Mathematics Stage 1BC
Work Samples

Question 1

\[ \text{A B C D E F G H I J K L M N O P Q R S T U V W X Y Z} \]

Which letters have:
\( a \) No lines of symmetry?
\( b \) Exactly one line of symmetry?
\( c \) More than two lines of symmetry?

Question 2

Draw each of the following shapes and determine how many lines of symmetry each has by drawing them in:
\( a \) square
\( b \) rectangle
\( c \) isosceles triangle

Question 3

Triangles are classified according to properties associated with their sides or angles. Complete the following table by drawing the triangle that best matches the description.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute triangle</td>
<td>All angles are less than ( 90^\circ )</td>
<td></td>
</tr>
<tr>
<td>Right triangle</td>
<td>One angle is ( 90^\circ )</td>
<td></td>
</tr>
<tr>
<td>Isosceles triangle</td>
<td>Exactly two sides the same length</td>
<td></td>
</tr>
</tbody>
</table>

Question 4

What is the value of each expression?
\( a \) \( 6 + 4 \times 2 = \)
\( b \) \( 75\% \text{ of } 4.8 = \)
\( c \) \( \frac{1}{2} \text{ of } 0.54 = \)

Question 5

Round to 2 decimal places.
\( a \) \( 14.621 = \)
\( b \) \( 0.0939 = \)
\( c \) \( 61.44996 = \)

Question 6

Is each statement true (T) or false (F)?
\( a \) \( 10 \times 2 - 6 < 14 \)
\( b \) \( 6 + 6 + 6 + 6 = 4 \times 6 \)
\( c \) \( 20 - 5 \times 3 < 6 \)
**Question 7**
Calculate the following dart scores:

- a) double 19, 7, 6 =
- b) triple 8, double 5, 3 =
- c) Jenny was playing darts and her score was 176. Se scored a double 18, a bullseye and a triple 19.

What is her new score?

**Question 8**
Complete the following time statements.

- a) 2 weeks = __________ days
- b) 5 years = ______________ months
- c) 100 days = ____________ fortights
- d) 737 days = ____________ years

**Question 9**
What fraction of a year are the following lengths of time?

- a) 26 weeks
- b) 6 months
- c) 15 days
- d) 4 fortights

**Question 10**
Convert these times to minutes and seconds.

- a) 66 seconds
- b) 91 seconds
- c) 73 seconds

**Question 11**
Convert these times to days and hours.

- a) 76 hours
- b) 133 hours
- c) 112 hours

**Question 12**
Approximately how much is each of these amounts?

- a) 18% of $525
- b) 11% of $110
- c) 5% of $100

**Question 13**
Calculate the mean of each of the sets of scores.

- a) 1, 3, 2, 5, 6, 10
- b) 1.6, 2.4, 5.2, 6.4, 1.2, 6.6
- c) 8.4, 6.4, 5.3, 4.1, 6.6, 8, 9, 10

**Question 14**
Determine the median of each of these sets of scores.

- a) 12, 15, 16, 22, 23, 25, 30
- b) 33, 36, 35, 39,
- c) 63, 64, 68, 74, 82, 93, 101, 110
Question 15
Express the following fractions as percentages.

a) \( \frac{1}{5} \)  
b) \( \frac{8}{26} \)  
c) \( \frac{22}{40} \)

Question 16
Express each of the following proportions as a fraction, then as a percentage

a) 5 out of 30  
b) 2 minutes out of 60 minutes  
c) 12 hours out of 1 day

Question 17
Complete the following statements

a) 5 m = __________ cm  
b) 600 cm = ________ m  
c) 30 mm = ________ cm  
d) 8 cm = ________ mm

1C Style Questions

1. A box of 24 chocolates contains 16 Boost Bars and 8 Cherry Ripes. Kimberley selected a chocolate at random from the box.
   
a. What is the probability that Kimberley selected a Cherry Ripe? Express your answer as a fraction, decimal and percentage.

b. If Kimberley selected and ate a Cherry Ripe, what is the probability that the next chocolate she selects will be a Cherry Ripe?

2. Howard plays soccer. During games, the probability that he will score any goal he attempts is \( \frac{2}{5} \). Predict the number of goals Howard will kick if he attempts 20 goals during the next game.

3. | Geraldton – Broome |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Geraldton</td>
</tr>
<tr>
<td>Carnarvon</td>
</tr>
<tr>
<td>Karratha</td>
</tr>
<tr>
<td>Broome</td>
</tr>
</tbody>
</table>

   a. How far is it from Karratha to Broome?

   b. When Lennard left Carnarvon his odometer read 266,165. What would it have read when he arrived in Broome?

   c. How long will it take to drive from Carnarvon to Karratha at a speed of 100km/h?
4. a. How far will Sheldon travel if travelling for 20 minutes at 80km/h/  
   b. Use the formula \( S = D \div T \) to determine the value of \( S \) when \( D = 170 \) and \( T = 34 \).

5. Calculate the area of the following:

   ![Images of geometric shapes]

6. Simplify these ratios:
   a. 30:10  
   b. 40:100  
   c. 32:70

7. Penny works at the Cheesecake shop. Her basic wage is $15.50 an hour. She is employed to work 7 hours a day, Monday to Friday. Any overtime she works is paid at time-and-a-half and she is paid double time for all work on weekends. Last week Penny worked the following hours: Monday 5 hours, Tuesday 7 hours, Wednesday 9 hours, Thursday 11 hours, Friday 7 hours and Saturday 5 hours.
   a. How many hours does Penny normally work each week?  
   b. How many hours overtime did Penny work last week?  
   c. How much does Penny normally earn each week?  
   d. How much did Penny earn last week?

8. Angie sells real estate. She receives 3% of the selling price of all properties she sells. Calculate the commission Angie will receive for selling a house valued at $1.25 million.

9. List the factors of the following numbers:
   a. 20  
   b. 15  
   c. 28

10. Morgan works in a café. She uses one-tenth of a 2L milk bottle to make one café latte. There are only 4 bottles of milk left, how many lattes can she make?

11. Determine the value of the following without using a calculator:
   a. \( 0.2 \times 6 \)  
   b. \( 6 \div \frac{1}{3} \)  
   c. 0.4 of 10kg

12. Determine the value of the following without using a calculator:
   a. \( \frac{5}{15} + \frac{6}{15} \)  
   b. \( \frac{9}{10} - \frac{3}{10} \)  
   c. \( \frac{7}{8} - \frac{3}{8} + \frac{1}{8} \)

13. Use the graph below to answer the following questions:

   ![Graph showing temperature and rainfall]
   a. What is the average maximum temperature in Cairns in November?  
   b. How much rain falls from December to March in Cairns?  
   c. In which month does Cairns receive the most rainfall?  
   d. Write a short paragraph to describe the trend of the climate in Cairns.
1. What is the radius of a circle with an area of 60cm\(^2\). Show working (2)

2. If the radius of a circle is 5cm what is the area of the circle? Show working (2)

3. What is the diameter of a circle if the circumference is 1 metre? Show working (2)

4. What is the circumference of a circle with a 3m diameter? Show working (2)

5. Draw the reflection of the triangle below about the line labelled A (1)

6. Rotate the shape 90\(^\circ\) clockwise around the dot
1. In your group roll the dice you have 10 times and record your results in the table below:

<table>
<thead>
<tr>
<th>Roll 1</th>
<th>Roll 2</th>
<th>Roll 3</th>
<th>Roll 4</th>
<th>Roll 5</th>
<th>Roll 6</th>
<th>Roll 7</th>
<th>Roll 8</th>
<th>Roll 9</th>
<th>Roll 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What is the mode for this set of data? ___________________________________________
What is the median? ____________________________________________________________
What is the range? _____________________________________________________________
What is the mean? _____________________________________________________________

Compare your answers with those of your group – are they the same

Yes  No

2. In your group have 10 shots at the basket each and record how many you got in out of the ten in the table below:

<table>
<thead>
<tr>
<th>YOU</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1</td>
<td>Shots in out of 10 shots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round 2</td>
<td>Shots in out of 10 shots</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use the number of shots in out of 10 for your group as your data set. Calculate:
The mean: ____________________________________________________________________
The mode: ___________________________________________________________________
The Median: __________________________________________________________________
The Range: ___________________________________________________________________

3. Test results for a group of 1D Maths students was as follows:


Calculate:
The mean: __________________________________________________________________
The mode: ___________________________________________________________________
The Median: __________________________________________________________________
The Range: ___________________________________________________________________
<table>
<thead>
<tr>
<th>TOPIC</th>
<th>Formula/ Notes</th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformations</td>
<td><img src="#" alt="Images" /></td>
<td>Enlarge the following shape by scale factor 2</td>
<td>Reflect the shape pictured about line A</td>
<td>Rotate the arrow about point B 90 degrees anti clockwise</td>
</tr>
<tr>
<td>Area of Circles</td>
<td></td>
<td>Calculate the area of a circle with a radius of 36cm.</td>
<td>Calculate the radius of a tank with a surface area of 500m²</td>
<td>Calculate the diameter of a coin with an area of 100mm².</td>
</tr>
<tr>
<td>Circumference of Circles</td>
<td></td>
<td>Calculate the circumference of a circle with a diameter of 15cm</td>
<td>Calculate the diameter of a circle with a circumference of 100cm.</td>
<td>Calculate the radius of a circle with a circumference 25m</td>
</tr>
<tr>
<td>CONCEPT</td>
<td>FORMULA</td>
<td>EXAMPLE</td>
<td>INVERSE EXAMPLE</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Perimeter</td>
<td>Perimeter = side 1 + side 2 + side 3 + side 4</td>
<td></td>
<td>If the perimeter is 50cm and one side of a rectangle is 5 cm. What is the length of the other 2 sides?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perimeter = s1 + s2 + s3 + s4</td>
<td>P= s1 + s2 + s3+ s4</td>
<td>P = 50 - (5 + 10) = 40 - (40 - 20)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>P = 5 + 12 + 5 +12</td>
<td>= 20 cm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>P= 34cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of a square/rectangle</td>
<td><img src="image" alt="Square" /></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of a triangle</td>
<td><img src="image" alt="Triangle" /></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mathematics Stage 2A
Work Samples

Number and Algebra
1. Terminology:
   a. Explain the difference between an integer, a whole number and a counting number.
      __________________________________________
      __________________________________________
      __________________________________________
      What are the factors of 20? ____________________________
   b. Give the first four multiples of 2: ____________________________
   c. What are prime numbers? ____________________________
      List the first 7: ____________________________
      List the first 6: ____________________________
   d. What are composite numbers? ____________________________
   e. 1, 4, 9 are the first three square numbers. What is a Square Number? ____________________________
      Give the next four: ____________________________

2. Decimals, Fractions, Percent, Squares and Square Roots
   a. Convert the following to fractions:
      4.7 __________________ 9.12 __________________ 7.259 __________________ 1.125 __________________
   b. Convert the following to decimals (4 dp):
      \[
      \frac{1}{2}, \frac{3}{4}, \frac{1}{5}, \frac{1}{3}, \frac{3}{8}, \frac{7}{10}
      \]
   c. Solve the following:
      \[
      4^2, 7^4, 4^3, \sqrt{64}, 8, \sqrt[3]{81}
      \]
   d. Find 15% of $280 mentally ____________________________

3. Rule of order
   a. What does BIMDAS stand for and how do you use it?
      __________________________________________
      __________________________________________
      __________________________________________
      Solve the following:
      (i) \(4 + 3 \times 8 = \) _____  (ii) \(10 - 20 \div 4 = \) _____  c. (iii) \(6 + 15 \times 4^3 = \) _____
      (iv) \((5 + 4) \times (10 \div 2) = \) _____  (v) \(2 \times 8 + 10 \div 2 \times 4^2 = \) _____
4. Rounding and truncating
a. Round the following to 3 decimal places (i) 23.47974 __________ (ii) 1.34325 __________
b. Truncating gives a more appropriate answer for some calculations e.g. An ice cream cost $2.20. How many ice creams can you buy for $19.00? ______________________________

5. Ratios, Rates and Percentages
a. Look at the box on the right and determine the simplified ratio of “O”s to “X”s? ______________________________
b. In the school choir, there were 42 females and 6 males. What is the simplified ratio of males to females in the choir? ________________
c. If a car travels 275 kilometres in 5 hours what is the car’s rate in km/hour? ________________
d. Complete the following table:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Understanding formulae
The circumference of a circle, C, is twice the radius multiplied by \( \pi \) or \( C = 2 \pi r \) or \( C = 2\pi r \) leaving out all multiplication and division signs. The addition and subtraction signs remain.
Write the following as formulas:
a. Area of circle, A, equals \( \pi \) multiplied by the radius multiplied by the radius: ________________
b. The final velocity, v, equals the initial velocity, u, plus the acceleration, a, multiplied by time, t. ________________
c. The velocity, v, equals the displacement, s, divided by the time, t: ________________

7. Coordinates
a) Name the coordinates in the graph shown:
A: ______________________
B: ______________________
C: ______________________
D: ______________________
b. Graph the linear equation \( y = 2x - 3 \)
c. What is the equation of the straight line through points B and A
8. Equations

a. Solve the following equations (ie find the value of \( h \)):

i) \( 2h = 30 \)  

ii) \( 3h + 12 = 27 \)  

iii) \( 20 - 4h = -4 \)  

iv) \( 0.5h - 10 = 5 \)

Chance and Data (page 13 - 20)

9. Data analysis Questions (a) and (b) below refer to the following set of scores:

\[ \begin{align*}
2 & \quad 5 & \quad 9 & \quad 6 & \quad 4 & \quad 2 & \quad 8 & \quad 5 & \quad 2 & \quad 10 \\
\end{align*} \]

Working space:

a. When analysing data, you can summarize a set of scores using the mean, median and mode.
   
   (i) What is the mode or modal score in the set of scores?
          ______________________________________
   
   (ii) What is the median in the set of scores?
            ______________________________________
   
   (iii) What is the mean of the set of scores (2dp)?
           ______________________________________

b. The range can help show how widely spread the data is. What is the range of the scores?
         ______________________________________

Now repeat questions (a) and (b) using the new set of scores below:

\[ \begin{align*}
26 & \quad 81 & \quad 53 & \quad 29 & \quad 42 & \quad 53 & \quad 44 & \quad 72 \\
\end{align*} \]

Working space:

   \[ \begin{align*}
\text{c. (i) Mode:} & \quad ______________________________________ \\
\text{(ii) Medium:} & \quad ______________________________________ \\
\text{(iii) Mean:} & \quad ______________________________________ \\
\text{d. What is the range of the scores?} & \quad ______________________________________ \\
\end{align*} \]
Number & Algebra

1. List the prime numbers between 30 and 40.

2. List all factors of 60

3. What is the next square number after 144?

4. Convert these decimals to fractions:

   2.3 = 
   0.4 = 
   3.12 = 

   5.25 = 
   1.32 =

5. Convert these fractions to decimals:

   \[
   \frac{3}{5} = 0.6, \quad \frac{1}{3} = 0.333\ldots, 
   \frac{7}{10} = 0.7, \quad \frac{8}{100} = 0.08, 
   \frac{1}{8} = 0.125, \quad \frac{12}{1000} = 0.012
   \]

6. What is \( \frac{1}{4} + \frac{2}{5} \)?

7. \( 2^2 = \)

8. (i) \( 25 - 5 \times 3 \)
   (ii) \( 8 + 4^2 \times 3 \)
   (iii) \( 18 \div 2 + (14 - 6) \times 3 \)

9. Round to 2 dp: \( 18.2763009 \)
10. Complete this table; you need to be familiar with common percentages:

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼</td>
<td></td>
</tr>
<tr>
<td>½</td>
<td></td>
</tr>
<tr>
<td>1/5</td>
<td></td>
</tr>
<tr>
<td>1/10</td>
<td></td>
</tr>
<tr>
<td>1/100</td>
<td></td>
</tr>
<tr>
<td>¾</td>
<td></td>
</tr>
<tr>
<td>2/5</td>
<td></td>
</tr>
</tbody>
</table>

11. (i) Find 32% of $550

(ii) Decrease $2850 by 12%

12. (i) 6 - 14 =

(ii) 13 - ( - 8) =

(iii) (-5)² =

13. Expand the following expressions:

(i) -4(x - 5)

(ii) 3(x + 5) - 7(x + 3)

(iii) (x + 5)(x - 8)

14. Factorise:

(i) 25xy - 10y + 40xyz

15. Solve:

(i) 80 - 5x = 45

(ii) 3(x - 2) + 5(x + 6) = 64
Space and Measurement

1. Use the Pythagorean Theorem to find $y$ (this is a right triangle)

Chance and Data

1. On a 10-sided dice, what is the probability of rolling a multiple of 3? What is the complement of this?

2. Find the mean, median, mode and range of the following set of numbers:

12, 26, 14, 18, 23, 28, 19, 30, 21, 19

3. What is the mathematical symbol often used to represent the mean?

4. Calculate the mean score from this frequency table:

<table>
<thead>
<tr>
<th>Score</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
</tr>
</tbody>
</table>

5. Learn to compute basic functions on your Classpad calculator 😊
1. Expand the following expressions (& simplify where possible):
   a) \(6(x + 2) – 3(x – 4)\)  
   b) \((x + 5)(x – 3)\)  
   c) \((x + 1)^2\)

2. Factorise:
   a) \(12rt + 20t\)  
   b) \(x^2 + 3x – 10\)  
   c) \(x^2 – 25\)

3. Solve:
   a) \(4w -13 = 15\)  
   b) \(6y + 2 = 2y + 20\)  
   c) \((x + 4)(x - 7)(3x + 10) = 0\)  
   d) \(\frac{3w^2 - 6}{2} = 3\)

4. Function notation. Find the value of the following function for certain values of \(x\): \(f(x) = -4x + 5\)
   a) \(f(2) =\)  
   b) \(f(-3) =\)

5. For the linear function \(y = 3x – 4\) list 5 points that lie on this line, then provide a sketch of the graph, labelling the important features.
6. What are the equations of the following lines?

(a) 
(b) 
(c) 

7. **Quadratic functions** are written in the form \( y = ax^2 + bx + c \) or \( y = a(x-p)^2+q \) or \( y = a(x - d)(x - e) \)

Sketch a graph of each of these quadratic functions below:

\[ y = x^2 \quad y = x^2 + 4 \quad y = -x^2 \quad y = (x - 3)^2 \]

8. **Exponential functions.** General form of \( y = a \times b^x \)

Find the equation of the exponential functions from the tables of values:

a). 

<table>
<thead>
<tr>
<th>( x )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>4</td>
<td>16</td>
<td>64</td>
<td>256</td>
<td>?</td>
</tr>
</tbody>
</table>

b). 

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>3</td>
<td>6</td>
<td>12</td>
<td>24</td>
<td>48</td>
</tr>
</tbody>
</table>
9. Sketch a graph of the two exponential functions from question 8.

10. By preparing a table of values if necessary, sketch a graph of \( y = \frac{10}{x} \). This is an example of a Reciprocal Function. (Make sure you include the negative region of the graph).
11. a) Calculate the value of the angle Y below:

![Diagram showing angle Y with sides 34 and 31]

b) Calculate the length of side h above

c). Find the value of x to 2dp in the following:

![Diagram showing triangle with angle 65° and sides 88 mm and x mm]

d) Find the value of \( \theta^o \)

![Diagram showing triangle with sides 4.43 cm and 5.80 cm]

12. Make c the subject of each of the following equations

a) \( w = r + c - d \)  
b) \( y = \frac{3c}{h} + 12 \)

c) \( r = 10c - pc \)
13. For the following table, state the type of function it represents and the corresponding algebraic rule or relationship.

a.)

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>5</td>
<td>9</td>
<td>13</td>
<td>17</td>
<td>21</td>
<td>25</td>
<td>29</td>
</tr>
</tbody>
</table>

Type _________________  Equation __________________

14. Solve the following simultaneous equations:

(i) \[ a + 2b = 6 \]
\[ 3a - b = -10 \]
1. Algebra Revision
a). Expand and simplify the following:
(i) 6(2a + 3)  
(ii) 2x – 3 – 2(5x – 7)

(iii) (x + 3)(x – 12)

b). Factorise these:
(i) 10h + 15hk – 25h  
(ii) y^2 + 8y + 15

(iii) y^2 - 16

c). Solve these equations
(i) 3y + 7 = 19  
(ii) 5(w + 3) – 2(w – 5) = 43

(iii) x^2 – 4x – 21 = 0  (hint: factorise first)  
(iv) x + 2y = 13  (simultaneous)
and 3x – y = 4

2. Indices
Simplify the following:
a) x^3 \times x^6  
b) \frac{x^6}{x^2}  
c) \frac{(3x^4)^3}{3x^7}

3. Absolute Value Functions
Note: the pair of parallel lines represent absolute value (ie a distance from zero in the positive or negative direction eg. |-4| = 4).

a). Solve the following

a) |x + 3| = 5

x = _______  or  x = _______
4. Coordinates and Functions

a). On the axes provided, plot the points P (3, 8) and Q (-2, 5). Then use your knowledge of Pythagoras’ Theorem to find the direct distance between these two points.

b). Produce a graph of \( y = 2x - 7 \) and \( y = x^2 \). Use your graph to estimate the intersection point(s).