Stage 6
PROMPT sheet

1 Place value in numbers to 10 million
The position of the digit gives its size

<table>
<thead>
<tr>
<th>Ten millions</th>
<th>Millions</th>
<th>Hundred thousands</th>
<th>Ten thousands</th>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Example
The value of the digit '1' is 10,000,000
The value of the digit '2' is 2,000,000
The value of the digit '3' is 300,000
The value of the digit '4' is 40,000

2 Round whole numbers

Example 1 - Round 342,679 to the nearest 10,000
- Step 1 - Find the 'round-off digit' - 4
- Step 2 - Move one digit to the right - 2

4 or less? YES - leave 'round off digit' unchanged
- Replace following digits with zeros

ANSWER - 340,000

Example 2 - Round 345,679 to the nearest 10,000
- Step 1 - Find the 'round-off digit' - 5
- Step 2 - Move one digit to the right - 5

5 or more? YES - add one to 'round off digit'
- Replace following digits with zeros

ANSWER - 350,000

2 Negative numbers

2 > -2 ➡ We say 2 is greater than -2
-2 < 2 ➡ We say -2 is less than 2

The difference between 2 and -2 = 4 (see line)

Remember the rules:
- When subtracting go down the number line
- When adding go up the number line

- 8 + -2 is the same as 8 - 2 = 6
- 8 - 2 is the same as 8 - 2 = 6
- 8 - -2 is the same as 8 + 2 = 10

3 Multiply numbers & estimate to check

Example
152 x 34

COLUMN METHOD

152
34x
608 (x4)
4560 (x30)
5168

Use estimates to check calculations
152 x 34
≈ 150 x 30
≈ 4500

≈ is the symbol for 'roughly equals'
3 Divide numbers & estimate to check
With a remainder also expressed as a fraction

Write out the tables: 15, 30, 45, 60, 75, 90, 105, 120

e.g. 432 ÷ 15

**BUS SHELTER METHOD**

\[
\begin{array}{cccccc}
& & & & & \\
0 & 2 & 8 & 8 & . & 8 \\
15 & \underline{4} & 3 & 2 & . & 0 \\
-3 & 0 & & & & \\
1 & 3 & 2 & & & \\
-1 & 2 & 0 & & & \\
1 & 2 & & & & \\
\end{array}
\]

**ANSWER** - 432 ÷ 15 = 28 r 12

\[= \frac{28}{15} \]

With a remainder expressed as a decimal

\[
\begin{array}{cccccc}
& & & & & \\
0 & 2 & . & 8 & . & 8 \\
15 & \underline{4} & 3 & 2 & . & 120 \\
-3 & 0 & & & & \\
1 & 3 & 2 & & & \\
-1 & 2 & 0 & & & \\
1 & 2 & & & & \\
\end{array}
\]

**ANSWER** - 432 ÷ 15 = 28 . 8

Use estimates to check calculations

432 ÷ 15
\[\approx 450 ÷ 15\]
\[\approx 30\]

4 Factors, multiples & primes

- **FACTORS** are what divides exactly into a number
  
e.g. Factors of 12 are: 1, 2, 3, 6,
  Factors of 18 are: 1, 2, 3, 6

The common factors of 12 & 18 are: 1, 2, 3, 6,

The Highest Common Factor is: 6

- **PRIME NUMBERS** have only TWO factors
  
e.g. Factors of 7 are: 1, 7
  Factors of 13 are: 1, 13

So 7 and 13 are both prime numbers

A prime factor is a factor that is a prime number so factors of 15 are

1, 3, 5, 15. The prime factors are 3 and 5.

- **MULTIPLES** are the times table answers
  
e.g. Multiples of 5 are: 5, 10, 15, 20, 25, ...
  Multiples of 4 are: 4, 8, 12, 16, 20, ...

The Lowest Common Multiple of 5 and 4 is: 20

5 Order of operations

Bracket
Indices
Divide Multiply \[\{\text{Do these in the order they appear}\}\]
Add Subtract \[\{\text{Do these in the order they appear}\}\]

\[\text{e.g. } 3 + 4 \times 6 - 5 = 22\]
\[\text{first} (2 + 1) \times 3 = 9\]
\[\text{first}\]

6 Addition

- **Line up the digits in the correct columns**

\[\text{e.g. } 48p + £2.84 + £9\]
\[0 . 4 8\]
\[2 . 8 4\]
\[9 . 0 0 +\]
\[£1 2 . 3 2\]
\[1 1\]
6 Subtraction

- Line up the digits in the correct columns

\[ \begin{array}{ccc} \text{H} & \text{T} & \text{U} \\ 6 & 34 & 15 \\ 4 & 27 & - \\ 2 & 1 & 8 \end{array} \]

7 Equivalent fractions

- To simplify a fraction
  Example: \( \frac{27}{36} \)
  First find the highest common factor of the numerator and denominator – which is 9, then divide:
  \[ \frac{27 \div 9}{36 \div 9} = \frac{3}{4} \]

- To change fractions to the same denominator
  Example: \( \frac{3}{4} \) and \( \frac{2}{3} \)
  Find the highest common multiple of the denominators – which is 12, then multiply:
  \[ \frac{3 \times 3}{4 \times 3} = \frac{9}{12} \text{ and } \frac{2 \times 4}{3 \times 4} = \frac{8}{12} \]
  So \( \frac{3}{4} \) is smaller than \( \frac{2}{3} \)

You can use this skill to then order fractions.

8 Add & subtract fractions

- Make the denominators the same

\[ \begin{array}{ll}
\text{e.g. } & \frac{1}{5} + \frac{7}{10} = \frac{2}{10} + \frac{7}{10} = \frac{9}{10} \\
\text{e.g. } & \frac{4}{5} - \frac{2}{3} = \frac{12}{15} - \frac{10}{15} = \frac{2}{15}
\end{array} \]

9 Multiply fractions

- Write 5 as \( \frac{5}{1} \)
- Multiply numerators & denominators

\[ \begin{array}{ll}
\text{e.g. } & 5 \times \frac{2}{3} = \frac{5 \times 2}{1 \times 3} = \frac{10}{3} = 3 \frac{1}{3} \\
\text{e.g. } & \frac{4}{5} \times \frac{2}{3} = \frac{8}{15}
\end{array} \]

9 Divide fractions

- Write 5 as \( \frac{5}{1} \)
- Invert the fraction after ÷ sign
- Multiply numerators & denominators

\[ \begin{array}{ll}
\text{e.g. } & \frac{2}{3} \div 5 = \frac{3}{2} \times \frac{1}{5} = \frac{3}{10} \\
\text{e.g. } & \frac{4}{5} \div \frac{2}{3} = \frac{4}{5} \times \frac{3}{2} = \frac{12}{10} = 1 \frac{2}{5} = 1 \frac{1}{5}
\end{array} \]

10 Multiply/divide decimals by 10, 100

\[ \begin{array}{cccccccc}
\text{thousands} & \text{hundreds} & \text{tens} & \text{ones} & \text{•} & \text{tents} & \text{hundredths} & \text{thousandths} \\
4 & 3 & 5 & 2 & \text{•} & 6 & 1 & 7
\end{array} \]

\( \text{To multiply by 10, move each digit one place to the left} \)
\[ \text{e.g. } 35.6 \times 10 = 356 \]

\[ \begin{array}{cccc}
\text{Hundreds} & \text{Tens} & \text{Ones} & \text{•} & \text{tents} \\
3 & 5 & \text{•} & 6
\end{array} \]

Do not add denominators
Multiply/divide decimals by 10, 100 cont.

- **To divide by 10**, move each digit one place to the right

  e.g. \(35.6 \div 10 = 356 \div 10 = 3.56\)

<table>
<thead>
<tr>
<th>Tens</th>
<th>Ones</th>
<th>tenths</th>
<th>hundredths</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

- **To multiply by 100**, move each digit 2 places to the left
- **To divide by 100**, move each digit 2 places to the right

11 Multiply decimals

Step 1 - remove the decimal point
Step 2 - multiply the two numbers
Step 3 - Put the decimal back in

<table>
<thead>
<tr>
<th>Example:</th>
<th>0.06 x 8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>=&gt; 6 x 8</td>
</tr>
<tr>
<td></td>
<td>=&gt; 48</td>
</tr>
<tr>
<td></td>
<td>=&gt; 0.48</td>
</tr>
</tbody>
</table>

11 Divide decimals

Use the bus shelter method
Keep the decimal point in the same place
Add zeros for remainders

<table>
<thead>
<tr>
<th>Example:</th>
<th>6.28 ÷ 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(\frac{1}{5} \div 5) 6.12530</td>
</tr>
</tbody>
</table>

12 Fraction, decimal, percentage equivalents

**LEARN THESE:**

- \(\frac{1}{4} = 0.25 = 25\%\)
- \(\frac{1}{2} = 0.5 = 50\%\)
- \(3 \div 4 = 0.75 = 75\%\)
- \(\frac{1}{10} = 0.1 = 10\%\)

- **Percentage to decimal to fraction**

  \(27\% = 0.27 = \frac{27}{100}\)
  \(7\% = 0.07 = \frac{7}{100}\)
  \(70\% = 0.7 = \frac{70}{100} = \frac{7}{10}\)

- **Decimal to percentage to fraction**

  \(0.3 = 30\% = \frac{3}{10}\)
  \(0.03 = 3\% = \frac{3}{100}\)
  \(0.39 = 39\% = \frac{39}{100}\)

- **Fraction to decimal to percentage**

  \(\frac{4}{5} = 0.8 = 80\%\)
  \(\frac{3}{8} = 0.375 = 37.5\%\)
  \(\frac{9}{12} = 0.75 = 75\%\)

  _Change to 100_

  \(\frac{3}{8} = 3 \div 8 = 3.306040 = 0.375 = 37.5\%\)
13 Fraction of quantity
- $\frac{4}{5}$ means $\div 5 \times 4$
eq

e.g. To find $\frac{4}{5}$ of £40
\[
\frac{40 \div 5 \times 4}{5} = \text{£}40
\]

13 Percentage of quantity
Use only:
- 50% $- \frac{1}{2}$
- 10% $- \frac{1}{10}$
- 1% $- \frac{1}{100}$

Example: To find 35% of £400
- 10% = £40
- 20% = £80
- 5% = £20
- 35% = £140

14 Similar shapes
When a shape is enlarged by a scale factor the two shapes are called SIMILAR shapes

Scale factor $= \frac{6}{3} = 2$
Length a $= 5 \times 2 = 10$cm
Length b $= \frac{8}{2} = 4$cm

14 Unequal sharing
Example - unequal sharing of sweets 3:4
- A gets 3 shares, B gets 4 shares
- $\Rightarrow$ 3 sweets $\times 4 = 12$ sweets
- $\Rightarrow$ 4 sweets $\times 4 = 16$ sweets

15 Express missing numbers algebraically
An unknown number is given a letter

Examples
- $2a - 4 = 8$
  - $2a = 12$ so $a = 6$
- $b + 32 = 180$ so $b = 148$

15 Use a word formula
Example: - Time to cook a turkey
Cook for 45min per kg weight
Then a further 45min

For a 6kg turkey, follow the formula:
- $45\text{min} \times 6 + 45\text{min}$
- $= 270\text{min} + 45\text{min}$
- $= 315\text{min}$
- $= 5h 15\text{min}$

16 Number sequences
- Understand position and term

Position  | 1  | 2  | 3  | 4  |
---------|----|----|----|----|
Term     | 3  | 7  | 11 | 15 |

$+4$

Term to term rule = $+4$
Position to term rule is $\times 4 - 1$
($because$ position $1 \times 4 - 1 = 3$)
nth term $= n \times 4 - 1 = 4n - 1$
Number sequences conti..  
• Generate terms of a sequence

If the nth term is 5n + 1
1st term (n=1) = 5x1 + 1 = 6
2nd term (n=2) = 5x2 + 1= 11
3rd term (n=3) = 5x3 + 1 = 16

17 Possible solutions of a number sentence

Example: x and y are numbers
Rule: x + y = 5
Possible solutions: x = 0 and y = 5
   x = 1 and y = 4
   x = 2 and y = 3
   x = 3 and y = 2
   x = 4 and y = 1
   x = 5 and y = 0

18 Convert units of measure
METRIC

When converting measurements follow these rules:
• When converting from a larger unit to a smaller unit we multiply (x)
• When converting from a smaller unit to a larger unit we divide (÷)

UNITs of LENGTH
10mm = 1cm
100cm = 1m
1000m = 1km

UNITs of TIME
60sec = 1 min
60min = 1 hour
24h = 1 day
365days = 1 year

UNITs of MASS
1000g = 1kg
1000kg = 1tonne

UNITs of VOLUME
1000ml = 1 litre
100cl = 1litre

19 Convert units of measure
METRIC/IMPERIAL

LEARN: 5 miles = 8km

Miles $\div 5$ $\times 8$ kilometres
Miles $\times 5$ $\div 8$ kilometres

20 Perimeter and area of shapes

Shapes can have the SAME area but different perimeters

The area of each shape is 9 squares

Perimeter of each shape is different
A - 12; B - 14; C -16

21 Area of parallelogram & triangle

Area of parallelogram
Area of parallelogram = $b \times h$
= 8 x 5
= 40cm$^2$

Area of triangle (½ a parallelogram)
Area of triangle = $\frac{1}{2} \times b \times h$
= $\frac{1}{2} \times 8 \times 5$
= 20cm$^2$

22 Volume

Volume of cuboid
Volume = $l \times w \times h$
= 5 x 3 x 2
= 30cm$^3$

Volume of cube
Volume = $l \times w \times h$
= 3 x 3 x 3
= 27m$^3$
23 Construct 2D shapes

Example: Triangle with side and angles given
- Draw line AB = 7cm
- Draw angle 34° at point A from line AB
- Draw angle 47° at point B from line AB
- Extend to intersect the lines at C

23 Construct 3D shapes

CUBE & its net

CUBOID & its net

TRIANGULAR PRISM & its net

24 Properties of shapes

TRIANGLES - sum of angles = 180°

- ISOSCELES triangle
  - 2 equal sides & 2 equal angles

- EQUILATERAL triangle
  - 3 equal sides & ALL angles 60°

- SCALENE triangle
  - All sides & angles different

QUADRILATERALS - sum of angles = 360°

- Square
- rectangle
- parallelogram
- Rhombus
- trapezium
- kite

REGULAR POLGONS - all sides the same
- Polygons have straight sides
- Polygons are named by the number sides
  - 3 sides - triangle
  - 4 sides - quadrilateral
  - 5 sides - pentagon
  - 6 sides - hexagon
  - 7 sides - heptagon
  - 8 sides - octagon
  - 9 sides - nonagon
  - 10 sides - decagon
Properties of shapes contin...

- Sum of exterior angles is always $360^\circ$

- Interior & exterior angle add up to $180^\circ$

- The interior angles add up to:
  - Triangle: $1 \times 180^\circ = 180^\circ$
  - Quadrilateral: $2 \times 180^\circ = 360^\circ$
  - Pentagon: $3 \times 180^\circ = 540^\circ$
  - Hexagon: $4 \times 180^\circ = 720^\circ$
  - etc.

25 Parts of a circle

- The circumference is the distance all the way around a circle.
- The diameter is the distance right across the middle of the circle, passing through the centre.
- The radius is the distance halfway across the circle.
- The radius is always half the length of the diameter. \((d = 2 \times r) \text{ or } (r = \frac{1}{2} \times d)\)

26 Angles and straight lines

- Angles on a straight line add up to $180^\circ$

  \[
  148^\circ + 32^\circ = 180^\circ
  \]

- Angles about a point add up to $360^\circ$

  \[
  146^\circ + 90^\circ + 124^\circ = 360^\circ
  \]

- Vertically opposite angles are equal

27 Position on a co-ordinate grid
28 Transformations

- **Translation** - A shape moved along a line.

Example - Move shape A 3 right & 4 down
Can also be written as a vector \( \begin{pmatrix} 3 \\ -4 \end{pmatrix} \)

Notice:
- The new shape stays the same way up
- The new shape is the same size

- Reflect a shape in x-axis

- Reflect a shape in y-axis

29 Graphs

- **Pie chart**

<table>
<thead>
<tr>
<th>Transport</th>
<th>Frequency</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>13</td>
<td>(13 \times 9 = 117^0)</td>
</tr>
<tr>
<td>Bus</td>
<td>4</td>
<td>(4 \times 9 = 36^0)</td>
</tr>
<tr>
<td>Walk</td>
<td>15</td>
<td>(15 \times 9 = 135)</td>
</tr>
<tr>
<td>Cycle</td>
<td>8</td>
<td>(8 \times 9 = 72)</td>
</tr>
</tbody>
</table>

Total frequency = 40
\(360^0 \div 40 = 9^0\) per person

- **Line graph**

Line graphs show changes in a single variable - in this graph changes in temperature can be observed.
30 The mean
The mean is usually known as the average. The mean is not a value from the original list. It is a typical value of a set of data.

\[
\text{Mean} = \frac{\text{total of measures}}{\text{no. of measures}}
\]

e.g. Find mean speed of 6 cars travelling on a road
Car 1 - 66mph
Car 2 - 57mph
Car 3 - 71mph
Car 4 - 54mph
Car 5 - 69mph
Car 6 - 58mph

\[
\begin{align*}
\text{Mean} &= \frac{66+57+71+54+69+58}{6} \\
&= \frac{375}{6} \\
&= 62.5 \text{mph}
\end{align*}
\]
Mean average speed was 62.5mph