NELSON MATHS: AUSTRALIAN CURRICULUM BUILDING MENTAL STRATEGIES SKILL BOOK 6

TEACHER SUPPORT NOTES

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Unit 1

Place Value up to 1 Million

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 4–5

Teaching Focus: ***to use an understanding of place value to read, write and order numbers from thousands to millions.***

You will need: number cards with 6-digit numbers written on them (enough for at least one for each student), 6-sided die

- Provide each student with a number card with a 6-digit number. Have them record the number. Roll the die, and the number on the die is the place of the digit the student needs to identify, e.g. if a 4 is rolled, the students need to look at the 4th digit from the right (e.g. thousands) and work out the value of their number in that position, e.g. 6 thousand. Have students record the value. Repeat.
- After 3 rolls, have students exchange cards and repeat the activity.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 4–5.***

Assessment Task/s

- Provide students with one of the 6-digit number cards. Ask them to identify the place-value of the number in the 5th position (e.g. fifty thousand). Have students explain how they worked this out.
- Have students write a number that has 6 digits with a 3 in the tens place, and a 5 in the hundreds of thousands place.

Recommendations

- Have students experiencing difficulty work in a teacher focus group using the 6-digit number cards. Have students select a number card and record the number and roll the die. Have them underline the place, e.g. 5, and then record the value in words, e.g. 50 thousand. Repeat the activity with another number card. If this is too difficult, have students work with smaller numbers and a related die or spinner.
- Provide students who have a sound understanding of 6-digit numbers with an amount of the number cards, and have them order the cards in ascending order, recording their answer. This can be repeated a number of times.
- For practice, provide students with two 6-digit number cards, and have them write the numbers in words, and circle/highlight the largest number of the pair. Students can complete this activity on the computer using Microsoft Word. Repeat, with students swapping cards.

Unit 2

Expanding Numbers

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 6–7

Teaching Focus: ***to explain the value of a numeral according to its place in a number.***

You will need: place-value chart (see p. 5), enough number cards (0–9) for students to make 6-digit numbers placed in containers (enough for a table), dice, blank pieces of card

- Provide each student with a place-value chart and have them write the number 431 846 into the number column, and then write it into the place-value section of the chart. Check answers.
- Ask students, 'How can we use the place-value information to write the number as an addition equation?' Provide time for the students to explore and collect ideas and responses on the whiteboard.
- Draw out the method of 400 000 + 30 000 + 1000 + 800 + 40 + 6 and identify it as expanded form. Have students write the expanded form underneath the chart. Repeat the activity for a range of numbers including 4-, 5- and 6-digit numbers.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 6–7.***

Assessment Task/s

- Provide students with a 6-digit number and ask them to expand it into its place-value components.
- Provide students with an expanded number (which may or may not be in the correct order, e.g. 2 + 600 + 5000 + 30 + 90 000) and have students write the numeral.

Recommendations

- Have students experiencing difficulty work in a teacher focus group using the place-value chart. Write the numbers underneath in the first column, e.g.

Number	Hundreds of thousands	Tens of thousands	Thousands	Hundreds	Tens	Ones
	100 000	10 000	1000	100	10	1

in a different colour to help students. Have students correctly enter numbers in the place-value chart. Start with smaller numbers, e.g. 465, and move to larger ones. Have students read the numbers aloud to develop an understanding of the table.

- Provide students who have a sound understanding of expanding numbers with pieces of card and two numbers. Have students expand the numbers with each component on a separate piece of card. Then have students group the numbers together, e.g. all the tens, and then add them to find the total of each group and the overall total.

- For practice, provide students with a container on each table. Roll a die. The number on the die gives the number of digits the students need to randomly select to make a number, e.g. if a 4 is rolled, students select 4 number cards and organise a number. Have students record the number, and then expand it. Once complete students return the cards to the container, mix them up and then repeat the activity. The activity can be extended with students looking for the largest or smallest numbers.

Place-value chart

Number	Hundreds of thousands	Tens of thousands	Thousands	Hundreds	Tens	Ones

Unit 3

Less Than, Greater Than

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 8–9

Teaching Focus: ***to identify 'less than' and 'greater than' signs, and use them correctly.***

You will need: four labels: '> 50 cm', '< 50 cm', '> 1 m', '< 1 m', four containers (e.g. clean rubbish bins), blank pieces of card, rulers, tape measures, number cards, card with '< and >' written on it

- Label each of the 4 containers with the labels '> 50 cm', '< 50 cm', '> 1 m' and '< 1 m'. Discuss with students what each of labels mean, e.g. ask 'What does > 50 cm mean?' and 'What does the sign > represent?'
- Have students move around the room and select items that go in one of the containers according to the criteria. If the item is too large or fixed, students can write or draw the item on a card and place it in the container.
- Empty out the containers one-by-one and share with students what they collected. Check all of the items meet the criteria.

Note: this activity can be completed in a set area outside.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 8–9.***

Assessment Task/s

- Select two number cards, and give to student with a '< and >' card. Have the student arrange the cards using one of the signs as a correct statement.
- Ask students, 'Can you create another correct statement using the cards?'

Have students record their created statements.

Recommendations

- Have students experiencing difficulty work in a teacher focus group using two of the containers. Label one container '< 50' and one '> 50'. Provide students with a number card, and ask them to place it in the correct container. Discuss with the group if this is the correct container and why. Continue with the next card, etc. When complete, have students tip out the containers and divide a piece of paper into 2 columns, and record which cards were in which containers.
- Provide students who have a sound understanding of less than and greater than with a series of equations that the students need to solve and then work out which is less than or greater than. This can be based on times tables.

  For example: 12 × 2_____ 3 × 6.

- For practice, have students draw up a table as below. Generate random numbers or use number cards, and have students write this number in the centre column. Then have students complete the other two columns.

For example:

<	**Number**	>
22	24	30

Unit 4
Number Patterns

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 10–11

Teaching Focus: ***to continue number patterns, explain number patterns and predict how a number pattern will continue.***

You will need: coloured chalk/masking tape, calculators, blank number line, ball or bean bag

- Create a number line in a large space (e.g. outside or in the school hall) of 0–1000 with every 100 marked. Invite a student to start at a particular number, e.g. 400, and count forwards by 50s. Have other students help, or check answers and mark on the number line the numbers in a different colour. Repeat with number patterns, counting forwards and backwards.
- Present students with a number pattern, e.g. 450, 480, 510, 540, …, and have them add to the number line by finding the next 5 terms. Ask students, 'What could be a rule for this number line?' Examine the different responses and highlight that there may be more than one rule. Repeat the activity.

***Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 10–11*.**

Assessment Task/s
- Provide students with a rule and ask them to find the next 5 numbers in the sequence. Have students record how they worked out the numbers, e.g. counted on, imagined a number line, etc.
- Provide students with a number pattern and have them determine the rule. Again, ask them to record how they worked out the pattern.

Recommendations
- Have students who are experiencing difficulty work in a teacher focus group using number lines. Have students record counting patterns on these number lines in different colours. Work with number patterns counting forwards and backwards. Supply calculators if necessary so students can determine the next number in the sequence.
- For students who have a sound understanding, have them create their own one and two step number patterns on a piece of paper or card, with the rule written on the back. Students can then swap the number patterns with a friend.
- For practice, have students stand in a circle. Present a number pattern via a rule, e.g. start at 100 and count forwards by 10s. By throwing a ball or bean bag randomly around the circle, have students call out the next number in the pattern.

Unit 5
Mixed Numbers

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 12–13

Teaching Focus: ***to represent fractions in a variety of forms.***

You will need: fraction pieces, counters, blank pieces of card

- Create a collection of fraction pieces and provide students with the same fractional pieces, e.g. sixths that would form together to create more than 1 whole. Note: different students could have different fractions, e.g. some quarters, others sixths, etc. Ask students to work out what one piece is a fraction of 1 whole e.g. sixths. Then ask them to count the total number of pieces and write as an **improper fraction**, e.g. 9/6.
- Then have students move the pieces into wholes and fractions and find the equivalent **mixed number**, e.g. 9/6 = 1 3/6 (have students simplify fractions if possible, so 1 3/6 = 1 1/2).
- Finally, have students draw their mixed number as a diagram. Repeat.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 12–13.***

Assessment Task/s
- Provide students with an improper fraction, and the matching fraction pieces, e.g. 9/4 and 3 circles cut into quarters. Have students find the equivalent mixed number, and record it.
- Ask students to explain how they found the mixed number. Note: they may not have used the fraction pieces.

Recommendations
- Have students experiencing difficulty work in a teacher focus group using the fraction pieces. Provide all of the students in the group with the same number of pieces and have them work out the improper fraction and equivalent mixed numbers. Have students record their answers and draw a diagram. Have students compare their answers, and ask them to share how they found their answers. Repeat the activity with different pieces. Begin with familiar fractions such as halves, quarters, eighths and tenths.
- Have students who have a sound understanding create their own improper fractions of less than 4. Have them write these on blank pieces of card, with the equivalent mixed number written on the back. Students can then swap and convert each other's improper fractions to mixed numbers and vice-versa.
- For practice, provide students with counters. Call out a number, e.g. 25, and have students collect the number of counters (this is the numerator). Then call out another number, e.g. 4 (this is the denominator) and the number of fractions (or groups). Students need to divide their counters into groups of 4, and work out the mixed number, e.g. 6 1/4. Repeat, and have students work faster each time.

Unit 6
Decimals and Fractions

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 14–15

Teaching Focus: ***to rename and relate common fractions and decimals.***

You will need: calculators, 100 chart

- Provide students with calculators. Have students enter a fraction with a denominator of 10 in the calculator and solve, e.g. 4/10 = 0.4. Repeat a number of times, and collect answers on the whiteboard. Ask 'Can anyone see a pattern?' Try to draw out that numbers divided by 10 have 1 decimal place.
- Now move to fractions with denominators of 100, e.g. have students enter 54/100 into the calculator and solve, e.g. = 0.54. Repeat a number of times, collecting answers on the whiteboard, again asking 'Can anyone see a pattern?' This time the aim is for students to see that numbers divided by 100 have 2 decimal places.
- Extend the activity by looking at fractions with denominators of 1000.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 14–15.

Assessment Task/s
- Provide students with a fraction of 10, e.g. 7/10, and ask them to write it as a decimal. Ask students to explain how they found the answer. (Note: don't use calculators.)
- Provide students with a decimal of two decimal places, e.g. 0.17, and ask them to write it as a fraction. Ask students to explain the answer.

Recommendations
- Have students experiencing difficulty work in a teacher focus group using the calculators. Have students explore numbers divided by 10 by writing a list of observations and answers. Ask students to work out what a decimal of one decimal place would look like as a fraction, e.g. 0.6. Have students predict and then check with the calculator. Repeat a number of times, and then move to fractions of denominators of 100.
- Have students who have a sound understanding use a source such as a newspaper, to find decimal numbers. Have students record the numbers and then convert them to fractions. Students can check answers with a calculator.
- For practices, use a cut up 100 chart and drop the numbers in a container. Have students select a number from the container, glue the number onto their page and express it as a fraction with a denominator of 100 and the number as the numerator. Then have students determine the decimal equivalent. Repeat a number of times.

Unit 7
Negative Numbers

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 16–17

Teaching Focus: ***to order negative and positive numbers, and complete simple calculations using negative and positive whole numbers.***

You will need: chalk or masking tape, number cards –10 to +10, blank number line

- Create a number line on the floor with chalk or masking tape from –10 to +10. Create number cards from –10 to +10. Ask a student to select a card and locate the position on the number line.
- Once in position ask the student to add 2. Ask 'If we are adding, which way will we move?' Collect a class vote, and have students justify their answer. Have the student move. Draw arrows on the number line to show the direction of addition and the direction of subtraction.
- Repeat the activity with a different student and a variety of addition and subtraction equations. Ask students to justify their reasons for movements in certain directions.
- Extend the activity by having students check the responses with calculators.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 16–17*.***

Assessment Task/s

- Provide students with a blank number line, but have –10, 0 and +10 written on it. Then give the student a number card from –10 to +10. Have the student determine where to locate the number, and record on the number line. Ask, 'Why did you place the number there?'
- Once placed, ask students to add 3 to the number and record the value of the new position. Then have them subtract 5 and record the value of the new position.

Recommendations

- Have students experiencing difficulty work in a teacher focus group using blank number lines. Have students divide the number line evenly from –10 to +10. Provide students with two numbers and ask them to identify which number is smaller and which is larger using the number line. Have students justify why a certain number is selected. Repeat a number of times.
- Provide students who have a sound understanding with an answer (e.g. –5) and a starting number (e.g. 6) and have them create their own equations, with one or more steps for the given criteria. Challenge students to find more than one response.
- For practice, provide students with a number card each, e.g. –10 to +10 depending on the number of students, and have students order themselves from smallest to largest without talking. Repeat, but with a smaller number of students and providing cards that are not sequential, again without talking. Have the observing students monitor the answer for correctness, and then swap students.

Unit 8
Addition

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 18–19

Teaching Focus: ***to use mental and written methods to add numbers.***

You will need: poster paper, 100 chart

- Present an addition equation on the whiteboard, e.g. 125 + 368, and ask students, 'How can we solve this equation horizontally?' Collect students' responses and comments and work through the different methods presented.
- Divide the class into groups and allocate different groups a different method (see *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, p. 18). Present the class with another addition equation and have students create a poster page that explains how to work out the equation using their particular method.
- Have students share their answer, their poster and briefly explain their methods. Display the posters around the room or create a big book for reference.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 18–19.***

Assessment Task/s

- Provide students with an addition equation and ask them to solve it horizontally, recording the question and answer. Ask students to explain how they worked out the answer and, if possible, to identify the method they used.
- Extend the task by asking students to use a different method to solve the equation and have them explain how the method is different.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Select one or two strategies for the students to look at and work through them slowly and in depth. The particular strategy should cater for the ability of the group, e.g. split, compensation, jump, etc. This can be determined by asking students to complete a simple addition equation such as 3 + 4 = and having them explain how they worked it out.
- Provide students who have a sound understanding with more complex equations, either with larger numbers or with more than three numbers to add. Have students identify the strategies they are using and encourage them to solve each equation two different ways and confirm answers.
- For practice, provide students with a number card created from a cut up 100 chart. Ensure that the numbers given out create pairs to form totals of 100. Have the students move around to find the two numbers that total 100. Repeat by exchanging cards. The activity can be extended by having students look for three or four numbers that total 150 or 200.

Unit 9
Addition with Trading

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 20–21

Teaching Focus: ***to use mental and written methods to add numbers.***

You will need: two dice per pair, calculators, digital camera (if available), blank pieces of card, modelling equipment such as MAB

- Present an addition equation on the whiteboard, e.g. 125 + 368, in horizontal form that requires trading and ask students, 'How do we find the answer to this equation?' Collect responses and comments and work through the different suggested methods, using words such as trading and leading to vertical presentation.
- In pairs, have each student roll a die three times and record the numbers. These numbers become their adding number, e.g. rolled numbers 4, 2, 6 becomes 426. Have the students work together to add the two numbers. Students can check their answers with a calculator.
- Have students repeat the activity, rolling the die each time to generate new numbers.
- The activity can be extended by having students generate 4- or 5-digit numbers to add. Alternatively the students can roll the die and generate the largest number with their digits and then add together.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 20–21.

Assessment Task/s
- Provide students with a horizontal addition equation that requires trading and ask them to solve it vertically. Have students record the question and answer.
- Ask students to explain how they solved the equation by talking through each step.

Recommendations
- Have students experiencing difficulty work in a teacher focus group and use modelling equipment such as MAB. Provide students with an equation that requires trading and have them model each number with the equipment. Then have the students combine the equipment to find the total, trading as required. Have students lay their work out on a blank sheet of paper and record the numeric equation next to the modelling equipment. A digital camera can be used for this purpose.
- Provide students who have a sound understanding of addition with trading with more complex equations – either with larger numbers or more than three numbers to add. Have students work through the questions and check answers with a calculator.

- For practice, provide students with a blank piece of card. Provide a range, e.g. between 350 and 400, and have students write down a number within this range. Repeat with another piece of card and a different range. Have students add the two numbers to find the total. Then have students change the order and add the two numbers. Ask ‘Does the order of the numbers make a difference?’ Repeat the activity with different ranges, e.g. one number could be in the hundreds and one in the thousands.

Unit 10
Adding Large Numbers

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 22–23

Teaching Focus: ***to use mental and written methods to add numbers.***

You will need: two spinners, 1 cm grid paper

- Have students create two different coloured spinners and provide them with 1 cm grid paper.
- Using the spinners, have students generate one 6-digit number with one spinner. This is the number for students to write in the top line of the paper (students could write the number in a corresponding colour). Use a similar grid on the whiteboard or overhead projector to guide students. Then have the students generate another 6-digit number with the second spinner and write in the second line in a corresponding colour.

For example:

	4	2	1	0	9	6				
+	2	2	8	5	7	2				

- Have students rule a line under the second number and then add the numbers together.

For example:

	4	2	1	0	9	6				
+	2	2	8	5	7	2				
	6	4	9	6	6	8				

- Repeat the activity working with the spinners and grid.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 22–23.

Assessment Task/s

- Provide students with an addition equation written horizontally on 1 cm grid paper. Ask students to estimate the answer to the equation, recording their estimation to the side.
- Have students solve the equation by their preferred method. Have students compare their answer and the estimation and comment.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide the students with the two numbers to be added and begin with smaller numbers (e.g. 4-digit numbers). Have students practise writing the numbers in the grids and solving them. Students can check their answers with a calculator.

- Provide students who have a sound understanding of addition with large numbers with word questions (such as the 'Solve the Problem' on *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, p. 23) and have students solve the questions with the support of grid paper.
- For practice, have students work in pairs. Provide students with an equation. Have one student work out the answer and have the other student estimate the answer. Have both students record their estimate/answer and compare. Reverse the roles and repeat the activity. After a number of turns each, have students list the advantages and disadvantages of estimation.

Unit 11
Adding Fractions

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 24–25

Teaching Focus: ***to add common fractions, simplify fractions and give fractions common denominators.***

You will need: an enlarged laminated copy and student copies of a fraction wall, chart paper, two different coloured standard 6-sided dice for each student

- Attach the enlarged copy of the fraction wall to the board. Invite volunteers to shade 2/3 of one of the parts of the wall, then 4/6 and 6/9. Ask 'What do you notice about the shaded parts?' Ask, 'What are these fractions called?' Write 2/3 = 4/6 = 3/9 on the board. Ask, 'Are there any other fractions that are equivalent to 2/3 on the chart?' Repeat with a different fraction if necessary – cleaning off the first example.
- Provide students with their own copies of the fraction walls and have them investigate, in pairs, sets of equivalent fractions and record their results.
- Collect student responses and groups of equivalent fractions on a chart to be used as a reference.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 24–25.

Assessment Task/s
- Provide students with an addition equation with common fractions and ask them to solve it, recording the question and answer.
- Provide students with an addition equation requiring the use of equivalent fractions and ask them to solve it, recording the question and answer. Have students explain the process they went through to find the answer.

Recommendations
- Have students experiencing difficulty work in a teacher focus group. Provide the students with a new fraction wall and work slowly through sets of equivalent fractions, e.g. start with 1/2 and find all the equivalent fractions. Have students write the fractions as an equivalence statement, e.g. 1/2 = 2/4 = 3/6 …, then have them look for numeric patterns, e.g. with 1/2 = 2/4 both numbers have been multiplied by 2 and so on.
- Extend the activity for students who have a sound understanding of addition of fractions by providing more challenging addition equations including fractions that are mixed numbers and ask students to work out how to add. Include fractions with different denominators to make it extra challenging.
- For practice, provide students with two different coloured dice each. Have the students decide which die represents the numerator and which represents the denominator. Have the students roll the dice, once for the numerator and once for the denominator. Have students record the fraction and, working in pairs, add the two generated fractions together. Repeat the activity.

Unit 12
Adding Decimals

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 26–27

Teaching Focus: ***to use mental and written methods to add decimal numbers.***

You will need: chalk/masking tape, five copies of number cards – positive and decimal point, an addition sign, 1 cm grid paper, calculators, enough rulers (30 cm or metre) for one between two students

- Create a large 7 × 3 grid on the floor with chalk or masking tape. For example:

Create large number cards using the positive numbers and the decimal point.

- Place the decimal points in the grid allowing only enough space for one decimal place. Randomly provide students with cards and have them place the cards in the top two lines of the grid creating two decimal numbers. For example:

		2	3	4	.	1
	1	7	4	5	.	9

Add the addition sign, and invite students to calculate the answer. Invite a student to add the cards to the grid to complete the answer and have the other students comment and assist. Include in discussion the process of trading.

- Repeat the process a number of times, extending to two decimal places by moving the decimal points.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 26–27.***

Assessment Task/s Present students with a horizontal addition equation and 1 cm grid paper. Have the student calculate and record the answer.

- Ask students focus questions such as, 'Why did you place the decimal place here?' and 'How can we check the answer?'

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide the students with a copy of the 1 cm grid paper, and a decimal addition equation with only numbers to one decimal place. Have students practise placing the numbers in the grid using pencil. Then talk through some addition strategies such as working right to left, looking to add to tens and trading. Repeat a number of times and then extend to numbers with two decimal places. Have students check their answers with calculators.
- For students who have a sound understanding of addition of decimals, extend the activity to working with decimals of up to three decimal places. You may or may not wish to supply 1 cm grid paper for working. Mix the decimals up, with combinations of 1, 2 and 3 decimal places, e.g. 42.16 + 32.109 + 4.5.

- For practice, provide students with a 30 cm ruler, one between two. Have one student hold the ruler above one hand of the other student and let go. The second student needs to catch the ruler and accurately record the number to at least one decimal place. Students swap roles and repeat. Then have students add the numbers to find the total of their catches. Repeat the activity a number of times. Students can compare answers with other pairs.

Note: this can be completed with metre rulers for a greater range of numbers.

Unit 13
Subtraction

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 28–29

Teaching Focus: ***to use mental and written methods to subtract numbers.***

You will need: selection of subtraction equations on card solved via one of the subtraction strategies (see *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 28–29), Blu Tack, calculators

- Present a horizontal subtraction equation on the board, e.g. 498 – 246 =, and ask students, 'How can we work out the answer horizontally?' Collect answers and ideas on the whiteboard. Group related comments together, e.g. the 'jump strategy', and identify them as one strategy. Introduce strategies that students may have missed such as 'near halving' or number lines.
- List the different strategies across the board and present students with a card that has a solved subtraction equation. Have students determine if the answer is correct and which strategy it uses. Have students work in pairs or small groups to discuss.
- Invite students to bring their cards to the board one at a time and attach them with Blu Tack under the strategy they think the equation is illustrating. Have students justify why they are placing their card in a particular position. Have the rest of the group comment. Continue so that all of the cards are attached to the board.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 28–29.***

Assessment Task/s

- Present students with a horizontal subtraction equation and have them solve it, recording the question and answer by their preferred method. Ask students to identify the strategy they used.
- Ask, 'Can you use another method to solve this equation?' Have students solve the equation an alternative way and check their answer against the first one.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Depending on the group of students, select one or two different subtraction methods to work through. These can be identified by having students complete a couple of very simple subtraction equations such as 20 – 8 and asking students how they solved the equation. When working through the two methods, start with 2-digit numbers, and then move to 3-digit numbers for the one strategy and then repeat with the other strategy.

- For practice, read out three different numbers (e.g. 4, 6, 7) and have students make the largest number and the smallest number with the three digits. Then have students find the difference of the two numbers. Check answers and repeat the activity. Note: numbers can be generated using a 10-sided die or spinner. Extend the activity to include four digits. Students can check their answers with a calculator.

Unit 14
Subtracting Large Numbers

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 30–31

Teaching Focus: ***to use mental and written methods to subtract numbers.***

You will need: rulers/tape measures, 1 cm grid paper

- Have students move around the classroom and measure the length of five different objects in millimetres using a ruler or tape measure. Have students record the object and its length.
- Ask a volunteer for two of their measurements. Modelling on the whiteboard with students' input ask, 'How can we find the difference in length between the two objects?' Collect students' comments and ideas. Show students the 1 cm grid paper and ask, 'How can this help us in solving the problem?' Guide students in the use of the grid paper as a tool for setting up the equation to solve (see *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, p. 30).
- Have students determine the differences between the different lengths of objects that they collected, using the grid paper as a structure for the equations.

***Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 30–31*.**

Assessment Task/s
- Present students with a horizontal subtraction equation and have them solve it vertically using their preferred method. Provide 1 cm grid paper, although students do not need to use it.
- Ask students to create and answer a word problem for the equation using the numbers. Have students record the question.

Recommendations
- Have students experiencing difficulty work in a teacher focus group. Provide them with a number of horizontal subtraction equations that do not require trading and 1 cm grid paper. Have students practise writing the equations in the correct manner on the grid paper before working through subtraction strategies such as working from the right to the left.
- Extend the activity for students who have a sound understanding of horizontal subtraction by providing them with larger number subtraction equations e.g. of 5 or 6 digits. Use combinations such as 5-digit and 3-digit numbers such as 45 362 – 988 = to challenge students. Provide 1 cm grid paper if appropriate.
- For practice, provide students with a number of subtraction equations such as 8006 – 4285 =. Have students solve the equations and write them in words, e.g. eight thousand and six minus four thousand, two hundred and eighty-five equals____. Repeat with each of the equations. Extend the activity by guiding students with the 'subtraction term' to use, e.g. difference, take away, minus, less than, etc.

Unit 15
Subtracting Fractions

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 32–33

Teaching Focus: ***to subtract common fractions, simplify fractions and give fractions common denominators.***

You will need: fraction pieces

- Provide students with a number of copies of the same fraction pieces, e.g. sixths. Have all students working with the same fraction, but they can use the different shapes (circles/rectangles).
- Ask pairs of students to model the equation 5/6 – 2/6 using their fraction pieces, and then find the answer. Have students record what they did as a series of diagrams. Invite students to share their ideas with the class. Repeat with a different equation.
- Now provide students with equivalent pieces, e.g. thirds, and pose a subtraction equation such as 5/6 – 2/3. Have students model the equation and find the answer. Again have students record what they did as a series of diagrams. Invite students to share their ideas with the class. Revise the term 'equivalent' if it doesn't come up. Repeat with a different equation.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 32–33.

Assessment Task/s
- Present students with a fraction subtraction equation that has common denominators and have them solve it, recording the question and their answer and any working.
- Present students with a fraction subtraction equation that requires the use of equivalent fractions and have them solve it. Have students explain how they solved the equation, providing any modelling equipment such as the fraction pieces as required.
-

Recommendations
- Have students experiencing difficulty work in a teacher focus group. Provide them with a subtraction equation with common denominators, e.g. 7/10 – 3/10. Have the students model each of the parts of the equation 7/10 and 3/10 with modelling equipment such as fraction pieces. Have the students read the equation and ask for the meaning, e.g. 'We need to take 3/10 from 7/10'. Have students complete the process, and then count the remaining pieces for the answer. Repeat a number of times, with students recording the question and answer. Ask students to identify any patterns such as 'the denominator remains the same' and 'only the numerator gets smaller'.
- Provide students who have a sound understanding of fraction subtraction with two-step subtraction equations posed as word questions, e.g. 'Find 7/8 minus 1/4 and then minus another 1/8'.

- For practice, provide students with whole fractions. Have students colour 2/3 and 5/6 on the circles or rectangles. Then have students work out the difference between the two shaded areas, using their preferred method, e.g. cutting out the shapes numerically. Repeat a number of times. Invite students to share answers and their methods of solution.

Unit 16

Subtracting Fractions from Whole Numbers

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 34–35

Teaching Focus: ***to subtract common fractions, simplify fractions and give fractions common denominators.***

You will need: egg cartons (at least two between two), small balls or similar objects to place in the egg carton holes, digital camera (if available), fraction pieces, blank circles

- Provide pairs of students with two or more egg cartons each. Have them work with one carton to begin with. Have the students place all the balls in the egg 'holes'. Ask 'How many holes are there?' and 'What fraction of the whole does each item represent?' (1/12). Provide students with a subtraction equation, e.g. 1 – 5/12, have students model the equation with their egg carton and record their result. Invite groups to share what they did.
- Repeat a number of times, working with twelfths. Then extend the activity to include the second egg carton, so questions such as 2 – 7/12 can be posed and modelled. With the 'greater than 1' questions ask, 'Did we take the pieces from both egg cartons or only one?' Guide students to subtract from 1 first and then add in the other whole, modelling the process of *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, p. 34. Have students record their work. A digital camera can be used for this purpose.
- The activity can be extended by combining groups and completing questions such as 2 5/12 – 1 7/12 with students modelling their answers.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 34–35***

Assessment Task/s

- Present students with a fraction subtraction equation that requires subtracting a fraction from a whole, e.g. 1 – 2/3. Provide appropriate modelling equipment, so students can use if required.
- Repeat the question but pose as 2 – 2/3 and have students solve it. Ask students to explain the process that they used. Students can be tested further with a question such as 3 1/3 – 2/3.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide them with fraction pieces and work with a fraction such as quarters. Have students create a whole and then subtract an amount such as 3/4. Have students record the question, a picture and the answer. Repeat the process, subtracting the same amount from 2 wholes and then 3 wholes. Have students look for patterns. Complete the activity again with a different fraction such as sixths.
- Present students who have a sound understanding of fraction subtraction from whole numbers with equations of subtracting mixed numbers from mixed numbers, e.g. 4 5/12 – 2 11/12, and have them model with the egg cartons. Have students record the question, what they did and the answer. The activity can be further extended by working with mixed numbers finding equivalent fractions.
- For practice, provide students with blank circles. Pose a subtraction equation such as 8 – 3 5/8. Have students use the circles to model the equation and attach their model to a sheet of paper. Repeat the activity with a number of different fractions. Invite students to share their results.

Unit 17
Subtracting Decimals

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 36–37

Teaching Focus: ***to use mental and written methods to subtract decimal numbers.***

You will need: 1 cm grid paper copied onto overhead sheets – one for each student, overhead pens/whiteboard marker, overhead projector, calculators, decimal flash cards

- Provide students with an overhead sheet of the 1 cm grid paper and overhead pens/whiteboard markers.
- Pose a decimal subtraction question such as 0.65 – 0.33 and have students use the grid paper to help set out the equation vertically and solve it. Invite students to share what they did by placing the sheets on the overhead projector. Point out features you would like students to focus on, e.g. alignment of decimal points, including the subtraction sign, ruling a line under the question, etc.
- Repeat with different decimal subtraction questions, inviting students to share their work. Include decimals of one and two decimal places, numbers that require carrying and numbers that don't have the same number of decimal places, i.e. need to have zeros added to balance columns.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 36–37.

Assessment Task/s
- Present students with a decimal subtraction equation and 1 cm grid paper (which they may or may not need to use). Ask students to estimate the answer and record their estimate.
- Have students solve the equation vertically and compare to their estimate.

Recommendations
- Have students experiencing difficulty work in a teacher focus group with the overhead sheets. Invite students to practise entering numbers into the grids by providing an equation, then allow students to calculate the answer on a calculator. Only work with decimal numbers with one decimal place to start with. When students are confident move to having them solve the question and check their answers using a calculator.
- Extend the activity for students who have a sound understanding of decimal subtraction by providing equations with three decimal places and subtracting from whole numbers, e.g. 5 – 2.681 =. Have students record the question and answer. After a number of equations have students write a statement about their findings of subtracting decimals from whole numbers and the process they used to solve the equations.

- For practice, cut up decimal flash cards and randomly give each student two cards each. Have students find the difference between the two cards. When complete, students can exchange their cards for another two and repeat the process. Students can use this activity to improve speed by seeing how many they can complete in a certain amount of time. Note: students need to record the question and answer. This activity can be extended by having students check their answers with calculators.

Unit 18

Multiplying by 11

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 38–39

Teaching Focus: ***to use 11 times tables multiplication strategies.***

You will need: tables chart, chart paper, calculators, packet of Tim Tams

- Provide students with a copy of a tables chart. Have students shade the 11 times tables. In pairs, have students look at the answers and any patterns. Also have students look at the 10 times and 12 times tables to see if there are any relationships that can help in the learning of the 11 times tables.
- Provide students with chart paper and have them create a concept map linking the 10, 11 and 12 times tables. Invite students to share the concept maps with the rest of the class.
- The activity can be extended to include tables from 13 to 22 of each of the 10, 11 and 12 times tables. Students working can be supported with calculators.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 38–39.***

Assessment Task/s

- Present students with an 11 times table question (1 – 12) and have them find the answer. Have students write a short description or draw a diagram to show how they calculated the answer.
- Present students with an 11 times table question (13 – 22) and have them find the answer. Again have students write a short description or draw a diagram to show how they calculated the answer.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide each student with a calculator. Have students enter the number 11 in the calculator and show them how to add on by 11. Have students record their answers up to 10 × 11. Have students look at patterns in the answers and have them record a statement about what they found. Continue with tables from 11 × 11 to 20 × 11, repeating the process.
- Extend the activity for students who have a sound understanding of the 11 times tables by providing questions with larger numbers such as 31 × 11. Have students try the strategies they discovered to see if they worked and have them record the question, answer and how they found the answer. Students can check answers with calculators. The activity can be extended further with students looking at hundreds multiplied by 11, e.g. 135 × 11.

- For practice, provide students with a word problem such as: ‘I have a packet of Tim Tams (have a packet if possible). Guess how many Tim Tams are in the packet.’ (There are 11). Find out how many Tim Tams we would have altogether if each student in our class had one packet of Tim Tams each. Have students work in pairs to record the question, working and solution. Invite students to share their answers and how they solved the question.

Unit 19
Multiplying by 12

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 40–41

Teaching Focus: ***to use 12 times tables multiplication strategies.***

You will need: tables chart, chart paper, modelling equipment such as MAB, 100 chart, calculators

- Provide students with a copy of a tables chart). Have students lightly shade the three, six and twelve times tables. Have students look for patterns between the sets of tables.
- Provide students with chart paper and have them create a list or diagram of the similarities and differences between the sets of tables.
- Have students share and display their work. The activity can be extended with students including other related table sets such as two and nine times tables and adding to their charts.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 40–41*.**

Assessment Task/s
- Present students with a 'quick quiz' of the twelve times tables. For the first half use the conventional tables, and for the second half extend to equations such as 12 × 17.
- Select one of the equations from the first half and one from the second half and ask students to write down or show how they solved each equation.

Recommendations
- Have students experiencing difficulty work in a teacher focus group. Provide students with modelling equipment such as MAB and have students create the groups of twelve and find the totals. Have students record the question, answer and a picture or description of what they did. Extend to larger groups such as 20 × 12 and see if students can develop their own strategies or short cuts, e.g. for 20 × 12 work out 10 × 12 and double it.
- Extend the activity for students who have a sound understanding of 12 times tables by having them work with the 12 as a decimal number such as 1.2 or 0.12. Have students examine if the patterns determined still hold, recording questions that they attempted. Students can write a statement about the 1.2 or 0.12 times tables and share with the group. Alternatively, the activity can be extended with students looking at 120 times tables and the patterning.
- For practice, cut up a 100 chart to 50. Place the numbers upside down between pairs of students and have one student turn the top card over – this is the number to be multiplied by 12. One student calculates the answer mentally and the other works the answer out on a calculator. If the student calculating mentally gets the answer correct, they keep the card and if not, the student with the calculator keeps it. Swap roles.

Unit 20
Multiplication Facts

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 42–43

Teaching Focus: ***to use mental and written methods to multiply numbers.***

You will need: tables chart, chart paper, modelling equipment such as abacuses, a selection of multiplication word problems, pieces of card, tables answer grid

- Provide students with a tables chart. Divide the class into 11 groups and allocate one table set for each group. Have students examine their table set and look for patterns or ideas that will help them find the answers (such as the strategies from *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, p. 42).
- Provide students with chart paper and have them record their ideas and comments.
- Invite students to share their work. Other students may have comments and ideas that can be added to the chart. Display or collate the charts as a big book for later reference. The activity can be extended with students including other related table sets such as two and four and adding to their charts.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 42–43.

Assessment Task/s
- Present students with a quick 5-minute 'tables challenge' (see p. 44 for a sample).
- Select one of the equations from the first half and one from the second half and ask students to write down or show how they solved each equation.

Recommendations
- Have students experiencing difficulty work in a teacher focus group. Provide students with modelling equipment such as abacuses and have students create the groups of ... to find answers. Focus on single tables sets such as 2. Then extend to examine related tables sets such as 2, 4 and 8. Using the abacus, students can complete patterns down the abacus such as 2 × 2, 2 × 4 and 2 × 8 and examine the answers for patterns.
- Extend students who have a sound understanding of tables with word problems. Extend students' knowledge further by having them write their own word problems on pieces of card with the answer on the back and then swapping with a friend.
- For practice, provide students with a copy of the tables answer grid and select three sets of tables, e.g. 4, 6 and 8. Have students write the questions in the grid, e.g. 4 × 6, and the teacher reads out an answer, e.g. 48. If the student has a matching question, they can cross it off. The game continues with the teacher reading out more answers. The winner is the first to have all nine squares crossed off.

5-minute tables challenge:

	Question	Answer
1	8 × 9 =	
2	12 × 6 =	
3	8 × 4 =	
4	7 × 5 =	
5	1 × 2 =	
6	11 × 11 =	
7	3 × 8 =	
8	12 × 2 =	
9	6 × 10 =	
10	3 × 3 =	
11		84
12		90
13		18
14		72
15		42
16		55
17		24
18		108
19		11
20		96

Unit 21

Rectangular Arrays

Teacher Support Notes

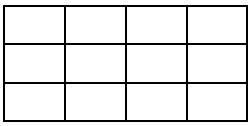
Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 44–45

Teaching Focus: ***to use mental and written methods to multiply numbers.***

You will need: 1 cm grid paper, square counters, packets of playing cards

- Provide students with a copy of the 1 cm grid paper. Have students shade an area that is 12 square units. Ask students to shade another area that is also 12 square units, but looks different from the first. Have students look for as many different answers that they can find. Invite students to share their responses.
- On the whiteboard, draw one of the alternatives and show students how to label. For example:

4



3 $4 \times 3 = 12$

Then write the multiplication table: $4 \times 3 = 12$. Have students complete this for all of their shaded shapes.

- On the second sheet have students shade 116 squares. They can then count the sides and write a multiplication table. Encourage students to break the shaded area down into familiar tables and solve. Have students outline the section and label (as in *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, p. 45). Invite students to share their work. Repeat the activity for a different number.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 44–45.

Assessment Task/s

- Present students with shaded area on 1 cm grid paper. Have students label the area and calculate the total number of shaded squares.
- Ask students, 'Is there another way to draw the grid?' Have students shade another grid and calculate the total number of squares to show that the areas are equal.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide students with square counters and have them create a grid of 20 counters, recording their responses on 1 cm grid paper. Have students continue to manipulate the counters looking for all of the alternatives to shade and label on the grid paper. Repeat the activity for a different number such as 24.

- For students who have a sound understanding of calculating tables with rectangular arrays, provide students with multiple copies of pre-shaded areas and have them examine the different arrangements of familiar tables they can use to solve, e.g. for an area of 60 squares the equations could be $(3 \times 15) + (9 \times 5) = 60$ or $(2 \times 10) + (4 \times 10) = 60$. Have students identify and label the areas appropriately and write the related addition/multiplication equation.
- For practice, provide pairs of students with a pack of playing cards. Have students lay the cards out in rectangular arrays, recording their patterns for their factors of 52. Invite students to share their findings with the group. To extend the activity have students remove some of the cards, e.g. the picture cards, and repeat.

Unit 22

Extended Multiplication

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 46–47

Teaching Focus: ***to use mental and written methods to multiply numbers.***

You will need: pieces of card, calculators, dice

- Pose a multiplication equation such as 425 × 9 =. Invite students to suggest how they might complete the calculation. Collect ideas and responses on the whiteboard.
- Provide students with a number of pieces of blank card. Have students expand (see Unit 2) 425 into 400 + 20 + 5 and have them write the 400, 20 and 5 on separate pieces of card. Now have students calculate 400 × 9 and write the answer under the 400 on the same piece of card. Repeat for the other two pieces of card.

For example:

400 400 × 9 = 3600	20 20 × 9 = 180	5 5 × 9 = 45

- Now have students lay out the cards horizontally across the page and have them add up the three answers, e.g. 3600 + 180 + 45, to find the total (3825). Students can check their answers on a calculator.
- Repeat a number of times. The activity can be extended to include numbers in the thousands as well as the hundreds (e.g. 2 378 × 6).

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 46–47.***

Assessment Task/s

- Present students with a 3-digit number multiplied by a single-digit number and have them solve it by their preferred method. Have students record the question, working and answer. Ask students to explain the process they used to solve the question.
- Ask students, 'How can we check the answer?' (e.g. estimation, calculator etc.) Have students check the answer.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Invite students to practise expanding 2- and 3-digit numbers on a piece of paper. Then, move them to the pieces of card. Finally, present simple multiples such as 42 × 3 and have students expand, calculate and solve. Provide students with calculators to help with the larger multiplication processes such as 40 × 3.

- For students who have a sound understanding of the process, provide equations with larger numbers such as 12 432 × 7 and have them solve using the expansion strategy and the extended multiplication process. Have students compare answers to see if they are the same.
- For practice, show students how to draw up the following:

  ___ 000 × 3 =_____

  ___ 00 × 3 = _____

  ___ 0 × 3 = _____

  ___ × 3 = _____

Have students generate the first numbers by a roll of a die; e.g. by rolling a 5, the first number will become 5000 × 3 = and then students can calculate the answers. At the end of the calculation have students write the question (e.g. forming a numeral) and the answer.

Unit 23
Multiplying Fractions

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 48–49

Teaching Focus: ***to use mental and written methods to multiply fractions.***

You will need: blank circles, scissors, fraction pieces, fraction dice

- Provide students with blank circles and have them divide three circles into quarters. Ask 'How many pieces in one whole?' and 'How many pieces in three wholes?' Have students cut the three circles out into the quarters and lay out the wholes in front of them on the table.
- Have students remove 1/4 from each of the wholes. Now ask students, 'How many pieces are left of one whole?' and 'How many pieces left of the three wholes?' Invite students to share responses and comments and collect on the whiteboard.
- Ask 'How can we write an equation to represent the circles and fractions?' Draw out 3 × 3/4 = 9/4 represents the three groups of 3/4. Ask, 'Is it possible to simplify this?' Have students investigate with their fraction pieces.
- Repeat a number of times with different fractional amounts and wholes.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 48–49.

Assessment Task/s

- Present students with a fraction multiplication equation of a whole number, e.g. 4 × 2/3. Have students solve by their preferred method, e.g. fraction pieces, pen and paper. Have students record the question, working and answer and ask students to explain how they found the answer.
- Repeat the process with a fraction multiplying a fraction, e.g. 2/5 × 3/4 =.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide students with copies of the same fraction pieces, e.g. thirds. Have students cut the shape (circle or rectangle) into the pieces and have them identify how many pieces in one whole, two wholes etc. Have students record the diagram and the fractions/numbers. Then have students look at a number of groups of a fraction, e.g. 4 × 1/3. Have students find four pieces of 1/3 and then make into whole circles. Have students record the answers. Work with single fractions such 1/3, 1/4, 1/8, etc. multiplied by a whole number.
- Extend the activity for students who have a sound understanding of the process of multiplying fractions by having them multiply three fractions together, e.g. 3/4 × 2/5 × 2/3, using their preferred method. Have students record results.
- For practice, provide pairs of students with two fraction dice. Have students roll the dice and then place the upper face between them. Have students practise speed and accuracy by multiplying the two fractions together. Any arguments can be settled with students using the blank circles to draw and justify their answer. Note: if you don't have access to fraction dice, a simple spinner can be generated.

Unit 24

Multiplying Decimals

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 50–51

Teaching Focus: ***to use mental and written methods to multiply decimal numbers.***

You will need: pieces of card, calculators, shopping catalogues

- Present students with a multiplication equation, e.g. 6 × 53, and ask, 'How can we solve this equation?' Collect students' ideas and comments on the whiteboard. Have students solve the equation by their preferred method and check answers.
- Now present the multiplication equation 0.6 × 5.3 and ask, 'How can we solve this equation?' Again collect ideas and comments on the whiteboard. Guide students towards identifying that 6 × 53 and 0.6 × 5.3 are similar. Look at the similarities and differences.
- Have students write the digits of the answer 318 on three separate pieces of card and a decimal point on a fourth piece of card. Have students lay the cards out in front of them with the decimal point at the end. Then have students count the number of decimal places in total in the question. Then have the students move or 'jump' the decimal point the two places in the answer in front of them to obtain the answer 3.18.
- Repeat the activity with the decimal in different places in the question, e.g. 6 × 5.3 or 0.6 × 53 or 0.6 × 0.53, etc. Have students make the connection that the digits of the answer are the same, but the decimal point is in different places.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 50–51.***

Assessment Task/s

- Present students with a decimal multiplication equation and have students solve it by their preferred method. Have students record the question, working and answer.
- Ask the students to find the answer to a similar decimal multiplication question that has the same digits but a different number of decimal places. Have students explain how they found the answer.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide students with a multiplication equation such as 48 × 3. Have students find the answer using a calculator. Then ask students to look at the movement of the decimal point in combinations of the original equation, e.g. 4.8 × 3, 48 × 0.3, etc., by counting the number of decimal places. Have students record the question, count the number of decimal places and add the arrows to show the jumping. Have students create a single page poster/chart with the original equation in the centre and the combinations around it.

- Extend the activity for students who have a sound understanding of the process of multiplying decimals by using decimals with up to three decimal places, e.g. 0.123 × 4.6. Have students record the question and answer. Have students check answers with a calculator.
- For practice, provide students with shopping catalogues. Have them select five items and cut out the items and prices. Have students find the total cost of five of each item, e.g. 5 × $2.99, and then have them find the overall cost of their shopping. (Note: answers can be checked with a calculator.)

Unit 25
Divisibility

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 52–53

Teaching Focus: ***to use mental and written methods to divide numbers.***

You will need: tables chart, chart paper, calculators

- Provide students with a copy of a tables chart. Divide students into 10 groups and allocate them a set of tables each, e.g. 4 times tables.
- Have students look at the answers of the table set and see if they can determine a pattern in the answers. Then have the students try and devise a rule, e.g. halve twice. This rule should allow them to find the answer of a number to be divided by a tables digit, e.g. 4, that is outside the range of known tables facts. Have students experiment with their rule for larger numbers with the support of calculators. Note: there is no fixed rule for divisibility by 7, so provide this one for investigation to a stronger group.
- Have students present their rule, tables chart and examples on poster paper. Invite groups to share their findings. Allow other groups to make suggestions and add ideas.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 52–53.

Assessment Task/s

- Present students with number and ask them to determine if it is divisible by another number, e.g. ask, 'Is 108 divisible by 6?' Have students justify their answer. Note: you may wish to supply a copy of the divisibility table (from *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, p. 52).
- Have the student find a number that is divisible by a certain number falling between a range, e.g. a number divisible by 6 between 100 and 110. Ask 'How did you find this number?'

Recommendations

- Have students who are experiencing difficulty work in a teacher focus group. Provide students with a copy of the rules of divisibility chart (*Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, p. 52). Look at the number 2 and provide students with a range of numbers and test if they are divisible by 2. Repeat with common multiples such as 4 and 8. Provide support to students with calculators, showing them how to divide the number and check that the answer is a whole number to be divisible by that number.
- Invite students who have a sound understanding to list the numbers from 100 to 130 down the side of their page. Then have the students identify which of the numbers each number is divisible by another number (from 1 to 10), e.g. 100, is divisible by 2, 5 and 10.

- For practice, provide students with a ‘Who am I?’ question. For example: I am a number that is divisible by 2, 3 and 5. I have a 0 in the tens place. What number am I?

After a couple of examples, have students write their own ‘Who am I?’ question. Invite students to share with the class to solve.

Unit 26

Factors

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 54–55

Teaching Focus: ***to show the factors for a whole range of numbers.***

You will need: butcher's paper, calculators, paper notes and coins, chart paper

- Present students with a number such as 80 on the whiteboard and ask 'How can we find some of the numbers that multiply to give 80?' Collect students' ideas and comments on the whiteboard.
- Present the idea of a factor tree and demonstrate with the number 80.

For example:

```
      80
      ^
    40  2
    ^
  5   8
      ^
    4  2
    ^
  2   2
```

Ask 'Is there more than one way of finding the answer?' Have students suggest alternative trees such as:

```
      80
      ^
    8    10
    ^    ^
  4  2  2  5
  ^
2   2
```

- Provide students with a selection of numbers such as 176, 400, etc. and have them create factors trees on large sheets of butcher's paper. Invite students to share their trees with the class.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6, *pp. 54–55.

Assessment Task/s

- Present students with a number, e.g. 36, and ask them to find all of the factors of the number. Have students record the numbers and list the factors in ascending order.
- Have students find the factors of a related number such as 20 and have them identify the common factors of the two numbers and the highest common factor of the two numbers.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide students with a 2-digit number (e.g. 20) and illustrate a process of finding factors. For example: list all the numbers (from 1 to 20) down the side of the page and circle the numbers that divide evenly (1, 2, 4, 5, 10). Repeat with another number such as 32. Provide students with calculators to make division easier. Have students look at the two examples and have them narrow the range of numbers they listed, e.g. they don't need to list the numbers that are greater than half the number (in the case of 20 – any numbers above 10).
- Present students who have a sound understanding of factors with 3- and 4-digit numbers and have them create factor trees on butcher's paper. Have students look at two alternative trees (at least) for each of the numbers.
- For practice, show students one copy of each of the coins and notes of Australian currency, e.g. 5 c, 10 c, etc.. Have students create a chart of each of the denominations and their factors. For example: 20 c = 4 × 5 c or 2 × 10 c or 1 × 20 c.

Unit 27
Division

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 56–57

Teaching Focus: ***to use mental and written methods to divide numbers.***

You will need: calculators, number cards, dice

- Present students with a division equation on the whiteboard such as 428 ÷ 2 and ask students, 'How can we solve this equation?' Revise the 'short division method'. For example:

$$\begin{array}{r} 214 \\ 2\overline{)428} \end{array}$$

- Now present students with a division equation such as 432 ÷ 12. Ask students, 'How can we solve this equation?' Collect ideas and comments on the whiteboard. Have students find all of the factors of 12, e.g. 1, 12, 2, 6, 3, 4. Ask, 'Can we divide 432 by any of the factors of 12?' Have students complete each of the divisions, e.g. by 2, 3, 4 and 6, on separate pieces of card. Ask, 'Have we completed the division?'
- Now have students complete the division on the back of the card by using the factor pair, e.g. for 432 ÷ 4 the answer needs to be divided by 3 (as 4 × 3 = 12). Have students compare the answers. Have them examine each of the pairs and processes. Ask, 'Which method was the easiest and why?' and 'Are there any shortcuts we can use?'

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 56–57.

Assessment Task/s
- Present students with a division equation such as 6800 ÷ 8 and ask them to find the answer by their preferred method, recording the question and the answer.
- Present students with a division equation such as 6800 ÷ 16 and have them find the answer. Ask students to explain how they found the answer.

Recommendations
- Have students experiencing difficulty work in a teacher focus group. Provide students with a division equation such as 920 ÷ 20. Have students find all the factor pairs of 20. Allocating factor pairs to students, have them find the answer (using calculators) by working down the page. For example:

920 ÷ 4 = 230
230 ÷ 5 = 46

- Have students circle the factor pairs and have them check answers with the rest of the group. Repeat the activity with a number of examples.
- Extend the activity for students who have a sound understanding of the division process with factors by having the students write their own division equations following the criteria of: the number to be divided must have at least 3 digits, the number dividing is to have least one factor pair and the answer is to be a whole number. Provide calculators if required. Students can share questions.
- For practice, cut up a 100 chart and place in a container. Draw out a number and roll a die. The number on the card is the one to be divided and the die number is the one dividing. Have students work out if the die number is a factor of the card number. Students can work in teams to practice speed and accuracy, and score points for each correct answer. The activity can be extended by having students find the factor pair, e.g. for card number 30 and die number 5 the factor pair is 6.

Unit 28
Division with Remainders

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 58–59

Teaching Focus: ***to use mental and written methods to divide numbers.***

You will need: counters, calculators, 100 chart, dice

- Provide pairs of students with an adequate number of counters. Ask students to collect 36 counters and organise them into an array displaying 36 ÷ 2. Invite students to present their responses by sketching on the whiteboard. Pose other division questions that result in whole number answers with students sharing their responses.
- Now present students with a division equation such as 36 ÷ 5 and ask them to organise the counters into a suitable array. Invite students to share responses. Examine the remainder and ask 'How can we express the remainder as a fraction?' Collect and share student responses.
- Repeat the activity with different remainders and then different starting numbers for the arrays. Have students record one of the questions, working (arrays) and answers.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 58–59.

Assessment Task/s
- Present students with a division equation that will result in a whole number answer such as 273 ÷ 3 and have them find the answer, recording the question and answer and showing any working.
- Present students with a division equation that will result in an answer with remainders such as 273 ÷ 5 and have students find the answer, again recording the question, working and answer. Have students express the remainder as a fraction and a decimal.

Recommendations
- Have students experiencing difficulty work in a teacher focus group. Provide students with counters and present them with equations that have whole number answers. Have students divide the counters into groups and examine any short cuts they find. Then move to similar equations with remainder answers. Have students divide the counters into groups and find the number of remainders. Have students record the question and answer and have them draw a diagram illustrating what they did. Show students how to express the remainder as a fraction.
- Extend the activity for students who have a sound understanding of the division process with fractional answers by having them complete division with 3-digit numbers, expressing the answer as both a fraction and a decimal. You may like to show students how to interpret and calculate remainders using calculators.

- For practice, cut up a 100 chart and place the cards in a container. Draw out a number and roll a die. The number on the card is the one to be divided and the die number is the one dividing. Have students find the answer to the division equation. Have students express remainders as fractions. Students can work in pairs practising for speed and accuracy, with the first one to calculate the answer collecting the card. Students can check answers with a calculator.

Unit 29
Division with Zeros

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 60–61

Teaching Focus: ***to use mental and written methods to divide with zeros.***

You will need: tape measures/metre rulers, chart paper, calculators

- Provide pairs/groups of students with a tape measure/metre ruler. Have students measure in millimetres two of the longest objects they can find in the classroom, e.g. the bookshelf is 2500 mm long. Invite students to share their measurements and collect a list on the whiteboard.
- Select one of the measurements and ask, 'If the bookshelf is 2500 mm, what is this in centimetres?' Students can use their tape measures/metre rulers to help them work out the answer. Collect students' ideas and responses on the whiteboard. Repeat again asking 'What would the bookshelf measurement be in metres?' Collect students' comments and ideas.
- Draw out the link that dividing millimetres by 10 gives centimetres and dividing centimetres by 100 gives metres. Have students select three of the measurements and express in centimetres and metres.
- The activity can be extended by finding the measurements in metres from millimetres or giving some examples to make the link between metres and kilometres.

***Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 60–61*.**

Assessment Task/s
- Present students with a division equation such as 4200 ÷ 100 and have them solve it. Ask students to explain what they did.
- Present students with a division equation such as 4200 ÷ 600 and have them solve it, again asking students to explain what they did. The activity can be extended by having students solve similar equations such as 4200 ÷ 60.

Recommendations
- Have students experiencing difficulty work in a teacher focus group. Provide students with calculators. Examine the patterns of dividing by 10 for a range of numbers with students recording the question and answer down the page (allow students to use the calculators in the division process). Have students write a comment about what they found out about dividing by 10 under the column. Repeat with 100 and 1000, again having students writing a comment about what they found. Have students create a statement or table at the end of the page for later reference, for example:

Divided by		
10	**100**	**1000**
Remove 1 zero	Remove 2 zeros	Remove 3 zeros

- Extend the activity for students who have a sound understanding of the process by having them complete a chart showing the links between division of numbers ending in 1, 2 or 3 zeros and the multiplication of numbers ending in 1, 2 or 3 zeros. Have students include examples on the charts.
- For practice, provide students with numbers of cents such as 1500 cents, 2900 cents, 24 000 cents, 15 600 cents, etc. and have students find the number of dollars the cents represent, e.g. 24 000 cents = $240.00. At the end students can calculate the total amount of money they had in cents and dollars. (Note: they may need to use a calculator). The activity can be extended with amounts such as 254 cents = $2.54.

Unit 30
Dividing Decimals

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 62–63

Teaching Focus: ***to use mental and written methods to divide decimal numbers.***

You will need: calculators, blank pieces of card, number cards

- Provide students with blank pieces of card. Pose a division equation such as 14 ÷ 100 and ask students, 'How can we solve this equation?' Collect students' ideas and comments on the whiteboard. On three pieces of card have students write each of 1, 4 and a decimal point. Have students lay the cards out in order on the table. Then have students leave space between each number and jump the decimal point 2 places to the left (due to the 2 zeros in the 100). Ask, 'What do we need in front of the decimal point?' Repeat with 14 ÷ 10, 1.4 ÷ 10 and 1.4 ÷ 100, adding zeros as required.
- Repeat a number of times with different numbers being divided by 10, 100 and 1000. To minimise the number of pieces of card, use combinations of the previous digits, e.g. 41, and also use the backs of the cards.
- The activity can be extended by posing questions such as 19 ÷ 99.8 and having students round the number, in this case 100, to complete the division.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 62–63.

Assessment Task/s
- Present students with a number such as 62 and have students divide by 10, 100 and 1000 using their preferred method. Have students to explain what they did and ask, 'What is the link between the movement of the decimal point and the number of zeros?'
- Present students with a division equation such as 2.4 ÷ 0.4 and have them solve it, recording the question, answer and any working. Have students check their answer and comment.

Recommendations
- Have students experiencing difficulty work in a teacher focus group. Provide students with calculators. Examine the patterns of dividing by 10 for a range of numbers creating decimal answers, with students recording the question and answer down the page (allow students to use the calculators in the division process). Have students write a comment or draw a diagram about what they found out about dividing by 10 under the column. Repeat with 100 and 1000, again with students writing a comment about what they found.
- Extend the activity for students who have a sound understanding of the process by having them write their own division equations involving decimal numbers. Set restrictions such as the divisor needs to have 2 decimal places and the answer should be a whole number. Have students find a number of examples. They may need to use calculators. Students can swap questions and solve.

- For practice, provide students with the number cards from 0 to 10 and the decimal point. Have students place the cards in a pile (except the decimal point) and randomly select three cards and add in the decimal point. With the three cards and the decimal point have students attempt to devise a ‘solvable’ division equation involving a decimal. e.g. 2.4 ÷ 6 =. Have students record the question and repeat. Collect the questions for later practice. Note: students can check questions and answers with calculators.

Unit 31

Square and Cubed Numbers

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 64–65

Teaching Focus: ***to use mental and written methods to multiply, and hence square and cube numbers.***

You will need: centicubes, isometric dot paper, 1 cm dot paper, square counters, chart paper

- Provide students with square counters, 1 cm dot paper and isometric dot paper. Have students create a 2 × 2 square with the square counters and count the total number of counters used. Have students sketch a diagram on the 1 cm dot paper adding labels. Repeat for 3 × 3, 4 × 4 and 5 × 5.
- Ask, 'Can you find a pattern between the side lengths and the total number of counters?' Collect students' responses and comments on the whiteboard.
- Now have students complete a model of 2 × 2 × 2 using the centicubes. Have students count the total number of cubes used and sketch on the isometric dot paper. Repeat with a number of examples such as 3 × 3 × 3. Ask, 'Can you find a pattern between the side lengths and the total number of cubes?' Collect students' responses and comments on the whiteboard.

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 64–65.

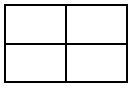
Assessment Task/s

- Present students with a number and ask them to find the square and the cube of that number.
- Present students with an answer (e.g. 144) and ask, 'What number squared makes this total?'

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide students with square counters and have them arrange the counters in arrays of 2 × 2, 3 × 3, 4 × 4, etc. Have students count the total number of counters used in each array. Have students trace/draw the counters and then have students write a mathematical statement under each of the diagrams.

For example:



2 × 2 = 4

Repeat the activity a number of times. To extend the activity, provide students with a number of counters (e.g. 49) and have them work backwards to find the square array that uses all of the counters (e.g. 7 × 7). Have students record their answer as a drawing and mathematical statement.

- Provide students who have a sound understanding of square and cubed numbers with a series of cubed answers (e.g. 1000, 512, 8000) and have them find what number cubed provided the answers.
- For practice and to summarise the work, provide students with chart paper. Have students create a table such as the one below and complete.

Number	**Squared**	**Diagram**	**Cubed**	**Diagram**
1				
2				
3				
4 …				

Unit 32

Inverse Operations

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 66–67

Teaching Focus: ***to use addition and subtraction to check each other, and to use multiplication and division to check each other.***

You will need: pieces of card

- Pose a question such as 396 + 125 on the whiteboard and ask, 'How can we solve this equation?' Have students solve it. Now ask, 'How can we check our answer?' Collect students' comments and ideas.
- Have students write each of the components of the addition equation on different pieces of card. For example:

396	+	125	=	521

Have students lay the cards out in the correct order on the table. Now have students rearrange the cards to make another correct addition equation. Check answers.

- Have students replace the '+' with a '–' and have them rearrange the cards to make two correct subtraction equations. Collect responses on the whiteboard and ask, 'What did we discover?' Introduce the term 'inverse operation'. Repeat many times.
- The activity can be extended by completing the same process with multiplication and division.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 66–67.***

Assessment Task/s

- Present students with an addition equation and have them solve it, recording the question and answer. Ask students to check their answer with a different type of equation (e.g. subtraction). Have students explain what they did.
- Present students with a multiplication equation and have them solve it, recording the question and answer. Ask students to check their answer with a different type of equation (e.g. division). Have students explain what they did.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide students with four cards each with the four operations (+, –, × and ÷). Have students pair the cards into inverse operations, e.g. + and –, and × and ÷. Provide students with a selection of addition, subtraction, division and multiplication equations written on cards (these can be based on *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, p. 66). Have students play a game where the cards are placed in a pile, and one card is turned over and the students have to place the correct inverse sign down first, e.g. for the card 212 ÷ 4 the matching card would be ×.

The fastest to place the correct inverse sign collects the equation card, adds the sign back into their hand and play continues.

- Have students who have a sound understanding of inverse operations write their own 'What is my starting number?' as on *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, p. 67 with the solution. Have students write their starting number on a piece of card with the answer on the back. Students can try their cards out on each other or these can be collected to use with the class for practice.
- To apply inverse operations provide students with a grid such as:

A	**B**	**C**
250		50
	9	70
	4	60
100		20
300		100

Have students complete the grid and ask, 'How did you find the answers?' Invite students to share ideas and comments. Ask, 'Can you write a rule for this table?' Complete the activity again with more complicated tables and rules.

Unit 33

Prime and Composite Numbers

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6,* pp. 68–69

Teaching Focus: ***to identify prime and composite numbers, and use factor tress to illustrate the different prime factors of numbers.***

You will need: number cards, butcher's paper, calculators

- Provide each student with a grid showing the numbers from 1 to 20. Have students circle the number 1. Have students move to the number 2, circle the number 2 and look for all the numbers that are divisible by 2 (e.g. 4, 6) and shade these numbers. Now have students circle the next unshaded number (e.g. 3) and look for all the numbers that are not shaded that could be divided by this number. Continue the process until all of the numbers in the grid are circled or shaded.
- Have students list the circled numbers in one column and the shaded numbers in another column. Ask, 'Do you know what the numbers in the first column are called?' (prime numbers) and 'Do you know what the numbers in the second column are called?' (composite numbers)
- Ask students, 'What about the number 1, is it prime or composite?' Collect students' ideas and comments on the whiteboard. (Note: it is neither.)

Have students complete* Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 68–69.

Assessment Task/s

- Present students with a selection of five numbers (from 1 to100) and have students identify the numbers as prime or composite. Provide calculators if required. Present students with a number and have them complete a factor tree to find the prime factors. Ask, 'Is there another way I could have found the factors?' Have students explain.

Recommendations

- Have students experiencing difficulty work in a teacher focus group. Provide students with a number such as 40. Ask, 'What two numbers would multiply to give the answer 40?' Collect students' responses looking for all the alternatives, e.g. 1, 40, 2, 20, etc. Discuss why we wouldn't use the combination of 1 and the number when working with factor trees. Have students select one of the combinations to start their factor trees, and then work with the next line, looking for each of the combinations, and so on. Work through a number of examples with students working on butcher's paper.
- For students who have a sound understanding of prime and composite numbers, pose a problem such as: 'Using the number cards from 0 to 9, arrange them so that they make five prime numbers'. Ask 'Is there more than one answer?' Have students solve. Note: there are similar problems on the *nrich* mathematics website: http://nrich.maths.org/

- For practice, have students draw up a 3 × 3 grid and using the numbers from 1 to 9 add in all the numbers so that all of the rows and all of the columns add up to a prime number. Note: the diagonals do not need to add up to a prime number. To extend the activity have students look for more than one answer.

Unit 34
Order of Operations

Teacher Support Notes

Recommended introductory lesson to *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 70–71

Teaching Focus: ***to use the correct order of operations to complete equations.***

You will need: chart paper

- Provide students with the following problem: 'Put operation signs (+ or – or × or ÷) between the numbers 3 4 5 6 to make the highest possible number and the lowest possible number.'
- Invite students to share possible strategies to solve the problem and collect ideas and comments on the whiteboard. Ask 'What effect could brackets have on completing the problem?'
- Have students attempt the problem. Invite students to share answers on the whiteboard.

Have students complete **Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 70–71*.***

Assessment Task/s
- Present students with two problems requiring the use of BODMAS (one problem without brackets and one with, similar to those on *Nelson Maths: Australian Curriculum Building Mental Strategies Skill Book 6*, pp. 70–71). Have students record the question and answer and explain or write down each of the steps they completed to find the answer.
- The activity can be extended by providing students with an equation without brackets but with the answer. Ask students to correctly add the brackets.

Recommendations
- Have students experiencing difficulty work in a teacher focus group. Provide students with an equation such as 7 + 6 × 3 =. Have students solve the equation normally. Then have students explore what happens to the answer of the equation as brackets are placed in different locations, e.g. (7 + 6) × 3 = and 7 + (6 × 3) =. Have students record the question, the different equations with the brackets and the answers. Repeat for a number of different equations.
- For students who have a sound understanding of BODMAS, pose a problem such as 'Using the number 2 and any of the operations +, –, × or ÷ and brackets, make the number 15.' Ask, 'How many different ways can you do this?' Have students attempt the problem and record answers.
- For practice, provide students with chart paper and ask them to write down the page the letters of BODMAS. Next to each letter have students explain what each letter means. Underneath the information, have students devise their own three- step, four-step and five-step equations that require the use of BODMAS. Students could explore the effect of the location of brackets on each of the equations, as in the first recommended activity above.

