

# Year 8 (2022)

## MATHEMATICS

### Term 1 Common Test Task Notification

<b>Date</b>	<b>Week 8A</b> <b>Monday 14<sup>th</sup> March 2022 and Tuesday 15<sup>th</sup> March 2022</b>																			
<b>Classes Assessed</b>	Compulsory for:																			
	<table border="1"> <thead> <tr> <th colspan="2"><b>Monday 14<sup>th</sup> March 2021</b></th> <th colspan="2"><b>Tuesday 15<sup>th</sup> March 2021</b></th> </tr> </thead> <tbody> <tr> <td>8 MATI (Mr Salame)</td> <td>Period 5</td> <td>8 MATR (Mr Salame)</td> <td>Period 2</td> </tr> <tr> <td>8 MATB (Mrs Ibrahim)</td> <td>Period 4</td> <td>8 MATO (Mrs Ibrahim)</td> <td>Period 2</td> </tr> <tr> <td>8MATP (Mrs Attaalla)</td> <td>Period 2</td> <td>8 MATY (Mr Mansouri)</td> <td>Period 2</td> </tr> <tr> <td>8MATV (Ms HUI)</td> <td>Period 2</td> <td>8 MATG (Mr Smithard)</td> <td>Period 2</td> </tr> </tbody> </table>	<b>Monday 14<sup>th</sup> March 2021</b>		<b>Tuesday 15<sup>th</sup> March 2021</b>		8 MATI (Mr Salame)	Period 5	8 MATR (Mr Salame)	Period 2	8 MATB (Mrs Ibrahim)	Period 4	8 MATO (Mrs Ibrahim)	Period 2	8MATP (Mrs Attaalla)	Period 2	8 MATY (Mr Mansouri)	Period 2	8MATV (Ms HUI)	Period 2	8 MATG (Mr Smithard)
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<b>Weighting</b>	25% of Year 8 Mathematics Assessment																			
<b>Examination Details</b>	<p>Read the following details carefully and write them into your diary.</p> <p><b>Duration:</b> 50 minutes  <b>Format:</b> Calculator  <b>Venue:</b> Classrooms</p>																			
<b>Equipment Required</b>	<p>The following equipment is required for this assessment task:</p> <ul style="list-style-type: none"> <li>• Blue and/or black pens</li> <li>• Lead Pencils</li> <li>• Ruler &amp; Eraser</li> <li>• Board-approved scientific calculator</li> </ul> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• No borrowing of equipment will be permitted.</li> <li>• A reference sheet (attached) will be provided for this examination.</li> <li>• No handwritten summaries will be permitted.</li> </ul>																			
<b>Marking Criteria</b>	<ul style="list-style-type: none"> <li>• All questions should be attempted.</li> <li>• All questions are worth 1 mark unless otherwise indicated.</li> <li>• To obtain full marks, answers must be completely correct and all necessary working must be shown.</li> <li>• Some marks may be awarded for partially correct answers.</li> <li>• Trivial attempts will be counted as a non-attempt and may result in an official warning letter being issued.</li> </ul>																			
<b>Absentee Procedures</b>	If you are absent on the day of this examination, upon your return to school you must present a Medical Certificate to your Class Teacher or the Head Teacher explaining your absence, otherwise a mark of zero may be awarded. You will be required to sit for your examination on the first day you return to school.																			

## Year 8 Term 1 Common Test

The following table lists all the Stage 4 outcomes, knowledge and numeracy skills that will be assessed in this assessment task.

Strands	Assessment Outcomes
<b>Number and Algebra</b>	<p><b>Topic: ALGEBRAIC TECHNIQUES</b></p> <ul style="list-style-type: none"> <li>• Cambridge 8 – Chapter 1</li> <li>• Cambridge Gold NSW 8 – Chapter 1</li> <li>• Essential Gold 8 – Chapter 5</li> </ul> <p>(Note – Consult the other two texts for Indices)</p> <p><b>MA4-8NA</b>      Generalises number properties to operate with algebraic expressions.</p> <p><b>MA4-9NA</b>      Operates with positive-integer and zero indices of numerical bases. *</p> <p>* Note: You will be expected to be able to apply index laws to both numerical and algebraic bases.</p> <p><b>Topic: EQUATIONS 2</b></p> <p><b><u>ONLY</u></b>  <b>Exercices 2A &amp; 2B only: Reviewing equations and Equivalent equations</b></p> <ul style="list-style-type: none"> <li>• Cambridge 8 – Chapter 2</li> <li>• Cambridge Gold NSW 8 – Chapter 2</li> <li>• Essential Gold 8 – Chapter 7</li> </ul> <p><b>MA4-10NA</b>      Uses algebraic techniques to solve simple linear equations.</p>
<b>Working Mathematically</b>	<p><b>MA4-1WM</b>      Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols.</p> <p><b>MA4-2WM</b>      Applies appropriate mathematical techniques to solve problems.</p> <p><b>MA4-3WM</b>      Recognises and explains mathematical relationships using reasoning.</p>

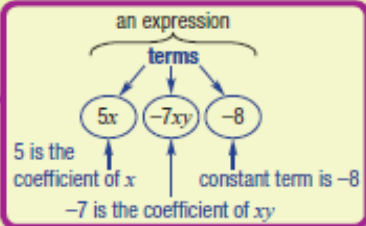


**Year 8 Reference Sheets: Algebraic Techniques 2 and Indices**  
**Equations 2**

**Pronumeral:** a letter which stands for one or more numbers

**Language**

- +** sum  
more than added  
increased
- difference  
less than minus  
decreased
- ×** product  
times double (2×)  
twice (2×)  
triple (3×)
- ÷** quotient  
divide one third  
one half  
quarter



**Substitution**

'evaluate' 'substitute'  
replace variables with numbers and calculate answer

$$\frac{7a}{4} + 3(a+b) + 4b^2$$

$a = 8$   $b = 2$

$$= \frac{7 \times 8}{4} + 3 \times (8 + 2) + 4 \times 2 \times 2$$

$$= 14 + 30 + 16$$

$$= 60$$

**Equivalent expressions**

	$7 - 3x$	$2 - 3x + 5$
$x = 2$	$7 - 6 = 1$	$2 - 6 + 5 = 1$
$x = 10$	$7 - 30 = -23$	$2 - 30 + 5 = -23$

$7 - 3x = 2 - 3x + 5$

**Algebraic fractions**

**Adding and subtracting**

$$\frac{3a}{2} + \frac{7m}{5} = \frac{3a \times 5}{2 \times 5} + \frac{7m \times 2}{5 \times 2}$$

$$= \frac{15a}{10} + \frac{14m}{10}$$

$$= \frac{15a + 14m}{10}$$

'unit' is tenths

**Multiplying**

$$\frac{7a}{81} \times \frac{4}{a}$$

$$= 28m$$

$$\frac{a}{a} = 1$$

**Dividing**

$$\frac{3a}{4} \div \frac{2}{3}$$

$$= \frac{3a}{4} \times \frac{3}{2}$$

$$= \frac{9a}{8}$$

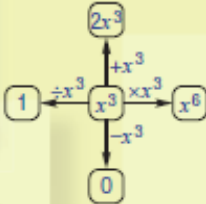
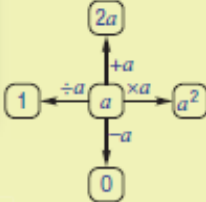
$$\frac{15x}{y} \div 20x$$

$$= \frac{15x}{y} \times \frac{1}{20x}$$

$$= \frac{15x^1}{y} \times \frac{1}{20x^1}$$

$$= \frac{3}{4y}$$

$$a \div a = a \times \frac{1}{a} = \frac{a}{a} = 1$$



**Algebraic terms**

Concise form	Expanded form
$5x^2y$	$5xxxy$
$-2ab^2$	$-2abb$
$7p^2q^3$	$7ppqqq$
$\frac{4ab^2}{5c^3}$	$\frac{4abb}{5ccc}$

**Like terms**

Variables have identical expanded form.

$6a^2m \rightarrow 6aam$   
 $-2a^2m \rightarrow -2aam$   
 $5ma^2 \rightarrow 5maa = 5aam$

$6a^2m, -2a^2m$  and  $5ma^2$  are like terms

$ab = ba$

**Adding and subtracting like terms**

- Count 'how many'
- Don't change variables.

$-6a + 4a^2 - 3 + 9a^2 - 12a$

sign in front belongs to term

$$= -6a - 12a + 4a^2 + 9a^2 - 3$$

$$= -18a + 13a^2 - 3$$

a stays the same      a<sup>2</sup> stays the same

**Expanding brackets**

$$3(x+y) = x + y + x + y + x + y = 3x + 3y$$

**Distributive law**

$$a(b+c) = ab + ac$$

$$5(2a+m) = 5(2a) + 5(m) = 10a + 5m$$

$$7(k-3a) = 7(k) - 7(3a) = 7k - 21a$$

$$a(b-c) = ab - ac$$

$$5(2a-3) - 7(4+a)$$

$$= 5(2a) - 5(3) - 7(4) + -7(a)$$

$$= 10a - 15 - 28 - 7a$$

$$= 3a - 43$$

**Factorising**

$$12x + 6a \text{ (HCF = 6)}$$

$$= 6 \times 2x + 6 \times a$$

$$= 6(2x + a)$$

$$12a^2m + 8am^2$$

$$= 12aam + 8amm \text{ HCF = } 4am$$

$$= 4am \times 3a + 4am \times 2m$$

$$= 4am(3a + 2m)$$

**Index notation**

$$a^n = \underbrace{a \times a \times a \times \dots \times a}_n$$

base      n 'lots' of a

**Index laws**

- $5^m \times 5^n = 5^{m+n}$
- $5^m \div 5^n = \frac{5^m}{5^n} = 5^{m-n}$
- $(5^m)^n = 5^{mn}$

**Examples**

- $3^2 \times 3^5 = 3^7$
- $\frac{12^5}{12^2} = 12^3$
- $(2^3)^4 = 2^{12}$

# Equations 2

**Unknown**

$$\begin{array}{r} -5 \\ \downarrow \\ 2x + 5 = 8 \\ \uparrow -5 \\ \hline 2x = 3 \\ \div 2 \\ \hline x = \frac{3}{2} \end{array}$$

Equation Solving

**Solution**

**Equivalent equations stay balanced**

$$\begin{array}{r} 5x + 1 = x + 9 \\ -x \quad \Delta \quad -x \\ \hline 4x + 1 = 9 \\ -1 \quad \Delta \quad -1 \\ \hline 4x = 8 \\ \div 4 \quad \Delta \quad \div 4 \\ \hline x = 2 \end{array}$$

**Equations with fractions**

$$\begin{array}{r} \times 3 \\ \frac{5x}{3} = 4 \\ \div 5 \\ \hline 5x = 12 \\ \div 5 \\ \hline x = \frac{12}{5} \end{array}$$

$$\begin{array}{r} -9 \\ 9 - \frac{2a}{3} = 6 \\ \div -2 \\ \hline -\frac{2a}{3} = -3 \\ \times 3 \\ \hline -2a = -9 \\ \div -2 \\ \hline a = \frac{9}{2} \end{array}$$

$$\begin{array}{r} \times 5 \\ \frac{3k-2}{5} = -2 \\ +2 \\ \hline 3k - 2 = -10 \\ \div 3 \\ \hline 3k = -8 \\ \div 3 \\ \hline k = -\frac{8}{3} \end{array}$$

**Solving simple quadratic equations**

If  $x^2 = c$  then:

- If  $c > 0$ ,  $x = \sqrt{c}$  or  $x = -\sqrt{c}$   
e.g.  $x^2 = 16$  gives  $x = \pm 4$
- If  $c = 0$  then  $x = 0$  with one solution.
- If  $c < 0$  then there are no solutions for  $x$ .

**Formulas rules, relationships**

$$P = 2\ell + 2w$$

↑ ↑ ↑  
subject pronominals

**Equations with brackets**

Expand brackets  
Collect like terms

$$5(2x - 3) + 8 = 6x - 19$$

$$10x - 15 + 8 = 6x - 19$$

**Distributive law**

$$a(b + c) = ab + ac$$

$$\begin{array}{r} -6x \\ 10x - 7 = 6x - 19 \\ +7 \\ \hline 4x - 7 = -19 \\ \div 4 \\ \hline 4x = -12 \\ \div 4 \\ \hline x = -3 \end{array}$$

**Pronumerals with negative coefficients**

$$\begin{array}{r} \times -1 \\ -x = -3 \\ \div -1 \\ \hline x = 3 \end{array}$$

$$\begin{array}{r} \times -1 \\ -5x = -2 \\ \div -5 \\ \hline 5x = 2 \\ \div 5 \\ \hline x = \frac{2}{5} \end{array}$$

$$\begin{array}{r} -3 \\ 3 - a = 5 \\ \div -1 \\ \hline -a = 2 \\ \times -1 \\ \hline a = -2 \end{array}$$

$$\begin{array}{r} \times -3 \\ \frac{6-2a}{-3} = 8 \\ -6 \\ \hline 6 - 2a = -24 \\ \div -2 \\ \hline -2a = -30 \\ \div -2 \\ \hline a = 15 \end{array}$$

**Problem solving with equations**

- Pronumerals: use words to explain
- Rule: starts with word or pronominal, has = sign
- Solve: state solution
- Sentence answer with units

An orange costs 5c more than an apple. An orange and an apple together cost \$1.15. Determine the cost of each.

Cost of apple =  $x$   
Cost of orange =  $x + 5$   
Total =  $x + x + 5$   
 $2x + 5 = 115$   
 $2x = 110$   
 $x = 55$   
Apples cost 55 cents each. Oranges cost 60 cents each.

## Stage 4 Mathematics Grading Scale

The following table lists outcomes and sample performance descriptors that students can typically achieve to be awarded the respective grades outlined.

Year 8	ACHIEVEMENT				
TOPIC / OUTCOME	<i>Limited (E)</i>	<i>Basic (D)</i>	<i>Sound (C)</i>	<i>High (B)</i>	<i>Extensive (A)</i>
<p><b>Algebraic Techniques 2</b></p> <p>MA4-8NA generalises number properties to operate with algebraic expressions</p> <p>MA4-9NA Operates with positive-integer and zero indices of numerical bases.</p>	Evaluate simple expressions using substitution.	Generate a number pattern from an algebraic expression.	<p>Expand algebraic expressions by removing grouping symbols.</p> <p>Factorise algebraic expressions by identifying numerical factors.</p>	Factorise more difficult algebraic expressions by identifying negative numerical factors.	Factorise algebraic expressions with both negative and algebraic factors.
<p><b>Equations</b></p> <p>MA4-10NA uses algebraic techniques to solve simple linear and quadratic equations.</p>	Recognise pronumerals and variables and be able to solve simple one step equations.	Solve simple linear equations up to two steps. Recognise that simple quadratic equations have two solutions.	<p>Solve two-step equations involving negative numbers <b>e.g.</b> <math>-2x + 7 = 19</math>.</p> <p>Check solutions to equations by substituting. Solve simple quadratic equations.</p>	Solve, and explain an appropriate technique to solve, linear equations that involve grouping symbols and an algebraic fraction. <b>e.g.</b> $(2x+3)/5 = 10$ and $2x/5 + 3 = 10$	<p>Solve linear equations that may have non-integer solutions that may be up to three steps with pronumerals on both sides.</p> <p>Describe the techniques required to solve a variety of equations demonstrating a conceptual understanding.</p>