MATHEMATICS
Pre-GCSE Skills Booklet

To be completed and handed in to your new Y10 Maths teacher when we return.
MathsWatch clip numbers have been provided, to help you if you get stuck.

NAME .................................................................
<table>
<thead>
<tr>
<th>MW Clip</th>
<th>KEY SKILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>No clip</td>
<td>Use mathematical notation/symbols correctly &amp; show working out</td>
</tr>
<tr>
<td>No clip</td>
<td>Know &amp; use times-tables up to 12</td>
</tr>
<tr>
<td>N13a, N14a, N15a, N16, N19</td>
<td>Add, subtract, multiply &amp; divide with integers, including negative numbers</td>
</tr>
<tr>
<td>N2b, N13b, N14b, N15, N17</td>
<td>Add, subtract, multiply &amp; divide with decimals</td>
</tr>
<tr>
<td>N36, N37</td>
<td>Add subtract, multiply &amp; divide with fractions</td>
</tr>
<tr>
<td>N20</td>
<td>Know and use the order of operations (BIDMAS)</td>
</tr>
<tr>
<td>N10, N11, N31</td>
<td>Find factors &amp; multiples of numbers</td>
</tr>
<tr>
<td>N32</td>
<td>Convert between and compare fractions, decimals &amp; percentages.</td>
</tr>
<tr>
<td>N25</td>
<td>Know square numbers up to 15 and cube numbers up to 5, plus powers of 10</td>
</tr>
<tr>
<td>N25</td>
<td>Understand indices including $\sqrt{}$ and $\sqrt[3]{}$</td>
</tr>
<tr>
<td>A20</td>
<td>Use inequality symbols between pairs of numbers</td>
</tr>
<tr>
<td>R9</td>
<td>Increase &amp; decrease an amount by a given percentage</td>
</tr>
<tr>
<td>R5</td>
<td>Share in a given ratio and link ratio to fractions</td>
</tr>
<tr>
<td>A1</td>
<td>Read &amp; plot co-ordinates in 4 quadrants</td>
</tr>
<tr>
<td>A6</td>
<td>Simplify algebraic expressions by collecting like terms</td>
</tr>
<tr>
<td>A8, A9</td>
<td>Expand &amp; factorise expressions with a single bracket</td>
</tr>
<tr>
<td>A10</td>
<td>Substitute values into an expression or formula</td>
</tr>
<tr>
<td>A11</td>
<td>Use &amp; find the nth term of a linear sequence</td>
</tr>
<tr>
<td>A14</td>
<td>Plot straight line graphs</td>
</tr>
<tr>
<td>A12</td>
<td>Solve 1-, 2- &amp; 3-step linear equations</td>
</tr>
<tr>
<td>A5</td>
<td>Scale axes accurately for co-ordinate &amp; data presentation purposes</td>
</tr>
<tr>
<td>G11, G12</td>
<td>Name 2D &amp; 3D shapes</td>
</tr>
<tr>
<td>G9, G20, G22</td>
<td>Find the area &amp; perimeter of rectangle, triangle, parallelogram, trapezium &amp; circle.</td>
</tr>
<tr>
<td>G13, G18</td>
<td>Know angle rules, including angles in parallel lines.</td>
</tr>
<tr>
<td>G19</td>
<td>Find interior &amp; exterior angles of polygons</td>
</tr>
<tr>
<td>G3, G4, G6, G7</td>
<td>Identify reflection &amp; rotational symmetry in 2D shapes</td>
</tr>
<tr>
<td>G21</td>
<td>Calculate volume &amp; surface area of cuboids</td>
</tr>
<tr>
<td>S2, S9</td>
<td>Draw bar charts, line graphs &amp; pie charts</td>
</tr>
<tr>
<td>S6</td>
<td>Calculate mean, median, mode &amp; range for a small data set</td>
</tr>
<tr>
<td>P2, P3</td>
<td>Determine probability for single and multiple events</td>
</tr>
</tbody>
</table>
Find:
a) \( \frac{1}{2} \) of 22  
b) \( \frac{1}{15} \) of 4500  
c) \( \frac{7}{100} \) of 300  
d) \( \frac{3}{8} \) of 32  

Evaluate, simplifying your answer if possible:

\[
\begin{align*}
\text{e)} & \quad \frac{3}{4} - \frac{2}{7} \\
\text{f)} & \quad \frac{2}{3} \times \frac{1}{5} - \frac{2}{7} \\
\text{g)} & \quad \frac{1}{3} \times \frac{4}{5} \\
\text{h)} & \quad \frac{5}{8} \div \frac{2}{3} \\
\text{i)} & \quad 7 \div \frac{1}{2}
\end{align*}
\]

Complete the tables:

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{3}{4} )</td>
<td>0.75</td>
<td>75%</td>
</tr>
<tr>
<td>( \frac{1}{10} )</td>
<td>0.1</td>
<td>10%</td>
</tr>
<tr>
<td>( \frac{1}{3} )</td>
<td>0.33...</td>
<td>33%</td>
</tr>
<tr>
<td>( \frac{68}{100} )</td>
<td>0.68</td>
<td>68%</td>
</tr>
<tr>
<td>( \frac{13}{50} )</td>
<td>0.26</td>
<td>26%</td>
</tr>
</tbody>
</table>

Fill in the missing number for each problem:

a) \( \square - 3 \times 8 = -13 \)

b) \( 39 \div \square + 9 \times 3 = 30 \)

c) \( 7 + 4 \div \square - 5 = 4 \)

d) \( \square \div 6 + 4 \times 2 - 18 = -8 \)

e) \( 22 \div 11 + 4 - 8 \times \square = -18 \)
Without a calculator:

a) Find 20% of 40  
d) Find 5% of 30

b) Decrease 72 by 15%  
e) Increase 68 by 55%

c) Increase 28 by 82%  
f) Decrease 300 by 81%

Ratio:

a) Simplify 24:80  
b) Simplify 77:42

c) Share 60m in the ratio 7:5  
d) Divide £120 in the ratio 5:1:2

Simplify, by collecting like terms:

a) 5x + 2y - x  
b) 6x + 8 + 3x - 5

c) 7x - y - 3x - 4y  
d) 5a + 2a - 4c - a + 3c

e) Write an expression for the perimeter of these 2 shapes, in the simplest form:
If $a = 3$ and $b = 5$, evaluate:

a) $4a$  

b) $a^2$

c) $3a + 2b$  

d) $ab$

e) $6a - 4b$  

f) $b^2 - a$

If $x = 7$ and $y = -2$, find the following:

g) $3x$  

h) $4y + 10$

i) $5x - 3y$  

j) $2x^2 + 11y$

Expand:

a) $9(x - 7)$  

b) $6(4x + 5)$

c) $5(2x + y)$  

d) $7(8x - 9y)$

Expand and simplify:

e) $5(x + 3) + 2(3x - 6)$  

f) $4(2x - 6) - 3(5x + 4)$

Factorise fully:

g) $14x - 21$  

h) $24 + 18y$

i) $6x^2 - 9x$  

j) $25xy - 15y$

Find the $n^{th}$ term and the $10^{th}$ term for each of these sequences:

<table>
<thead>
<tr>
<th>Sequence</th>
<th>$n^{th}$ term</th>
<th>$10^{th}$ term</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) $4, 7, 10, 13, 16, 19, ...$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) $8, 13, 18, 23, 28, 33, ...$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) $2, 8, 14, 20, 26, 32, ...$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) $-3, -1, 1, 3, 5, 7, 9, ...$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Solve these equations:

a) \(6x + 7 = 19\)  
b) \(5x - 2 = 18\)

c) \(4x + 3 = 2x + 11\)  
d) \(5x + 18 = 2x + 3\)

e) \(x^2 = 81\)  
f) \(2(5x - 2) = 1\)

Averages and Range:

Here are the test marks of some students: 12, 14, 15, 23, 10, 17, 15, 19, 11, 22, 18

a) What is the mode?

b) Work out the median mark

c) Calculate the mean mark

d) What is the range?

A card is drawn from a well-shuffled deck of 52 cards. What is the probability of drawing:

a) \(P(\text{ace}) = \)

b) \(P(\text{face card: K, Q, J}) = \)

c) \(P(\text{a red 10}) = \)

d) \(P(\text{NOT a diamond}) = \)

e) \(P(\text{6 of clubs}) = \)
Complete the table of values for:

\[ y = 2x - 1 \]

<table>
<thead>
<tr>
<th>x</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Plot the coordinates below and join them with a straight line to draw the graph of \( y = 2x - 1 \)

Calculate the area of the shapes:

\[ \text{a) Area = } \text{(triangle)} \]
\[ \text{b) Area = } \text{(rectangle)} \]
\[ \text{c) Area = } \text{(trapezoid)} \]

Calculate the circumference and area of:

\[ \text{d) A circle of radius 10cm} \]
\[ \text{e) A circle of diameter 16mm} \]
Find the size of the labelled angles, giving a reason for each one:

\[ a = \ldots \text{°} \text{ because } \ldots \]

\[ b = \ldots \text{°} \text{ because } \ldots \]

\[ c = \ldots \text{°} \text{ because } \ldots \]

Find the labelled angles in this polygon:

\[ a = \ldots \]

because \ldots

\[ b = \ldots \]

because \ldots

What are the interior and exterior angles of a regular octagon?

Calculate the volume of this cuboid

Volume =

Calculate the surface area of this cube

Surface Area =