<table>
<thead>
<tr>
<th>Syllabus Reference</th>
<th>MA4-11NA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome</strong></td>
<td>Creates and displays number patterns; graphs and analyses linear relationships; and performs transformations on the Cartesian plane</td>
</tr>
</tbody>
</table>

- Introduce all 4 quadrants
- Read, plot and name points
- Points to include positive, negative, fractions and decimals
- Transformations of points
  - Translation, Reflection in an axis, Rotation (multiples of 90°).
  - Use geogebra to rotate an image around a given point (at a particular angle)
  - Use geogebra to reflect an image across a given line or around a point
  - Use geogebra/smart notebook to translate images according to vectors eg (-2,3) left 2, up 3
  - Use P’ to name the resulting transformation of P
  - Plot and determine the coordinates for P’ resulting from translating/reflecting/rotating P one or more times
  - Investigate rotation of 180° about the origin
- Create a Picture from a collection of points
- Horizontal and vertical distances on plane
- Perimeter and area of shapes on plane
  - Area – Rectangle, Triangle, Parallelogram, Composite figures
  - Perimeter - Only shapes with horizontal and vertical edges

<table>
<thead>
<tr>
<th>Graded Examples/Responses</th>
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<tbody>
<tr>
<td><strong>E</strong></td>
</tr>
</tbody>
</table>

**D**
Read, plot and name points in the first quadrant
Often swaps x and y values for coordinates
Horizontal/Vertical Distances provided with diagram

**C**
Horizontal/Vertical distances in the one quadrant (no diagram)

**B**
Horizontal/Vertical Distances across two quadrants
Perimeter of a shape across multiple quadrants (no diagram)

**A**
D/E Grade

Q1 On the number plane below, state what “letter” is at the following points

(1,2) ............ (5,2) ............
(-5, 3) ............ (6, -2) ............
(2.5, 3.5) ............

Q2 On the number plane shown, give the coordinates of the following letters

F ................. G ....................... H .........................

Q3 Using the number plane above, write down which quadrant the given letter is located in

A .....................

Q4 Write down the correct mathematical term for the following transformations (terms to choose from are reflect, rotate, translate)

TURN .......................... FLIP .......................... SLIDE ..........................

C Grade

Q5 What transformation occurs here and in what directions

...........................................................................................................
...........................................................................................................
Q6 Move the triangle ABC 3 units left and 1 unit down

a) What lines in the above shapes are parallel? ..........................................................

Q7 Rotate the line AB 90° clockwise

Q8 Rotate the shape shown 180° clockwise about O

Q9 Reflect each shape in the line given

Q10 On the number plane shown, complete the following

a) Mark the point (2,4) as A
b) Mark the point (-2,4) as B
c) How long (units) is the interval AB?.......................
B Grade

Q9
Consider the following diagram of a house.

a. Draw the image of the house after a rotation of 90° anticlockwise about O. Label it $A'B'C'D'E'$. (Hint: Remember $E'C' \perp E'A'$ etc.)

b. $AE$ and $BC$ are parallel. What do you notice about $AE'$ and $B'C'$?

c. Measure $AB$ and $A'B'$. Comment.

D. What is the area of the house shown (in square units)? .........................

Q10 Reflect the following shapes about the line shown

Q11
## Syllabus Reference
MA 4-9NA (p63)

### Outcome
Operates with pos integer & zero indices

### New Content
- **USING NUMBERS ONLY AS BASES**
  - Review
  - Investigate & express indices as products (of primes)
  - Recognise inverse of “squared” (=√) & “cubed”

- **Apply order of operations involving indices**
- **Develop & Use index laws**
  - \(3^4 \times 3^5 = 3^9\)
  - \(3^5 ÷ 3^2 = 3^3\)
  - \(3^{-2} \times 3^5 = 3^3\)
  - \((3^3)^2 = 3^6\)
- **Recognise \((2 \times 3)^2 = 2^2 \times 3^2\)**
- **Recognise an indice of 1 maintains the base**
- **Recognise an indice of “0” always gives a value of 1**
- **Using the power buttons on the calculator**

### EXT
- **Use √ and ³√**
- **Develop patterns for neg indices (why neg indice = fraction)**

### Language
- **Index, indice, power, exponent, base**

---

### Graded Examples/Responses

#### E
- **Calc allowed**
  - Does \(4^2 = 4 \times 4\)
  - Write 8 as \(2^3\)
  - Evaluate \(4^3\)
  - Find the missing indice \(125 = 5^n\)
  - Solve \(5^2\)

#### D
- **Fill in the gaps**
  - \(18^2 = (6 × \_\_)^2\)
  - Find square root of 49
  - Find cube root of 125
  - Find to 1 dp \(\sqrt{13}\)
  - Solve \(3 \times 5^2 + 4^2 ÷ 2\)
  - Solve \(7^3\) and

#### C
- **Write answer in index form**
  - \(4^5 \times 4^2\)
  - \(3^5 ÷ 3^4\)
  - \((3^2)^2\)
  - \(1.5^3 \times 1.5^2\)
  - Simplify \(3^0\)
  - Fill the gap \(24^3 = \_\times 3^3\)
  - Simplify \((-3)^3\)

#### B
- **Explain why** \(3^4 \times 4^2 \neq 12^6\)
- **What number is \(1/10\)th of \(2^5\)**

#### A
- **Explain why** 
  - \(3^{-2} = \frac{1}{9}\)
  - **Explain why** \(4^{1/2} = \sqrt{4}\)
E Grade

1. Write in expanded form: $4^3$ ______________

2. Use your calculator or otherwise evaluate
   a) $5^3$ __________
   b) $2^3 + 3^2$ __________

3. What number/digit goes in the “box”?
   a) $5 \times 5 \times 5 \times 5 = 5^\Box$ __________
   b) $\Box^2 = 7 \times 7$ __________

4. Write the basic numeral for $10^3$ __________

5. In the following statement $2^3 = 8$,
   - The **Index** is the number __________
   - the **Basic numeral** is the number __________
   - the **Base** is the number __________

D Grade

6. Evaluate: $3^2 \times 2 + 5 \times 3 = __________$

7. Evaluate:
   a) $\sqrt{16}$ __________
   b) $\sqrt{25} + \sqrt{9}$ __________

8. Circle the bigger number: $\sqrt{38}$ or 7

9. Write as a decimal $0.2^2$ __________
C Grade

10 Simply and leave in index form

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

b) \(4^3 \times 4^2 \times 4^2 = \) _______

c) \(5^4 \div 5^3 = \) _______

d) \(\frac{5^3}{5^4} = \) _______

e) \(7 \times 7^0 = \) _______

11 Find (accurate to 1 decimal place) the value of \(\sqrt{13} \) _______

12 What number goes in the box? \(6^2 = 2^2 \times \square^2 \) _______

13 Write the basic numeral for:

a) \(13^0 \) _______

b) \((5 \times 2)^0 \) _______

14 What numeral goes in the box? \((5\square)^2 = 625 \) _______

15 Show, using a factor tree, 90 as a product of its prime factors

```
Draw factor tree here>                 90
```

Prime Factors = ______________________________
B Grade

16 What number (in index form) is $\frac{1}{10}$ of $10^{-2}$? ________

17 Explain using an example why $3^{-n} = \frac{1}{3^n}$ ____________________________

18 Circle the correct response “True” or “False”
   
a) The answer to $(-2)^n$ is always positive True False
   
b) The solution to $(-3)^n$ where “n” is even is always odd True False

19 Find a pair of numbers $(m$ and $n)$ such that $3^m \div 3^n = 3^6$
   
   $m =$ ________  $n =$ ________

20 What do you need to multiply $10^7$ by to get $10^{12}$? (leave in index form) ________

21 Simplify & leave in index form  $4^{1.5} \times 4^{1.5} =$ ________

A Grade

22 Answer in index form $\frac{9^7}{3^9}$ ________

23 Given that $12 = 2^c \times 3^d$, find the value of “$c$” and “$d$”
   
   $c =$ ________  $d =$ ________

24 How much do you multiply $5^4$ by to get $25^7$?

   Answer in index form ________

25 Given that $a^m \times a^n = a^{m+n}$, rewrite $\sqrt{5}$ in index form ________
### Year 8

#### Term 1

**Weeks 10-11**

<table>
<thead>
<tr>
<th>Syllabus Reference</th>
<th>MA4-12MG  p 72</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome</strong></td>
<td>Calculate circum of circle</td>
</tr>
</tbody>
</table>

| Circles  
(Perimeter) |

#### Graded Examples/Responses

1. **What is π?**
   - Investigate, π approximations, irrational numbers

2. **Develop the formula**
   - Define relationship between \( C, d \) & π
   - \( C \div d = \pi, \ C \div \pi = d, \ C = \pi d, \ C = 2\pi r \)

3. **Using the formula**
   - Answer using approximations and exact form (π)
   - Use mental strategies to estimate the Circumference
   - Find \( d & r \) when given \( C \) using Guess and Refine method and/or division.

4. **Perimeter**
   - **Semi circles, quadrants, sectors**
   - Use problem solving to establish formulas
     - \( \frac{1}{2} \times C + \text{length}, \frac{1}{4} \times C + \text{lengths}, \frac{40}{360} \times C + \text{lengths} \)

5. **Perimeter of composite shapes**
   - **2 shapes only**
   - Variety of measurement units with need to convert
   - Use Pythagoras to solve perim probs

**Vocab:**
- Perimeter
- Sector
- Quadrant
- Tangent
- Chord
- Segment
- Circumference - revolution
- Radius
- Diameter
- Irrational
- Approximation
- Pi

**Recognise diameter, radius, circumference**

- State pi as 3.14

**Recognise pi as a ratio**

- Find diameter given radius
- Find circum given formula & pi
- Draw a circle of given radius or diameter

**Perimeter of composite shapes**

- Including semi & quad only
- Recognise arc, tangent, sector, chord, segment
- Apply formula for circumference
- Find arc length (given formula)
- Find radius given circumference

**Perimeter of composite shapes**

- Including sectors
- Find arc length (not given formula)

**Use Pythagoras to find the perimeter**
ASSESSMENT TASK-Year 8- Circles 1

E Grade

1) Write the correct word under each diagram: Diameter, Circumference or Radius

________________   ___________________  _________________

2) Write the number which $\pi$ represents: ________________________

3) In the formula $C = \pi \times d$, $C$ stands for the __________________

$d$ stands for the __________________

D Grade

4) Draw: a. semicircle  b. sector

5) What is the length of the DIAMETER of this circle?

$d =$_____________________

6) What is the length of the RADIUS of this circle?

$r =$_____________________
C Grade

7) True or False:

\( \pi \) is found by dividing the circumference by the radius _____________

\( \pi \) is found by multiplying the circumference by the radius _____________

\( \pi \) is found by multiplying the radius and the diameter _____________

8) Calculate the length of the **circumference** of this circle.

\[ C = \ldots\text{ cm} \] (round your answer to 2 decimal places)

9) Calculate the length of the **circumference** of this circle.

\[ C = \ldots\text{ cm} \] (round your answer to 2 decimal places)

10) Calculate the length of the **circumference** of a circle with a diameter of 7 cm.

\[ C = \ldots\text{ cm} \] (round your answer to 2 decimal places)

11) If a circle has a circumference of 52 cm, what would be its **diameter**?

\[ d = \ldots\text{ cm} \] (to nearest cm)

12) Calculate the **perimeter** (round your answer to 2 decimal places):

\[ P = \ldots\text{ cm} \] \[ P = \ldots\text{ cm} \]
13) A sector, with a $30^\circ$ angle, is cut out of a circle with a radius of 12 cm.

   a. Sketch and label the shape. 
   b. What is the perimeter of the sector?

   \[ P = \text{__________} \]

14) A Milo tin (with a diameter of 10 cm) rolls 6 full times from one end of the table to the other. How long is the table?

   Table length = ______________cm

15) Calculate the perimeter of each shape (round your answer to 2 decimal places):

   Show ALL working out!  Show ALL working out!

16) The minute hand of a clock is 10 cm long.

   How far does the tip of the hand move in a period at school? (50 minutes)

   Distance = ______________________
17) A circle with a radius of 2cm, rolls around the outside of a larger circle of radius 5 cm. How many revolutions will the smaller circle do in 1 revolution of the larger circle?

*Sketch and label the circles*  
*Show your working out*

18) An equilateral triangle (*all sides equal*) is drawn in a circle with a radius of 10cm.

What is the length of the arc?  
(The triangle sits on the centre of the circle)

19) For a right angled triangle  \( a^2 + b^2 = c^2 \) where “c” is the side opposite the right angle and “a” and “b” are the 2 other sides.

Using this information, calculate the **perimeter** of the following shape:
SHAPES

Can you find the hidden shapes? They may be horizontal, vertical, diagonal, forwards or backwards.

CIRCLE, CONE, CUBE, CUBOID, CYLINDER, DECAGON, DODECAHEDRON, ELLIPSE, HEPTAGON, HEXAGON, NONAGON, OCTAGON, OCTAHEDRON, PARALLELOGRAM, PENTAGON, POLYGON, POLYHEDRON, PRISM, PYRAMID, QUADRILATERAL,.Rectangle, RHOMBUS, SEMICIRCLE, SPHERE, SQUARE, TETRAHEDRON, TRAPEZIUM, TRIANGLE.
<table>
<thead>
<tr>
<th>Syllabus Reference</th>
<th>Outcome</th>
<th>Example Q</th>
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</thead>
<tbody>
<tr>
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<td></td>
<td>E grade</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D grade</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C Grade</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A/B grade</td>
</tr>
</tbody>
</table>

### Week 8 - Term 1

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1. | Identify hypotenuse  
*Opposite RA, longest side (by sight, from numbers)*  
  |   |   |
| 2. | Establish relationship between lengths of sides of RAΔ  
*Measure, describe, table, formula, area diagrams*  
*Identify RA and Non-RA triangles from relationship between sides*  
  |   |   |
| 3. | Practise $\sqrt{x^2}$ and $\sqrt{x}$, $2^2$ and $\sqrt{4}$  
  |   |   |
| 4. | Calculate Hypotenuse using formula  
$c^2 = a^2 + b^2$  
*Include examples with a variety of unit measurements*  
*Give answers in approximate and exact form ($\sqrt{\text{ }}$)  
  |   |   |
| 5. | Practical problems including perimeter (no area)  
*Ext: Pythagoras in 3 dimensions*  
  |   |   |
| 6. | Calculate the distance between 2 points on the coordinate plane  
*By drawing a right angled triangle and using Pythagoras only*  
  |   |   |

**Do not calculate other missing sides!**

**More examples following**
Pythagoras Theorem 1

Name...........................................class........

**Grade E**

1/ Circle the hypotenuse on this triangle

2/ $3^2 =$

3/ $\sqrt{16} =$

**Grade D**

4/ $3^2 + 4^2 =$

5/ Using the triangle opposite, fill in the missing numbers

\[ \ldots \ldots^2 = \ldots \ldots^2 + 6^2 \]

6/ find $\sqrt{15} + \sqrt{5}$ correct to 1 decimal place

**Grade C**

7/ Calculate the length of the hypotenuse

8/ Is the triangle below right angled. Show working?

9/ What is the perimeter of the following triangle
10/ Find the length of the diagonal in the shape below

![Diagram](image1)

11/ Find the perimeter of the triangle below

![Diagram](image2)

Grade B

12/ Find the perimeter of these shapes:

- ![Diagram](image3)
- ![Diagram](image4)

Find the length of the wire between the 2 poles

![Diagram](image5)

Find the distance between pts A and B

![Diagram](image6)
3 dimensional diagram problems

Calculate the slant height

A 20 cm straw sits in a cylindrical glass as shown. What length of straw sticks above the top of the glass? Round the answer to two decimal places.

Find the value of $y$ as a fraction
<table>
<thead>
<tr>
<th>Syllabus References</th>
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</thead>
<tbody>
<tr>
<td><strong>Current topic:</strong></td>
</tr>
<tr>
<td>Stage (ACMNA131), (ACMNA157), (ACMNA158)</td>
</tr>
<tr>
<td><strong>Next topic:</strong></td>
</tr>
<tr>
<td>Year 8 - Percentages 2 (Money 2)</td>
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</table>

<table>
<thead>
<tr>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is a percentage?</td>
</tr>
<tr>
<td>2. Fractions &lt;-&gt; Percentages</td>
</tr>
<tr>
<td>3. Decimals &lt;-&gt; Percentages</td>
</tr>
</tbody>
</table>

**CONTENT...**

1. **What is a percentage?**

   *Diagrams & shading (numberline, rectangles, circles, etc.), + - ÷ percentages (e.g. 20% + 20% = 40%), common percentages (10%, 25%, 50%, 75%, 100%), percentages greater than 100%*

2. **Fractions <-> Percentages**

   *Common percentages <-> fractions (encourage mental strategies 50% = ÷2), percentages <100% convert to fract, one quantity expressed as a % of another, simplify fractions percentages >100% convert to fract and mixed numerals fract to perc (x100), perc to fract (÷100)*

3. **Decimals <-> Percentages**

   *Common percentages <-> decimals (memorise) Percentages <100% and >100% convert to decimals dec to perc (x100), perc to dec (÷100) ordering perc, dec and fract (ascending and descending)*

**Ext:** use spreadsheets to perform percentage calculations and conversions

**Vocab:**

Per – out of, divide, /

Cent – hundred

Percent – out of 100, divide by 100, hundredths

“as a percentage of”

“out of”
1. What **percentage** of each of the following diagrams has been **shaded**?

   [Images of shaded diagrams]

   _______%      _______%      _______%      _______%

2. Fill in the empty boxes.

   \[
   58\% = 58 \text{ out of } \square = 58 \square 100 = \frac{58}{\square} = 0 \square 58
   \]

   \[
   126\% = 126 \square \square 100 = \square \div 100 = \frac{126}{\square} = 1. \square \square
   \]

3. Complete the table:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Fraction</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\frac{3}{4})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td></td>
<td>0.25</td>
</tr>
<tr>
<td>10%</td>
<td>(\frac{1}{10})</td>
<td></td>
</tr>
</tbody>
</table>

4. What **percentage** of the following diagrams has been **shaded**?

   \[
   \text{Percentage of shaded} = \square \square \%
   \]

   \[
   \text{Percentage of shaded} = \square \square \%
   \]

5. Prue answered half the questions correctly for a test marked out of 100.

   What percentage did Prue get on the test? \(\square \square \)%

6. Circle the correct working line to express 42 as a percentage of 65 is:

   a) \(\frac{42}{100} \times 65\%\) \hspace{1cm} b) \(\frac{65}{42} \times 100\%\) \hspace{1cm} c) \(\frac{100}{42} \times 65\%\) \hspace{1cm} d) \(\frac{42}{65} \times 100\%\)
7. What **percentage** of the following diagrams has been **shaded**?

```
\[ \text{Diagram 1} \quad \text{Diagram 2} \quad \text{Diagram 3} \quad \text{Diagram 4} \]
\[ \quad \% \quad \% \quad \% \quad \% \]
```

8. Three students completed three different Mathematics tests. Each of the tests was out of a different number of marks. The results are shown below. Fill in the table below and rank the three students in descending order, according to their test result.

<table>
<thead>
<tr>
<th>Test Result</th>
<th>Percentage</th>
<th>Rank (1st to 3rd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matthew scored 15 out of a possible 20 marks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mengna scored 36 out of a possible 50 marks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maria scored 33 out of a possible 40 marks.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. 20 out of 25 = _________% \hspace{1cm} \frac{1}{8} = _________% \hspace{1cm} \frac{36}{40} = _________% \hspace{1cm} 0.39 = _________%

10. Convert $8\frac{1}{4}$% to a fraction = _________

11. Convert 72.5% to a decimal = _________

12. Convert 1452% to a decimal = _________

13. Place the following values in order from greatest to least.

\[ 86\%, 0.5\%, 0.6, 0.125, 22\%, 75\%, 2\%, 0.78 \]
1. What percentage of the following diagrams has been shaded? = ___________%

2. Write three percentages which would occur between the decimals 0.47 and 0.57

   0.47, __________%, __________%, __________%, 0.57

3. What percentage of your day has passed? __________%

4. What percentage of your school education has passed? __________%

5. Due to illness, Vanessa missed 15 days of the 48 school days in Term 1.

   What percentage of classes did Vanessa attend in Term 1? __________%

6. Express 40c as a percentage of $8 = _________________%

7. Express 400 m as a percentage of 1.6 km = _________________%

8. Express $5.10 as a percentage of 85¢ = _________________%
<table>
<thead>
<tr>
<th>Year 8</th>
<th>Term 2 Weeks 1-2</th>
<th>Area 2</th>
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</thead>
<tbody>
<tr>
<td>Syllabus Reference</td>
<td>MA4-2WM, 13MG</td>
<td>Graded Examples/Responses</td>
</tr>
<tr>
<td>Outcome</td>
<td>Uses approp techniques to solve problems</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Uses formula to find area of quads</td>
<td>Count squares to determine area of rectangle</td>
</tr>
<tr>
<td></td>
<td>• Area of composite shapes made from triangles and rectangles</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>• Develop area formula( from area of rectangles formulae) for quadrilaterals such as kites, rhombus, trapezium</td>
<td>Count squares to find area of triangle &amp; composite shapes</td>
</tr>
<tr>
<td></td>
<td>• Recognise shapes in different orientations eg a rotated square is still a square- not a diamond/ kite</td>
<td>Given conversion rate- convert units of area</td>
</tr>
<tr>
<td></td>
<td>• Identify correct height for problem solving (perpendicular height)</td>
<td>Find area of rectangles &amp; simple triangles</td>
</tr>
<tr>
<td></td>
<td>• Understand Difference between “square metres” and “metres squared”</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>• Solve area problems</td>
<td>Find areas of simple composite shapes</td>
</tr>
<tr>
<td>Language- diagonals, perpendicular height(needs to be defined), parallel, respectively</td>
<td>NOTE - m² is read as square metres. A 4 m square has an area of 16 m² whereas a square that is 4 sq m in size has an area of 4 m².</td>
<td>B</td>
</tr>
<tr>
<td>Text Reference- NC Yr 8 Ch 11</td>
<td>Find area of complex composite shapes</td>
<td>Find area of other quads</td>
</tr>
<tr>
<td></td>
<td>Given conversion rate- convert units of area</td>
<td>Find perimeter given area</td>
</tr>
<tr>
<td></td>
<td>Identify correct height of a triangle</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Conversions involving decimals</td>
<td>Algebraic areas</td>
</tr>
<tr>
<td></td>
<td>Given conversion rate- convert units of area</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Find area of complex composite shapes</td>
<td>Find dimension of other quad given area</td>
</tr>
<tr>
<td></td>
<td>Find surface area</td>
<td>Given area</td>
</tr>
<tr>
<td></td>
<td>Use “new” formula to find area eg herons formula for area triangle</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Given conversion rate- convert units of area</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Find area of complex composite shapes</td>
<td>Find perimeter given area</td>
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<tr>
<td></td>
<td>Identify correct height of a triangle</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Conversions involving decimals</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Find area of complex composite shapes</td>
<td>Find dimension of other quad given area</td>
</tr>
<tr>
<td></td>
<td>Algebraic areas</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>A</td>
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<tr>
<td></td>
<td>B</td>
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<td></td>
<td>C</td>
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<td>D</td>
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<td></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Syllabus Reference</td>
<td>MA4-4NA</td>
<td>Term 2 Weeks 3-4</td>
</tr>
<tr>
<td>-------------------</td>
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<td>------------------</td>
</tr>
<tr>
<td>Outcome</td>
<td>Compare, order &amp; calculate with integers</td>
<td>Graded Examples/Responses</td>
</tr>
<tr>
<td></td>
<td>• Basics covered in Yr 7 (term 4)</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>• Recognise direction &amp; magnitude of integers</td>
<td>4-7, 6x3</td>
</tr>
<tr>
<td></td>
<td>• Using &gt; AND &lt; signs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Recognise difference between “minus” and “negative”</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>• Apply integers to money &amp; temperature problems</td>
<td>7-(-4), -3 x 4,</td>
</tr>
<tr>
<td></td>
<td>• Determine that subtracting a negative is the same as adding a positive (using calculator or by looking at patterns)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Carry out 4 operations with directed numbers</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>• Investigate negative numbers on mobile phone calculators</td>
<td>-3x-6+2, -2(-6)</td>
</tr>
<tr>
<td></td>
<td>NC Yr 7 Ch 5</td>
<td>Find the missing digit ,7+...=4</td>
</tr>
<tr>
<td></td>
<td>Extension- Indices &amp; negative numbers</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Language- left, down, below normally refer to negative</td>
<td>Find 2 integers that add to give -7 and multiply to give -28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-2)³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is -(1/2)² the same as (-1/2)²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not assessable</td>
</tr>
</tbody>
</table>
Assessment task- Year 8- Directed Numbers

NO CALCULATORS- Times tables allowed

E Grade

1) Answer the following
   a) 7-4 =              b) 2-3 =              c) 3 x 2=

2) Fill in the missing number
   a) 4 -......= 1, b) 6 -...... =(-1) , c) 4 x ....=20

3) Circle each of these numbers on the number line below.
   4, -2, 7 , -8

D Grade

4) Answer the following
   a) 4 x -5 =......
   b) 6-(-2) =......
   c) -5 -2 =......
   d) -4-(-3) =......
   e) -5 x 0 =......

5) Put these numbers in ascending order
   a) -3, 4, -4, 3, 2, 0

B / A Grade

11) Simplify(answer) the following
    a) 3 × −4 ÷ 2 + (−5) =
    b) \frac{4−6}{8−10} =
    c) 4 × −2 + 3 × −4 =
    d) 5 + 2 × −5 + 6 ÷ −2 − 2 =

12) WHO AM I?. I am a negative number. Three times myself plus myself gives -20. Who Am I?
    ................................

13) What does (−5)^2 = ?............

14) What 2 numbers add to give (-7) and multiply to give 12 ? ..........................

15) Why is \(\left(\frac{1}{2}\right)^2\) the same as \(\left(-\frac{1}{2}\right)^2\) ?
    ..........................................................................

16) What is the answer ?
    a) start at (-3), add (-5), subtract (-2) multiply by (-4) ..........................

17) If \((n − 3) \times (n − 6) = −2\), what does “n” equal? ..............................

18) \((-2)^3=\)
<table>
<thead>
<tr>
<th>Year 8</th>
<th>Term 2 Weeks 5-6</th>
<th>Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Syllabus Reference</strong></td>
<td>MA4-7NA MALS-19NA</td>
<td><strong>Graded Examples/Responses</strong></td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td>operates with rates &amp; explores graphical representation</td>
<td><strong>E</strong></td>
</tr>
<tr>
<td></td>
<td>Related Next topics: Year 9 – Percentages 2, Ratios, Gradient</td>
<td>Recognise rates Matching statement with rate</td>
</tr>
</tbody>
</table>

1. **State the Rate**
   - What is a rate? How are they written? When do we use/see them?
   - (Water, land, tax, conversion, exchange, commission, decay, weight loss, heart, growth, pay, call, speed, best-buy:cost). Need for 2 units

2. **Simplify the Rate – unitary method**
   - 12 days / 4 years >>> ÷4 >>>> reduce to 1

3. **Converting Units**
   - \$57.60 / 4hrs ◄ cents/min >>>÷4 ◄ ◄ - reduce to 1
   - \$14.40 / hr ◄ ◄ ◄ ◄ ◄ 1440c / 60min ◄ convert unit

4. **Using the Rate**
   - 4 L to travel 36km, 70L =?km 36km / 4L >> (÷4) >> - reduce to 1 9km / L
   Then multiply x70

   **Ext:** Average Rates, Combination Rates
   **Estimate rates (speed)**

5. **Interpreting Line Graphs**
   - Dependant vs independent variables (which axis?)
   - Calculate rates from graphs (from 2 pts)
   - Recognise slope/horizontal line meaning
   - Match graph to situations
   - Describe changes over time with historical/contextual reasons
   - Identify direct proportion
   - **Ext:** Direct Proportion calculations

6. **Drawing Line Graphs – from real life data**
   - Speed graphs, impossible graphs (time backwards), slope= speed
   - **Ext:** Graphs of Physical Phenomenon

**Vocab:**
- Rate – a way to compare quantities measured in different units
- Per means "for every"
- Gradient= slope

**NC Yr 8 Ch 10 (Ex 10.10-10.14)**
Questions

E Grade

State the Rate

1. For each of the following statements, write down a corresponding rate.
   a. The Lodges travelled 400 km in 5 hours.
   b. Gary was paid $98 for a 4-hour shift at work.
   c. Felicity spent $600 on a two-day shopping spree.
   d. Max had grown 9 cm in the last three months.
   e. Vuong paid $37 for half a cubic metre of crushed rock.
   f. Paul cycled a total distance of 350 km for the week.

2. Which of the following are examples of rates?
   a. $5.50
   b. 180 mL/min
   c. $60/h
   d. $\frac{5}{23}$
   e. 4.2 runs/over
   f. 0.6 g/L
   g. 200 cm²
   h. 84c/L

3. Match each rate in the first column with its most likely rate in the second column.

<table>
<thead>
<tr>
<th>Employee’s wage</th>
<th>90 people/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed of a car</td>
<td>$2100/m²</td>
</tr>
<tr>
<td>Cost of building a new home</td>
<td>68 km/h</td>
</tr>
<tr>
<td>Population growth</td>
<td>64 beats/min</td>
</tr>
<tr>
<td>Resting heart rate</td>
<td>$15/h</td>
</tr>
</tbody>
</table>

4. Write typical units for each of the following rates.
   a. Price of sausages
   b. Petrol costs
   c. Typing speed
   d. Goal conversion rate
   e. Energy nutrition information
   f. Water usage in the shower
   g. Pain relief medication
   h. Cricket team’s run rate

5. Which of the following is not a unit of speed?
   a. m/s
   b. km/h
   c. cm/h
   d. L/kg
   e. m/min

D Grade

Convert Units (not in rates)

6. 3456 km = __________ m
7. 5.6 kg = __________ g

Interpret line graphs

8. As an experiment, the temperature in two rooms is measured hourly
over a period of time. The results are graphed below.

a) Each room has a heater and an air conditioner to control the temperature. At what point do you think these were switched on and off in each room.

b) For each room, what is the approximate temperature 90 minutes after the start of the experiment?

9. The line graph shows the weight of a cat over a 3-month period. It is weighed at the start of each month. What is the cat’s weight at the start of:
   a. January
   b. February
   c. March
   d. April?

10. The graph shows Lillian’s height over a 10-year period from when she was born.
    a. What was Lillian’s height when she was born?
    b. What was Lillian’s height at the age of 7 years?
    c. At what age did she first reach 130 cm tall?
    d. How much did Lillian grow in the year when she was 7 years old?
    e. Use the graph to estimate her height at the age of 9 \( \frac{1}{2} \) years.

11. Consider the following graph, which shows the outside temperature over a 24-hour period that starts at midnight.
    a. What was the temperature at midday?
    b. When was the hottest time of the day?
    c. When was the coolest time of the day?
    d. Use the graph to estimate the temperature at these times of the day:
       i. 4:00 am
       ii. 9:00 am
       iii. 1:00 pm
       iv. 3:15 pm
12. The water storage levels for a given city are graphed based on the percentage of water available. For this question, assume that the amount of water that people use in the city does not change from month to month.
   a. During which month did it rain the most in this city?
   b. At what time(s) in the year did the water storage fall below 40%?
   c. From August to September, it rained a total of 20 megalitres of water. How much water did the people in the city use during this period?
   d. Is it more likely that this city is located in the Northern Hemisphere or the Southern Hemisphere? Justify your answer.

13. The line graph shows the height of Slesha and her twin brother Ross from the time they were born.
   a. Which of the children was taller on their first birthday?
   b. Which of the children was taller on their eighth birthday?
   c. How old were the children when they were the same height?
14. The temperature in a classroom is graphed over an eight-hour period.
   a. What was the temperature at 8 am?
   b. By how much did the temperature increase in the eight-hour period?
   c. Students complain that it is uncomfortably hot when the temperature is 25°C or greater. At what time does it become uncomfortably hot?

15. A diver jumps off a 10-metre diving board into a pool. The height of the top of her head above the water is shown by the following graph.
   a. How tall is the diver?
   b. During which second does her head first enter the water?
   c. What is the deepest that her head reaches?

**Draw a Line Graph**

16. A dog is weighed over a period of 3 months. Draw a line graph of its weight.

   January: 5 kg,
   February: 6 kg,
   March: 8 kg,
   April: 7 kg.
17. Oliver measures his pet dog’s weight over the course of a year. He obtains the following results.

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>7</td>
<td>7.5</td>
<td>8.5</td>
<td>9</td>
<td>9.5</td>
<td>9</td>
<td>9.2</td>
<td>7.8</td>
</tr>
</tbody>
</table>

a. Draw a line graph showing this information, making sure the vertical axis has an equal scale from 0 kg to 10 kg.
b. Describe any trends or patterns that you see.
c. Oliver put his dog on a weight loss diet for a period of 3 months. When do you think the dog started the diet? Justify your answer.

18. The number of rainy days experienced throughout a year in a certain town is displayed below.

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of rainy days</td>
<td>10</td>
<td>11</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Show this information in a line graph.

C Grade
Simplify Rates

19. Write each of the following as a simplified rate.
   a. 12 days in 4 years
   b. 15 goals in 3 games
   c. $180 in 6 hours
   d. $17.50 for 5 kilograms
   e. $126 000 to purchase 9 acres
   f. 36 000 cans in 8 hours
   g. 12 000 revolutions in 10 minutes
   h. 80 mm rainfall in 5 days
   i. 60 minutes to run 15 kilometres
   j. 15 kilometres run in 60 minutes

20. Harvey finished a 10 kilometre race in 37 minutes and 30 seconds. Jacques finished a 16 kilometre race in 53 minutes and 20 seconds. Calculate the running rate of each runner. Which runner had a faster running pace?

21. A car uses 24 L of petrol to travel 216 km. Express these quantities as a simplified rate in:
   a. km/L
   b. L/km

22. Calculate the average speed of:
   a. a sprinter running 200 m in 20 seconds
   b. a skateboarder travelling 840 m in 120 seconds
   c. a car travelling 180 km in 3 hours
   d. a truck travelling 400 km in 8 hours
   e. a train travelling 60 km in 30 minutes
   f. a tram travelling 15 km in 20 minutes

Use rates

23. A plane is flying at a cruising speed of 900 km/h. How far will the plane travel from 11:15 am to 1:30 pm on the same day?

24. If 1 person takes 1 hour to dig 1 post hole, how long will it take 2 people to dig 2 post holes?

25. Calculate the distance travelled by:
   a. a cyclist travelling at 12 m/s for 90 seconds
   b. an ant travelling at 2.5 m/s for 3 minutes
c. a bushwalker who has walked for 8 hours at an average speed of 4.5 km/h

d. a tractor ploughing fields for 2.5 hours at an average speed of 20 km/h

26. Calculate the time taken by:
   a. a sports car to travel 1200 km at an average speed of 150 km/h
   b. a bus to travel 14 km at an average speed of 28 km/h
   c. a plane to fly 6900 km at a constant speed of 600 km/h
   d. a ball moving through the air at a speed of 12 m/s to travel 84 m

27. If 8 kg of chicken fillets cost $72, how much would 3 kg of chicken fillets cost?

28. If one dozen tennis balls cost $9.60, how much would 22 tennis balls cost?

29. If three pairs of socks cost $12.99, how much would 10 pairs of socks cost?

30. If 500 g of mince meat costs $4.50, how much would 4 kg of mince meat cost?

31. A tap is dripping at a rate of 200 mL every 5 minutes. How much water drips in 13 minutes?

32. A professional footballer scores an average of 3 goals every 6 games. How many goals is he likely to score in a full season of 22 games?

33. A snail travelling at a constant speed travels 400 mm in 8 minutes. How far does it travel in 7 minutes?

34. A computer processor can process 500 000 kilobytes of information in 4 seconds. How much information can it process in 15 seconds?

35. Gemma runs 70 metres in 8.4 seconds. If she maintains the same average speed, in what time will she run 100 metres?

36. A dripping tap filled a 9 litre bucket in 3 hours.
   a. What was the dripping rate of the tap in litres/hour?
   b. How long would it take the tap to fill a 21 litre bucket?

37. Martine grew at an average rate of 6 cm/year for the first 18 years of her life. If Martine was 50 cm long when she was born, how tall was Martine when she turned 18?

38. The Tungamah Football Club had 12 000 members. After five successful years and two premierships, they now have 18 000 members.
   a. What has been the average rate of membership growth per year for the past 5 years?
   b. If this membership growth rate continues, how many more years will it take for the club to have 32 000 members?

Convert units in rates

39. Convert the following rates into the units given in the brackets.
   a. $15/h (c/min)
   b. $144/h (c/s)
   c. 3.5 L/min (L/h)
d. 20 mL/min (L/h)
e. 0.5 kg/month (kg/year)
f. 120 g/day (kg/week)
g. 60 g/c (kg/$)
h. $38/m (c/mm)
i. 108 km/h (m/s)
j. 14 m/s (km/h)

40. Convert the following speeds to m/s.
   a. 36 km/h
   b. 180 km/h
   c. 660 m/min
   d. 4 km/s

41. Convert the following speeds to km/h.
   a. 15 m/s
   b. 2 m/s
   c. 12 m/min
   d. 1 km/s

42. Determine the faster of the two listed alternatives.
   a. Car A travelling at 10 m/s   Car B travelling at 40 km/h
   b. Walker C travelling at 4 km/h  Walker D travelling at 100 m/min
   c. Jogger E running at 1450 m/h  Jogger F running at 3 m/s
   d. Plane G flying at 700 km/h   Plane H flying at 11 km/min

43. Convert the following to a price per kg.
   a. 2 kg of apples for $3.40
   b. 5 kg of sugar for $6.00
   c. 1.5 kg of cereal for $4.50
   d. 500 g of butter for $3.25

44. Convert the following to a price per 100 g.
   a. 300 g of grapes for $2.10
   b. 1 kg of cheese for $9.60
   c. 700 g of yogurt for $7.49
   d. 160 g of dip for $3.20

45. By converting to a price per kg, determine which is the best buy.
   a. 2 kg of sauce A for $5.20 or 1 kg of sauce B for $2.90
   b. 4 kg of pumpkin A for $3.20 or 3 kg of pumpkin B for $2.70
   c. 500 g of honey A for $5.15 or 2 kg of honey B for $19.90
   d. 300 g of milk A for $0.88 or 1.5 kg of milk B for $4.00

46. By converting to a price per 100 g, determine which is the best buy.
   a. 500 g of paper A for $3.26 or 200 g of paper B for $1.25
   b. 250 g of salami A for $4.50 or 150 g of salami B for $3.10
   c. 720 g of powder A for $3.29 or 350 g of powder B for $1.90
   d. 1.1 kg of shampoo A for $12.36 or 570 g of shampoo B for $6.85

**Identify rate from line graph**

**Interpret Travel Graphs**

1. This travel graph shows the distance travelled by a van over 6 hours.
   a. How far did the van travel in total?
   b. How far did the van travel in the first hour?
   c. What is happening in the fourth hour?
   d. When is the van travelling the fastest?
   e. In the sixth hour, how far does the van travel?
2. This travel graph shows the distance travelled by a bushwalker over 5 hours.
   a. For how long was the bushwalker at rest?
   b. How far did the bushwalker walk in the second hour?
   c. During which hour did the bushwalker walk the fastest?

47. The temperature in a lounge room is measured frequently throughout a particular day. The results are presented in a line graph, as shown below. The individual points are not indicated on this graph to reduce clutter.
   a. Twice during the day the heating was switched on. At what times do you think this happened? Explain your reasoning.
   b. When was the heating switched off? Explain your reasoning.
   c. The house has a single occupant, who works during the day. Describe when you think that person is:
      i. waking up
      ii. going to work
      iii. coming home
      iv. going to bed

Draw Travel Graphs
1. Draw travel graphs to illustrate the following journeys.
   a. A car travels:
      120 km in the first two hours
      0 km in the third hour
      60 km in the fourth hour
      120 km in the fifth hour
   b. A jogger runs:
      12 km in the first hour
      6 km in the second hour
      0 km in the third hour
      at a rate of 6 km per hour for two hours

B Grade
1. The Mighty Oats breakfast cereal is sold in boxes of three different sizes:
   Small (400 g) for $5.00, medium (600 g) for $7.20, large (750 g) for $8.25
   a) Find the value of each box in $/100 g.
   b) What is the cheapest way to buy a minimum of 4 kg of the cereal?

2. Maria can paint 15 m² in 20 minutes.
a) What is the rate at which Maria paints in $\text{m}^2/\text{h}$?
b) What area can Maria paint in 20 hours?
c) Maria must paint 1000 $\text{m}^2$ in 20 hours. Find the rate at which she will need to paint in $\text{m}^2/\text{min}$.

3. What is the cost of paving a driveway that is 18 m long and 4 m wide, if the paving costs $35 per square metre?

4. A saltwater swimming pool requires 2 kg of salt to be added for every 10 000 litres of water. Joan’s swimming pool is 1.5 metres deep, 5 metres wide and 15 metres long. How much salt will she need to add to her pool?

5. The Ghan train is an Australian icon. You can board The Ghan in Adelaide and 2979 km later, after travelling via Alice Springs, you arrive in Darwin. (Round the answers correct to one decimal place.)
   a. If you board The Ghan in Adelaide on Sunday at 2:20 pm and arrive in Darwin on Tuesday at 5:30 pm, what is the average speed of the train journey?
   b. There are two major rest breaks. The train stops for $4\frac{1}{2}$ hours at Alice Springs and 4 hours at Katherine. Taking these breaks into account, what is the average speed of the train when it is moving?

6. Write two speeds in $\text{km/h}$ that are between 40 m/s and 45 m/s.

7. The wheels on Charlie’s bike have a circumference of 1.5 m. When Charlie is riding fastest, the wheels rotate at a speed of five turns per second.
   a. What is the fastest speed Charlie can ride his bike, in km/h?
   b. How far would Charlie travel in 5 minutes at his fastest speed?

8. 1.5 kg of cheddar cheese costs $11.55, and 800 g of feta cheese costs $7.25. Sally works out the best value cheese, then buys $5 worth of it. How much and what type of cheese did Sally buy?

9. The Teleconnect telecommunications company has a variable call charge rate for phone calls of up to 30 minutes. The charges are 50c/min for first 10 minutes, 75c/min for the second 10 minutes and $1/min for the third 10 minutes.
   a. Find the cost of phone calls of these given lengths.
      i. 8 minutes
      ii. 13 minutes
      iii. 24 minutes
      iv. 30 minutes
   b. What is the average charge rate per minute for a 30 minute call?

10. If 3 people take 3 hours to make 3 wooden train sets, how many train sets can 6 people make in 6 hours?

A Grade

11. If $x$ donuts cost $y$:
   a. how much would 1 donut cost?
   b. how much would one dozen donuts cost?
   c. how much would $z$ donuts cost?
12. In a faraway galaxy, a thriving alien colony uses the following units:
   For money they have puks and paks: 1 puk (pu) = 1000 pak (pa)
   For length they have doits and minidoits: 1 doit (D) = 80 minidoits (mD)
   Polynaute rope is priced at 4 pu/D. Find the cost of the rope in terms of pa/mD.

13. The Bionic Woman gives Batman a 12 second start in a 2 kilometre race. If the Bionic Woman runs at 5 km/min, and Batman runs at 3 km/min, who will win the race and by how many seconds?

14. At a school camp there is enough food for 150 students for 5 days.
   a. How long would the food last if there were only 100 students?
   b. If the food ran out after only 4 days, how many students attended the camp?

15. Nina, Shanti and Belle run a 1000 m race at a constant speed. When Nina crossed the finish line first, she was 200 m ahead of Shanti and 400 m ahead of Belle. When Shanti crossed the finish line, how far ahead of Belle was she?

16. Julie and Jeanette enjoy finishing their 6 km morning run together. Julie runs at an average speed of 10 km/h and Jeanette runs at an average speed of 3 m/s. If Julie leaves at 8:00 am, at what time should Jeanette leave if they are to finish their run at the same time?

17. Brothers Marco and Matthew start riding from home into town, which is 30 km away. Marco rode at 10 km/h and Matthew took 20 minutes longer to complete the trip. Assuming that they both rode at a constant speed, how fast was Matthew riding?

18. If 1 person takes 2 hours to dig 1 post hole, how long will it take 3 people to dig 2 post holes?

19. At a market you can trade 2 cows for 3 goats or 3 goats for 8 sheep. How many sheep are 3 cows worth?

20. Two cars travel toward each other on a 100 km straight stretch of road. They leave at opposite ends of the road at the same time. The cars’ speeds are 100 km/h and 80 km/h. How long does it take for the cars to pass each other?

21. A river is flowing downstream at a rate of 1 km/h. In still water Michael can swim at a rate of 2 km/h. Michael dives into the river and swims downstream then turns around and swims back to the starting point, taking 0.5 hours in total. How far did he swim?

22. A fitness fanatic walks at 4 km/h for time t₁, and then runs at 7 km/h for time t₂. He travels a total of 26 km. If he had run for the same time that he had walked (t₁) and walked for the same time that he had run (t₂), then he would have
23. The back end of a 160-metre-long train disappears into a 700-metre-long tunnel. Twenty seconds later the front of the train emerges from the tunnel. Determine the speed of the train in m/s.

24. Anna rode her bike to school one morning, a distance of 15 km, at an average speed of 20 km/h. It was raining in the afternoon, so Anna decided to take the bus home. The bus trip home took 30 minutes. What was Anna’s average speed for the return journey to and from school?
<table>
<thead>
<tr>
<th>Year 8</th>
<th>Term 2 Weeks 7-8</th>
<th>Algebraic Techniques 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syllabus Reference</td>
<td>Algebraic Techniques 2 Stage 4- expanding</td>
<td>Graded Examples/Responses</td>
</tr>
<tr>
<td>Outcomes</td>
<td>MA4-1,2,3 WM MA4-8NA generalise number properties</td>
<td></td>
</tr>
</tbody>
</table>

**Content**
- adding & subtracting like terms - include negative terms
- simplifying algebraic terms - using 4 operations
- Expanding brackets - positive coefficients ex 3(x+y)
- Expansion of more complex terms ex 3d(3+f) 3d(2d-4)
- Expand expressions with negative terms ex -3(d+3e)
- Link algebraic expansions to distributive law ex a(b+c) = ab+ac

<table>
<thead>
<tr>
<th>E</th>
<th>Simplify 4c+2c, 13g-2e, 3 x a x 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Expand 2(x+y) Simplify 4r+r, -2 x -a</td>
</tr>
<tr>
<td>C</td>
<td>Expand 2(2a+3) Expand 3d(2d-4) Expand &amp; simplify 3(d-2)+ 4(3-d)</td>
</tr>
<tr>
<td>B</td>
<td>Expand -3e(2e-4)</td>
</tr>
<tr>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>
ASSESSMENT TASK - Yr 8

Algebraic Techniques 2

GRADE E

1. Simplify the following
   a) $3x + 2x =$
   b) $6c ÷ 3 =$
   c) $10t − 8t =$
   d) $10xy ÷ xy =$
   e) $4b \times 0 =$

2. Simplify ( & remove unnecessary symbols)
   a. $3 \times d \times 2 \times f =$
   b. $14 \times 2xd ÷ 7 =$

GRADE D

3. Simplify the following
   a) $3x + 2x − 4x =$
   b) $3m \times 2m =$
   c) $− 3y \times 2 =$
   d) $\frac{7x}{14xy} =$
   e) $12ac − 2b + 3ac =$
   f) $4f + 3 \times 2f =$

4. Expand the following
   a) $2(x + 3) =$
   b) $3(d − 2) =$

GRADE C

5. Expand the following
   a) $2a(a + 3) =$
   b) $m(2m − 4) =$
   c) $2d(d − 4) =$
   d) $−3a(a + 2) =$

6. Expand and simplify
   a. $2(x − 3) + 4x =$
   b. $5(p + 2) + 2 − 3p =$
   c. $3(w − 4) + 2(3 − w) =$

7. John says the correct expansion of $3d(d − 2)$ is $3d^2 − 6$. Why is he wrong?

GRADE B

8. If 1 side of a rectangle is 3cm and the other is $(2x − 1)$ cm, what is its AREA?

9. If Mr Colliss buy “$r$” pens and “$2n$” pencils and Mr Garvey buys “$3r + 2$” pens and “$3n − 2$” pencils, how many pens do we have?

   How many pencils are there?
10. Expand and Simplify the following

a) \(3(2x - 4) + x(3 - a) + a(3 - x)\)

b) If \(5(2x - 2g) = 10x - 40\), what is the value of "\(g\)"

GRADE A

11. Given \((a + b)(c + d) = ac + ad + bc + bd\), expand and simplify the following

a) \((x + 2)(x + 3)\)

b) \((2x - 4)(5 - 3x)\)

12. What is the perimeter (in simplified form) of a triangle where the 3 sides are \(x\) cm, \((3x - 3)\) cm and \((2x + 2)\) cm?
<table>
<thead>
<tr>
<th>Syllabus Reference</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Review- complementary &amp; supplementary angles, conventions(point, interval, angle), adjacent angles, angles at a point, vertically opposite angles</td>
</tr>
<tr>
<td></td>
<td>• Review 2- triangle types, sum of interior angles, exterior angle sum</td>
</tr>
<tr>
<td></td>
<td>• What is a transversal?</td>
</tr>
<tr>
<td></td>
<td>• Corresponding angles</td>
</tr>
<tr>
<td></td>
<td>• Alternate angles</td>
</tr>
<tr>
<td></td>
<td>• Co-interior angles</td>
</tr>
</tbody>
</table>

Graded Examples/Responses

- E
- D
- C
- B
- A
<table>
<thead>
<tr>
<th>Syllabus Reference</th>
<th>MA4-10NA, 3WM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome</td>
<td>Uses algebraic techniques to solve linear equations</td>
</tr>
<tr>
<td><strong>SKILLS/CONTENT</strong></td>
<td></td>
</tr>
<tr>
<td>• Solve simple linear equations ex $x + 2 = 5, x - 4 = -3$</td>
<td></td>
</tr>
<tr>
<td>• distinguish between algebraic expressions where pronumerals are used as variables, and equations where pronumerals are used as unknowns</td>
<td></td>
</tr>
<tr>
<td>• solve simple linear equations using concrete materials, such as the balance model or cups and counters, stressing the notion of performing the same operation on both sides of an equation</td>
<td></td>
</tr>
<tr>
<td>• solve linear equations that may have non-integer solutions, using algebraic techniques that involve up to two steps in the solution process, eg $x - 7 = 15, 2x - 7 = 15, 7 - 2x = 15, x / 7 = 5, 2x / 7 = 5$</td>
<td></td>
</tr>
<tr>
<td>• compare &amp; contrast strategies to solve a variety of linear equations</td>
<td></td>
</tr>
<tr>
<td>• generate equations with a given solution, eg find eqn’s where the solution is $x = 5$</td>
<td></td>
</tr>
<tr>
<td>• Solve linear equations using algebraic techniques and verify solutions by substitution</td>
<td></td>
</tr>
<tr>
<td>• Solve a variety of word problems requiring algebraic techniques</td>
<td></td>
</tr>
<tr>
<td><strong>LIFE SKILLS</strong></td>
<td></td>
</tr>
<tr>
<td>• complete number sentences involving one operation by calculating missing values, eg find $\Box$ if $\Box + 5 = 8$, find $\Box$ if $\Box \times 3 = 12$</td>
<td></td>
</tr>
<tr>
<td>• describe strategies for calculating missing values</td>
<td></td>
</tr>
<tr>
<td>• use a number sentence to solve a given problem, eg 'I have $25 and the CD costs $31. How much more money do I need to purchase the CD?'; this can be solved by $31 - 25 = \Box$</td>
<td></td>
</tr>
</tbody>
</table>
ASSESSMENT TASK- Yr 8 -Solving Equations

E Grade

1. Solve the following equations
   a. $x + 2 = 7$ ..........................
   b. $2x = 10$ ..........................

2. Circle the variable in the equation
   a. $5 - 2w = 24$

3. If $x = 4$, find the value of
   a. $x + 5$ .................
   b. $3x$ .................

D Grade

4. Does $5 \times 2 \times 3m = 2 \times 3m \times 5$ ?
   .........

5. Does $2m - 3 = 3 - 2m$ ? .........

6. If $t = 2w + 2$, complete the table of values

<table>
<thead>
<tr>
<th>$w$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$t$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Circle the equation in the list below
   a. $2w$, $3w - 2 = 5$, $3d + 2$

8. Which of the equations below have a solution (answer ) of 7 - write yes or no
   a. $t + 7 = 7$ ..............
   b. $13 - d = 6$ ..............
   c. $2d - 4 = 10$ ..............

9. John said $5 \times 2 \times m$ could be written as $52m$. Was he correct? Yes / no

NAME........................................class..............

C Grade

10. Solve the following equations-show working
    a. $2x - 4 = 6$
        ........................................
    ........................................

11. $20 = 3x - 2$
    ........................................
    ........................................

B Grade

12. Solve the following equations
    a. $2x - 4 = 3x + 7$
        ........................................
    ........................................

NAME........................................class..............
b. $2(x - 4) = 4x$

13. If 7 apples cost $6 more than 3 apples, what does 1 apple cost?

GRADE A

14. Solve the following equations

c. \( \frac{3(x+2)}{5} = \frac{4x}{3} \)

d. \( \frac{1}{x} + \frac{1}{4} = 1 \)

GRADE D

15. In the formula, \( A = \pi r^2 \), \( r \) stands for

16. If the diameter of a circle is 10 cm, what is its radius?

CIRCLES

17. Neatly draw the following

e. Semicircle

f. Quadrant

18. Find the area of the following circles (correct to 1 decimal place)

Grade E

19. Match the term with the label on the picture- use letters (ex segment = RS)

Sector, 

diameter, 

radius,
C Grade

20. If a 20 cm pizza feeds 4 people, how many people will a 30 cm pizza feed?

Grade A/B

24. A circle with a 10 cm diameter just touches each side of a square. What % of the area is between the circle and the square?

25. What is the area of a sector with an angle of 17°

26. What is the area of the following shaded shape? The 2 inner circles are the same size.

27. A square and a circle have the same perimeter. What is the ratio of their areas?

23. A circle has an area of 23 cm². What is its diameter?
<table>
<thead>
<tr>
<th>Syllabus Reference</th>
<th>MA4-13MG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome</strong></td>
<td>Use formula to find area of circles &amp; convert between units</td>
</tr>
</tbody>
</table>

**SKILLS/CONTENT**

- Investigate the relationships between
  - the area and the radius
  - the area and the diameter
- round off calculations to a specified number of decimal places
- develop the formula to find the areas of circles: Area of circle = \( \pi r^2 \)
  - cut a circle into a large number of sectors and arrange the sectors alternately point-up and point-down to form a rectangle with height \( r \) and base length \( \pi r \)
  - inscribe a number of congruent triangles in a circle, all with corresponding vertex at the centre, and show that the area of the inscribed polygon is half the length of the perimeter times the perpendicular height of the triangles.
- use formulas to solve circle area problems
- find the areas of quadrants, semicircles and sectors
- solve a variety of practical problems involving circles and parts of circles, giving an exact answer in terms of \( \pi \) and an approximate answer (Use pi = 3.14)

**LIFE SKILLS MALS 29MG - applies formal units to estimate and calculate area**

- use informal units to estimate and calculate area, eg count the number of equal-sized pieces of paper required to cover a table,
- compare the areas of two similar shapes by cutting out the shapes and placing one over the other
- recognise & select the appropriate unit, and its abbreviation, for measuring area, eg square cm (cm\(^2\)), square metre (m\(^2\))
- estimate the areas of everyday objects and check using a measuring device,
- identify the concept of area in a problem
- select and use appropriate strategies, and make calculations, to solve a problem (Communicating, Problem Solving, Fluency)

<table>
<thead>
<tr>
<th><strong>Graded Examples/Responses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E</strong></td>
</tr>
<tr>
<td>Label diameter &amp; radius</td>
</tr>
<tr>
<td>Find radius given diameter &amp; vice versa</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>D</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate area using grid</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Find area given radius</td>
</tr>
<tr>
<td>Find area of circle parts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>B</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>A</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Find radius given area</td>
</tr>
</tbody>
</table>
### Year 8
### Term 3
### Weeks 5-6

**Syllabus References**

| Stage 4 (ACMMG200), (ACMMG201), (ACMMG202) | MA4-17MG |
| Stage 5.3 (ACMMG243), (ACMMG244) |

**Outcomes**

1. Define congruence of plane shapes using transformations
2. Develop the conditions for congruence of triangles
3. Establish properties of quadrilaterals using congruent triangles and angle properties and solve related numerical problems using reasoning

**CONTENT...**

1. What is congruence? Where is it found? Why is it needed? Tessellations, Superimposed images.
2. Reflect, rotate, translate
3. Identify, match and name sides and vertices using conventions
4. Minimum info needed for congruent triangles
5. Identify congruent triangles, fill in missing sides/angles

**Stage 4**
Define congruence of plane shapes using transformations (ACMMG200)
- Identify congruent figures by superimposing them through a combination of rotations, reflections and translations
  - Recognise congruent figures in tessellations, art and design work
  - Recognising that area, length of matching sides and angle sizes are preserved in congruent figures
- Match sides and angles of two congruent polygons
- Name the vertices in matching order when using the symbol ≡ in a congruence statement
- Determine the condition for two circles to be congruent (equal radii)

**Develop the conditions for congruence of triangles (ACMMG201)**
- Investigate the minimum conditions needed, and establish the four tests, for two triangles to be congruent:
  - If three sides of one triangle are respectively equal to three sides of another triangle, then the two triangles are congruent (SSS rule)
  - If two sides and the included angle of one triangle are respectively equal to two sides and the included angle of another triangle, then the two triangles are congruent (SAS) rule
  - If two angles and one side of one triangle are respectively equal to two angles and the matching side of another triangle, then the two triangles are congruent (AAS rule)
  - If the hypotenuse and a second side of one right-angled triangle are respectively equal to the hypotenuse and a second side of another right-angled triangle, then the two triangles are congruent (RHS rule)
    - Use dynamic geometry software and/or geometrical instruments to investigate what information is needed to show that two triangles are congruent
    - Explain why the angle in the SAS test must be the included angle
    - Demonstrate that three pairs of equal matching angles is not a sufficient condition for congruence of triangles. This is a SIMILARITY test.
- Use the congruency tests to identify a pair of congruent triangles from a selection of triangles or from triangles embedded in a diagram

**Establish properties of quadrilaterals using congruent triangles and angle properties and solve related numerical problems using reasoning (ACMMG202)**
- Apply the properties of congruent triangles to find an unknown side and/or angle in a diagram giving a reason
- Use transformations of congruent triangles to verify some of the properties of special quadrilaterals including
properties of the diagonals, eg the diagonals of a parallelogram bisect each other.

**Ext:** Reasoning/proofs - > Quadrilateral properties

**LIFE SKILLS**

**MALS -30MG  Recognise, match & sort 2D shapes**

- Identify 2D shapes in the environment
- Match 2D shapes based on an attribute eg size, shape
- Sort 2D shapes based on an attribute- use tables to help classify
- Match & sort shapes using interactive software

**Vocab:**
Congruent, Congruence, Tessellation, Reflect, Rotate, Translate, Vertices, superimpose, corresponding(matching), similar, included angle, congruency sign (≡)
1. Colour in the congruent shapes for each part. (Hint: use a ruler if you need to)
   a) 
   b) 
   c) 
   d) 

2. Circle the transformation has been applied to shape A to make shape B: 
   a) Reflection 
   b) Rotation 
   c) Translation 
   d) None of these 

D grade

1. Circle the correct congruence statement for these two triangles: 
   a) \( \triangle GDF = \triangle PRT \) 
   b) \( \angle DGF \equiv \angle TPR \) 
   c) \( \triangle GDF \equiv \triangle RPT \) 
   d) \( \angle GDF = \angle RTP \) 

2. Trapezium TRAP has been translated and relabelled LMNO. Write a congruence statement for these shapes.
1. For each pair of congruent triangles, give a congruence statement and the reason for congruence.

\[ \triangle XYZ \equiv \triangle PQR \]  \( (\text{SSS}) \)

\[ \triangle ABC \equiv \triangle XYZ \]  \( (\text{SAS}) \)

2. The following pairs of triangles are congruent. Fill in the missing information (sides and angles) for each pair.
1. Choose 1 pair of triangles and prove or describe how you know they are congruent. Show all necessary working out.

2. Prove that PQRS is a Parallelogram. (Hint: prove that $\overline{PQ} \parallel \overline{RS}$ and $\overline{PS} \parallel \overline{QR}$)

(Choose 1 question only!)

1. Prove that PQRS is a Parallelogram. (Hint: prove that $PQ \parallel RS$ and $PS \parallel QR$)

2. Prove that the diagonals of this Rhombus bisect each other. (Hint: prove that $VO = TO$)
E Grade – translate, rotate, reflect, congruent

Find three congruent pairs of shapes

Which transformation/s have occurred to each shape?

D Grade – match sides and angles in order using naming conventions

Write a congruence statement for these pairs of congruent shapes

C Grade – using the 4 congruent triangle rules

1. Explain why SSA is not sufficient to prove that two triangles are congruent. Draw diagrams to support your answer.
2. Explain why AAA is not sufficient to prove that two triangles are congruent. Draw diagrams to support your answer.
3. Which test?

4. Missing sides/angles
B Grade – using the 4 congruent triangle rules +
Are these triangles congruent?

(vertically opposite angles)

(isosc. Tri. Properties)

(alt angles)

(equal radii)

(pythag)

(algebra)

A Grade – using formal proofs

Prove that AD ∥ BC

Prove that AB ∥ CD

Prove that ΔACD is Isosceles

Prove that AE=EC
Teachers Notes...

How can we tell if shapes are congruent? (E/D Grade)

- Look at congruent figures in art, design, tessellations, tapa cloth, Aboriginal designs, Indonesian ikat designs, Islamic designs, designs used in ancient Egypt and Persia, window lattice, woven mats and baskets. True congruence/symmetry is rarely seen in nature.
- Investigate using superimposed images on rotations, reflections and translations and combinations
- Match sides and angles of congruent polygons using naming conventions
- Name vertices in matching order of congruent polygons using an ≡ symbol in a congruence statement
- How can we tell if circles are congruent?
  - Equal radii or diameter

Rules for Congruent Triangles... (C/B Grade)

- Use Geogebra or other internet sites to investigate what is the minimum information needed to show 2 triangles are congruent
- Identify congruent triangles using the 4 tests: SSS, SAS, AAS, RHS
  - Explain why the angle in the SAS rule must always be the included one.
  - Demonstrate that AAA is not a sufficient congruency proof.
- Identify congruent triangles from triangles embedded in a diagram.
- Find an unknown side or angle in a figure giving reasoning.

Using Congruent Triangles to prove Quadrilateral Properties. (B/A Grade)

- Use the 4 congruent triangle rules to show...
  - The sum of the interior angles of a quadrilateral is 360°
  - The opposite angles of a parallelogram are equal
  - The opposite sides of a parallelogram are equal
  - The diagonals of a parallelogram are equal
  - The opposite sides of a parallelogram are equal
  - The diagonals of a parallelogram bisect each other
  - The diagonals of a rhombus bisect each other at right angles
  - The diagonals of a rhombus bisect the vertex angles through which they pass
  - The diagonals of a rectangle are equal

Notes:

Term: CORRESPONDING - often used in relation to congruent and similar figures to refer to angles or sides in the same position - the word MATCHING could be used instead so as not to be confused with the idea of corresponding angles.

SUPERIMPOSE - used to describe the placement of one figure upon another in such a way that the parts of one coincide with the parts of the other.
Hwk Sheet Congruence

1. Draw the following shapes:

<table>
<thead>
<tr>
<th>Parallelogram</th>
<th>Rhombus</th>
<th>Trapezium</th>
<th>Kite</th>
<th>Isosceles Triangle</th>
<th>Equilateral Triangle</th>
<th>Scalene Triangle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Are these angles equal? Draw a line from the reason to the diagram.

Vertically opposite cointerior alternate corresponding angles on a straight line

3. Mark the EQUAL sides and angles using the correct Mathematical Markings on these shapes:

4. Use Pythagoras’ Theorem to decide if these triangles are congruent.

\[ c^2 = a^2 + b^2 \]
\[ = 12^2 + 5^2 \]
\[ = 144 + 25 \]
\[ = 169 \]
\[ c = \sqrt{169} \]
\[ = 13 \]

\[ f^2 = e^2 - d^2 \]
\[ = 9^2 - 5^2 \]
\[ = 81 - 25 \]
\[ = 56 \]
\[ f = \sqrt{56} \]
\[ = 2\sqrt{14} \]
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
<th>Picture Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Translation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reflection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rule 1: SSS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rule 2: SAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rule 3: AAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rule 4: RHS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**What do you call a man with a shovel?**

Work out the answer to each part and put the letter for that part in the box above the correct answer.

Which congruence test can be used to state why the triangles in each pair are congruent?
Find the value of the pronumeral (letter) in each of the following:

\[
\begin{align*}
\Delta A & \equiv \Delta B (\alpha, \beta, \gamma) \\
\Delta C & \equiv \Delta D (\alpha, \beta, \gamma) \\
\Delta E & \equiv \Delta F (\alpha, \beta, \gamma) \\
\Delta G & \equiv \Delta H (\alpha, \beta, \gamma)
\end{align*}
\]

Which of these triangles are congruent? Give reasons...

\[
\begin{align*}
\Delta _____ & \equiv \Delta _____ (\alpha, \beta, \gamma) \\
\Delta _____ & \equiv \Delta _____ (\alpha, \beta, \gamma) \\
\Delta _____ & \equiv \Delta _____ (\alpha, \beta, \gamma) \\
\Delta _____ & \equiv \Delta _____ (\alpha, \beta, \gamma)
\end{align*}
\]

\[
\begin{align*}
\Delta _____ & \equiv \Delta _____ (\alpha, \beta, \gamma) \\
\Delta _____ & \equiv \Delta _____ (\alpha, \beta, \gamma)
\end{align*}
\]

Hard Stuff to Prove...

b. Prove that \( \angle AOB = \angle COD \).

c. Prove that \( AX = AY \).
Puzzle:
Divide the following shape into the given number of congruent pieces, if it is possible.
<table>
<thead>
<tr>
<th>Year 8</th>
<th>Term 3 Weeks 7-8</th>
<th>Volume (Prisms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syllabus Reference</td>
<td>MA4 -14MG</td>
<td>Grade Examples/Responses</td>
</tr>
<tr>
<td>Outcome</td>
<td>uses formulas to calculate volumes of prisms and cylinders, and converts between units of volume</td>
<td>E</td>
</tr>
</tbody>
</table>

**CONTENT/ SKILLS**

**REVIEW** Area of basic quadrilaterals & triangles
- Draw different views of prisms and solids formed from combinations of prisms, include top, side front views
- Identify and draw the cross-sections of different prisms & vice versa
- Distinguish between solids with uniform & non-uniform cross-sections
- Choose appropriate units of measurement for volume and convert from one unit to another, eg L, kL, ML, cm³, m³
- Choose an appropriate unit to measure the volumes or capacities of objects, eg swimming pools, household containers, teaspoon
- Develop the formulas for the volumes of rectangular and triangular prisms and of prisms in general; use formulas to solve problems involving volume
  
  \[
  V = Ah \quad (\text{using perpendicular height})
  \]
- Solve a variety of practical problems involving the volumes and capacities of right prisms
- Develop and use the formula to find the volumes of cylinders:
  
  \[
  V = \pi r^2 h
  \]
- Recognise and explain the similarities between the volume formulas for cylinders and prisms (Communicating)
- Solve a variety of practical problems involving the volumes and capacities of right prisms and cylinders, eg find the capacity of a cylindrical drink can or a water tank

**LIFE SKILLS**
- Use informal units to estimate and measure capacity & volume, eg count the number of times a glass can be filled and emptied into a jug
- Compare and order the volumes of two or more models by counting the number of blocks used in each model
- Recognise the appropriate unit, and its abbreviation, for measuring capacity, eg millilitre (mL), litre (L)
- Select and use the appropriate unit and device for measuring volume and capacity, eg a medicine glass for medicine, measuring cups for recipes
- Recognise the relationship between commonly used units for measuring volume and capacity, eg 1 L = 1000 mL
- estimate the capacities of everyday objects and check using a measuring device, e.g., estimate the capacity of a bucket and check using a measuring jug
- identify the concept of volume/capacity in a problem
- select and use appropriate strategies, and make calculations, to solve a problem (Communicating, Problem Solving, Fluency)
- convert measurements of volume/capacity in larger units to measurements in smaller units, e.g., 3 L = 3000 mL
Year 8  
Term 3  
Weeks 3-4

**Syllabus Reference** MA4 – 19SP

**Outcome** collects, represents and interprets single sets of data, using appropriate statistical displays

**CONTENT/SKILLS**

- REVIEW- Interpret line & column graphs, dot plots and tables- STAGE 3
- collect and interpret information from secondary sources, presented as tables and/or graphs, 📊
- interpret and use scales on graphs, including those where abbreviated measurements are used, (Reasoning)
- identify features on graphical displays that may mislead and result in incorrect interpretation, eg displaced zeros, the absence of labelling (Communicating, Reasoning) 📊
- use spreadsheets or statistical software to tabulate and graph data 📊
- select and use appropriate scales and labels on horizontal and vertical axes (Communicating, Problem Solving, Reasoning) 📊
- construct dot plots & explain importance of ordering & aligning data points when constructing dot plots (Communicating, Reasoning) 📊
- construct ordered stem-and-leaf plots (up to 2 digit stems) 📊
- construct divided bar graphs, sector graphs and line graphs, with and without the use of digital technologies 📊
- calculate length of bar for each section of divided bar graphs and angle at centre for each sector of sector graphs & percentage of each part compared to whole(Problem Solving) 📊
- interpret a variety of graphs, including dot plots, stem-and-leaf plots, divided bar graphs, sector graphs and line graphs 📊
- compare strengths /weaknesses of different data displays (Reasoning)
- identify and explain which graph types are suitable for the data being considered, eg categorical data, but not for numerical data 📊
- discuss ethical issues, analyse & draw conclusions from data displayed in a graph 📊
- identify any clusters, gaps and outliers in sets of data 📊

**LIFE SKILLS**

- recognise that information can be presented in tables and graphs, eg a picture graph to show favourite foods, column graph to show classroom gender, sector graph to represent sports students play, table to record daily rainfall 📊
- identify information in graphs using features such as the heading/title of the graph, labels on axes, scale and key 📊
- recognise data displayed in different ways, eg a table and graph to show daily temperatures over a week 📊
- recognise ways in which data about the environment can be displayed, eg data about climate and population growth 📊

**Graded Examples/Responses**

**E**

Answer simple questions from picture graph

**D**

Construct a dot plot

Matching a table to a graph

**C**

Answer questions from a dot plot, sector graph, Construct double stem & leaf plot

**B**

Interpret complex graphs

**A**

Recognise ways in which data about the environment can be displayed, eg data about climate and population growth 📊
ASSESSMENT TASK- DATA 1
Revises:

- Identify hypotenuse & 2 short legs
  *Opposite RA, longest side (by sight, from numbers)*

- Calculate Hypotenuse using formula
  \[ c^2 = a^2 + b^2 \]
  *Include examples with a variety of unit measurements*
  *Give answers in approximate and exact form (\(\sqrt{\_}\)), practise rounding to given d.p.*

- Distance on a coordinate plane

New Stuff...

1. Calculate Short Leg using formula
   \[ a^2 = c^2 - b^2 \]
   *Include examples with a variety of unit measurements*
   *Give answers in approximate and exact form (\(\sqrt{\_}\))*

2. Practical & word problems including perimeter and area.

3. Use Pythagoras’ Theorem to prove that a given triangle is Right Angled.

   **Ext:** Pythagoras in 3 dimensions
<table>
<thead>
<tr>
<th>Year 8</th>
<th>Term 4 Weeks 3-4</th>
<th>Data 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syllabus Reference</td>
<td>Graded Examples/Responses</td>
<td></td>
</tr>
<tr>
<td>Outcome</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>
This is a continuation of Algebra Patterns topic (yr 7)

1. 1 Step equations -> table of values -> graph equation

2. 2 Step equations -> table of values -> graph equation
   
   Ext: 3 step equations

3. Odd ones out: horizontal, vertical, diagonal
   
   \( y = 2, \quad x = 3, \quad y = x, \quad y = -x \)

4. Word problems -> graphs (what’s the rule?)
   
   \( \text{Eg. Write a rule for the total monthly cost, } SC, \text{ of using Netshare for } t \text{ hours per month.} \)
   
   Answer questions based on graph.

5. Non-linear equations
   
   \( y = x^2, \quad y = -(x^2), \quad y = \frac{1}{x}, \quad y = x^3 \)

   Negative Numbers and pronumerals may now be used!

**NO REARRANGING** OF EQUATIONS

<table>
<thead>
<tr>
<th>Syllabus Reference</th>
<th>Graphing Equations (table)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome</td>
<td>Graded Examples/Responses</td>
</tr>
<tr>
<td>This is a continuation of Algebra Patterns topic (yr 7)</td>
<td>E</td>
</tr>
<tr>
<td>1. 1 Step equations -&gt; table of values -&gt; graph equation</td>
<td>Plotting Points</td>
</tr>
<tr>
<td>2. 2 Step equations -&gt; table of values -&gt; graph equation</td>
<td>Complete a table of values from a 1 step equation</td>
</tr>
<tr>
<td>Ext: 3 step equations</td>
<td>D</td>
</tr>
<tr>
<td>3. Odd ones out: horizontal, vertical, diagonal</td>
<td>Graph 1 step equations</td>
</tr>
</tbody>
</table>
| \( y = 2, \quad x = 3, \quad y = x, \quad y = -x \) | \( y = x + 1, \)
| | \( y = x - 2, \)
| | \( y = 2x, \)
| | \( y = \frac{x}{2} \)
| | \( y = -3x, \)
| | \( y = 2, \)
| | \( x = 3, \)
| | \( y = x, \)
| | \( y = -x \)
| 4. Word problems -> graphs (what’s the rule?) | Graph 2 step equations |
| | \( \text{Eg. Write a rule for the total monthly cost, } SC, \text{ of using Netshare for } t \text{ hours per month.} \)
| | Answer questions based on graph. |
| 5. Non-linear equations | Graph 3 step equations |
| \( y = x^2, \quad y = -(x^2), \quad y = \frac{1}{x}, \quad y = x^3 \) | Graph non-linear equations |
| | \( y = x^2, \)
| | \( y = -(x^2), \)
| | \( y = \frac{1}{x}, \)
| | \( y = x^3 \) |
| | A |
| Not provided with a table of values. | B |
| Graph 2 step equations | Graph 3 step equations |
| \( y = -x + 3, \) | Graph non-linear equations |
| \( y = -x - 2, \) | \( y = x^2, \)
| \( y = 2x + 3, \) | \( y = -(x^2), \)
| \( y = -3x + 2, \) | \( y = \frac{1}{x}, \)
| \( y = 3x - 2, \) | \( y = x^3 \) |
| \( y = -2 - 2x \) | |
Syllabus References

Current topic:
Stage (ACMNA132), (ACMNA158), (ACMNA173), (ACMNA189), (ACMNA211)

Next topic:
Year 10 – Compound interest

Outcomes

1. Percentage OF quantities
2. What is the SELLING PRICE?
3. What is the ORIGINAL PRICE? (Unitary Method)
4. What is the PERCENTAGE CHANGE? (% increase/decrease)

CONTENT...

1. Percentage OF quantities

   Mental strategies for common percentages (10% = \( \div 10 \)), harder percentages, Commission, GST, Leave Loading, Simple Interest

2. What is the SELLING PRICE?

   What is profit/loss?
   3 methods:
   
   \[
   \begin{align*}
   10\% \text{ of } 20 &= \frac{10}{100} \times 20 = 2 \\
   110\% \text{ of } 20 &= \frac{110}{100} \times 20 = 22 \\
   1.1 \times 20 &= 22 \\
   20 + 2 &= 22
   \end{align*}
   \]

   Mental strategies for easy %
   Cost incl. GST, total incl. interest of investment, paying on terms
   Ext: use spread sheets to perform percentage calculations

3. What is the ORIGINAL PRICE? – Unitary Method

   Ex-GST price, original price before % increase or decrease,
   “60% of the time is 48mins. What was the total time?” “profit of 10% gives $22”
   \[
   \begin{align*}
   60\% &= 48\text{mins} \\
   \div 60 &\div 60 \\
   \times 100 &\times 100 \\
   100\% &= 80\text{mins} \\
   110\% &= 22 \\
   \div 110 &\div 110 \\
   1\% &= 0.2 \\
   \times 100 &\times 100 \\
   100\% &= 20
   \end{align*}
   \]

4. What is the percentage CHANGE? (% increase or decrease)

   “$20 increased to $22” “$20 increased by $2”
   \[
   \begin{align*}
   22 - 20 &= 2 \text{ (profit)} \\
   \frac{2}{20} \times 100 &= 10\% \text{ increase} \\
   \frac{2}{20} \times 100 &= 10\% \text{ increase}
   \end{align*}
   \]
Vocab:
“percent of” vs “as a percentage of”
“of” vs “out of”
10% on $20
10% off $20
“profit of 10% gives $22”
Profit
Loss
Commission
Simple Interest
Principle
Unitary method
GST
Mark-up
Discount
Reduction
Sale
Loss
Depreciation
Selling price
Cost price
Wholesale price
ATM
COD
EFTPOS
GDP
IOU
ASX
1. Complete the table:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Fraction</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>$\frac{3}{4}$</td>
<td>1</td>
</tr>
<tr>
<td>50%</td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>10%</td>
<td>$\frac{1}{10}$</td>
<td>0.1</td>
</tr>
</tbody>
</table>

2. $20 \div 25 = \frac{20}{25} = \frac{4}{5} = \frac{8}{10} = 0.8 = 80\%$

3. Convert $8\%$ to a fraction $= \frac{8}{100}$
Convert $72\%$ to a decimal $= 0.72$

4. At Evans River K-12, 10% of students walk to school, 35% of students catch the bus and the remainder of students are driven to school. If there are 600 students at the school,
Calculate how many students:
- walk to school __________
- catch the bus __________
- are driven to school __________

5. Increase $440$ by $25\%$. $\ 440 \times 1.25 = \ 550$

6. A sale on digital cameras offers $20\%$ discount.
Determine the sales price of a camera that was originally priced at $220. $220 \times 0.8 = \ 176$

7. Mr Garvey mows $60\%$ of the lawn in $48$ minutes.
How long will it take him to mow the entire lawn if he mows at a constant rate? $\frac{48}{60} \times 100 = 80$ mins

8. The sale price of a DVD is $18. This is $25\%$ less than the original marked price.
Determine the original price of this DVD. $18 \div 0.75 = 24$

9. Calculate the percentage profit made when
the cost price = $25.50 and the sale price = $28.95
$28.95 - 25.50 = 3.45$
$\frac{3.45}{25.50} \times 100 = 13.5\%$
10. If 25% of an amount is $3, what is $\frac{4}{2}\%$ of the amount? $\underline{__________}$

11. Brad scored 66% on his most recent Mathematics test. He has studied hard and is determined to improve his score on the next topic test, which will be out of 32 marks. What is the least number of marks Brad can score to improve on his previous test score? $\underline{______________}$ marks

12. When a Z-flex is sold for $200 the shop makes 25% profit. If this $200 Z-flex is now sold at a discount of 10%, what is the percentage profit of the price at which the shop bought the Z-flex? $\underline{______________}$% At what price should the Z-flex be sold to make 30% profit? $\underline{______________}$

13. Miss Morton earnt an hourly rate of $20 per hour and 5% commission. Mr Colliss earns an hourly rate of $16 per hour and 10% commission. They each work a 40-hour week. In one particular week, Miss Morton and Mr Colliss both sold the same value of goods and both received the same wage.

How much did they sell and what was their wage? Sold = $\underline{______________}$ Wage = $\underline{______________}$
Year 8  Term 4
Weeks 10  Probability 2
(Ways to describe chance)

Syllabus References

Current topic:
Stage (ACMSP144), (ACMSP168), (ACMSP204), (ACMSP226), (ACMSP292)

Next Topics:
Year 9  Prob 3 –

Outcomes

1. Express probability outcomes as fractions, decimals or percentages
2. Complimentary Events
3. Venn Diagrams (2 attributes only)

CONTENT...

1. What it IS...
   Probability expressed as fract/dec/perc, design spinners to reflect events (die roll, coin toss, 4/7 red)
   Make calculations from relative frequency back to theoretical probability
   (estimates stabilise as number of experiments increase)

2. What it’s NOT...
   Complimentary events, sum of probabilities = 1, red’=not red

3. What it MIGHT BE...
   Venn Diagrams
   – total number of outcomes, probability of single category, prob of combination of categories.

Vocab:
At least / at most
Exclusive or (A or B but not both)
Inclusive or (A or B or both)
And - Mutually exclusive (multiple events)
And - Non-mutually exclusive (can be same event)
Not
Neither / either
nor

Formula:
P(Event A) + P(compliment of A) = 1

Expected number of occurrences = probability × number of trials

Card drawn from a pack of 52...
- Non-mutually exclusive event

-club or number but not both = 31/52
-clubs only = 4/52
-a club a number or both = 36/52
-both a club and a number = 9/52
-neither club nor a number not a club or a number = 12/52