

Year 7 - Mathematics ...

Milestone Assessment 1

Speak Like a Mathematician

- Integer** - A whole number that is positive or negative
- Place value** - The value of a digit depending on its position in a number
- Decimal** - A number with a decimal point used to separate ones and tenths
- Commutative** - Changing the order of the operations does not change the result
- Product** - The result of multiplying
- Divisor** - The number we divide by
- Polygon** - A 2D shape made with straight lines
- Quadrilateral** - A four-sided shape
- Perimeter** - The distance / length around a 2D-shape

Integer Place Value

Billions		Millions		Thousands		Ones	
H	T	H	T	H	T	H	T
		3	1	4	8	0	3
						3	0
						2	9

Placeholder

Three billion, one hundred and forty eight million, thirty three thousand and twenty nine
 1 billion 1,000,000,000
 1 million 1,000,000

Mental methods for multiplication/ division

Multiplication is commutative



Partitioning can help multiplication
 $24 \times 6 = 20 \times 6 + 4 \times 6$
 $= 120 + 24$
 $= 144$

$$2 \times 4 = 4 \times 2$$

Division is not associative

The order of multiplication does not change the result

Chunking the division can help $4000 \div 25$
 "How many 25's in 100" then how many chunks of that in 4000

Mental methods for addition/ subtraction

Addition is commutative



Subtraction the order has to stay the same

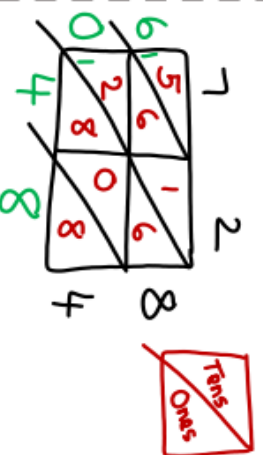
$$350 - 147 = 350 - 100 - 40 - 7$$

- Number lines help for addition and subtraction
- Working in 10's first aids mental addition/ subtraction

The order of addition does not change the result

Multiplication methods - Chinese Grid

$$72 \times 84 = 6048$$



Addition/ Subtraction with integers



Modelling methods for addition/ subtraction

- Bar models
- Number lines
- Part/ Whole diagrams

Addition is commutative



The order of addition does not change the result

Subtraction the order has to stay the same

$$350 - 147 = 350 - 100 - 40 - 7$$

- Number lines help for addition and subtraction
- Working in 10's first aids mental addition/ subtraction
- Show your relationships by writing fact families

Formal written methods

H	T	O
1	8	7
+	5	4
		2

H	T	O
	4	2
-	2	4
		9

Remember the place value of each column
 You may need to move 10 ones to the ones column to be able to subtract

Properties of Quadrilaterals

Square
All sides equal size
All angles 90°
Opposite sides are parallel

Rectangle
All angles 90°
Opposite sides are parallel

Rhombus
All sides equal size
Opposite angles are equal

Parallelogram
Opposite sides are parallel
Opposite angles are equal
Co-interior angles

Trapezium
One pair of parallel lines

Kite
No parallel lines
Equal lengths on top sides
Equal lengths on bottom sides
One pair of equal angles

Solve problems with perimeter

Perimeter is the length around the outside of a polygon

The triangle has a perimeter of 25cm
Find the length of x

8cm + 8cm + x cm = 25cm
16cm + x cm = 25cm
 x cm = 9cm

Parallel and Perpendicular lines

Parallel lines
Straight lines that never meet
(Have the same gradient)

Perpendicular lines
Straight lines that meet at 90°

Polygons

- | | | | | | |
|---|-----------------|---|------------|----|-----------|
| 3 | - Triangle | 5 | - Pentagon | 8 | - Octagon |
| 4 | - Quadrilateral | 6 | - Hexagon | 9 | - Nonagon |
| | | 7 | - Heptagon | 10 | - Decagon |

If all the sides and angles are the same, it is a **regular** polygon

Multiply/Divide by powers of 10

$3000 \times 100 = 300000$

$3 \times 100 = 300$

$0.03 \times 100 = 3$

Repeated multiplication and division by powers of 10 is commutative.

$\div 10$ then $\div 10 \rightarrow \div 100$

Letter and labelling convention

The letter in the middle is the angle
The arc represents the angle

Angle Notation three letters ABC
This is the angle at B = 115°

Line Notation two letters EC
The line that joins E to C

Types of triangles

Equilateral triangle
All sides and angles are equal

Isosceles triangle
2 sides and 2 angles are equal

Scalene triangle
Unequal sides and angles

Right angled triangle
Could be an isosceles or scalene triangle

Mental methods for decimals

Multiplying by a decimal < 1 will make the original value smaller eg $x 0.1 = \div 10$

Methods for multiplication 12×0.03

$12 \times 3 = 36$	$12 \times 3 = 36$
$12 \times 0.3 = 3.6$	$12 \times 0.3 = 3.6$
$12 \times 0.03 = 0.36$	$12 \times 0.03 = 0.36$

Methods for addition $2.3 + 2.4$

$2 + 2 = 4$	$0.3 + 0.4 = 0.7$
$4 + 0.7 = 4.7$	

Methods for division $15 \div 0.05$

Multiply by powers of 10 until the divisor becomes an integer

$1.5 \div 0.05$	$150 \div 5 = 30$
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Decimals

We say "ought point five two"

Five tenths and two hundredths

0 ones, 5 tenths and 2 hundredths
 $0 + 0.1 + 0.1 + 0.1 + 0.1 + 0.01 + 0.01$
 $= 0 + 0.5 + 0.02$
 $= 0.52$

Decimal intervals on a number line

One whole split into 10 parts makes tenths = 0.1
One tenth split into 10 parts makes hundredths = 0.01

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

0.02 0.04 0.06 0.08 0.1

0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2

Addition/ Subtraction with decimals

The decimal place acts as the placeholder and aligns the other values

0 can be used to fill empty places with value

5.43 + $\frac{8}{10}$

Revisit Fraction - Decimal equivalence
5.43 + 0.8

Metric conversions

Useful Conversions

$\text{mm} \xrightarrow{\div 10} \text{cm} \xrightarrow{\div 100} \text{m} \xrightarrow{\div 1000} \text{km}$

$\text{g} \xrightarrow{\div 1000} \text{kg}$

$\text{m} \xrightarrow{\div 1000} \text{L}$

Year 7 - Mathematics . . .

Milestone Assessment 2

Speak Like a Mathematician

- Average** - A measure of central tendency: typical value of all data together
- Spread** - The variation of data
- Integer** - A whole number that is positive or negative
- Decimal** - A number with a decimal point used to separate ones and tenths
- Place holder** - We use 0 as a place holder to show that there are none of a particular place in a number
- Negative** - Any number less than 0: written with a minus sign
- Round** - Making a number simpler but keeping the value close to what it was
- Area** - The space inside a 2D shape
- Perpendicular height** - The height of a shape that meets the base at a 90° angle

Mode *The most common*

Example: 6, 9, 3, 2, 6, 8

Mode: 6

Some data sets may not have a mode = 'no mode'

Median *The middle value*

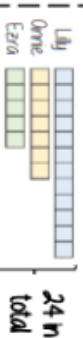
Example 1 Median: put the n order 3 4 8 9 12
4 3 9 8 12 find the middle number 3 4 **8** 9 12

Example 2 Median: put the n order 137 148 **150** 154 158 160
150 154 148 160 137 160 There are 2 middle numbers
137 160 Find the midpoint

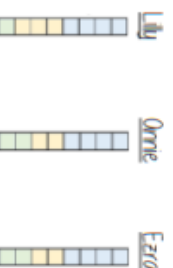
Mean problems

Mean - a measure of average
It gives an idea of the central value

Lilly, Orrie and Ezra have the following cubes



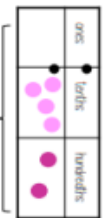
Finding the mean amount is the average amount each person would have if shared out equally



The mean number of books would be 8 each

Decimals

We say
'naught part the two'



Five tenths and two hundredths
 $0 \cdot 01 + 0 \cdot 01 + 0 \cdot 01 + 0 \cdot 01 + 0 \cdot 01 + 0 \cdot 01$
 $= 0 \cdot 05 + 0 \cdot 02$
 $= 0 \cdot 07$

Comparing decimals

Which the largest of 0.3 and 0.23?

Ones	Tenths	hundredths
		
		
Ones	Tenths	hundredths
		
		

0.3 > 0.23
 There are more tenths in the first column to the left
0.30
 Comparing the values both with the same number of decimal places is another way to compare the number of tenths and hundredths

Compare integers using <, >, =, ≠

< less than Two and a half million 2 500 000
 > greater than 300 000 000 300 000 000
 = equal to Six thousand and eighty 68 000
 ≠ not equal to

Range

Spread of the values

Difference between the biggest and smallest

3 9 8 12

Range: Biggest value - Smallest value

12 - 3 = 9

Range = 9

Round to decimal places

2.46192 → Focus on the numbers after the decimal point

"To 1dp" - to one number after the decimal
 "To 2dp" - to two numbers after the decimal

2.46192 (to 1dp) - is the closer to 2.4 or 2.5

2.4

↑

2.5

2.46192 The shows the number is closer to 2.5

2.46192 (to 2dp) - is the closer to 2.46 or 2.47

2.46

↑

2.47

2.46192 The shows the number is closer to 2.46

Rounding to the nearest power of ten

If the number is halfway between we "round up"

5495 to the nearest 1000
5000

↑

6000

5400

↑

5500

5470

↑

5480

5475 to the nearest 100

5475 to the nearest 10



Perform calculations that cross zero

Number lines are useful to help you visualize the calculation crossing 0

$$4 - 6 = -2$$



Use the number line to guide subtraction of 6

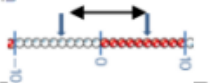
$$-5 + 5 = 0$$

Rearrangements of the same equation

$$5 - 5 = 0$$



Find the difference between 6 and -4
From 6 to 0
From 0 to -4
10 steps between them



Odd directed numbers

$$2 + -4 = -2$$



Zero pair (-1 + 1 = 0)

Two '-1' left

$$8 + -3 = 5$$



Partitioning

$$8 + -3 = 5$$

$$5 + 3 + -3 = 5$$

Partition the value to create a zero pair calculation

Corollation

Subtract directed numbers



Representation for calculation

$$2 - -1 = 3$$

Take away one

2

"Subtract" means like away or remove

3

Start with the representation of 2

$$2 - -3 = 5$$



Corollation

5

Multiply/Divide directed numbers



Two representations of the same calculation

$$2 \times -3 = -6$$

Negative, Negative calculation

$$-2 \times -3$$



The act of making counters into their negatives turning them over

This is the negative of 2×-3

$$-2 \times -3 = 6$$

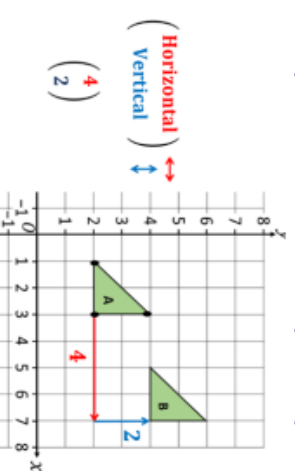
Disorders are the inverse operations

Transformations

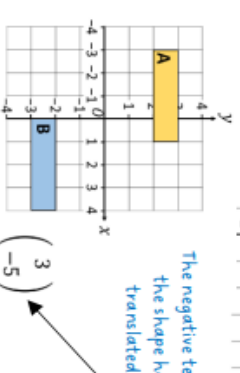
Translating a shape means to move the position of a shape

We use a column vector to translate shapes

Examples to show translation of shape A to shape B



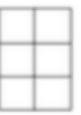
The negative tells us that the shape has been translated down



Area problems

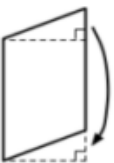
Rectangle

Base x Perpendicular height



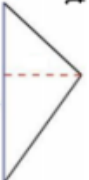
Parallelogram/ Rhombus

Base x Perpendicular height



Triangle
1/2 x Base x Perpendicular height

A triangle is half the size of the rectangle it would fit in



Adding and subtracting with negatives

+ - = smaller

-- = bigger

$$-10 - 4 = -14$$

Start value

make -10 bigger by 4

Start value