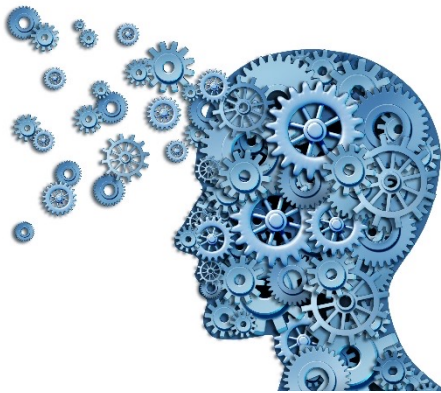


Kettlethorpe HIGH SCHOOL

MATHS
Year 7 | Pi

Name:

Set:



Unit	Topic	Complete
1	Calculating	
2	Time and Timetables	
3	Expressions, Functions and Formulae	
4	Fractions, Decimals and Percentages	
5	Working with Money	
6	Theoretical Probability	
7	Angles and lines	
8	Ratio and Proportion	
9	Sequences	
10	Averages	

Pi Unit 1: Calculating

Adding

Use a column method to add.
Make sure you line up the place value correctly.
E.G. $87 + 342 = 429$

		8	7	
+	3	4	2	
	4	2	9	

Add downwards,
start at the right.

↓

If you have more than 9 you need to carry.

Subtracting

Use a column method.
Make sure you line up the place value correctly.
You may need to borrow from the previous column.
E.G. $167 - 38 = 129$

		5	1	
	1	6	7	
+		3	8	
	1	2	9	

You can't subtract 8 from 7, so you must borrow from the next column.

Multiplying

Use a column method to multiply.
E.G. $45 \times 23 = 1035$

		4	5	
x		2	3	
	1	3	5	
+	9	0	0	
	1	0	3	5

Remember the place holder.

Add your answers together.

Dividing

Use the bus stop method for short division.
E.G. $546 \div 3 = 182$

	1	8	2	
3	5	2	4	6

$5 \div 3 = 1$ remainder 2

Literacy

Can you unscramble these words to make maths words?

tbusarc

tylmulip

viidde

Problem Solving

Jay, Mel and Kai made 80 toffee apples to sell at the school open day.

Jay sold 12, Mel sold 25 and Kai sold 17.
How many toffee apples were left?

Fluency

Work out each of the following:

$34 + 62$

$751 + 184$

$369 + 83$

$95 - 34$

$836 - 244$

$175 - 73$

Reasoning

There are 100 children in a village school.
Ken buys 1 large box and 2 small boxes
of chocolates.

Each large box has 46 chocolates.

Each small box has 24 chocolates.

Does Ken buy enough chocolates for
each child to have one?

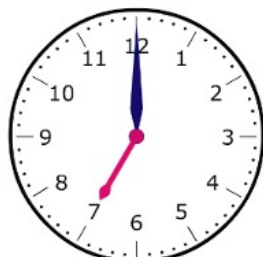
Pi Unit 2: Time and Timetables

Telling the Time

On an analogue clock:
The big hand tells the hours. The little hand tells the minutes.



Half past 3.



7 o'clock.

An analogue clock does not tell you if it is am (morning) or pm (afternoon).

On a digital clock:
Times may be in the 12 hour clock or 24 hour clock.
For am (morning) the time doesn't change.

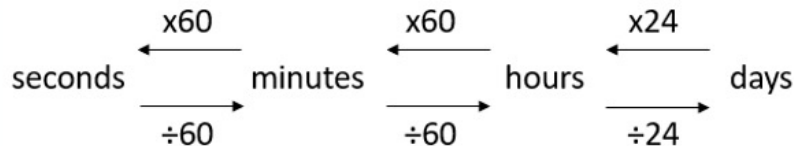


For pm (afternoon), to get from the 24 hour clock to the 12 hour clock take 12 hours away.



Converting Units of Time

Use this chart to help remember whether to multiply or divide.



E.G.

$$480 \text{ minutes} \div 60 = 8 \text{ hours}$$

$$250 \text{ seconds} \div 60 = 4 \text{ minutes } 10 \text{ seconds}$$

Reading Timetables

Timetables are normally used to tell you when buses or trains depart, and the routes they take.
Timetables are in the 24 hour clock.

Centre, Rupert Street	0830 0845 0900 0915
Montpelier, Colston Girls School	0838 0853 0908 0923
Filton Avenue, Lockleaze Road	0851 0906 0921 0936
Bristol Parkway Station	0907 0922 0937 0951

E.G. the 8.45am bus from Centre, Rupert Street gets to Bristol Parkway at 9.22am

Literacy

Write down 5 more words that have the word 'TIME' in them.

e.g. MARITIME

CENTIMETRE

TIMETABLE

Fluency

1. Write these times using the twenty-four hour clock:

a) 7:35 am

b) 3:20 pm

c) 11:45 pm

2. Write these times using the 12-hour clock:

a) 08:30

b) 17:55

c) 16:40

3. Work out the length of each journey shown in the table:

Starting Time	Finishing Time	Length of time taken for the journey
07:20	10:45	
11:15	17:37	

Problem Solving

Jack finished a sponsored run in 53 minutes and 5 seconds.

1) Ally finished 3 minutes 50 seconds after Jack. How long did Ally take?

2) Ali finished the run 8 minutes 15 seconds before Jack. How long did Ali take?

Reasoning

Sam goes to watch a film that lasts 2 hours 30 minutes including adverts.

The film starts at 5.55pm. He wants to get the 20.30 bus home.

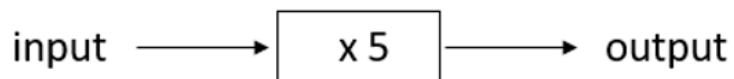
Can he make this bus?

Pi Unit 3: Expressions, Functions and Formulae

Function Machines

To use a function machine you must perform the operation (or operations) in the machine to the input to get the output.

E.G.

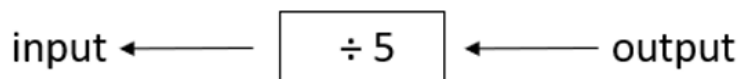


If the input is 2: $2 \times 5 = 10$ The output is 10

If the input is 9: $9 \times 5 = 45$ The output is 45

If you know the output, work backwards doing the **inverse** to find the input:

I.e. The inverse of $\times 5$ is $\div 5$ so $\div 5$ instead.



If the output is 20: $20 \div 5 = 4$ The input is 4.

Simplify Expressions

To add expressions, add the same letters together.

Remember just a letter means 1 of them (1m is written as m).

E.G.

$$e + e + e + e = 4e$$

$$3a + 2a + 5a = 10a$$

$$4g + 3h + 2g + 5h = 6g + 8h$$

$$5k + 3j + k + 9j = 6j + 12k$$

Substitute into Worded Formulae

You need to replace the word with the information given to find the answer.

E.G. To find Sarah's age you add 3 onto Tom's age.

If Tom is 5, how old is Sarah?

$$5 + 3 = 8 \text{ so Sarah is 8}$$

If Tom is 40, how old is Sarah?

$$40 + 3 = 43 \text{ so Sarah is 43}$$

Literacy

Write down 5 more words that have the maths word 'term' in them.

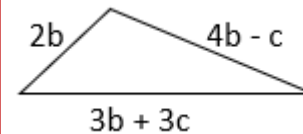
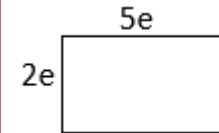
E.G. **terminate**

Watermelon

Problem Solving

Write down a simplified expression for the perimeter of these shapes:

HINT: Add the sides.



Fluency

Simplify each of the following expressions:

a) $K + K + K$

b) $2e + 5e + 3e$

c) $7m + 2m - 4m$

d) $2a + 5b + 3a + 4b$

e) $4v + 3g + 2v + 9g$

f) $5m + 2d - 4m + 3d$

Reasoning

Explain in your own words why $3a - a$ can be simplified, but $3a - b$ cannot.

Pi Unit 4: Fractions, Decimals and Percentages

Calculate with Percentages

- To find 10%, divide the original by 10.
- To find 50% divide the original by 2.
- To find 1% divide the original by 100.

E.G. find 60% of £80. (60% = 50% + 10%)

$$50\% = £80 \div 2 = £40$$

$$10\% = £80 \div 10 = £8$$

$$60\% = £40 + £8 = £48$$

Fractions of Amounts

To find a fraction of an amount you need to:

- Divide by the denominator.
- Multiply by the numerator.

E.G. Find $\frac{1}{3}$ of 15.

$$15 \div 3 = 5$$

E.G. Find $\frac{3}{4}$ of 60.

$$60 \div 4 = 15$$

$$15 \times 3 = 45$$

Mixed Numbers

A mixed number is another way to write an improper fraction.

To convert to a mixed number you need to see how many times the denominator fits into the numerator. Then see how many you have left over.

To convert from a mixed number multiply the whole number by the denominator and add the numerator back on.

E.G.

$$\frac{14}{5} = 2\frac{4}{5} \qquad 3\frac{2}{7} = \frac{23}{7}$$

Equivalent Fractions

To find an equivalent fraction you must multiply both the numerator and the denominator by the same value.

E.G.

$$\frac{1}{2} \overset{\times 2}{=} \frac{2}{4}$$

$$\frac{3}{5} \overset{\times 4}{=} \frac{12}{20}$$

Literacy

In your own words, describe what each of the following mean:

Numerator

Denominator

Mixed number

Problem Solving

Sam has 40 pears. Sam eats $\frac{1}{4}$ of his pears, how many pears does Sam have left?

Fluency

Work out the following fractions of amounts:

1) $\frac{1}{2}$ of 80

2) $\frac{1}{4}$ of 400

3) $\frac{1}{3}$ of 90

4) $\frac{2}{5}$ of 40

5) $\frac{3}{4}$ of 200

6) $\frac{3}{8}$ of 240

Reasoning

James and Lucia both get some money.

James gets $\frac{3}{5}$ of £400.

Lucia gets $\frac{7}{10}$ of £600.

Who do you think gets more money? Why?

Pi Unit 5: Working with Money

Adding and Subtracting Money

Remember when adding or subtracting money, the values have to be in the same units. You may need to use decimals for pence.

E.G. Find £2.50 + 84p

1) Change 84p to £0.84

$$\begin{array}{r} 2 \cdot 5 \quad 0 \\ + \quad \cdot 8 \quad 4 \\ \hline 3 \cdot 3 \quad 4 \\ \hline 1 \end{array}$$

$$\text{£}2.50 + 84\text{p} = \text{£}3.34$$

Converting Money Units

Remember £1 = 100p.

To change from pounds (£) to pence (p) you need to multiply by 100.

$$\text{E.G. } \text{£}8 \times 100 = 800\text{p} \qquad \text{£}1.12 \times 100 = 112\text{p}$$

To change from pence (p) to pounds (£) you need to divide by 100.

$$\text{E.G. } 400\text{p} \div 100 = \text{£}4 \qquad 45\text{p} \div 100 = \text{£}0.45$$

Calculating Change

There are two ways to calculate change.

i) Subtract the spent amount from the amount being paid with.

E.G. Find the change from £5 when you spend £2.35.

$$\begin{array}{r} 4 \quad 5 \cdot 10 \quad 10 \\ - 2 \cdot 3 \quad 5 \\ \hline 2 \cdot 6 \quad 5 \end{array}$$

$$\text{£}5.00 - \text{£}2.35 = \text{£}2.65$$

ii) Using the shopkeeper method of counting up from the spent amount to the amount being paid with.

E.G. In a shop you spend £1.72 on a bottle of water and an apple.
How much change should you get from £5?

$$\begin{array}{ccccccc} \text{£}1.72 & & \text{£}1.80 & & \text{£}2.00 & & \text{£}5.00 \\ & \underbrace{\hspace{1cm}} & & \underbrace{\hspace{1cm}} & & \underbrace{\hspace{1cm}} & \\ & +8\text{p} & & +20\text{p} & & +\text{£}3.00 & \end{array}$$

$$+\text{£}3.00 + 20\text{p} + 8\text{p} = \text{£}3.28 \text{ change}$$

Literacy

Can you write down the names of 10 different currency's and the country they are for?

E.G. UK = great British pounds

Problem Solving

Mike is paid £9 per hour. The table shows the hours that he worked one weekend. How much did he earn on this weekend?

	Start time	End time
Saturday	08:30	16:30
Sunday	09:00	14:00

Fluency

- Jay buys two cans of pop, each costs 65p. He pays with a £2 coin. How much change will he get?
- A shop-owner buys 60 choco bars costing 24p each. What is the total cost?
- A box of eggs in a store costs £1.30. Olivia has £10 and wants to buy as many boxes of eggs as possible. How many boxes of eggs can she buy?

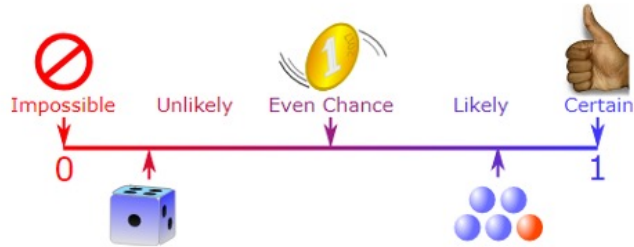
Reasoning

Jacob has managed to save £180 last year. He is planning to buy tickets for 2 festivals this year. The festivals cost £85 and £92 each. Does Jacob have enough money to buy his festival tickets?

Pi Unit 6: Theoretical Probability

Probability Scale

The probability scale is between 0 and 1.



Calculating Probability

$$P(\text{event}) = \frac{\text{Number of ways the event can occur}}{\text{Total number of outcomes}}$$

E.g. The probability of rolling a 6 on a normal dice.

Number of ways the event can occur = 1

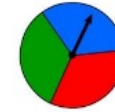
Total number of outcomes = 6

$$P(\text{Roll } 6) = \frac{1}{6}$$

Listing Outcomes

You need to list all possible combinations (outcomes).
E.G.

You are spinning a fair spinner with red, blue, green on, and you are rolling a fair dice.



Possible Outcomes are:

Red 1	Blue 1	Green 1
Red 2	Blue 2	Green 2
Red 3	Blue 3	Green 3
Red 4	Blue 4	Green 4
Red 5	Blue 5	Green 5
Red 6	Blue 6	Green 6

There are 18 outcomes in total.

The probability of each outcome is $\frac{1}{18}$.

Question: What is the probability of rolling a 5 or 6 and spinning blue.

Answer: There are two choices we that satisfy the conditions:

Blue 5 Blue 6

So our probability is $\frac{2}{18}$ which we should simplify to $\frac{1}{9}$

Literacy

Write down the definition of the following key probability language:

Even chance

Impossible

Certain

Problem Solving

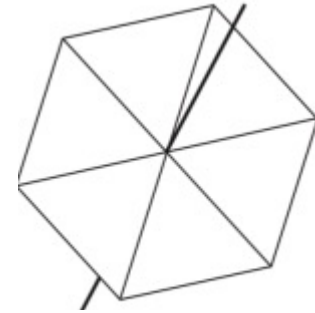
Zoe has a fair 6 sided spinner.

She wants to label it with letters A, B, C

The probability of getting A is $\frac{1}{2}$

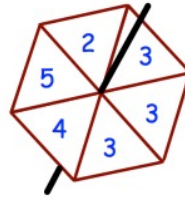
The probability of getting B is $\frac{2}{6}$

Label the spinner for Zoe.



Fluency

1) Amir makes a fair spinner with six sectors.



Use a word from the box which best describes the probability of each of the following events

IMPOSSIBLE UNLIKELY EVEN CHANCE LIKELY CERTAIN

(a) The spinner will land on 6

(b) The spinner will land on 3

(c) The spinner will land on 2

2) In a bag there are 4 white marbles, 7 black marbles and 9 colored marbles, what is the probability of picking a white marble?

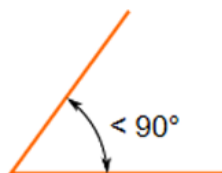
Reasoning

Sam says that the probability of rolling a 2 on a dice is $\frac{1}{5}$ because there is only one 2 and five other numbers. Comment on Sam's mistake.

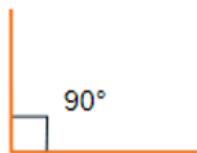
Pi Unit 7: Angles and Lines

Types of Angles

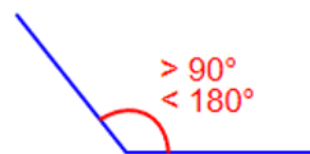
Acute angles are less than 90°



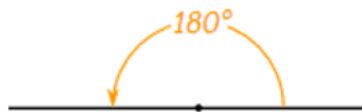
Right angles are exactly 90°



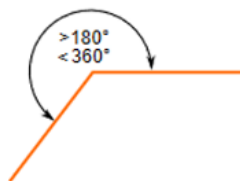
Obtuse angles are between 90° and 180°



Straight lines are exactly 180°



Reflex angles are bigger than 180°



A full turn is exactly 360°



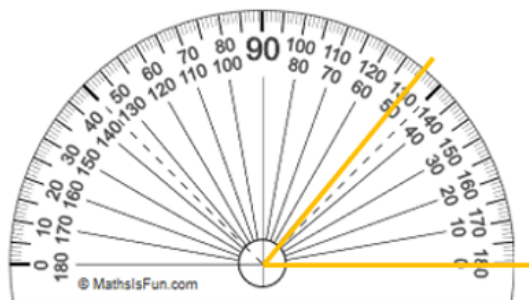
Metric Measures

Key metric units of measure:

Length	Capacity	Mass
Millimetres (mm)	Millilitres (ml)	Grams (g)
Centimetres (cm)	Centilitres (cl)	Kilograms (kg)
Metres (m)	Litres (l)	
Kilometres (km)		

Using a Protractor

You should be able to measure and draw acute angles accurately – e.g. draw a 50° angle.



Literacy





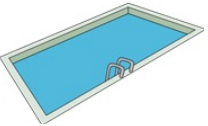

What is an acute angle?

What is an obtuse angle?

What is a reflex angle?

Fluency

Write down which units you think you would use to measure each of the following:

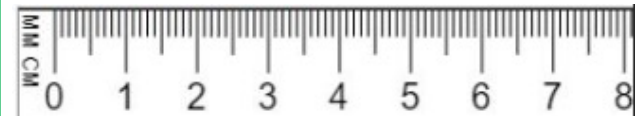
<p>Weight of a plane</p>  <p>747 Jumbo Jet</p>	<p>Width of your maths book</p> 	<p>Weight of your pen</p> 
<p>Distance round a park</p> 	<p>Volume of a swimming pool</p> 	<p>Volume of coke in a</p> 

Problem Solving

- a) Jane runs 5000m.
Bryan runs 3.5km.
Who runs further? How much further?
- b) Leon has a 3m rope and a 150cm rope,
how long is this in total?

Reasoning

Look at the ruler below, explain how it can be used to convert between cm and mm.



Pi Unit 8: Ratio and Proportion

Simplifying Ratio

- Find the Highest Common Factor (HCF) of the two sides of the ratio.
- Divide each side by the HCF to get the ratio in its simplest form.

E.G.

HCF of 15 and 21 = 3

$$15 : 21 = 5 : 7$$

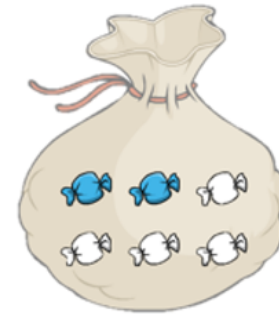
$15 \div 3 = 5$ $21 \div 3 = 7$

Writing Ratios

The colon means 'to'. You need to write:
amount of first item : amount of second item

E.G. In the bag there are 2 blue sweets and 4 white sweets.

The ratio of
blue sweets : white sweets
2 : 4



Direct Proportion

Use the unitary method to find 1 first (this is the unit).

Multiply the unit to calculate other amounts.

E.G. 5 pens cost 80p, find the cost of 7 of the pens.

$$5 \text{ pens} = 80\text{p} \quad (80\text{p} \div 5 = 16\text{p})$$

$$1 \text{ pens} = 16\text{p} \quad (16\text{p} \times 7 = 112\text{p})$$

$$7 \text{ pens} = 112\text{p} \text{ or } \text{£}1.12$$

Fractions and Ratio

The denominator of the fraction is the total number of parts added together.

E.G.

$$4 : 3 = \frac{4}{7} : \frac{3}{7}$$

$4 + 3 = 7$

Literacy

The word **ration** contains the word **ratio**.

What other words can you think of that contain **ratio**?:

Problem Solving

Use your knowledge of ratios to simplify each of these real-life ratios.

HINT: Make the units match first

a) 50p: £3

b) 30mm:9cm

c) 1hour : 20 minutes

Fluency

1) In a bag there are 10 red marbles and 7 blue marbles.

Write the ratio of red to blue marbles.

2) Simplify the following ratios fully:

a) 3:6

b) 15:5

c) 12:36

d) 20:44

d) 6:8:14

e) 12:48:60

f) 10 : 30 : 45

Reasoning

The cost of 3 chocolate bars is £1.80.

Mrs Kaye wants to buy enough chocolate bars for 5 children.

Mrs Kaye has £3, does she have enough money to buy 5 of the chocolate bars?

Pi Unit 9: Sequences

Nth Term

The n th term is the rule that tells us how to find any term in the arithmetic sequence (**position – to – term rule**).

Step 1: find what amount the sequence is increasing (or decreasing) by from term-to-term. The sequence is linked to this multiplication table and is the start of your rule.

Step 2 : Write this multiplication table above the sequence.

Step 3: Find how to get from the multiplication table to the sequence for each term, this is the end of your rule.

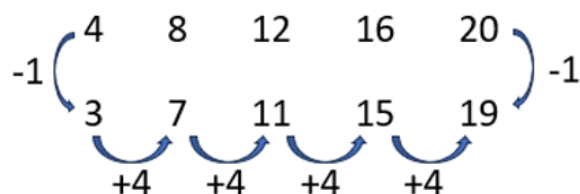
E.G. Find the n th term for 3, 7, 11, 15, 19, ...

1: Sequence goes up by 4 so the n th term starts $4n$.

2: Write out 4, 8, 12, 16, 20, ... above the sequence.

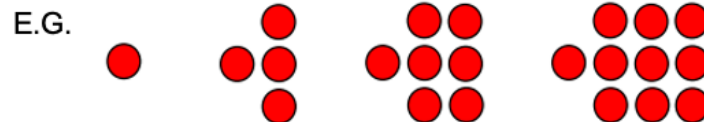
3: The sequence is 1 less than the 4 times table so the n th term ends -1 .

So the n th term = $4n - 1$



Pattern sequences

Pattern sequences are a sequence of diagrams that follow a pattern. You can find the next pattern in the sequence, or the n th term for the sequence.



Generating a Sequence

You generate a sequence from by substituting into the n th term (**position – to – term rule**).

1st term $n = 1$, 2nd term $n = 2$, etc.

E.G. Generate the sequence $2n + 4$.

1st term = $2 \times 1 + 4 = 6$

2nd term = $2 \times 2 + 4 = 8$

3rd term = $2 \times 3 + 4 = 10$

4th term = $2 \times 4 + 4 = 12$

Sequence = 6, 8, 10, 12, ...

Term to Term rule

A **term to term** rule describes how to get from one term to the next.

E.G. What is the term to term rule for the sequence 3, 12, 21, 30, 39, ... ?

The sequence goes up by 9 each term.

The rule is $+9$.

Literacy

What is a term-to-term rule?

What is a pattern sequence?

Fluency

- 1) Describe what's happening in the sequences below.
- 2) Find the next 2 terms for the sequences below.

a) 4, 7, 10, 13, 16...

b) 2, 6, 10, 14, 18...

c) 5, 9, 13, 17, 21....

d) 27, 25, 23, 21, 19...

Problem Solving

a) Draw the next pattern in this sequence



b) Describe what's happening to the pattern involving dots.

c) How many dots would be in the next term of the sequence?

Reasoning

Will there be an odd number in this sequence 2, 6, 10, 14, 18...?
Explain how you know.

Pi Unit 10: Averages and Data

Range

Range: Biggest value subtract smallest value.
E.G. Find the range for the following numbers:
5, 9, 3, 4, 11, 6, 8, 5

$$\text{Range} = 11 - 3 = 8$$

Mean

Mean: Add the values together then divide by how many values there are.

E.G. Find the mean of 5, 9, 3, 4, 11, 6, 8, 5

$$5 + 9 + 3 + 4 + 11 + 6 + 8 + 5 = 51$$

$$51 \div 8 = 6.375$$

Median

Median: The middle number, when in size order.

- If there are 2 middle numbers, add them and divide by 2.

E.G. Find the median for the following numbers:
5, 9, 3, 4, 11, 6, 8

$$\text{Median} = 3, 4, 5, 6, 8, 9, 11. = 6$$

Mode

Mode: The most common value.
E.G. Find the mode for the following numbers:
5, 9, 3, 4, 11, 6, 8, 5

Mode = 5

Comparing Data

- 1) Compare the range to see which set of data is more spread out.
- 2) Compare an average (mean or median).

E.G. Looking at these test scores, compare the boys and girls.

	mean	range
Boys	54	11
Girls	60	15

- 1) Boys have a smaller range showing their data is less spread out and more consistent.
- 2) Girls have a higher mean, showing they score more marks on average.

Types of data

Primary data is data collected first hand for a specific purpose.
E.G. a survey or questionnaire.

Secondary data is data that has already been collected previously.
E.G. from the internet or census.

Literacy

How do you work out each of the following:

Mode

Median

Range

Problem Solving

A set of 5 numbers have a range of 8 and a median of 6.

4 of the numbers are 3, 6, 9, 7.

What is the missing number from the list?

Fluency

1. Find the mean, mode median and range for each of the following:

a) 1, 1, 2, 4, 6, 7, 8, 10, 15

b) 12, 13, 12, 13, 20

c) 1.1m, 80cm, 90cm, 1.2m

Reasoning

Jack and Ethan do a weekly test.

Jack gets a mean score of 24.

Ethan gets a mean score of 22.

Who do you think does better in the tests?
Explain your reason.