MATHEMATICS
STAGE 4
DIAGNOSTIC TASKS
Introduction

Mathematics Stage 4 Diagnostic Tasks have been designed to assist secondary teachers in accurately identifying skills, knowledge and understandings of students in Stage 4. They are intended to be a diagnostic snapshot of learning key ideas and concepts from the NSW Mathematics K-10 Syllabus for the Australian Curriculum. This resource is one example of assessment for learning, other forms of assessment include hands-on tasks, practical activities, investigations, observations and anecdotal evidence. A wide range of assessments are also used by teachers to identify teaching points and learning needs for all students.

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Stage 4: Computations with Integers

Name: 

Class: 

**BACKGROUND KNOWLEDGE: STAGE 3 KEY IDEAS**

<table>
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<tr>
<th>STUDENTS HAVE LEARNT</th>
<th>SYLLABUS CONTENT AREAS RELATED TO THE OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading, writing and ordering numbers of any size</td>
<td></td>
</tr>
<tr>
<td>The place value of digits in numbers</td>
<td></td>
</tr>
<tr>
<td>Recording numbers in expanded notation</td>
<td></td>
</tr>
<tr>
<td>Factors, HCF (highest common factor), LCM (lowest common multiple)</td>
<td></td>
</tr>
<tr>
<td>Overall average</td>
<td></td>
</tr>
<tr>
<td>Identifying prime and composite numbers</td>
<td></td>
</tr>
<tr>
<td>Square and triangular numbers</td>
<td></td>
</tr>
<tr>
<td>Locating negative numbers on a number line</td>
<td></td>
</tr>
<tr>
<td>Addition and subtraction</td>
<td></td>
</tr>
<tr>
<td>Creating a simple budget</td>
<td></td>
</tr>
<tr>
<td>Multiplication and division</td>
<td></td>
</tr>
<tr>
<td>Interpreting remainders in division problems</td>
<td></td>
</tr>
<tr>
<td>Recognising and using grouping symbols</td>
<td></td>
</tr>
<tr>
<td>Applying the order of operations in calculations</td>
<td></td>
</tr>
<tr>
<td>Solving worded problems and recording strategy used</td>
<td></td>
</tr>
</tbody>
</table>

Refer to Stage 3 Whole Numbers, Addition and Subtraction, Multiplication and Division.
**STAGE 4: COMPUTATIONS WITH INTEGERS**

<table>
<thead>
<tr>
<th>QUESTION 1</th>
<th>ORDERING INTEGERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) What is an integer?</td>
<td></td>
</tr>
<tr>
<td>b) Place the following integers on a number line</td>
<td></td>
</tr>
<tr>
<td>-4, 3, 6, -2, 2, -5, 1</td>
<td></td>
</tr>
<tr>
<td>c) Write this set of integers in ascending order (smallest to largest)</td>
<td></td>
</tr>
<tr>
<td>9, -1, 0, 5, -4, 8</td>
<td></td>
</tr>
<tr>
<td>d) Complete the following using the symbols &lt; or &gt;</td>
<td></td>
</tr>
<tr>
<td>i) 4 □ -1</td>
<td></td>
</tr>
<tr>
<td>ii) -5 □ -2</td>
<td></td>
</tr>
<tr>
<td>iii) 0 □ -3</td>
<td></td>
</tr>
</tbody>
</table>

**QUESTION 2 | ADDING AND SUBTRACTING INTEGERS**

Evaluate each expression:

a) \(3 + 6 = \) 

b) \(-4 + 3 = \) 

c) \(-2 - 2 = \) 

d) \(0 - 6 = \) 

**QUESTION 3 | MULTIPLYING AND DIVIDING INTEGERS**

Evaluate each expression:

a) \(-3 \times 6 = \) 

b) \(-4 \times -3 = \) 

c) \(15 \div -3 = \) 

d) \(-12 \div (-6) = \) 

e) \(-18 \div 6 = \)
STAGE 4: COMPUTATIONS WITH INTEGERS

QUESTION 4

Evaluate each expression:

a) \(24 - 5 \times 6 = \) __________________________

b) \(45 \div 5 - 10 = \) __________________________

c) \(-3 \times 6 + 33 = \) __________________________

d) \(-100 \div 10 + 9 = \) __________________________

e) \(8 + (6 + 4) \div 2 = \) __________________________

QUESTION 5

Use a calculator to evaluate each expression:

a) \(-28 + 12 = \) __________________________

b) \(-44 + 56 \times 4 = \) __________________________

c) \(80 - (20 - 16) \times 3 = \) __________________________

QUESTION 6

a) The temperature in Bathurst was 15°C at midday. By dusk the temperature was -8°C. How much had the temperature dropped?

b) Jan dropped a rock from the top of a cliff 15 metres above sea level. The rock hit the ocean floor 5 metres below sea level. How far did the rock fall?

c) Sandra’s bank account balance showed -$50

i) Does this mean she has $50 or owes $50? __________________________

ii) Sandra decides to deposit $200 into her account what is her new balance? __________________________
Stage 4: Fractions, Decimals and Percentages

Name: _____________________________________________________________

Class: _____________________________________________________________

BACKGROUND KNOWLEDGE: STAGE 3 KEY IDEAS

STUDENTS HAVE LEARNT

☐ Comparing and ordering unit fractions
☐ Expressing mixed numerals as improper fractions and vice versa
☐ Adding and subtracting fractions, including mixed numerals with the same denominator
☐ Applying the place value system for decimals
☐ Comparing and ordering decimals up to three decimal places
☐ Determining and generating equivalent fractions
☐ Writing fractions in simplest form
☐ Multiplying fractions by whole numbers
☐ Finding a simple fraction of a quantity
☐ Multiplying decimals by one- and two-digit whole numbers
☐ Dividing decimals by one-digit whole numbers
☐ Multiplying and dividing decimals by 10, 100 and 1000
☐ Solving word problems involving fractions and decimals
☐ Making connections between equivalent fractions, decimals and percentages
☐ Calculating 10%, 25% and 50% of quantities, including as discounts

Refer to Stage 3 Fractions and Decimals, part 1 and 2.
STAGE 4: FRACTIONS, DECIMALS AND PERCENTAGES

QUESTION 1

EXPRESS IMPROPER FRACTIONS AS MIXED NUMERALS AND VICE VERSA

a) Change the following into a mixed numeral:
   i) \( \frac{7}{3} = \) 
   ii) \( \frac{23}{10} = \)

b) Change the following into an improper fraction:
   i) \( 3 \frac{1}{3} = \)
   ii) \( 2 \frac{3}{4} = \)

QUESTION 2

GENERATE EQUIVALENT FRACTIONS WRITE FRACTION IN SIMPLEST FORM

a) Complete the equivalent fraction:
   i) \( \frac{2}{7} = \frac{6}{\square} \)
   ii) \( \frac{\square}{20} = \frac{3}{5} \)

b) Simplify the following:
   i) \( \frac{6}{8} = \)
   ii) \( \frac{40}{100} = \)

QUESTION 3

APPLY THE FOUR OPERATIONS WITH FRACTIONS AND DECIMALS

a) Find the simplest answer for the following:
   i) \( \frac{2}{3} + \frac{1}{4} = \)
   ii) \( \frac{5}{6} - \frac{1}{3} = \)
   iii) \( \frac{2}{5} - \frac{1}{2} = \)
   iv) \( \frac{4}{5} \times \frac{2}{11} = \)
   v) \( \frac{2}{3} \times \frac{3}{4} = \)
   vi) \( \frac{3}{10} \div \frac{1}{5} = \)
   vii) \( \frac{4}{6} \div \frac{1}{4} = \)
   viii) \( 2 \div 4 = \)
STAGE 4: FRACTIONS, DECIMALS AND PERCENTAGES

QUESTION 3

b) Evaluate the following:

i) \( 83.65 - 2.43 = \) 

ii) \( 0.02 + 29.1 = \) 

iii) \( 43.52 \times 10 = \) 

iv) \( 77.879 \div 1000 = \) 

v) \( 2.3 \times 4.5 = \) 

vi) \( 6.6 \div 1.1 = \) 

vii) \( 0.23 \div 0.1 = \)

QUESTION 4

a) Complete the following table:

<table>
<thead>
<tr>
<th>FRACTION</th>
<th>DECIMAL</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{2}{5} )</td>
<td>0.3</td>
<td>12.5%</td>
</tr>
</tbody>
</table>

b) Write the following in ascending order:

\( 2, \, \frac{5}{3}, \, 30\%, \, 1, \, 0.34, \, -4.3 \)

QUESTION 5

Express the following as a fraction and then as a percentage:

a) \( 20 \text{ min of } 1\text{hr} = \)

b) \( 200\text{ml of } 2\text{L} = \)
STAGE 4: FRACTIONS, DECIMALS AND PERCENTAGES

QUESTION 6

ROUND DECIMALS TO A SPECIFIED NUMBER OF PLACES
USE THE NOTATION OF RECURRING DECIMALS

a) Round off the following to the number of decimal places in brackets:
   i) 0.344 (1 decimal place)
   ii) 12.565 (2 decimal places)
   iii) 365.998 (nearest tenth)

b) Write as recurring decimals using the correct notation:
   i) 0.33333333333...
   ii) 34.3721721721...

QUESTION 7

CONVERT FRACTIONS INTO RECURRING DECIMALS

a) Convert the following fractions into decimals
   i) \( \frac{2}{3} \)
   ii) \( \frac{2}{9} \)

b) Use a calculator to convert the following decimals into fractions
   i) 0.6
   ii) 1.45

QUESTION 8

SOLVE PROBLEMS INVOLVING FRACTIONS, DECIMALS AND PERCENTAGES

a) Maria received her exam results and achieved 78% in Art, 19/25 in English and 32/40 in Maths.
   In which exam did she achieve the highest result?

b) Lisa decided to hire some computer games to play during the school holidays. The games cost $5.50 each. She has $20.00 to spend.
   i) How many games can she hire?
   ii) How much change will she be left with?
Stage 4: Financial Mathematics

Name: ____________________________________________________________

Class: ____________________________________________________________

STAGE 4: FINANCIAL MATHEMATICS

QUESTION 1

PERFORM CALCULATIONS INVOLVING GST

a) What does GST stand for?

i) What does GST inclusive mean?

ii) What does GST exclusive mean?

iii) What does pre-GST mean?

iv) What is the rate of GST?

b) The following items do not have GST added to them. Find the GST of the following:

i) Scooter: $120

ii) Computer: $980.95

c) The following items are GST inclusive. Find the GST of the following:

i) Toy racing car: $99

ii) iPad: $880

d) Determine the pre-GST prices of the following goods:

i) Mobile phone: $250

ii) Play Station 3: $345

QUESTION 2

CALCULATE DISCOUNTS AND ‘BEST BUYS’

a) Lisa saw a sports bag she liked for $45. The store she was buying it from had a 30% discount storewide.

i) How much did she save?

ii) How much did she pay for the bag?

b) Robix cereal comes in three sizes; 300g for $2.50, 600g for $5.00 and 1kg for $8.00. Which is the best buy?
STAGE 4: FINANCIAL MATHEMATICS

QUESTION 3

SOLVE PROBLEMS INVOLVING PROFIT AND LOSS

a) Lisa bought a bike for $150 and later sold it for $220. Find the profit as a percentage of the cost price.

b) At the half yearly sales, toys were sold for 10% below cost. A toy was sold for $150. Calculate the cost price and the loss.
Stage 4: Ratio and Rates

Name: ____________________________________________
Class: ____________________________________________

STAGE 4: RATIO AND RATES

QUESTION 1 SIMPLIFY RATIOS

a) For the following, write the first quantity as a fraction of the other and then simplify:
   i) 4 girls, 7 girls
   ii) 5kg, 10kg

b) Simplify the following ratios:
   i) 4:6
   ii) 1:2 = \(\frac{2}{2}\)
   iii) 0.3:1

c) How many parts in the following ratios:
   i) 3:5
   ii) 2:11

QUESTION 2 SOLVE PROBLEMS INVOLVING RATIOS

a) Divide $40 in the ratio 3:5

b) Jamie and Richie won prize money and shared it in the ratio 3:4. If the total prize money was $21,000, how much prize money did each person receive?

c) There are 22 students in a class, twelve of whom are girls. Find the ratio of the following:
   i) girls : students
   ii) girls : boys

d) In a rectangle, the ratio of the length to the width is 7:4. The width is 12cm. Find the length.
STAGE 4: RATIO AND RATES

QUESTION 3

CONVERT INTO SIMPLIFIED RATE

a) Write the following as a rate:
   i) 150km in 2 hours
   ii) 5.6m in 6 hours

b) Convert the following:
   i) 25c/min to $/h
   ii) 20cm/sec to m/h

QUESTION 4

SOLVE PROBLEMS INVOLVING RATES

a) Amanda walks 300m in 12 minutes. How far can she walk in an hour?

b) Greg runs 120m in 20 seconds. Find his speed in metres per second.

QUESTION 5

INTERPRET DISTANCE/TIME GRAPHS

The travel graph below shows Emma’s trip on Saturday. Emma picked up her friend Sally and went for a walk to Central park where they sat and had lunch. They then sprinted back to Emma’s house. Answer the following questions:

![Distance-Time Graph]

i) How many stops did Emma make?

ii) What unit of measurement is used on the horizontal axis?

iii) What time did Emma pick up Sally?

iv) How long did they stop and have lunch?

v) At what time did they arrive home?
Stage 4: Algebraic Techniques 1

Name: _______________________________________________________

Class: _______________________________________________________

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STAGE 4: ALGEBRAIC TECHNIQUES 1

QUESTION 1

USE LETTERS TO REPRESENT NUMBERS

If \( a = 3 \), \( b = 2 \) and \( c = 4 \), evaluate:

a) \( a + c = \) __________________________

b) \( 12 = \) __________________________

c) \( 5a - b = \) __________________________

---

QUESTION 2

RECOGNISE AND USE SIMPLE EQUIVALENT ALGEBRAIC EXPRESSIONS

a) Expand the following by placing multiplication or division symbols.

i) \( 6m = \) __________________________

ii) \( h = \) __________________________

iii) \( 3k + 2 = \) __________________________

b) Simplify:

i) \( 5 \times b \times c = \) __________________________

ii) \( 6 \times m \times m \times 2 = \) __________________________

---

c) Write expressions for the following:

i) 5 more than a number \( N = \) __________________________

ii) The product of 3 and \( w = \) __________________________

iii) The next consecutive number after \( N = \) __________________________

---

QUESTION 3

SIMPLIFY ALGEBRAIC EXPRESSIONS INVOLVING THE FOUR OPERATIONS

a) \( 3x + 5x - 6x = \) __________________________

b) \( -5y^2 + 3y^2 = \) __________________________

c) \( 3x^2 - 5x + 4x^2 - 3 = \) __________________________

d) \( 8a - 5b + a + 2b = \) __________________________

e) \( 2b \times 3b = \) __________________________

f) \( -5a \times 2b \times 3 = \) __________________________
Stage 4: Algebraic Techniques 2

Name: ________________________________________________________________

Class: ________________________________________________________________

STAGE 4: ALGEBRAIC TECHNIQUES 2

QUESTION 1 SUBSTITUTE INTO ALGEBRAIC EXPRESSIONS

Complete the following tables:

a) 

<table>
<thead>
<tr>
<th>x</th>
<th>-3</th>
<th>-1</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>x²</td>
<td>1</td>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) 

<table>
<thead>
<tr>
<th>y</th>
<th>-2</th>
<th>0</th>
<th>1</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>y⁄4</td>
<td></td>
<td>1⁄4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

c) 

<table>
<thead>
<tr>
<th>m</th>
<th>-3</th>
<th>0</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>-m + 2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

STAGE 4: ALGEBRAIC TECHNIQUES 2

QUESTION 2 EXPAND AND FACTORISE SIMPLE ALGEBRAIC EXPRESSIONS

a) Expand the following:

i) $2(x - 4) =$ ________________________________  iii) $6ab =$ ________________________________

ii) $-2(3k - 2) =$ ________________________________  iv) $m^3 y^2 =$ ________________________________

b) Factorise the following:

i) $8a + 16 =$ ________________________________  iii) $y^2 - 3y =$ ________________________________

ii) $-3t - 12 =$ ________________________________  iv) $2xy + 8x =$ ________________________________
Stage 4: Indices

Name: ____________________________
Class: ____________________________

STAGE 4: INDICES

QUESTION 1 USE INDEX NOTATION FOR POSITIVE INTEGRAL INDICES

a) Use index notation to simplify the following:
   i) $2 \times 2 \times 2 =$ ____________________________  ii) $3 \times 4 \times 4 \times 4 =$ ____________________________

b) Expand and simplify the following:
   i) $2^2 \times 5^2 =$ ____________________________  ii) $4^3 =$ ____________________________

QUESTION 2 EXPRESS A WHOLE NUMBER AS A PRODUCT OF ITS PRIME FACTORS

Express the following as a product of its prime factors (hint: use factor trees)
   i) $24 =$ ____________________________  ii) $100 =$ ____________________________

Draw a factor tree  Draw a factor tree

QUESTION 3 APPLY THE ORDER OF OPERATIONS TO EVALUATE INDICES

Evaluate the following:
   i) $4 + 5 \times 2^2 =$ ____________________________  ii) $12 \div 2 + (7 + 3^3) =$ ____________________________
STAGE 4: INDICES

QUESTION 4

DETERMINE AND APPLY TESTS OF DIVISIBILITY
FOR 2, 3, 4, 5, 6, 10

DIVISIBILITY TESTS

A number is divisible by:

2 if the last digit is 0, 2, 4, 6 or 8
3 if the sum of the digits is divisible by 3
4 if the last 2 digits form a number divisible by 4
5 if the last digit is 0 or 5
6 if the number is divisible by 2 and 3
10 if the last digit is 0

Use the divisibility tests to determine if the following are true or false.

i) 325 is divisible by 3
ii) 456780 is divisible by 5
iii) 512 is divisible by 4
iv) 312 is divisible by 6

QUESTION 5

FIND SQUARE ROOTS AND CUBE ROOTS

Evaluate the following:

i) $\sqrt{25}$
ii) $\sqrt{100}$
iii) $\sqrt[3]{64}$
iv) $\sqrt[3]{125}$

\[ \sqrt{2000} \]
\[ \sqrt[3]{27} \times (-3)^{\frac{4}{3}} = \]

f) $\sqrt[3]{27} \times (-3)^{\frac{4}{3}} = $
STAGE 4: INDICES

QUESTION 6
DETERMINE AND APPLY THE INDEX LAWS FOR NUMERICAL EXPRESSIONS WITH POSITIVE INTEGER INDICES

True or false:

i) \((2 \times 3)^2 = 2^2 \times 3^2\)

ii) \(\sqrt{9 \times 4} = \sqrt{9} \times \sqrt{4}\)

iii) \(\sqrt{36+64} = \sqrt{36} + \sqrt{64}\)

iv) \(3^2 \times 3^4 = 9^6\)

b) Between which two integers does the \(\sqrt{60}\) lie?

QUESTION 7
DETERMINE AND APPLY THE INDEX LAWS FOR NUMERICAL EXPRESSIONS AND THE MEANING OF THE ZERO INDEX

Simplify the following:

a) \(4^2 \times 4^3 = \)

d) \(7^0 = \)

b) \(5^6 \div 5^2 = \)

e) \((-1/2)^0 = \)

c) \((2^3)^2 = \)

QUESTION 8
VERIFY THE INDEX LAWS USING A CALCULATOR

a) \(4^9 = \)

d) \((2^{15})^3 + 2 \times \sqrt[3]{64} = \)

b) \(\sqrt{896} = \)

e) \((3^7 \times 3^3) = \frac{\sqrt[3]{2000}}{(-6)^3}\)

f) \(-(3^8 \times (-3^4))^0 = \)
Stage 4: Equations

Name: ________________________________

Class: ________________________________

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STAGE 4: EQUATIONS

QUESTION 1

SOLVE SIMPLE LINEAR EQUATIONS

a) Given that $x = 4$, determine if the following are true or false.

i) $3x = 12$

ii) $2x - 1 = 9$

b) Write an algebraic equation for the following:

i) The product of 3 and $x$ is equal to 15

ii) The sum of 2 and $y$, all squared, is equal to 25

c) Solve the following linear equations, check solutions by substituting:

i) $y - 6 = 14$

ii) $3p - 5 = 13$

iii) $8 - 2m = 10$

iv) $x = 4$

v) $3n = 6$

vi) $2(x + 2) = 8$

-----

QUESTION 2

SOLVE SIMPLE LINEAR EQUATIONS USING ALGEBRAIC TECHNIQUES

Solve the following linear equations, simplify fractions where necessary.

a) $2m + 5 = 18$

b) $3x + 2 = x - 5$

c) $3(p + 5) = 25$

d) $4x + 3 = 6 - 2x$

e) $y + 5 = 8$

f) $3k + 4 = 6$
STAGE 4: EQUATIONS

QUESTION 3

DISTINGUISH BETWEEN ALGEBRAIC EQUATIONS

Write an algebraic expression for the following and solve:

a) Three more than a number multiplied by two is 21. What is the number?

b) Casey’s father is three times Casey’s age. Their combined age is 48. What are their individual ages?

QUESTION 4

SOLVE SIMPLE QUADRATIC EQUATION OF THE FORM $x^2 = c$

a) Solve the following quadratic equations, leaving answers in exact form:

i) $a^2 = 16$

ii) $y^2 - 64 = 0$

iii) $4x^2 - 1 = 11$

iv) $m^2 = 12$

b) Which of the following has no solution?

i) $y^2 = 16$

ii) $1 - p^2 = -8$

iii) $x^2 = -9$
Stage 4: Linear Relationships

Name: ____________________________________________

Class: __________________________________________

STAGE 4: LINEAR RELATIONSHIPS

QUESTION 1 LOCATE AND DESCRIBE POINTS ON THE CARTESIAN PLANE USING COORDINATES

Identify the following points on the number plane and write them as coordinates:

![Cartesian Plane Diagram]

i) A ____________________  
ii) B ____________________  
iii) C ____________________  
iv) D ____________________

QUESTION 2 RECOGNISE DESCRIBE AND RECORD GEOMETRIC AND NUMBER PATTERNS IN WORDS AND ALGEBRAIC SYMBOLS

Find the next three terms in the number pattern:

a) 9, 7, 5, 3... ____________________  
b) -10, -8, -6... ____________________
QUESTION 3

RECOGNISE DESCRIBE AND RECORD GEOMETRIC AND NUMBER PATTERNS IN WORDS AND ALGEBRAIC SYMBOLS

Complete the table for the following geometric pattern:

![Pentagons pattern](image)

<table>
<thead>
<tr>
<th>Number of pentagons (P)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of sides (S)</td>
<td>5</td>
<td></td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) Complete the following statement. The number of matches M equals __________________________ times the number of pentagons plus __________________________.

b) Write the rule for the table as a formula __________________________.

c) How many sides are needed to form 100 pentagons? __________________________.

QUESTION 4

INCREASING AND DECREASING LINES

Determine if the following linear graphs are increasing or decreasing.

a)

b)
STAGE 4: LINEAR RELATIONSHIPS

QUESTION 5

a) Complete the following table of values for the following:

\[ y = x + 1 \]

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

b) Plot the linear relationship on a number plane.
Stage 4: Linear Relationships

Question 6

Derive a rule for a set of points that have been graphed on a Cartesian plane.

a) Using the graph below, complete the table of values.

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

b) Find the equation of the line.

\[ y = \text{\line equation} \]

\[ x - 1 0 1 2 \\
\[ y 2 0 -1 \]

\[ x -2 -1 0 1 2 3 4 \\
\[ y -2 -3 1 3 \]

Question 7

Identify similarities between groups of linear relationships.

Circle the two linear equations that are parallel:

\[ y = 3x + 3 \]
\[ y = 2x + 1 \]
\[ y = 3x \]
STAGE 4: LINEAR RELATIONSHIPS

QUESTION 8

SOLVE SIMPLE LINEAR EQUATIONS USING GRAPHICAL TECHNIQUES

Use the graph below to find the solution to the equation $x + 2 = 1$.

\[
y = x + 2
\]

\[
y = x + 1
\]

\[
y = -x + 3
\]

QUESTION 9

POINT OF INTERSECTION OF TWO LINES

At what point do these two lines intersect? ( , )

\[
y = x + 1
\]

\[
y = -x + 3
\]
Stage 4: Length

Name: ____________________________________________

Class: ____________________________________________

### BACKGROUND KNOWLEDGE: STAGE 3 KEY IDEAS

**STUDENTS HAVE LEARNT**

- Using the kilometres to measure lengths and distances
- Selecting and using appropriate instruments and units to measure lengths
- Recording lengths and distances using the abbreviations km, m, cm and mm
- Finding perimeters of common two-dimensional shapes and recording the strategy
- Recording lengths and distances using decimal notation to three decimal places
- Converting between kilometres, metres, centimetres and millimetres
- Solving problems involving length and perimeter

Refer to Stage 3 Length.
STAGE 4: LENGTH

QUESTION 1

FIND PERIMETERS OF TWO-DIMENSIONAL SHAPES

Find the perimeter of the following:

a)

\[ P = \]

b)

\[ P = \]

c)

\[ P = \]

d)

\[ P = \]

QUESTION 2

FIND PERIMETERS OF TWO-DIMENSIONAL SHAPES

Find the unknown sides. Calculate the perimeter of this composite shape.

\[ P = \]

QUESTION 3

ESTABLISH AND USE FORMULAS TO FIND CIRCUMFERENCE OF CIRCLES

a) Use your calculator to round \( \pi \) to 4 decimal places

\[ \pi = \]

b) Find the circumference of the following, answer in exact form in terms of \( \pi \):

i)

\[ d = 8 \text{ cm} \]

\[ C = \]

ii)

\[ 5 \text{ cm} \]

\[ C = \]
STAGE 4: LENGTH

**QUESTION 4**

**FIND ARC LENGTHS AND THE PERIMETERS OF QUADRANTS, SEMI-CIRCLES AND SECTORS**

Find the arc length (L) and perimeter (P) of the following:

- Diameter = 8 cm
- Radius = 6 cm
- Radius = 3 cm

**QUESTION 5**

**SOLVE PROBLEMS INVOLVING PERIMETER AND CIRCUMFERENCE**

a) A rectangle has a perimeter of 90 cm. If its length is 20 cm, find its width.

b) Lisa wanted to order tiles to lay around the edge of her pool. One end of her pool is shaped as a semi-circle. How many metres of tiles does she need to order?

---

6 m

---

m
Stage 4: Area

Name: 

Class: 

BACKGROUND KNOWLEDGE: STAGE 3 KEY IDEAS

STUDENTS HAVE LEARNT

☐ Recognising the need for square kilometres and hectares to measure area
☐ Recording areas using the abbreviations km² and ha
☐ Developing a strategy to find areas of rectangles (including squares) and recording the strategy in words
☐ Developing a strategy to find areas of triangles and recording the strategy in words
☐ Solving problems involving areas of rectangles (including squares) and triangles

SYLLABUS CONTENT AREAS RELATED TO THE OUTCOME

Refer to Stage 3 Area.
QUESTION 1

CONVERT BETWEEN METRIC UNITS OF AREA

Convert the following:

a) 800mm² = ____________ cm²  

b) 2.5km² = ____________ m²

QUESTION 2

USE FORMULAS TO FIND THE AREAS OF TRIANGLES, SPECIAL QUADRILATERALS

Find the area of the following:

a)

\[ A = \]  

b)

\[ A = \]  

c)

\[ A = \]  

d)

\[ A = \]  

e)

\[ A = \]  

f)

\[ A = \]  

g)

\[ A = \]
STAGE 4: AREA

QUESTION 3

USE FORMULAS TO FIND
THE AREAS OF CIRCLES

Find the area of the following:

a)  

\[ A = \text{________________________} \]

b)  

\[ A = \text{________________________} \]

QUESTION 4

SOLVE PROBLEMS INVOLVING AREA

a)  Greg wanted to tile a room. The tiles he chose cost $25/m². His room is 3m by 4.3m.
What is the cost of the tiles?

b)  Lisa’s dad owns a paddock that measures 900m by 800m. He wants to put a fence on a diagonal across his land. What is the area of each triangular block in hectares?
Stage 4: Volume

Name: 
Class: 

BACKGROUND KNOWLEDGE: STAGE 3 KEY IDEAS

STUDENTS HAVE LEARNT

☐ Using cubic centimetres and cubic metres to measure and estimate volumes
☐ Selecting and using appropriate units to measure volume
☐ Recording volumes using the abbreviations cm$^3$ and m$^3$
☐ Connecting volume and capacity and their units of measurement
☐ Recording volumes and capacities using decimal notation to three decimal places
☐ Converting between millilitres and litres
☐ Developing a strategy to find volumes of rectangular prisms and recording the strategy in words
☐ Recognising the need for tonnes to measure mass
☐ Recording masses using the abbreviations t, kg and g
☐ Selecting and using appropriate instruments and units to measure mass
☐ Distinguishing between ‘gross mass’ and ‘net mass’
☐ Solving problems involving mass
☐ Recording mass using decimal notation to three decimal places
☐ Converting between tonnes, kilograms and grams

Refer to Stage 3 Volume and Capacity, Mass.
STAGE 4: VOLUME

QUESTION 1

VISUALISE AND DRAW DIFFERENT VIEWS OF THREE-DIMENSIONAL OBJECTS

Draw the following views for the solid below:

i) Top view:

ii) Side view:

iii) Front view:

QUESTION 2

IDENTIFY AND DRAW THE CROSS-SECTIONS OF DIFFERENT PRISMS

Identify and draw the uniform cross-section of each three-dimensional object:

a) b) c)

QUESTION 3

CONVERT BETWEEN METRIC UNITS OF VOLUME AND CAPACITY

Convert the following:

a) \( 5000 \text{ mm}^3 = \underline{\quad} \text{ cm}^3 \)

b) \( 4.2 \text{ L} = \underline{\quad} \text{ ml} \)

c) \( 2.6 \text{ m}^3 = \underline{\quad} \text{ L} \)

d) \( 6.2 \text{ kL} = \underline{\quad} \text{ L} \)
QUESTION 4  

ESTABLISH AND USE FORMULAS TO FIND VOLUMES OF RIGHT PRISMS AND CYLINDERS

Find the volume of the following:

a) 

\[ V = \text{ } 9 \text{ cm} \times 4 \text{ cm} \times 3 \text{ cm} \]

b) 

\[ V = \text{ } 4 \text{ m} \times 4 \text{ m} \times 4 \text{ m} \]

c) 

\[ V = \text{ } 4 \text{ cm} \times 6.2 \text{ cm} \times 2.5 \text{ cm} \]

d) 

\[ V = \text{ } 6 \text{ m} \times 7 \text{ m} \times \text{ } \]

QUESTION 5  

SOLVE PROBLEMS INVOLVING VOLUME AND CAPACITY

(Hint: draw diagrams)

a) A cylindrical tank has a radius of 3 m and a height of 12 m.

i) What is the volume of the tank?  

ii) How much water can it hold in litres?  

iii) How much water can it hold in millilitres?  

b) A box is used to store 1 litre milk cartons. If the box can hold 24 milk cartons, identify the possible dimensions of the box.
Stage 4: Time

Name: 

Class: 

BACKGROUND KNOWLEDGE: STAGE 3 KEY IDEAS

STUDENTS HAVE LEARNT

☐ Converting between 12 and 24-hour time
☐ Determining and comparing the duration of events
☐ Interpreting and using timetables
☐ Drawing and interpreting timelines using a given scale

SYLLABUS CONTENT AREAS RELATED TO THE OUTCOME

Refer to Stage 3 Time.
STAGE 4: TIME

QUESTION 1

PERFORM OPERATIONS WITH TIME UNITS MENTALLY AND WITH A CALCULATOR

Convert the following:

a) 72 hours = ________________ days c) 30240 min = ________________ weeks

b) $\frac{3}{4}$ hours = ________________ minutes d) 9.25 hours = ________________ seconds

QUESTION 2

SOLVE PROBLEMS INVOLVING TIME DURATION

a) Convert the following into 24 hour time:

i) 2.26 am ________________ ii) 9:14 pm ________________ iii) 12:36 am ________________

b) Use your calculator to convert the following into hours, minutes and seconds:

i) 9.67 h ________________ ii) 5.25 h ________________ iii) 7.93 h ________________

c) Calculate the time difference for the following:

i) 2:45 am to 5 am ________________ ii) 6:45 pm to 3:15 pm ________________ iii) 8:25 am to 2:45 pm ________________

d) Use your calculator to calculate the time difference for the following:

i) 4 hours 20 min to 6 hours 15 min ________________

ii) 4 hours 15 min 30 sec to 11 hours 7 min 8 sec ________________

QUESTION 3

INTERPRET INTERNATIONAL TIME ZONES

a) Given that London is 10 hours behind Sydney, what time is it in London when it is 5:00 pm in Sydney?

b) Sue needs to call Adam in Western Australia. Western Australia is 2 hours behind New South Wales. What time should Sue call Adam at 9:00 am Western Australia time?
STAGE 4: RIGHT ANGLED TRIANGLES

QUESTION 1
IDENTIFY THE HYPOTENUSE

Name the hypotenuse in each of these triangles:

a) 
\[ \text{WXY} \]

b) 
\[ \text{mnl} \]

QUESTION 2
APPLY PYTHAGORAS THEOREM TO FIND SIDES IN RIGHT-ANGLED TRIANGLE

Find the unknown side in the following. Leave answers in exact form.

a) 
\[ \text{5 cm} \] 
\[ \text{x} \] 
\[ \text{12 cm} \]

b) 
\[ \text{9 m} \] 
\[ \text{y} \] 
\[ \text{6 m} \]
STAGE 4: RIGHT ANGLED TRIANGLES

QUESTION 3

ESTABLISH IF TRIANGLE HAS RIGHT ANGLE

Is the following triangle right angled? Show working to prove your answer.

![Diagram of a triangle with sides 6 cm, 8 cm, and 10 cm]

QUESTION 4

SOLVE PROBLEMS INVOLVING PYTHAGORAS' THEOREM

a) Find the length of the diagonal in a rectangle with length 8 cm and width 5 cm. Answer correct to 1 decimal place.

![Diagram of a rectangle with sides 8 cm and 5 cm]

b)

i) Find x

![Diagram of a triangle with sides 5 m, 13 m, and the unknown x]

ii) Find the perimeter of this shape

![Diagram of a shape with sides 5 m, 13 m, and 15 m]
Stage 4: Properties of Geometric Figures (Part 1)

Name: __________________________________________

Class: __________________________________________

BACKGROUND KNOWLEDGE: STAGE 3 KEY IDEAS

STUDENTS HAVE LEARNT

☐ Identifying, naming and drawing right-angled, equilateral, isosceles and scalene triangles
☐ Comparing and describing side properties of the special quadrilaterals and triangles
☐ Exploring angle properties of the special quadrilaterals and special triangles
☐ Classifying and drawing regular and irregular two dimensional shapes from descriptions of their features
☐ Using the terms ‘translate’, ‘reflect’ and ‘rotate’ to describe transformations of shapes
☐ Identifying line and rotational symmetries
☐ Making and compare enlargements of shapes/pictures
☐ Describing, comparing and drawing diagonals of two-dimensional shapes
☐ Identifying and naming parts of circles
☐ Identifying, using and describing combinations of translations, reflections and rotations

SYLLABUS CONTENT AREAS RELATED TO THE OUTCOME

Refer to Stage 3 Two Dimensional Space.
STAGE 4: PROPERTIES OF GEOMETRIC FIGURES (PART 1)

QUESTION 1

LABEL AND NAME TRIANGLES AND QUADRILATERALS

i) Name the angles marked with (*) in the following:

ii) Name the triangle or quadrilateral:

a) 

i) ____________________________

ii) ____________________________

b) 

i) ____________________________

ii) ____________________________

QUESTION 2

RECOGNISE AND CLASSIFY TRIANGLES ON THE BASIS OF THEIR PROPERTIES

Tick the boxes that best suit the triangles:

<table>
<thead>
<tr>
<th>TRIANGLE</th>
<th>OBTUSE ANGLED</th>
<th>ACUTE ANGLED</th>
<th>SCALENE</th>
<th>ISOSCELES</th>
<th>EQUILATERAL</th>
<th>RIGHT ANGLED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### STAGE 4: PROPERTIES OF GEOMETRIC FIGURES (PART 1)

#### QUESTION 3

CLASSIFY SPECIAL QUADRILATERALS ON THE BASIS OF THEIR PROPERTIES

Tick the property that applies to the following quadrilaterals:

<table>
<thead>
<tr>
<th></th>
<th>RECTANGLE</th>
<th>SQUARE</th>
<th>PARRALLELOGRAM</th>
<th>TRAPEZIUM</th>
<th>RHOMBUS</th>
<th>KITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opposite sides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>are parallel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opposite sides equal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjacent sides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>are perpendicular</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opposite angles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>are equal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagonals are equal</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Diagonals bisect</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>each other</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagonals bisect</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>each other at right angles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagonals bisect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the angles of the quadrilateral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### QUESTION 4

USE PROPERTIES OF SHAPES TO FIND UNKNOWN SIDES AND ANGLES IN TRIANGLES AND QUADRILATERALS GIVING A REASON

a) The angle sum of a triangle is

b) The angle sum of a quadrilateral is
STAGE 4: PROPERTIES OF GEOMETRIC FIGURES (PART 1)

USE PROPERTIES OF SHAPES TO FIND UNKNOWN SIDES AND ANGLES IN TRIANGLES AND QUADRILATERALS GIVING A REASON

QUESTION 5

Find the pronumerals in the following, give reasons for your answers:

a)

b)


c)


d)


e)
Stage 4: Properties of Geometric Figures (Part 2)

Name: 

Class: 

STAGE 4: PROPERTIES OF GEOMETRIC FIGURES (PART 2)

QUESTION 1 IDENTIFY CONGRUENT FIGURES

a) What does congruent mean?

b) Circle the pair of shapes that are congruent.

[Diagrams of shapes]

QUESTION 2 IDENTIFY CONGRUENT TRIANGLES USING THE FOUR TESTS

a) Write down the four tests for two triangles to be congruent.

b) Which two triangles are congruent? State the test that proves them congruent.

[Diagrams of triangles]

c) Identify the test that proves that the triangles below are congruent.

[i] 7 cm, 55°, 8 cm

[ii] 20°, 20°, 5 cm
Stage 4: Angles

Name:__________________________________________

Class:__________________________________________

BACKGROUND KNOWLEDGE: STAGE 3 KEY IDEAS

STUDENTS HAVE LEARNT

☐ Recognising the need for formal units to measure angles
☐ Measuring, comparing and estimating angles in degrees (up to $360^\circ$)
☐ Recording angle measurements using the symbol for degrees (°)
☐ Constructing angles using a protractor (up to $360^\circ$)
☐ Describing angle size in degrees for each angle classification
☐ Identifying and naming angle types formed by the intersection of straight lines, including ‘angles on a straight line’, ‘angles at a point’ and ‘vertically opposite angles’
☐ Using known angle results to find unknown angles in diagrams

Refer to Stage 3 Angles.
STAGE 4: ANGLES

QUESTION 1

LABEL AND NAME ANGLES

Name the angles that are marked (★):

i) ii)

QUESTION 2

IDENTIFY AND NAME ANGLE TYPES

Name the following types of angles and draw a diagram.

<table>
<thead>
<tr>
<th>DEFINITION</th>
<th>TYPE OF ANGLE</th>
<th>DIAGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>An angle that is less than 90˚</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An angle that is 90˚</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An angle that is greater than 90˚ and less than 180˚</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An angle that is 180˚</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An angle that adds up to 360˚</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STAGE 4: ANGLES

QUESTION 3  IDENTIFY AND NAME PERPENDICULAR LINES

Name two lines that are perpendicular in the diagram below using the symbol (⊥).

![Diagram with lines and symbols]

QUESTION 4  USE THE TERMS COMPLEMENTARY AND SUPPLEMENTARY FOR ANGLES

What is the complement of 30˚?

What is the supplement of 110˚?

QUESTION 5  FIND THE SIZES OF UNKNOWN ANGLES

Find the size of each unknown angle:

a) b) c)
STAGE 4: ANGLES

QUESTION 6

Identify alternate, corresponding or co-interior angles. Also state if the angles are equal or supplementary.

a) x

b) x

c) x

QUESTION 7

Find the sizes of the unknown angles below:

a) 119°

b) 94°

c) 89°
STAGE 4: DATA COLLECTION AND REPRESENTATION

QUESTION 1

IDENTIFY VARIABLES AS CATEGORICAL OR NUMERICAL (DISCRETE OR CONTINUOUS)

Categorise the following data as categorical or quantitative (discrete or continuous)

a) Colours of cars
b) Shoe size
c) Heights of bridges

QUESTION 2

IDENTIFY AND DISTINGUISH BETWEEN A ‘POPULATION’ AND A ‘SAMPLE’

What is the difference between a ‘population’ and a ‘sample’ when collecting data?
STAGE 4: DATA COLLECTION AND REPRESENTATION

QUESTION 3

INVESTIGATE TECHNIQUES FOR COLLECTING DATA AND CONSIDER THEIR IMPLICATIONS AND LIMITATIONS

a) Determine which method of collecting data (observation, sample or census) is the most appropriate for the following:

i) Native animals in a local area

ii) Income of Australians

iii) Testing the effectiveness of batteries

b) Identify two limitations of collecting data through a census

1.

2.

c) The high school year advisors selected a few girls in year 9 to survey them on their ideas on how bullying should be addressed in the school.

i) Do you think that the year advisors would receive reliable feedback?

ii) Were the year advisors biased with their selection?

iii) How would you select the students for this survey?

QUESTION 4

COLLECT AND INTERPRET DATA FROM PRIMARY AND SECONDARY SOURCES, INCLUDING SURVEYS

Name two primary and two secondary sources for collecting data:

<table>
<thead>
<tr>
<th>PRIMARY SOURCE</th>
<th>SECONDARY SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
STAGE 4: DATA COLLECTION AND REPRESENTATION

QUESTION 5

The students of a Year 8 mathematics class were asked how many siblings they had in their families and the results are shown below:

1 2 3 1 1 3 4 5 4 3 4 2 4 5 6 3 0

a) Complete the following frequency table and then draw a histogram and polygon to represent the data on the axis provided.

<table>
<thead>
<tr>
<th>SIBLINGS</th>
<th>TALLY</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total:

b) How many students were there altogether?

c) How many students had 4 siblings in their family?

d) How many students have at least 2 siblings?

e) What percentage of students have more than 3 siblings?
STAGE 4: DATA COLLECTION AND REPRESENTATION

QUESTION 6

Interpret Dot Plots

The following dot plot shows the number of hours it takes a group of students to do their homework.

Students homework hours

<table>
<thead>
<tr>
<th>Number of hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

a) How many students spend 3 or more hours on homework? 

b) How many students were asked altogether? 

c) What is the outlier? 

QUESTION 7

Construct and Interpret Stem and Leaf Plots

Yasmine did a survey of how many times the members of her class had visited the canteen over the month. The results were as follows: 10 15 23 2 20 31 14 10 8 19 8 42 15 22 6 34 19 3 44

Construct an ordered stem and leaf plot for the data set above.

QUESTION 8

Interpret Sector Graphs

The sector graph below shows the favourite fruit of a population of 200 people in Adamstown.

a) What fruit was the favourite in the town? 

b) What fruit was the least favourite in the town? 

c) How many people liked pears? 

d) What percentage of the town liked bananas? 
Stage 4: Single Variable Data Analysis

Name: ____________________________

Class: ____________________________

---

**STAGE 4: SINGLE VARIABLE DATA ANALYSIS**

**QUESTION 1**  
**CALCULATE MEAN, MEDIAN, MODE AND RANGE FOR SETS OF DATA**

State three measures of location: ____________________________

State a measure of spread: ____________________________

**QUESTION 2**  
**CALCULATE MEAN, MEDIAN, MODE AND RANGE FOR SETS OF DATA**

The data set below shows the first 10 prime numbers:

\{ 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 \}

Find the:

a) Median ____________________________

b) Range ____________________________

c) Mean (\( \bar{x} \)) ____________________________

d) Mode ____________________________

**QUESTION 3**  
**INVESTIGATE THE EFFECT OF OUTLIERS ON THE MEAN AND MEDIAN**

The following data set shows how many students walked to school on different days:

\{ 6, 8, 6, 1, 5, 8, 11, 10, 14, 3, 2, 4, 8, 9, 24 \}

Find the:

a) Mode ____________________________

b) Median ____________________________

c) Range ____________________________

d) Mean ____________________________

e) Are there any outliers? ____________________________

f) If the outlier was removed, what will happen to the median and mean? ____________________________
STAGE 4: SINGLE VARIABLE DATA ANALYSIS

QUESTION 4

The following stem and leaf plot shows the heights of students in our netball team.

STEM | LEAF
--- | ---
14 | 12
15 | 2335
16 | 157

a) Find the mean, median and range

MEAN | MEDIAN | RANGE
--- | --- | ---

b) What is the average?

c) What is the height of the tallest team member?

d) What was the modal height?

e) Are there any outliers?

QUESTION 5

Complete the frequency table below and then answer the following questions:

<table>
<thead>
<tr>
<th>SCORE (X)</th>
<th>FREQUENCY (f)</th>
<th>fx</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) Find the mean

b) Find the median
# Stage 4: Probability (Part 1)

Name: 

Class: 

## BACKGROUND KNOWLEDGE: STAGE 3 KEY IDEAS

**STUDENTS HAVE LEARNT**

- Listing outcomes of chance experiments involving equally likely outcomes
- Representing probabilities using fractions
- Recognising that probabilities range from 0 to 1
- Comparing observed frequencies in chance experiments with expected frequencies
- Representing probabilities using fractions, decimals and percentages
- Conducting chance experiments with both a small and large number of trials

Refer to Stage 3 Chance.
STAGE 4: PROBABILITY (PART 1)

QUESTION 1

CONSTRUCT SAMPLE SPACES FOR SINGLE-STEP EXPERIMENTS WITH EQUALLY LIKELY OUTCOMES

a) Describe the likelihood of each of the following events occurring:
   i) The toss of a coin shows a tail
   ii) Rolling a 7 on a standard dice
   iii) Picking a red or black card from a regular pack of playing cards

b) List the sample space for the following:
   i) Tossing a coin
   ii) Rolling a standard dice

b) The following spinner shows the colours of counters in a bag.

i) List the possible outcomes when taking a counter from the bag?
   ii) Are the outcomes equally likely?

QUESTION 2

FIND PROBABILITIES OF EVENTS IN SINGLE-STEP EXPERIMENTS

What is the probability of obtaining the following when tossing a coin?

a) Tail

b) Head or tail

c) Neither a head or tail

QUESTION 3

IDENTIFY COMPLEMENTARY EVENTS AND USE THE SUM OF PROBABILITIES TO SOLVE PROBLEMS

A bag contains 7 green discs, 8 red discs and 5 blue discs. If one disc is drawn at random, find the probability that it is:

a) Red

b) Not red

c) Blue or green

d) Neither blue or green
Stage 4: Probability (Part 2)

Name: ________________________________

Class: ________________________________

STAGE 4: PROBABILITY (PART 2)

QUESTION 1 RECOGNISE THE DIFFERENCE BETWEEN MUTUALLY EXCLUSIVE AND NON-MUTUALLY EXCLUSIVE EVENTS

What is the probability of obtaining the following when rolling a standard dice?

a) A number greater than 3

b) At least 4

c) Rolling an even number and 5

d) Rolling an odd number and rolling a 2

e) 'Rolling an even number' and 'rolling an odd number' are these events mutually exclusive or non-mutually exclusive? How do you know?

f) 'Rolling a 5' and 'rolling an odd number' are these events mutually exclusive or non-mutually exclusive? How do you know?

g) Give another example of non-mutually exclusive events

____________________________________

____________________________________
STAGE 4: PROBABILITY (PART 2)

QUESTION 2

Represent events in two-way tables and Venn diagrams and solve related problems.

Analyze the Venn diagram below and then answer the following questions:

a) How many students played tennis?

b) How many students played tennis and soccer?

c) How many students played tennis or soccer?

d) How many students played neither sport?

e) How many students are there in this year 8 group?

Sports played by Year 8

![Venn Diagram]

QUESTION 3

Represent events in two-way tables and Venn diagrams and solve related problems.

Analyze the Venn diagram below and then answer the following questions:

a) How many students study French?

b) How many students study Japanese?

c) How many students do not study a language?

d) How many students are in year 7?

Students studying languages in Year 7

![Venn Diagram]
STAGE 4: PROBABILITY (PART 2)

QUESTION 4

The two way table below shows the job status of men and women in Rays Town. Complete the table and then answer the following:

<table>
<thead>
<tr>
<th>JOB STATUS – RAYS TOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMPLOYED</td>
</tr>
<tr>
<td>MEN</td>
</tr>
<tr>
<td>90</td>
</tr>
<tr>
<td>105</td>
</tr>
<tr>
<td>WOMEN</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>108</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

a) How many men are employed?

b) How many men and women are unemployed?

c) What is the population of men and women in Rays Town?

d) Interpret the information in the two-way table above as a Venn Diagram.