

Year 5		Western Adelaide Region - Maths Assessment Tasks Map (Draft –November 2013)						Proficiency Strands	
Aims	<p>The Australian Curriculum Mathematics aims to ensure that studentsare confident, creative users and communicators of mathematics, able to investigate, represent and interpret situations in their personal and work lives and as active citizens; develop an increasingly sophisticated understanding of mathematical concepts and fluency with processes, and are able to pose and solve problems and reason in <i>Number and Algebra, Measurement and Geometry, and Statistics and Probability</i>; recognise connections between the areas of mathematics and other disciplines and appreciate mathematics as an accessible and enjoyable discipline to study.</p>							<ul style="list-style-type: none"> • Understanding • Fluency • Problem Solving • Reasoning 	
Content Strands	Number & Algebra								
Sub Strands	Number & Place Value			Fractions and Decimals		Money and Financial Mathematics	Patterns & Algebra		
Big Idea / Concept/ Key Understanding	Additive to Multiplicative Thinking			Partitioning		<ul style="list-style-type: none"> -Money values can be represented in a variety of combinations -Goods and services are paid for with cash, credit or bank cards and cheques -Currency provides access to food and services -Creating budgeting plans assists in achieving financial goals 	<ul style="list-style-type: none"> -A pattern requires an element of repetition that can be described and generalised with a pattern rule -Patterns can be represented in many ways, including using combinations of numbers, objects and symbols -Patterns can consist of multiple operations and inverse operations -Patterns are all around us 		
	<ul style="list-style-type: none"> -It is important to work flexibly and efficiently with a range of numbers and explore generalisations (e.g. for 7 sixes - "I know that 5 sixes are 30 and 2 sixes are 12, therefore 7 sixes is 42") -Each operation has its appropriate use in solving a range of problems involving multiplication or division -Solutions to problems can be found and communicated in a variety of ways (e.g. using words, diagrams, tables, symbols, explanations) 	<ul style="list-style-type: none"> -Numbers have special properties that can be used to solve problems (e.g. factor, multiple, prime) 	<ul style="list-style-type: none"> -The language of fractions is important -The denominator of a fraction names the part. The numerator tells their number -- how many -A unit fraction is a fraction whose numerator is 1 (e.g. 1/3: in 2/3 the unit is 1/3 and we have 2 of them) -Representations of quantities can be larger than 1 whole and this is called a mixed number -The decimal numeral system has 10 as the base. A decimal is a tenth part (e.g. 0.6 is 6 tenths of a part, the part being 1 whole) -A decimal fraction is a fraction whose denominator is a power of ten (e.g. 6 tenths, 6 hundredths, 6 thousandths, etc.) 						
Australian Curriculum Content Descriptor	<p>Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies</p> <p>Solve problems involving division by a one digit number, including those that result in a remainder</p> <p>Use efficient mental and written strategies and apply appropriate digital technologies to solve problems</p>	<p>Use estimation and rounding to check the reasonableness of answers to calculations</p>	<p>Identify and describe factors and multiples of whole numbers and use them to solve problems</p>	<p>Compare and order common unit fractions and locate and represent them on a number line</p> <p>Recognise that the place value system can be extended beyond hundredths</p> <p>Compare, order and represent decimals</p>	<p>Investigate strategies to solve problems involving addition and subtraction of fractions with the same denominator</p>	<p>Create simple financial plans</p>	<p>Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction</p>	<p>Use equivalent number sentences involving multiplication and division to find unknown quantities</p>	
Achievement Standard	<p>Students solve simple problems involving the four operations using a range of strategies</p>	<p>Students check the reasonableness of answers using estimation and rounding</p>	<p>Students identify and describe factors and multiples</p>	<p>Students order decimals and unit fractions and locate them on number lines</p>	<p>Students add and subtract fractions with the same denominator.</p>	<p>Students explain plans for simple budgets</p>	<p>Students continue patterns by adding and subtracting fractions and decimals</p>	<p>Students find unknown quantities in number sentences</p>	
Summative Assessment Task	5.1 Animal Parade		5.2 Factor Trees Magic Number		5.3 All Mixed Up!		5.4 Growing Tall		

5.1 – Number & Place Value

Solve multiplication and division problems using efficient mental and written strategies

Western Adelaide Region

Mathematics Performance Assessment Tasks (Updated: November 2013)

Year 5

Big Idea(s)

-It is important to work flexibly and efficiently with a range of numbers and explore generalisations (e.g. for 7 sixes - "I know that 5 sixes are 30 and 2 sixes are 12, therefore 7 sixes is 42").

-Each operation has its appropriate use in solving a range of problems involving multiplication or division.

-Solutions to problems can be solved and communicated in a variety of ways (e.g. using words, diagrams, tables, symbols, explanations).

Australian Curriculum Content Descriptor

Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies.

Solve problems involving division by a one digit number, including those that result in a remainder.

Use efficient mental and written strategies and apply appropriate digital technologies to solve problems.

Achievement Standard

By the end of Year 5, students solve simple problems involving the four operations using a range of strategies.

Students find unknown quantities in number sentences.

Related Mathematical Proficiencies

- *Understanding* includes making connections between representations of numbers
- *Fluency* includes using estimation to check the reasonableness of answers to calculations
- *Problem Solving* includes formulating and solving authentic problems
- *Reasoning* includes investigating strategies to perform calculations efficiently

<p>Prior Learning Experiences</p> <p>Do I use ongoing Formative Assessment to inform the teaching & learning cycle? Do I provide learning experiences that enable students to build on their knowledge?</p>	<p>Feedback</p> <p>How will I provide feedback to students?</p>	<p>Summative Assessment</p> <p>Does the assessment task indicate how well students understand and can apply their learning? (how well = extent, depth and sophistication of thinking – informs A-E grading)</p>	<p>Evidence</p> <p>What evidence am I looking for that demonstrates the student has got it?</p>
<p><u>It is important that students have had experiences with the learning opportunities below before administering the assessment task.</u></p> <p>Developing: Understanding Fluency Problem Solving Reasoning</p> <p>Through experiences with:</p> <ul style="list-style-type: none"> • Mental Routines using a 100s chart (<i>Natural Maths, Ann & Johnny Baker</i>) • Number patterns • Equal groups, fair share • Unknown number sentences – including substituting numbers for symbols • Exploring the use of the equals sign (e.g. <i>12 and 4 is the same as 8 and ?</i>) • Addition, subtraction, multiplication and division • Exploring multiples and factors including factor trees • Exploring arrays and regions using concrete materials • Problem solving involving the 4 operations including word problems and using thinkboards • Exploring efficient strategies such as landmark numbers, 25, 50, 75, 100, balance and compensate, round and adjust (<i>Natural Maths, Ann & Johnny Baker</i>) • Using calculators to assist with problem solving • I have, who has cards • Arrays and regions games, such as Multiplication Toss (<i>George Booker, Professor Dianne Siemon</i>) 	<p>Teacher observations</p> <p>Conferences 1:1 with peers & teacher</p> <p>Learning log: Student identifies areas for focus</p> <p>SNW (S- strengths, N – needing improvement, W- where to next)</p> <p>Stars/smiley faces</p>	<p>Animal Parade</p> <p>Entry Level</p> <p>When I was at the Royal Show I saw the farmers getting ready to parade their animals for judging. One of the farmers accidentally left a gate open and all of the animals got mixed together. I counted 60 legs and 20 heads. I saw 3 different types of animals. How many of each animal might there have been? Record your thinking.</p> <p>This problem could be adapted to suit a range of contexts (e.g. <i>at the zoo, at the park</i>)</p> <p><i>*If this is too challenging for students consider posing the following problem: At the nature reserve I saw some emus and wombats. I counted 40 legs. How many wombats and how many emus might I have seen?</i></p> <p>Challenge Level</p> <p>Is there another way that you can solve this problem? Is there a logical pattern to solving this problem? Could you use symbols to represent the animals in your number sentence? Record your thinking.</p> <p>Questioning – “What strategies did you use?” “Is there another way to solve the problem?” “What did you find challenging? Easy? Why?” “Did you find any patterns?” “How could you use symbols to represent each animal when writing a number sentence?”</p> <p>Organisation</p> <p>Teacher – record the key information from the problem on the board; have counters accessible to students if they chose to use them</p> <p>Students – working out paper; whiteboard; eraser; pencil</p>	<p>Students will:</p> <ul style="list-style-type: none"> • Demonstrate knowledge by solving a given problem using a range of strategies involving the four operations. • Show understanding by applying known strategies to find unknown quantities and recording matching number sentences. They identify patterns when finding multiple solutions to the problem. <p>Advanced – Students demonstrate understanding of multiplicative thinking by identifying relationships between the given facts (e.g. $60 \div 3 = 20$ legs each group of animals). They solve the problem in more than one way and identify patterns within their solution. They are able to substitute number of legs for a symbol and record an algebraic number sentence.</p> <p>Competent – Students demonstrate an understanding of problem solving using multiplicative strategies. They identify at least one way of solving the problem and record their thinking using mathematical reasoning.</p> <p>Developing – Students demonstrate some/little understanding of problem solving using multiplication. They attempt to solve the problem using additive strategies. They are unable to find a solution.</p> <p>Possible solution: 10 x 2 legged animals; 5 x 4 legged animals (type 1); 5 x 4 legged animals (type 2) = 20 heads and 60 legs</p> <p>Possible pattern – facts to 10 for 4 legged animals (1 of type 1 and 9 of type 2, 2 of type 1 and 8 of type 2, 3 and 7, etc.)</p>

5.2 – Number & Place Value

Identify and describe factors and multiples

Western Adelaide Region

Mathematics Performance Assessment Tasks (Updated: November 2013)

Year 5

Big Idea(s) -Numbers have special properties that can be used to solve problems (e.g. factor, multiple, prime).	Australian Curriculum Content Descriptor Identify and describe factors and multiples of whole numbers and use them to solve problems.	Achievement Standard By the end of Year 5, students identify and describe factors and multiples.	Related Mathematical Proficiencies <ul style="list-style-type: none"> Understanding includes making connections between representations of numbers
Prior Learning Experiences Do I use ongoing Formative Assessment to inform the teaching & learning cycle? Do I provide learning experiences that enable students to build on their knowledge?	Feedback How will I provide feedback to students?	Summative Assessment Does the assessment task indicate how well students understand and can apply their learning? (how well = extent, depth and sophistication of thinking – informs A-E grading)	Evidence What evidence am I looking for that demonstrates the student has got it?
<p><u>It is important that students have had experiences with the learning opportunities below before administering the assessment task.</u></p> <p>Developing: Understanding Fluency Problem Solving Reasoning</p> <p>Through experiences with:</p> <ul style="list-style-type: none"> Using a 100s chart to explore patterns and to find common multiples Developing the vocabulary and exploring number concepts, including number properties (e.g. multiples, factor, lowest common multiple, highest common factor, lowest (prime) factor, composite number) Exploring, creating and deconstructing factor trees to identify multiples and factors Problem solving involving multiplication and division Exploring commutativity using arrays and regions and concrete materials Number sentences, including finding the unknown Exploring efficient strategies such as landmark numbers, 25, 50, 75, 100, balance and compensate, round and adjust (Natural Maths, Ann & Johnny Baker) Using calculators to assist with problem solving I have, who has cards Arrays and regions games, such as Multiplication Toss (George Booker, Professor Dianne Siemon) 	<p>Teacher observations</p> <p>Conferences 1:1 with peers & teacher</p> <p>Learning log: Student identifies areas for focus</p> <p>SNW (S-strengths, N – needing improvement, W- where to next)</p> <p>Stars/smiley faces</p>	<p>Option 1: Factor Trees</p> <p>Entry Level The class were learning about factor trees and were recording these on their whiteboards. The teacher wanted the students to share what they had done but some of the students had rushed ahead and had already wiped off their boards. One student said that she would share and that she remembered having the lowest (prime) factors of 5, 3, 2 and 2 on her board. What do you think the factor tree would have looked like? What might have been the starting number?</p> <p>Challenge Level How many different ways can you use some or all of the lowest (prime) factors in the problem? (Please note that there are at least 5 possibilities that students can make)</p> <p>Option 2: Magic Number</p> <p>Entry Level Mrs Jones told her class she was thinking of a magic number. She gave them two clues to start with and said that she would give them more clues during the day. Her first clue was that her magic number was a multiple of 4. Her second clue was that it was also a multiple of 6. After recess she told them that it was less than 120. After lunch she gave them the last clue. When you add the digits together the total is more than 8. What might have been the starting magic number? What are the possibilities for the magic number?</p> <p>Challenge Level What clues could you give so that there would only be one possible answer? Identify at least one number that couldn't be the magic number and explain why?</p> <p>Questioning – “What do you understand the term factor to mean?” “What do you understand the term multiple to mean?” “What are common factors?” “What is the difference between a factor and a multiple?” “How could you record your thinking?” “What prior knowledge will help you to solve the problem?”</p> <p>Organisation Teacher – Read the problem and record key information on the board Students – Paper to record; pencils</p>	<p>Students will:</p> <ul style="list-style-type: none"> Demonstrate knowledge by identifying factors and multiples for given numbers. Show understanding by recreating factor trees from the lowest (prime) factors. <p>Advanced –Students demonstrate multiple representations of factor trees for the same number. They are able to determine and record all of the factors, including the lowest (prime) factors. They construct a range of factor trees using a combination of the (prime) factors 5, 3 and 2. They identify common multiples and use their knowledge of factors to determine the magic number.</p> <p>Competent –Students demonstrate knowledge by finding and recording more than one factor. They identify the lowest (prime) factor. They use a range of strategies to solve a given problem and use mathematical terms when reasoning.</p> <p>Developing –Students demonstrate some/little understanding of factors and multiples. They are unable to reconstruct factor trees and use inefficient strategies when problem solving.</p>

5.3 – Fractions & Decimals

Solve problems involving purchases

Western Adelaide Region

Mathematics Performance Assessment Tasks (Updated: November 2013)

Year 5

Big Idea(s)

- A unit fraction is a fraction whose numerator is 1 (e.g. $\frac{1}{3}$: in $\frac{2}{3}$ the unit is $\frac{1}{3}$ and we have 2 of them).
- The decimal numeral system has 10 as the base. A decimal is a tenth part (e.g. 0.6 is 6 tenths of a part, the part being 1 whole).
- A decimal fraction is a fraction whose denominator is a power of ten (e.g. 6 tenths, 6 hundredths, 6 thousandths, etc.).

Australian Curriculum Content Descriptor

Compare and order common unit fractions and locate and represent them on a number line.
Recognise that the place value system can be extended beyond hundredths.
Compare, order and represent decimals.

Achievement Standard

By the end of Year 5, students order decimals and unit fractions and locate them on number lines.

Related Mathematical Proficiencies

- Understanding includes comparing and ordering fractions and decimals and representing them in various ways

Prior Learning Experiences

Do I use ongoing Formative Assessment to inform the teaching & learning cycle? Do I provide learning experiences that enable students to build on their knowledge?

Feedback

How will I provide feedback to students?

Summative Assessment

Does the assessment task indicate **how well** students understand and can apply their learning? (**how well** = extent, depth and sophistication of thinking – informs A-E grading)

Evidence

What evidence am I looking for that demonstrates the student has got it?

It is important that students have had experiences with the learning opportunities below before administering the assessment task.

Developing:

Understanding Fluency Problem Solving Reasoning

Through experiences with:

- Modelling and exploring halves, quarters, thirds, fifths, eighths, tenths beyond the whole to include mixed numbers
- Make, name and record fractions, including mixed numbers and improper fractions
- Counting by halves and thirds, including mixed numbers
- Investigating equivalent fractions
- Problem solving with common fractions and multiples of a fraction
- Problem solving situations and rich tasks involving finding unknown fractions, explaining fractions, comparing fractions
- Exploring fractions in real-world contexts – (e.g. fractions of a quantity- sharing lollies)
- Locating and recording common fractions on a number line beginning 0-1, then on an open number line beyond 0-1
- Place value to tenths and hundredths
- Using a thinkboard to model and represent unit fractions
- Games such as Make a Whole (Professor Dianne Siemon) and Maths Games (George Booker)

Teacher observations

Conferences 1:1 with peers & teacher

Learning log: Student identifies areas for focus

SNW (S- strengths, N – needing improvement, W- where to next)

Stars/smiley faces

All Mixed Up! (See attachments 5.3A, 5.3B & 5.3C)

Entry Level

Mrs Jones's class were learning about fractions, percentages and decimals. They were asked to put a range of items on a number line, but all came up with different number lines. What do you think a number line might have looked like?
What fractions, decimals and percentages could you use and represent on a number line?

Challenge Level (see attachment 5.3C)

Choose a mixed number from the task ($1\frac{1}{2}$, $1\frac{1}{4}$) and model and represent this fraction using the thinkboard provided.

Questioning – “Tell me why you placed... fraction ...?” “What would ... look like if you drew a model of it?” “Which is larger... or ...?” “Which fraction is a mixed number? What makes it a mixed number?” “How would you record the fraction... as a decimal number?”

Organisation

Teacher – copy attachments 5.3B and 5.3C; display problem solving task on the board (attachment 5.3A); paper; frieze tape; plus other items students could use for modelling fractions (e.g. paper squares, play dough, streamers, etc.)

Students – attachments 5.3B & 5.3C; scissors; scrap paper or whiteboards for recording

Students will:

- Demonstrate knowledge by comparing and ordering common fractions.
- Show understanding by correctly ordering decimals and unit fractions on locating them on a number line.

Advanced – Students demonstrate a good understanding of fractions, decimals and percentages by correctly ordering these on a number line using appropriate spacing and explain their positioning using mathematical reasoning. They choose a mixed number and correctly record its properties using a thinkboard.

Competent – Students demonstrate an understanding of fractions and decimals by correctly ordering these on a number line and explaining the positioning of numbers. They may record properties of a mixed number on a thinkboard.

Developing – Students demonstrate some/little understanding of fractions and decimals. They attempt to place these on a number line with some or little accuracy.

5.4 – Patterns & Algebra

Continue patterns using fractions & decimals

Western Adelaide Region

Mathematics Performance Assessment Tasks (Updated: November 2013)

Year 5

Big Idea(s)

- A pattern requires an element of repetition that can be described and generalised with a pattern rule.
- Patterns can be represented in many ways, including using combinations of numbers, objects and symbols.
- Patterns are all around us.

Australian Curriculum Content Descriptor

Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction.

Achievement Standard

By the end of Year 5, students continue patterns by adding and subtracting fractions and decimals.

Related Mathematical Proficiencies

- Reasoning includes continuing patterns involving fractions and decimals

Prior Learning Experiences

Do I use ongoing Formative Assessment to inform the teaching & learning cycle? Do I provide learning experiences that enable students to build on their knowledge?

Feedback

How will I provide feedback to students?

Summative Assessment

Does the assessment task indicate **how well** students understand and can apply their learning? (**how well** = extent, depth and sophistication of thinking – informs A-E grading)

Evidence

What evidence am I looking for that demonstrates the student has got it?

It is important that students have had experiences with the learning opportunities below before administering the assessment task.

Developing:

Understanding Fluency Problem Solving Reasoning

Through experiences with:

- Count on and back by halves, quarters, thirds beyond the whole to include mixed numbers
- Make, name and record a range of fractions, including mixed numbers.
- Locating and recording fractions on a number line beginning 0-1, then on an open number line
- Exploring fractions in real-world contexts – (e.g. fractions of a quantity)
- Add and subtract common fractions, with common denominators
- Equivalent fractions, including using paper folding and fraction bars
- Fractions games such as Make a Whole (Professor Dianne Siemon)
- Problem solving situations and rich tasks involving finding unknown fractions, explaining fractions, comparing fractions
- Place value to tenths, hundredths
- Representing fractions using fractions thinkboards – (e.g. the answer is $1\frac{1}{4}$)
- Using a thinkboard to model and represent fractions and to solve problems

Teacher observations

Conferences 1:1 with peers & teacher

Learning log: Student identifies areas for focus

SNW (S-strengths, N-needing improvement, W- where to next)

Stars/smiley faces

Growing Tall! (see attachment 5.4)

Entry Level

Every year on her birthday Chris's mum decided she would measure Chris's height to see how much taller she had grown. Each year for 5 years Chris grew $\frac{3}{4}$ of a centimetre taller than when she was measured the year before. When Chris was first measured she was 84 cm tall. How tall was Chris after 5 years? **Record your thinking.**

Challenge Level

Chris's mum also measured how tall Chris's brother had grown. Her brother was 87cm tall when his mum first started to measure his height. Every year for 5 years Chris's brother grew $1\frac{1}{4}$ cms taller. How tall was Chris's brother after 5 years. **Record your thinking.**

How many more centimetres did Chris's brother grow compared to Chris? How did you work this out? How could you represent both comparisons together? **Explain your thinking.**

Questioning – “What strategies did you use to help you solve the problem?” “What did you need to think about when you put your numbers on the number line?” “What knowledge of fractions helped you to solve the problem?” “How could you show growth comparison of Chris and her brother on a single number line?” “What was challenging? Easy? Why?”

Organisation

Teacher – attachment 5.4 for each student (optional); record key information on the board as you read the narrative; check for understanding of key terms; measuring tape if students wish to use it to help with their thinking
Students – attachment 5.4 or recording paper; ruler; whiteboard

Students will:

- Demonstrate knowledge by creating repeating patterns involving fractions and decimals.
- Show understanding by describing fractions patterns and applying their knowledge to solve a problem involving fractions and decimals.

Advanced –Students demonstrate an understanding of adding fractions from different starting points. They create and continue a number pattern involving addition of fractions. They apply their knowledge to solve a problem and record two data sets together. They use efficient strategies and explain their thinking using mathematical reasoning.

Competent –Students demonstrate an understanding of fractions by correctly solving a problem involving recording a continued pattern. They record and explain their thinking using mathematical reasoning.

Developing –Students demonstrate some/little understanding of addition of fractions problem solving task. They attempt to solve the task, however are unable to record a continuing pattern involving fractions. They are unable to explain how they might solve the problem.

Attachment 5.3A – All Mixed Up!

All Mixed Up!

Mrs Jones's class were learning about fractions, percentages and decimals. They were asked to put a range of items on a number line, but all came up with different number lines. What do you think a number line might have looked like?

$\frac{1}{2}$

1.5

0.25

$\frac{1}{3}$

50%

$1\frac{1}{4}$

100%

$1\frac{1}{2}$

$\frac{3}{12}$

0.33

0.1

$\frac{1}{4}$

$\frac{1}{5}$

$\frac{2}{10}$

1.25

All Mixed Up!

Mrs Jones's class were learning about fractions, percentages and decimals. They were asked to put a range of items on a number line, but all came up with different number lines. What do you think a number line might have looked like?

$$1/2$$

$$1.5$$

$$0.25$$

$$1/3$$

$$50\%$$

$$1\ 1/4$$

$$100\%$$

$$1\ 1/2$$

$$3/12$$

$$0.33$$

$$0.1$$

$$1/4$$

$$1/5$$

$$2/10$$

$$1.25$$

Draw 2 different models of your mixed number

Record your mixed number as a decimal, percentage and improper fraction



What equivalent fractions can you record?

What real-world connections can you make?

Attachment 5.4 – Growing Tall

Name:

Date:

Each year on her birthday Chris's mum decided she would measure Chris's height to see how much taller she had grown. Each year for 5 years Chris grew $\frac{3}{4}$ of a centimetre taller than when she was measured the year before. When Chris was first measured she was 84 cm tall. How tall was Chris after 5 years? **How could you solve this problem? Record your thinking.**

