NELSON MATHS

VICTORIAN CURRICULUM

DIGITAL RESOURCES INSIDE

Teacher's Resource Book

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Unit **7**

Composite Numbers

Victorian Curriculum: **Number and Algebra**

Number and place value Identify and describe properties of prime, composite, square and triangular numbers (VCMNA208)

ML composite number, divisibility, divisible, factor, multiple, prime number

LESSON PLAN **1**

TUNING IN

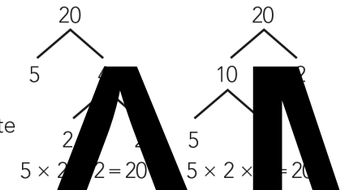
PRIMES AND COMPOSITES

Write a selection of numbers on the board. Have students identify which of the numbers are prime, and why. Name the other numbers as composite. (Note: 0 and 1 are special cases.) Have students find the factors of composite numbers, e.g. $6 = 3 \times 2$, and $6 = 6 \times 1$, so factors are 1, 2, 3 and 6. Have students note that with $6 = 3 \times 2$, the number 6 is a product of prime numbers. Repeat with a number of examples.

WHOLE-CLASS INTRODUCTION

FACTOR TREES

Write a number on the board, e.g. 20. Look at the number with students and create a factor tree. Note at the bottom of the tree which numbers are prime numbers. Repeat to show there is more than one pathway but the results are the same. Repeat with a number of examples. Have students represent the composite numbers as a product of their prime factors.



INDEPENDENT TASKS

Note: Choose from Tasks 1, 2 or 3.

You will need: Student Book p. 28 'Composite Numbers', LO: *L3545 'Sieve of Eratosthenes'*, chart paper

TASK 1: EXPLORING FACTOR TREES

Provide pairs of students with chart paper and composite numbers (suitable for their level of ability). Have them create factor trees to identify the factors, then express the composite numbers as a product of their prime factors. Have students find two trees for each composite number.

TASK 2: INTERACTIVE TASK

Have students work independently on computers using LO: *L3545 'Sieve of Eratosthenes'*, where they are to remove multiples from a grid of numbers, e.g. remove 2 and all its multiples to find the smallest prime number. Students then investigate and predict number patterns as well as examine prime numbers.

TASK 3: STUDENT BOOK p. 28 ***'Composite Numbers'***

TEACHING GROUP

You will need: calculators, chalk, a digital camera

FINDING FACTORS WITH CALCULATORS

For students who require support, provide them with calculators, and have them find factors of larger numbers, e.g. 100–200. Work with students to create a process, e.g. ÷2, ÷3, ÷4, and discuss how to record results. Provide students with a number of different examples.

IN CHALK

For students who require a challenge, provide them with chalk and, in an appropriate space outside in the school ground, have them create the largest factor tree that they can. Note: students may need to use calculators. Have students record their results digitally, e.g. using a digital camera.

REFLECTION

Select from the following to suit your class and their learning outcomes:

- Have students share their factor trees from Independent Tasks, Task 1. Have students compare their factor trees and answers for the same numbers.
- Invite students to share the images of their large factor trees from the Teaching Group activity, 'In Chalk'. Have students explain how they determined their starting number.
- Have students write a reflection on their understanding of the Sieve of Eratosthenes and what they discovered using LO: *L3545 'Sieve of Eratosthenes'*.

LESSON PLAN **2**

TUNING IN

PRIME FACTORS

Provide students with a list of numbers, e.g. 28, 45 and 60. Have pairs of students work together to find the prime factors of the composite numbers. Have students then share their results and explain how they found their responses. Compare answers and the different processes students used to complete the task.

WHOLE-CLASS INTRODUCTION

RULES OF DIVISIBILITY

You will need: BLM 13 'Rules of Divisibility', calculators, NTO 6.1 'Calculator'

Provide students with a copy of BLM 13 'Rules of Divisibility'. Look at each of the rules and explore a number of examples for each. Note: students may need access to calculators or NTO 6.1 'Calculator'. Ask, 'How could the rules of divisibility helps us to find prime factors?'

INDEPENDENT TASKS

Note: Choose from Tasks 1, 2 or 3.

You will need: Student Book p. 29 'Using the Rules of Divisibility', LO: *L3538 'Pascal's triangle'*, BLM 13 'Rules of Divisibility'

TASK 1: FINDING PRIME FACTORS

Provide pairs of students with a range of composite numbers, e.g. 2536, 171, 5643 (suitable to students' level of ability), and have them use the rules of divisibility on BLM 13 'Rules of Divisibility' to find the factors, and hence the prime factors.

TASK 2: INTERACTIVE TASK

Have students work independently on computers using LO: *L3538 'Pascal's triangle'*, where they explore patterns in Pascal's triangle as well as how number sets create different patterns. Students can also create their own number sets and review the patterns.

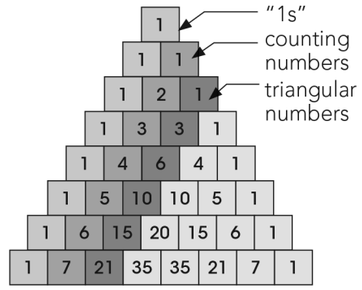
TASK 3: STUDENT BOOK p. 29 ***'Using the Rules of Divisibility'***

TEACHING GROUP

You will need: calculators, large chart paper, BLM 13 'Rules of Divisibility', BLM 5 '1 cm Grid Paper'

EXPLORING SOME OF THE RULES OF DIVISIBILITY

For students who require support, provide them with a copy of BLM 13 'Rules of Divisibility'. Work through a couple of the rules that these students need to focus on, in depth. Have students complete a number of examples for that rule, working with smaller numbers before moving to larger ones. Note: students may need access to calculators.



CREATING PASCAL'S TRIANGLE

For students who require a challenge, have them draw out Pascal's triangle themselves. BLM 5 '1 cm Grid Paper' could be used to support the structure. Upon completion, have students look for patterns within the triangle. (See diagram above right.)

REFLECTION

Select from the following to suit your class and their learning outcomes:

- Have students share their results from Independent Tasks, Task 1. Ask, 'Which rule/s of divisibility did you use in finding the factors? What are the prime factors for …?'
- Review students' answers to the Student Book page as a class. Make note of any areas in which students are struggling.
- Have students share their created Pascal's triangles from the Teaching Group activity 'Creating Pascal's Triangle'. Discuss the patterns evident as a class.

TUNING IN

SQUARE NUMBERS

You will need: counters, a digital camera

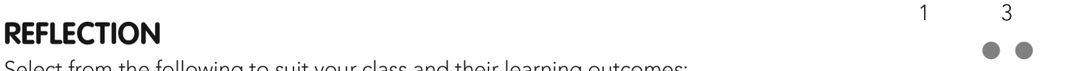
Have students use counters to represent the first few square numbers, i.e. 1, 4, 9, 16, etc. with counters. Have them record with a digital camera, download the photos and then comment on the pattern.

WHOLE-CLASS INTRODUCTION

TRIANGULAR NUMBERS

You will need: counters, a digital camera

Have students use counters to explore the first few triangular numbers. Have students record with a digital camera, download the photos and then comment on the pattern.



INDEPENDENT TASKS

Note: Choose from Task 1, 2 or 3.

You will need: Student Book p. 30 'Square and Triangular Numbers', LO: *L1935 'Circus towers: square stacks'*, chart paper

TASK 1: LARGER SQUARE AND TRIANGULAR NUMBERS

Provide pairs of students with chart paper and have them explore larger square and triangular numbers (according to their abilities). Have students record the shapes and values. Extend this activity by having students look for patterns and write a description.

TASK 2: INTERACTIVE TASK

Have students work independently on computers using LO: *L1935 'Circus towers: square stacks'* where they work out how many acrobats are needed to form square-shaped towers. Students determine the pattern and then use this to predict the number of acrobats needed to build bigger towers.

TASK 3: STUDENT BOOK p. 30 *'Square and Triangular Numbers'*

TEACHING GROUP

You will need: counters, a digital camera

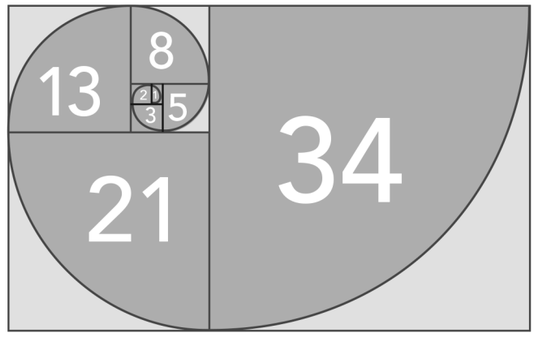
EXPLORING SQUARE AND TRIANGULAR NUMBERS

For students who require support, provide them with counters and have them explore square numbers, then record on a sheet of paper and label. Repeat with triangular numbers. Check to ensure students are creating the patterns correctly.

FIBONACCI SEQUENCE

For students who require a challenge, have them use the library or internet to explore the Fibonacci number sequence and how it relates to shapes. (See diagram at right.)

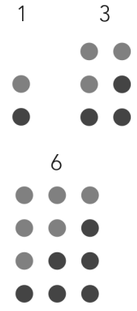
The numbers represent the dimensions of the squares.



REFLECTION

Select from the following to suit your class and their learning outcomes:

- Review with students the difference between square and triangular numbers. This could be explored using the digital images from the Tuning In activity and the Whole-Class Introduction.
- Invite students to share their larger square and triangular numbers from Independent Tasks, Task 1. Ask students to reflect and comment on how they found the larger values.
- Invite students to share their findings about the Fibonacci number sequence. Have students explain the pattern to the class.



- Have students look for a relationship between triangular numbers and square numbers. Ask, 'Is there a link?' (There is a relationship, but it is a rectangle not a square – see diagram p. 30, bottom.)

Home Tasks

Select from the possible Home Tasks:

- Provide students with a set of numbers (according to their level of ability) and have them find the prime factors for each by completing the factor trees.
- Have students select one of the following concepts: prime numbers, composite numbers, square or triangular numbers. Have them teach a parent or carer about the concept. Have students bring the materials they used to do this activity to school and reflect on the experience.

Assessment

- Have students complete **Student Assessment p. 31**.
- Review with students **Assessment Task Card 6.7**.

During the three lessons:

- Collect copies of students' factor trees from Lesson Plan 1, Independent Tasks, Task 1, as evidence of their understanding of factors and prime factors.
- Collect copies of students' square and triangular numbers from Lesson Plan 3, Independent Tasks, Task 1, and the Teaching Group activity 'Exploring Square and Rectangular Numbers', and add these and the students' comments to their portfolios.
- Make notes of students' abilities to complete the Student Book pages, and any areas in which they struggled or excelled. Match these with students' responses to the Teaching Group activities.

Recommendations for Future Learning

Specific to Student Assessment p. 31; if the student is experiencing some difficulty:

Q 1 Revise the definition of factors. Have the student practise creating factor trees using chart paper.

Q 2 Have the student find factors of smaller, then larger numbers. Provide the student with copies of BLM 'Factors Chart 1' and 'Factors Chart 2', to aid with multiplication facts.

Q 3 Revise the definition of a composite number. Link factors with composite numbers.

Q 4 Revise the definition of prime factors. Identify prime numbers if required. Work with smaller numbers to practise process before moving to larger numbers.

Q 5 Explore ideas of square numbers by drawing diagrams or constructing representations.

Q 6 Explore ideas of triangular numbers by drawing diagrams or constructing representations. This can extended to numeric representation.

If the student has not achieved the recommended skills for this unit:

1. See **Assessment Task Card 6.7** for specific recommendations.
2. Have the student review finding factors of numbers. This could be supported with the use of calculators.
3. Review terms such as 'factors', 'prime numbers', 'composite numbers', 'factor trees' and 'square and triangular numbers' with the student, and have them write a summary sheet of each of the concepts.
4. Work with smaller numbers, e.g. 1 to 100.
5. For square and triangular numbers, have the student use materials to create visual representations.
6. Review *Nelson Maths: Victorian Curriculum Year 5* Unit 3.

If the student has achieved the recommended skills and these skills are firmly established, consider:

1. Having the student work with larger numbers.
2. Moving forward to *Nelson Maths: Australian Curriculum Year 6 Plus* Unit 1.
3. Extending the student by having them utilise the main concepts explored in this unit in a variety of problem-solving activities.
4. Having the student continue to work with patterns and representations, and to look for generalisations in found patterns.