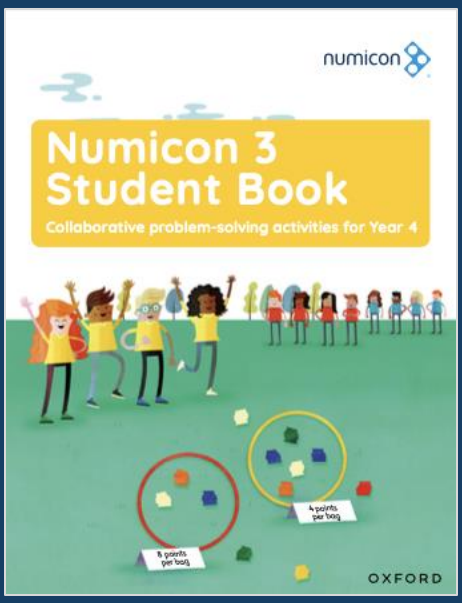
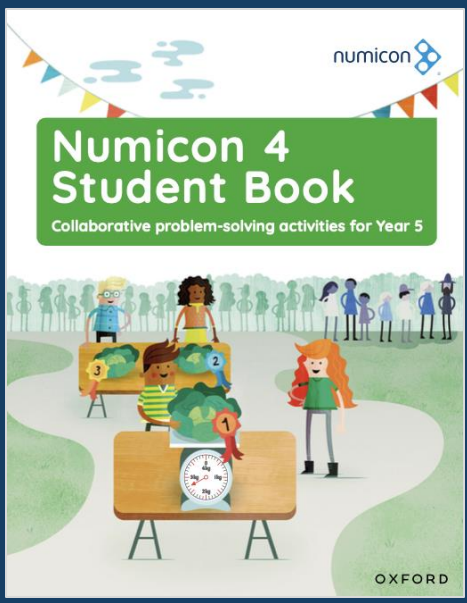
numicon

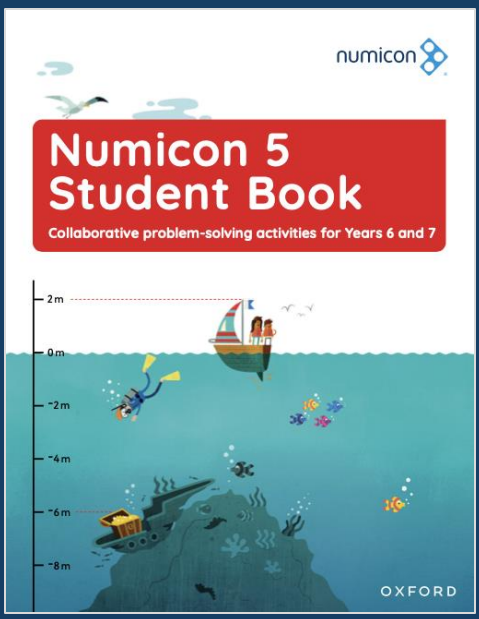


Year 4

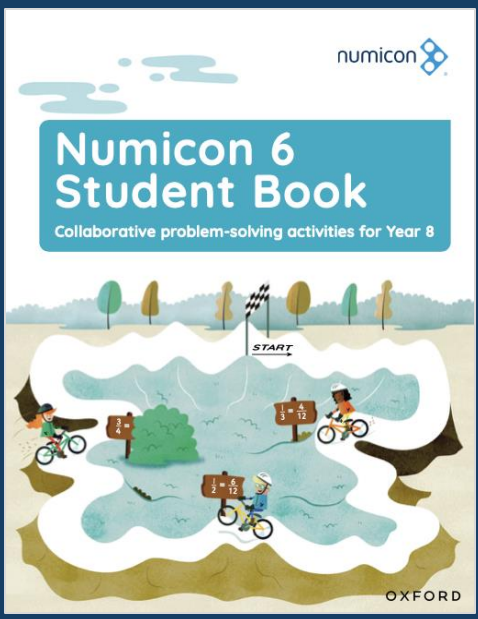


Year 5

Numicon Student Book Samples For NZ students



Years 6 & 7



Year 8

Using multiplying facts when solving problems

Practice

1 Explore this grid to find five pairs of commutative facts.

	5 × 5		10 × 3
	9 × 2		
7 × 3			

2 10 pairs of children go to school assembly. They sit on benches that seat 10. How many benches will they need?

Going deeper

1 Can you solve these empty box problems?

a 4 × 0 = ☐ × 4 b ☐ × 5 = ☐ × 7 c 3 × 1 = ☐ × ☐

2 Can you explain how you solve this problem?

> The 6 Ngata children each have 4 meatballs for lunch.
> The 4 Smith children each have 6 meatballs for lunch.
> Do both families need the same number of meatballs?

3 What do you notice about these pairs of multiplying facts? Talk about which you find easier to solve and why.

a 10 × 7 = ☐ or 7 × 10 = ☐ b 5 × 6 = ☐ or 6 × 5 = ☐

Temperature

Average temperatures in a year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
South Pole (°C)	⁻28	⁻41	⁻54	⁻57	⁻57	⁻58	⁻60	⁻60	⁻59	⁻51	⁻38	⁻28
Tāmaki Makaurau Auckland (°C)	22	23	21	18	16	13	13	13	14	16	18	20

Practice

1 Can you work out which were the three coldest months in Tāmaki Makaurau Auckland?

2 Can you work out which were the three warmest months at the South Pole?

3 For how many months was it colder than 19 °C in Tāmaki Makaurau Auckland?

4 Look at the temperatures for January. How many degrees warmer was Tāmaki Makaurau Auckland than the South Pole?

Going deeper

1 Look at the table above. Can you work out how many degrees warmer it was during the warmest month at the South Pole, than during the coldest month there?

2 How many months was it warmer than ⁻40 °C at the South Pole?

3 How many months was it colder than ⁻50 °C at the South Pole?

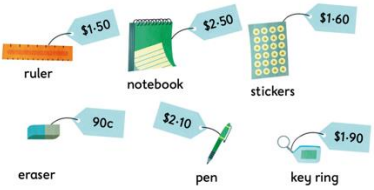
Solving problems with partitioning

I have saved $1·70.

Practice

1 What is the smallest number of coins Tia could have?

2 Which items do you think Tia could **not** buy with her money?



3 Tāne has also been saving. He has saved one of each coin. Can you say how much money he has saved?

Going deeper

1 Hana has some 10c, 20c, 50c and $1 coins. A pencil costs 70c. Hana wants to buy 3 pencils. Which coins do you think she can use?

2 The school buys glue in 50 ml, 100 ml and 250 ml containers. Each class has 500 ml. Which combinations of containers could they have?

Explorer Progress Book 3b, pages 8–9

Types of angles

The time on the clock shows 3 o'clock and the angle between the minute hand and hour hand is a right angle.

Practice

1 When the clock shows ten past 3, will the angle between the minute hand and the hour hand be acute or obtuse?

2 Can you give two different times when the angle between the two hands will be obtuse?

3 Can you draw a 2D shape that contains at least two acute angles? Can you draw another one?

Going deeper

1 Write four different times. Can you order them, so that the angles between the minute hand and hour hand increase from the smallest angle to the largest? Ask your partner to draw the clock face for each to check.

2 Can you draw a quadrilateral that has two acute angles and two obtuse angles?

3 Each draw a shape. Say which angles are right angles, which are obtuse and which are acute.

Fractions of a set

Practice

1 a What fraction of the chairs are red?

b What fraction of the cups are empty?

c What fraction of the people are wearing a hat?

d What fraction of the people are not wearing glasses?

2 Can you copy and then colour in $\frac{1}{3}$ of each of these shapes?

a  b  c 

Going deeper

1 a Compare two of these Numicon Shapes at a time. What fractions can you find? Try to find all the possibilities.

b Can you write each one as a fraction and in words?

Rounding with decimals

Practice

1 Ava wants to make the flower bed above. Can you work out what the area will be to the nearest square metre?

2 Seeds are bought in bags of 50 g, and should be spread at the rate of 2 g per square metre. Roughly how much of the bag will be left over after Ava has sown the seeds?

3 Ava wants to put edging around her flower bed, which comes in packs of 1·5 m for $3·69. How much edging do you think she will have to buy? How much do you think it will cost, to the nearest $1?

Going deeper

1 Josh said that he would rather be given a column of $2 coins as tall as himself than a collection of $1 coins weighing as much as himself. He is 140 cm tall and weighs 35 kg. A $2 coin is 2·7 mm thick and a $1 coin weighs 8 g.

Estimating roughly, do you think he made the right choice? Can you explain?

2 If you lined up 1 km of 50c coins, roughly what would their mass be?

Using proper fractions

Practice

1 One jug of lemonade was made using $\frac{1}{3}$ lemon juice, and the rest was water. Another jug was made using $\frac{1}{2}$ lemon juice, and the rest was water.

a Which do you think tasted stronger and why?

b How much of the weaker lemonade was water?

2 Which fraction is bigger, $\frac{3}{8}$ or $\frac{1}{2}$? Can you use number rods, a number line, or Numicon Shapes to show why?

3 Which fraction is bigger, $\frac{2}{3}$ or $\frac{5}{8}$? Can you show why?

4 Which fraction is bigger, $\frac{6}{10}$ or $\frac{12}{20}$? Can you explain, or show, why?

Going deeper

1 Amy played three pieces of music in a competition, and she scored: 4 out of 5, 7 out of 10, and 17 out of 20. Which was her best score? Can you explain why?

2 Would you rather be right 56 times out of 64, 27 times out of 32, or 3 times out of 4? Can you explain why?

3 Can you put the fractions below in order of size, starting with the smallest?

$\frac{2}{3}$ $\frac{73}{108}$ $\frac{49}{72}$ $\frac{7}{12}$ $\frac{25}{36}$

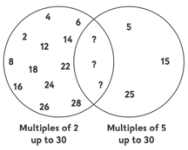
4 Can you write three fractions where the three denominators have a common factor? Can you now put them in order of size?

Exploring multiples

Practice

1 Can you write down the numbers missing from the Venn diagram? How would you describe these numbers?

2 Can you draw a Venn diagram showing the multiples of 3 and the multiples of 6 up to 40? What do you notice?



3 Can you work out the first three common multiples of 2, 4 and 5? Use number rods to help you.

Going deeper

1 Can you work out the numbers Ben and Tia are thinking of? Can you explain how you know?

a 
It's an even number less than 50 that's a multiple of 13.

b 
Mine is the largest odd 2-digit number that's a multiple of 7.

Developing fluency and accuracy

Practice

1 Can you think of two quick ways and a long way to work out this calculation? Can you explain which method you prefer?

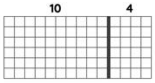
999 × 9

2 Does Molly's method to calculate 75 × 6 give the correct answer? Can you explain?


To multiply 75 × 6, I changed the calculation to 150 × 12.

3 How could Molly change the calculation to make it easier and get the right answer? Can you find three different ways and say which method you prefer?

Going deeper

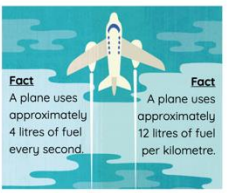


1 Ira divides this garden patio vertically and proves that 14 × 6 = (10 × 6) + (4 × 6). Find other ways to divide it vertically. Which ways of calculating 14 × 6 do you find easiest and why?

2 A new patio is made up of 125 paving stones across and 9 down. How many stones are there altogether? You can make this easier by splitting the stones that go across into sections. Can you find more than one way to do this that helps you?

Explorer Progress Book 4c, pages 6–7

Problems involving capacity



Practice

1 a Can you work out how many litres of fuel the plane above uses per minute?

b If it is 700 km from Auckland to Christchurch by plane, how much fuel is needed?

2 If the plane above travels 1·8 km on the runway, how much fuel does it use before it takes off?

Going deeper

1 If the plane above has used 7200 litres of fuel, how long has it been flying for?

2 a A helicopter uses 40 litres of fuel per hour. Approximately how much fuel does it use in 10 minutes of flying, to the nearest 100 ml?

b Can you explain how you know you are correct?

Converting units of mass and volume

Practice

1 Ravi is preparing drinks for a party. Each glass holds 0·4 L. Can you work out how many full glasses he can get from a full 1 imperial gallon jug?

2 Tia, Ben, Ravi and Molly are going on a plane. They have each packed a suitcase and weighed it, but their scales only show masses in pounds (lbs).

Name	Mass of suitcase (lbs)
Ben	42
Molly	33
Ravi	44
Tia	55

a What is the approximate mass of each suitcase in kilograms?

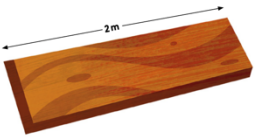
b If the maximum permitted weight per case is 20 kg, what would you advise the children to do to ensure that they can all bring their cases?

Going deeper

1 In NZ fuel costs $2.70 per litre. In the USA fuel costs $2 per US gallon and a US gallon is approximately 3·8 litres. $1 NZ dollar is approximately $0.60 US dollars. How much less will it cost to buy 38 litres of fuel in the USA than in NZ?

2 A beekeeper used to sell honey in $\frac{1}{2}$ lb jars for $1. He now sells in metric quantities, in jars holding 250 g. Do you get more or less honey for $1 in a 250 g jar than a $\frac{1}{2}$ lb jar? Tip: look at what Molly says above.

Dividing with the answer as a decimal



Practice

1 A carpenter has a piece of wood 2 m long and wants to make 3 shelves of identical length. Can you work out how long each shelf will be:

a to the nearest centimetre b to the nearest millimetre?

2 The carpenter has 3 metres of wood and wants to make 7 shelves of equal length. Can you work out how many metres long each shelf will be, to two decimal places?

3 Can you use short dividing to work out 5 L ÷ 8?

Going deeper

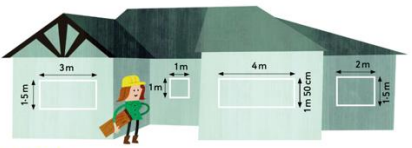
1 Which of the following do you think will result in an answer with more than three decimal places? Investigate, and then explain what you find out to your partner.

a 4 ÷ 6 b 1 ÷ 7 c 1 ÷ 3

d 2 ÷ 8 e 7 ÷ 9 f 3 ÷ 5

2 Can you think of six dividing calculations that you know will result in an answer with decimals?

Area, perimeter and decimals



Practice

1 A builder wants to place a board over each of the windows above. How many square metres of board does she need to order in total?

2 Charlie decides to buy carpet for five rooms in his house. The dimensions of the rooms are given in the table. If carpet costs $20 per square metre, how much will it cost to carpet the rooms altogether?

Study	Dining room	Bedroom	Guest room	Lounge
2 m × 2·5 m	4·5 m × 3 m	3·5 m × 4 m	2·5 m × 2·5 m	5 m × 2·5 m

3 Can you explain to your partner how you worked out your answers to question 2?

Going deeper

1 A rectangle has a perimeter of 26 cm. Its side lengths (in centimetres) are all whole numbers. What could its area be?

How many answers can you find? Can you explain how you know you've found all the possible answers?

2 A rectangle has sides that are all whole numbers between 1 and 10. Its perimeter is 2 less than its area. Can you find its dimensions?

Converting currencies

Practice

1 a Can you explain what 'currency exchange' means?

b The symbol for British pounds is £. How many New Zealand dollars would you get in exchange for £1, for £2, for £100 and for £0?

2 Can you draw a conversion graph on graph paper showing pounds and New Zealand dollars?

3 a Can you say how many New Zealand dollars you would get for £25? How do you know?

b Can you think of a way to check your answer to question 3a?

c How many New Zealand dollars would you get for £2500? Can you explain how you worked this out?

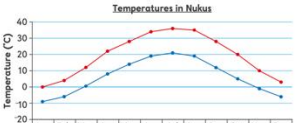
4 How many pounds (£) would you get for NZD $100? How do you know?

Going deeper

1 At the end of his trip to Malaysia, Ant has RM 480 left to change into pounds for his next trip. For her trip to the UK, Rosa has $219 NZD to change into pounds. Who will get the most after changing their money?

2 Tui lives in Christchurch, New Zealand and is visiting Kuala Lumpur, Malaysia. She needs to take RM 5600 with her. She has saved NZD $2000. Will this be enough? Can you explain how you know?

Using negative numbers



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	0	4	12	22	28	34	36	35	28	20	10	3
Minimum	-9	-6	0	8	14	19	21	19	12	5	-1	-6

Practice

1 Jack has found a graph showing the monthly maximum and minimum temperatures in Nukus, Uzbekistan.

a In which months does the temperature **sometimes** fall below freezing?

b Which is the coldest month?

c Which months are generally hotter than the month of May?

2 Which months have the same minimum temperature?

Going deeper

1 Can you copy and complete the sentences below with 'colder' or 'warmer'?

a 10 °C is _____ than -5 °C b 15 °C is _____ than -20 °C

c 12 °C is _____ than 18 °C

2 Can you give a whole number that is between:

a -9 and -6 b -6 and 4?

3 Can you suggest a temperature for each missing box to keep the temperatures in order from coldest to warmest?

□ °C -50 °C □ °C -15 °C □ °C 1 °C 18 °C

Missing number problems

	5 · 6 ☆			1 ☆ · 4 8			1 4 · ☆ 6			1 ☆ · 3	
+	8 · ☆ 5		+	5 · 8 4		−	6 · 1 ☆		−	1 2 · 8 4	
	1 4 · 1 2			1 8 · ☆ 2			8 · 0 8			5 · ☆ 5	

Ali spilled his drink and smudged some of the numbers in his book.

Practice

1 Can you work out what missing digits are hidden by the splodges for each calculation? Check by completing the calculations.

2 a Choose one number from each list to create an adding calculation. Do this three times with different number pairs.

A: 56·8 32·43 16·126 11·73 0·562 125·67

B: 8·92 24·57 13·06 35·75 18·3 5·649

Rub out some of the digits and ask your partner to work them out.

b Now choose one number from each list and come up with a subtracting calculation. Repeat three times and rub out some of the digits for your partner to work out.

Going deeper

1 a Using the key, can you work out the missing numbers in this calculation?

☆ = multiple of 4
△ = multiple of 3
□ = multiple of 5

△□ 7 △
\+ □△□△
☆△△□

b Can you write your own calculation for a partner using the same key?

Using percentages with data

NZ population at 2023 census = 5 million

NZ population by Island at 2023 census

Island	Approximate percentage of total population
North Island	75%
South Island	25%

NZ population by age at 2023 census

Age group	Approximate percentage of total population
0–14 years	19%
15–64 years	65%
65 years and over	16%

Practice

1 a Roughly how many 0–14 year olds were living in NZ in 2023, do you think? Can you round your answer to the nearest 100 000?

b Can you say roughly how many people lived in the South Island in 2023?

c Roughly how many people in NZ lived in the North Island in 2023?

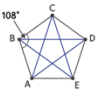
2 In a bag of marbles, 20% are red. There are 15 red marbles. How many marbles are in the bag? Explain how you know.

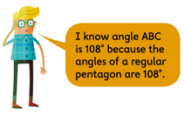
Going deeper

1 Clara wants to increase this recipe by 25%. Can you work out what the new amounts will be for each ingredient, and how many rolls this new recipe will make?

2 In the 30 years leading up to 2014, the number of sparrows in Europe fell by 147 million. This was a fall of roughly 60%. What do you think the number of sparrows in Europe was in 1984, to the nearest million? Can you explain your answer?

Finding missing angles





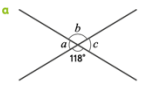
Practice

1 ABC forms an isosceles triangle, so can you calculate the other two angles in the triangle ABC? (angle BAC and angle BCA)

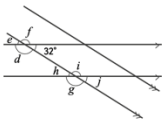
2 How could you calculate angle CAE?

3 Can you work out all the missing angles in the diagrams below?

a



b



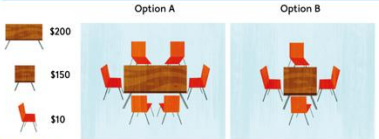
Going deeper

1 Can you draw the pentagon and five-pointed star above and then label the size of all the other angles? (Do not measure the angles with a protractor.)

2 Sketch a rhombus and show the diagonals within it. If one of the interior angles in the rhombus is 116°, can you label all the other angles within your drawing?

3 Create a missing angles problem for your partner, giving them the fewest number of angles they need to solve it.

Exploring multi-step problems



Practice

1 Owners of a new cafe are buying second-hand furniture to seat 40 customers. Can you help them decide which seating plan above is more cost effective? Can you explain the calculations you would use?

2 The owners estimate that up to 60 people will visit the cafe per hour and spend an average of $4·50 each on soft drinks. They want to find out how much money they could make on soft drinks in a day if they are open from 9 a.m. to 4 p.m.

a Can you explain the steps you need to take to solve this problem?

b Try to solve the problem using your steps. How can you check your answer?

Going deeper

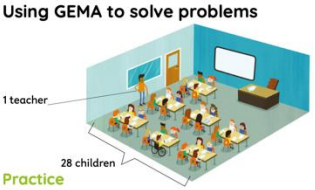
1 Two adults and three children are going on a seven-day holiday. They think that every day each child will spend around $30 and each adult will spend around $75. They want to know how much they are likely to spend in total.

a Can you list the steps they need to follow to work this out?

b How can they check their calculations?

2 Kiwa buys 10 kg bags of compost to put on his new garden. Each day he spreads out 3kg of compost. Compost costs 23c per kilogram. How much will he spend if the whole garden takes him a fortnight?

Using GEMA to solve problems



Practice

1 There are 12 classes in a school. Each class has the same number of children and teachers as shown above. How many people are in the school altogether? Can you write a single calculation to show this, using brackets?

2 Can you work out these calculations?

a $14 \div 2 \times 1 + 1$
b $24 - (3 \times 2 \div 3)$
c $2^3 \div 2^4$
d $2 \times 4 + 6 \div 8$
e $3^2 \div 2 \times 4 - 1$
f $72 \div (3 \times 3) \times 3$
g $3^2 + 4^2 - 5^2$
h $4 \times 3 - 2 \div 2 \times 5$
i $1 + 2 \times 3 + 4 \times 5$

Going deeper

1 Can you copy these calculations and put, +, −, ×, or ÷ symbols in the boxes to make them correct? Add brackets where you need them.

a 4 □ 2 □ 6 = 16
b 4 □ 2 □ 6 = 12
c 4 □ 2 □ 6 = −4
d 4 □ 2 □ 6 = $\frac{1}{3}$
e 4 □ 2 □ 6 = 14
f 4 □ 2 □ 6 = 1

2 What possible answers can you find by putting any of +, −, ×, or ÷ symbols in the boxes below?

1 □ 2 □ 3 □ 4 =

3 Repeat question 2 but this time you are allowed to use exactly one pair of brackets. What new answers can you find?