf{0.65}$

0.65 x 80 = **52**

The multiplier

Using the percent button

Type **65**

Press SHIFT ((%)

This brings up the % button on screen. You will see 65%

Press ✕ 80 and then press =

You can also use the calculator to support non calculator methods and find 1% or 10% then add percentages together

Knowledge Organiser

Subject	Year	Term	KO n.o.	Title
Mathematics	9	1	4B	Ch 4 Fractions, Decimals and Percentages

Multiplying non-unit fractions

Shade in 3 parts

Repeat it on this many rows

$\frac{3}{4} \times \frac{2}{3}$

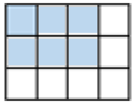
This many columns

This many rows

$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$

Parts shaded

Total number of parts in the diagram



Dividing any fractions

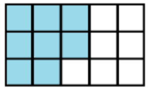
(Remember to use reciprocals)

$\frac{2}{5} \div \frac{3}{4}$

$\frac{2}{5} \times \frac{4}{3}$

Multiplying by a reciprocal gives the same outcome

Represented



$= \frac{8}{15}$

Decimals to Fractions

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$0.4 = \frac{4}{10} = \frac{2}{5}$ (÷ 2) (÷ 2)

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Fractions of amount

The bar represents the whole amount

$\frac{2}{5}$ of of 205 .

205

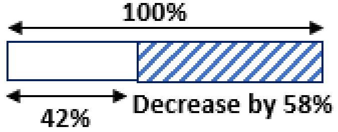
£205 ÷ 5 = £41

£41	£41	£41	£41	£41

2 out of the 5 equal parts

2 x £41 = **£82**

Percentage decrease: Multipliers



100% - 58% = **42%**

1.00 – 0.58 = **0.42**

Multiplier Less than 1

New amount = original amount x multiplier

Percentage increase: Multipliers

100% 12%

Increase by 12%

100% + 12% = **112%**

1.00 + 0.12 = **1.12**

Multiplier More than 1

New amount = original amount x multiplier

Fractions to Decimals (with a calculator)

Divide the numerator by the denominator

$\frac{5}{9} = 5 \div 9 = 0.5555.. = \mathbf{0.\dot{5}}$

$\frac{4}{11} = 4 \div 11 = 0.3636.. = \mathbf{0.\dot{3}\dot{6}}$

Add/Subtraction any fractions

$\frac{4}{5} - \frac{2}{3} =$

$\frac{12}{15} - \frac{10}{15}$

$= \frac{\mathbf{2}}{\mathbf{15}}$

Use **equivalent fractions** to find a **common multiple** for both denominators before you add/subtract the numerators

Find the percentage of an amount

The **whole** represents 100%

0% 20% 40% 60% 80% 100%

$10\% = \frac{1}{10}$ of the whole

$10\% = \frac{1}{10}$ of the whole $\quad 50\% = \frac{5}{10} = \frac{1}{2}$ of the whole

$20\% = \frac{2}{10} = \frac{1}{5}$ of the whole $\quad 5\% = \frac{1}{20}$ of the whole

Find 65% of 80

65% = 10% x 6 + 5%

= (8 x 6) + 4 = **52**

Find the percentage of an amount (Calculator methods)

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$65\% = \frac{65}{100} = \mathbf{0.65}$

0.65 x 80 = **52**

The multiplier

Using the percent button

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Press SHIFT ((%)

This brings up the % button on screen. You will see 65%

Press ✕ 80 and then press =

You can also use the calculator to support non calculator methods and find 1% or 10% then add percentages together

Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	9	1	4C	Ch 4 Fractions, Decimals and Percentages

Multiplying non-unit fractions

Shade in 3 parts

Repeat it on this many rows

$\frac{3}{4} \times \frac{2}{3}$

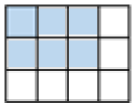
This many columns

This many rows

$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$

Parts shaded

Total number of parts in the diagram



Dividing any fractions

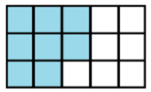
(Remember to use reciprocals)

$\frac{2}{5} \div \frac{3}{4}$

$\frac{2}{5} \times \frac{4}{3}$

Multiplying by a reciprocal gives the same outcome

Represented



$= \frac{8}{15}$

The reciprocal

When you multiply a number by its reciprocal the answer is always 1

$3 \times \frac{1}{3} = 1$

$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$

The reciprocal of 3 is $\frac{1}{3}$ and vice versa

Reciprocals for division

e.g

$5 \div \frac{1}{4} = 20$

$5 \times 4 = 20$

Multiplying by a reciprocal gives the same outcome

Repeated percentage change (for n years)

after 1 year...

Amount x multiplier

after 2 years...

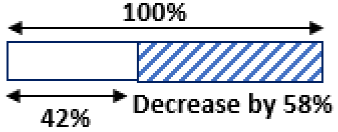
Amount x multiplier x multiplier

after 3 years...

Amount x multiplier x multiplier x multiplier

∴New Amount = Original Amount x Multiplier ^{n}

Percentage decrease: Multipliers



100% - 58% = **42%**

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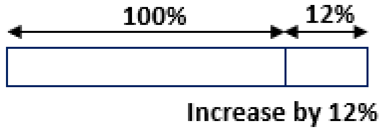
Multiplier

Less than 1

New amount = original amount x multiplier

Percentage increase: Multipliers



100% + 12% = **112%**

1.00 + 0.12 = **1.12**

Multiplier

More than 1

New amount = original amount x multiplier

Reverse percentages

Undo the effects of percentage increase/decrease

Now £16

$20\%\ off$

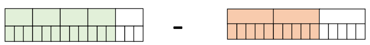
$Amount \times 0.8 = £16$

The **inverse operation** of multiplying by the multiplier is dividing by the multiplier

Original amount = new amount ÷ multiplier

Add/Subtraction any fractions

$\frac{4}{5} - \frac{2}{3} =$



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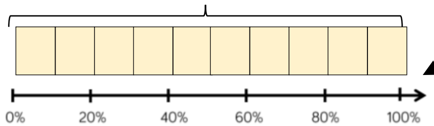

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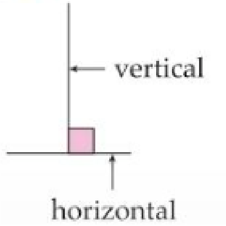
Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	9	1	5A	Ch 5 Angles and 2D shape

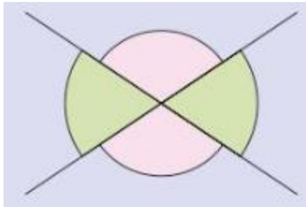
Angles and parallel lines

Parallel lines are always the same distance apart

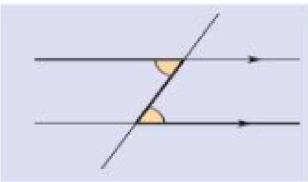
Perpendicular lines meet at right angles



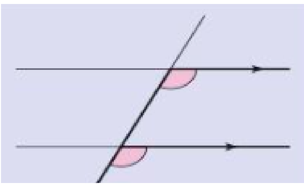
Vertically opposite angles **are equal**



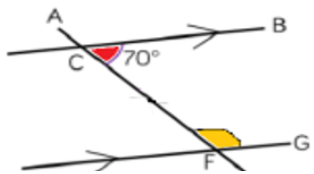
Alternate Angles are equal



Corresponding angles are equal

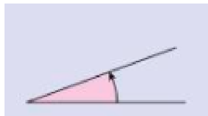


Co-interior angles add to 180°

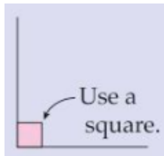


Angle Types

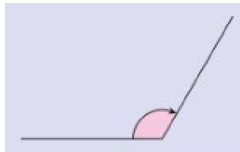
An **Acute** angle Is **smaller than 90°**



A **Right angle** is **exactly 90°**

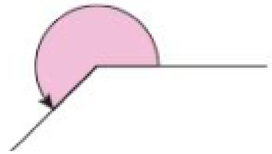


An **Obtuse Angle** is **between 90° and 180°**



Angles on a **straight line** is **exactly 180°**

Reflex angles are **more than 180° but less than 360°**

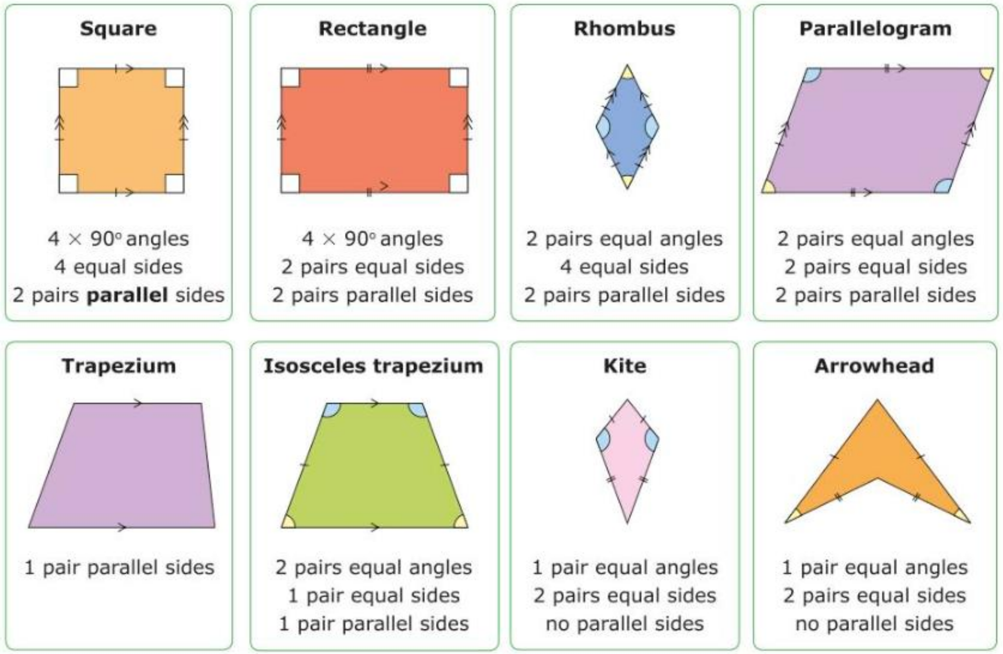


Notation:

ABC represents the angle from a to b to c.

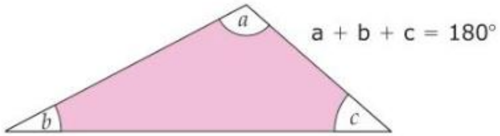
Line AB represents the line from a to B

2D Shapes

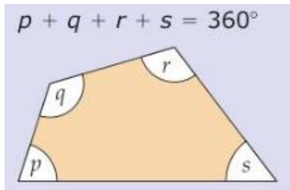


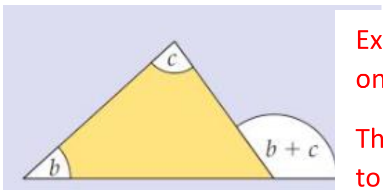
Angles in a triangle and quadrilateral

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



Interior angles of a **quadrilateral** add up to **360°**





Exterior angles are found by extending one side at the corner.

The exterior angle of a triangle adds up to the other 2 interior angles

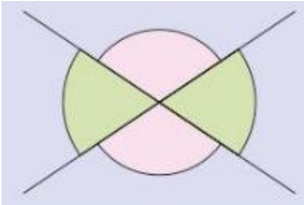
Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	9	1	5B	Ch 5 Angles and 2D shape

Angles and parallel lines

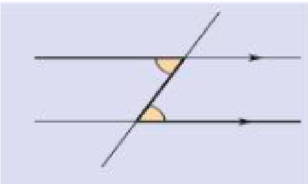
Parallel lines are always the same distance apart

Perpendicular lines meet at right angles

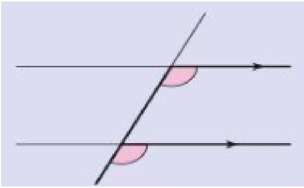
Vertically opposite angles **are equal**



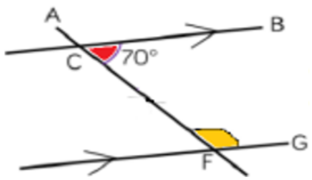
Alternate Angles are equal



Corresponding angles are equal

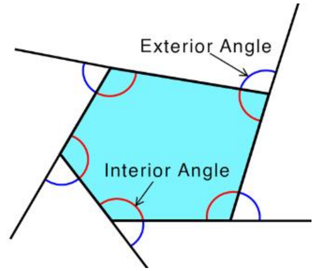


Co-interior angles add to 180°



Interior and exterior angles

Interior angles + exterior angle = 180°
The exterior angles of any polygon add up to 360°
A regular shape has equal sides and angles

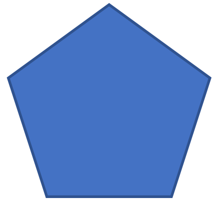


Missing Angles in regular Polygons

Exterior angles = 360 ÷ n

Sum of Interior angles = (n-2) x 180

Regular interior angle = ((n-2) x 180) ÷ n



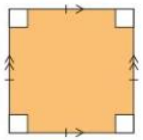
Example: A regular pentagon:

Exterior angles = 360 ÷ 5 = 72°

Regular interior angle = ((n-2) x 180) ÷ n = ((5-2) x 180) ÷ 5 = 108°

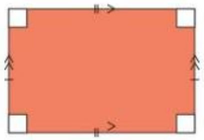
2D Shapes

Square



4 × 90° angles
4 equal sides
2 pairs **parallel** sides

Rectangle

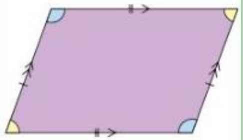


4 × 90° angles
2 pairs equal sides
2 pairs parallel sides

Rhombus

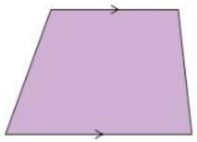
2 pairs equal angles
4 equal sides
2 pairs parallel sides

Parallelogram



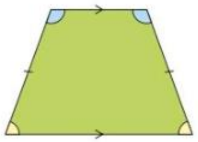
2 pairs equal angles
2 pairs equal sides
2 pairs parallel sides

Trapezium



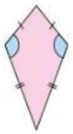
1 pair parallel sides

Isosceles trapezium



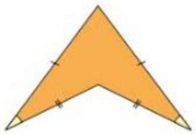
2 pairs equal angles
1 pair equal sides
1 pair parallel sides

Kite



1 pair equal angles
2 pairs equal sides
no parallel sides

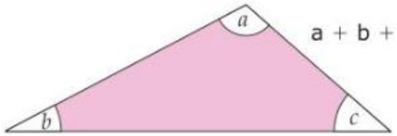
Arrowhead



1 pair equal angles
2 pairs equal sides
no parallel sides

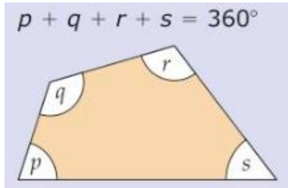
Angles in a triangle and quadrilateral

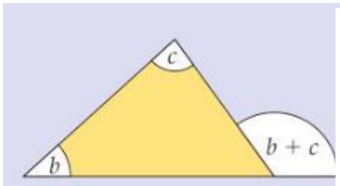
Angles in a **triangle** adds up to **180°**



$a + b + c = 180°$

Interior angles of a **quadrilateral** add up to **360°**





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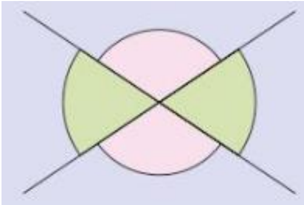

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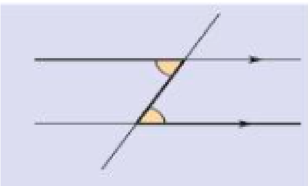
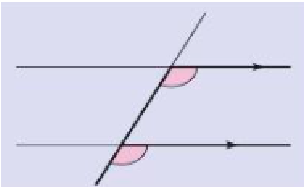


Corresponding angles are equal



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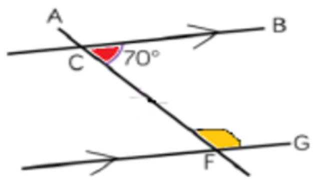

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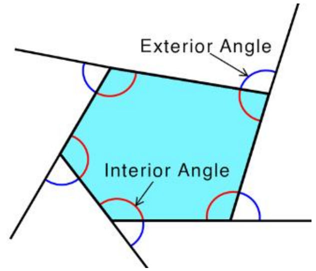

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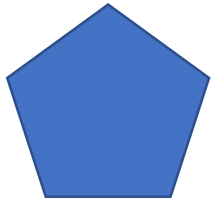

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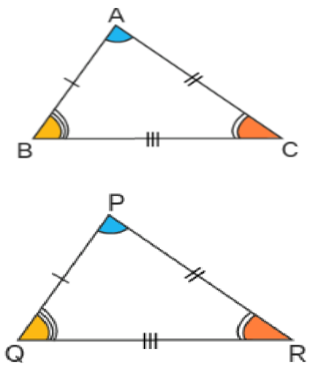
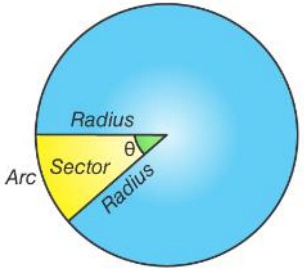
Congruent Shapes

Congruent shapes are identical in size and shape. They can be rotations or reflections of each other. Congruent shapes are identical with corresponding angles and sides the same size.



Arcs and Sectors



Circumference = 2πr

Arc length = (Ɵ ÷ 360) x 2πr

Area of a circle = πr^2

Area of sector = (Ɵ ÷ 360) x πr^2

Angles in a triangle and quadrilateral

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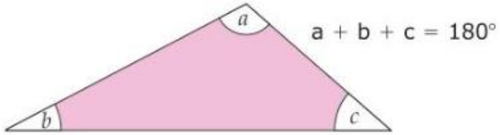

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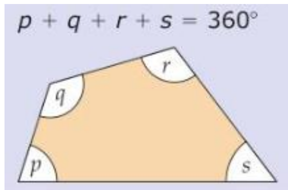

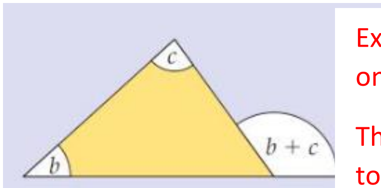

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