Mathematics Level 4

Chapter 1 — Number: whole numbers, the four operations and algorithms

Aboriginal and Torres Strait Islander content has been excluded as accuracy cannot be guaranteed, and it is better to be respectful than cover the entire curriculum inaccurately.

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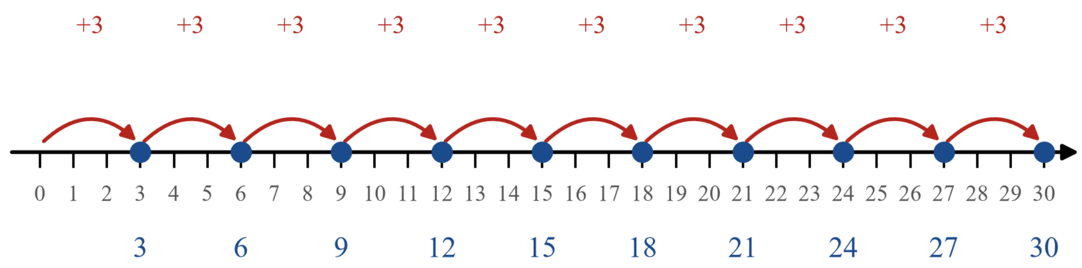
Number sequences: multiples of 3, 4, 6, 7, 8 and 9

Code `VC2M4N02` (Victorian Curriculum F–10 Version 2.0, Mathematics, Level 4; authority file `maths_4.json`): "investigate number sequences involving multiples of 3, 4, 6, 7, 8 and 9". This section draws on elaboration `VC2M4N02.E01`.

What you need to know

In Year 3 you learnt the 3, 4, 5 and 10 times tables, and you know odd and even numbers. Both come back in this section.

Multiples. Say the 4 times table out loud: 4, 8, 12, 16, 20, … Those numbers are the **multiples** of 4. In this section, *the multiples of a number* means *the numbers you say when you count on by that number, starting at the number itself*. So the multiples of 3 are 3, 6, 9, 12, …, the multiples of 7 are 7, 14, 21, 28, …, and so on. Counting on by 4s lands on the multiples of 4, and counting on by 7s lands on the multiples of 7.



A number line from 0 to 30. Red jumps of +3 land on 3, 6, 9 and every third number up to 30, shown as blue dots with the multiples written below.

The picture shows counting on by 3s from 0. Every landing place is a multiple of 3.

Number sequences. A **number sequence** is a list of numbers that follows a rule. The rule for 4, 8, 12, 16, … is *add 4 each time*. The rule for 7, 14, 21, 28, … is *add 7 each time*. Sequences are what this section is about.

Sequences never have to stop. The little dots … mean *and it keeps going*. There is no biggest multiple of 4: whatever multiple of 4 you write down, adding 4 gives you one more. We say the sequence can be **extended indefinitely** — that is the maths way of saying it can go on for ever, so it never has a last number.

Patterns are what you notice. To find a pattern in a sequence, look along the numbers and say what you notice. One good way to look is on a hundred square, with the multiples shaded.

Multiples of 4 on a hundred square

1	2	3	**4**	5	6	7	**8**	9	10
11	**12**	13	14	15	**16**	17	18	19	**20**
21	22	23	**24**	25	26	27	**28**	29	30
31	**32**	33	34	35	**36**	37	38	39	**40**
41	42	43	**44**	45	46	47	**48**	49	50
51	**52**	53	54	55	**56**	57	58	59	**60**
61	62	63	**64**	65	66	67	**68**	69	70
71	**72**	73	74	75	**76**	77	78	79	**80**
81	82	83	**84**	85	86	87	**88**	89	90
91	**92**	93	94	95	**96**	97	98	99	**100**

A hundred square with the multiples of 4 shaded blue: 4, 8, 12 and so on up to 100.

Multiples of 6 on a hundred square

1	2	3	4	5	**6**	7	8	9	10
11	**12**	13	14	15	16	17	**18**	19	20
21	22	23	**24**	25	26	27	28	29	**30**
31	32	33	34	35	**36**	37	38	39	40
41	**42**	43	44	45	46	47	**48**	49	50
51	52	53	**54**	55	56	57	58	59	**60**
61	62	63	64	65	**66**	67	68	69	70
71	**72**	73	74	75	76	77	**78**	79	80
81	82	83	**84**	85	86	87	88	89	**90**
91	92	93	94	95	**96**	97	98	99	100

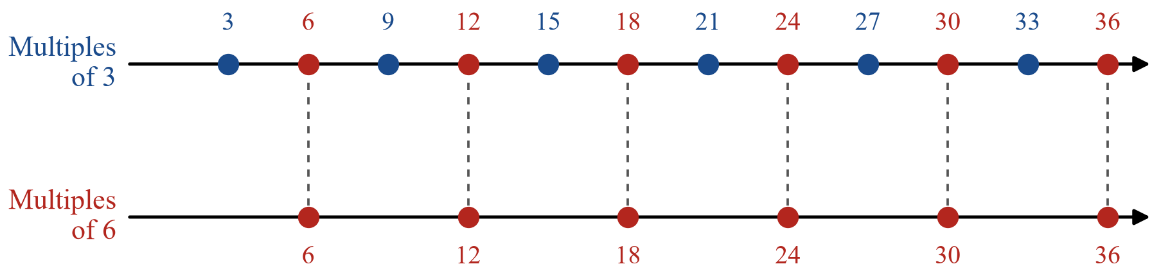
A hundred square with the multiples of 6 shaded blue: 6, 12, 18 and so on up to 96.

Here are patterns you can find in the six lists in this section.

List	A pattern to notice
Multiples of 3	odd, even, odd, even — they take turns
Multiples of 4	all even, and the ones digits go 4, 8, 2, 6, 0, then repeat
Multiples of 6	all even
Multiples of 7	odd, even, odd, even — they take turns
Multiples of 8	all even
Multiples of 9	the ones digits step down: 9, 8, 7, 6, 5, 4, 3, 2, 1, 0

Why are the multiples of 6 all even? Six is even, and an even number plus an even number is always even, so counting on by 6s from 6 stays even the whole way. The same idea works for 4 and 8. And 3 and 7 are odd, so their lists take turns between odd and even.

One list can hide inside another. Compare the multiples of 3 with the multiples of 6.



Every second multiple of 3 is also a multiple of 6.

Two number lines. The top line shows the multiples of 3 from 3 to 36; the bottom line shows the multiples of 6 from 6 to 36. Dotted lines join 6, 12, 18, 24, 30 and 36 on both lines, showing every second multiple of 3 is a multiple of 6.

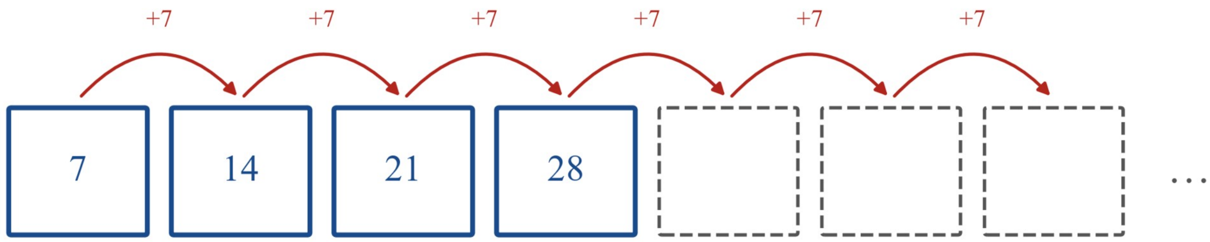
Every second multiple of 3 is a multiple of 6, because 6 is two 3s. In the same way, every second multiple of 4 is a multiple of 8, because 8 is two 4s. And some numbers live in several lists at once: 12 is a multiple of 3, of 4 and of 6.

A word on Year 5. Multiples come back in Year 5 with more ideas around them. In this section, making the lists and spotting the patterns is the whole job.

Worked examples

Example 1 — continuing the multiples of 7

These number cards show the start of the multiples of 7. Three cards are blank. Fill in the blank cards, then describe the pattern.



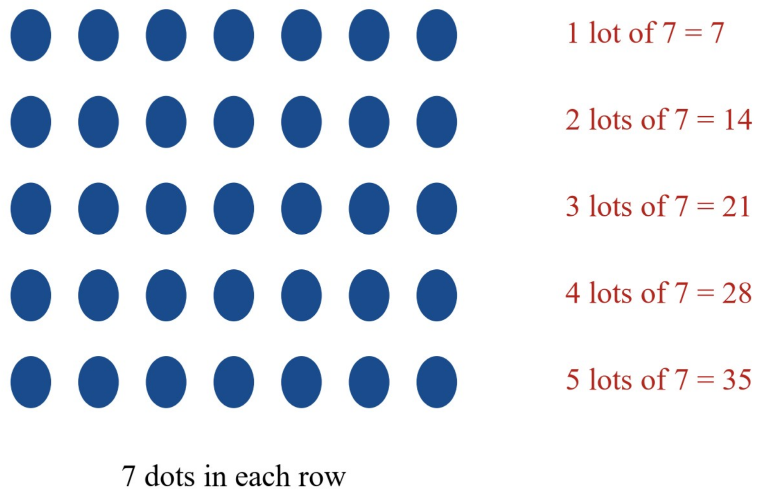
Number cards showing 7, 14, 21 and 28, then three blank cards, with red +7 jumps between the cards and dots to show the sequence keeps going.

Working	Comment
$28 + 7 = 35$	Add 7 to the last card.
$35 + 7 = 42$	Add 7 again.
$42 + 7 = 49$	And again.

The blank cards are **35, 42 and 49**.

The pattern: each number is 7 more than the one before, and the numbers take turns between odd and even (7 is odd, 14 is even, 21 is odd, and so on).

If your 7 times table is not quick yet, this is the way to do it: keep adding 7. The adding *builds* the table for you. Five rows of 7 dots build it too.

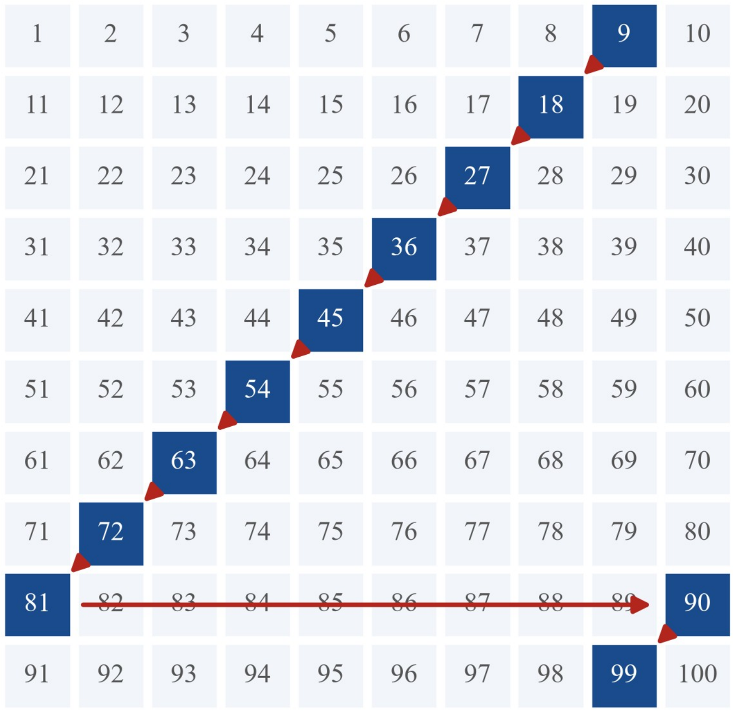


An array of blue dots in 5 rows of 7. Beside each row a running total: 1 lot of 7 is 7, 2 lots of 7 is 14, 3 lots of 7 is 21, 4 lots of 7 is 28, 5 lots of 7 is 35.

Example 2 — patterns in the multiples of 9

Here are the multiples of 9 shaded on a hundred square. The red arrows follow the sequence from 9 to 99. Describe the patterns you can see.

Multiples of 9 on a hundred square

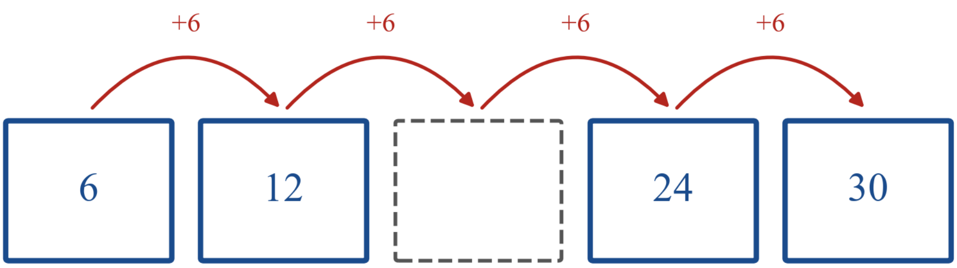


A hundred square with the multiples of 9 shaded blue, 9, 18, 27 up to 99. Red arrows follow the sequence, stepping down and to the left, with a long jump across from 81 to 90.

What you notice	Why
The shaded numbers step down and to the left, one square at a time.	Adding 9 is adding 10 and taking away 1: down one row, left one column.
The ones digits step down 9, 8, 7, 6, 5, 4, 3, 2, 1, 0.	Same reason: each step, the ones digit gets 1 less.
The chart stops at 100, but the list does not stop.	The next multiple of 9 is 99 + 9 = 108, then 117, and the sequence can be extended indefinitely.

Example 3 — a missing card, and a number that is not in the list

The cards show multiples of 6 with one card missing. Find the missing number. Then decide: is 32 a multiple of 6?



Number cards showing 6, 12, a blank card, 24 and 30, with red +6 jumps between the cards.

Working	Comment
12 + 6 = 18	Count on by 6 from 12.
Check: 18 + 6 = 24. ✓	The next card is 24, so 18 fits.

The missing card is **18**.

Is 32 a multiple of 6? Count on past 30: 30, then 36. The count jumps straight over 32, so **32 is not a multiple of 6**. A number is a multiple of 6 only if the count on by 6s lands on it.

Practice questions

Questions with help

Q1. The multiples of 3 are the numbers you say when you count on by ____ .

Q2. Write the first five multiples of 4.

Q3. Count on by 7s to finish the sequence: 7, 14, 21, ____, ____.

Q4. Count on by 8s to finish the sequence: 8, 16, ____, 32, ____.

Q5. Count on by 9s to finish the sequence: 9, 18, 27, ____, ____.

Q6. Look at the hundred square above with the multiples of 6 shaded. Are the multiples of 6 odd or even?

Q7. Circle the multiples of 6 in this list: 6, 10, 12, 18, 21, 24.

Q8. Start at 0 on a number line and make 5 jumps of 4. What number do you land on?

Questions on your own

Q9. Write the first six multiples of 7.

Q10. Write the next three numbers in the sequence 6, 12, 18, 24, … Then describe the pattern.

Q11. This sequence counts down by 4s: 40, 36, 32, 28, ____, ____, ____. Are all of these numbers multiples of 4? How do you know?

Q12. Fill in the missing number: 9, 18, ____, 36, 45.

Q13. List all the multiples of 4 from 20 to 40.

Q14. True or false: every multiple of 8 is also a multiple of 4. Use the hundred square with the multiples of 4 shaded to help you explain your answer.

Q15. Write the first six multiples of 9. Do they take turns between odd and even, like the multiples of 3?

Q16. Is 49 a multiple of 7? Is 50 a multiple of 7? Explain how you know.

Q17. List all the numbers up to 30 that are multiples of 3 **and** multiples of 6. What do you notice about your list?

Q18. Three number cards in a row show 21, a blank card, and 35. The cards are multiples of 7 in order, with the same jump each time. What number is on the blank card?

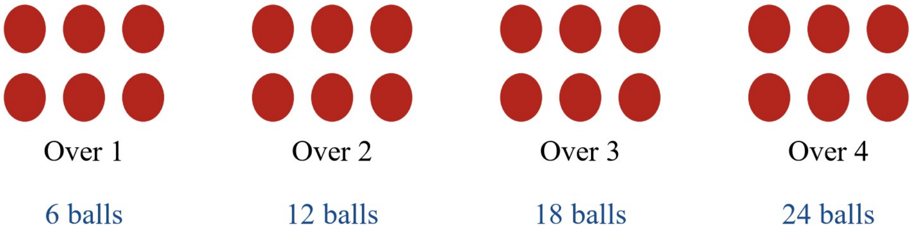
Q19. Explain why every multiple of 6 is an even number.

Q20. The multiples of 9 can be extended indefinitely, past any hundred square. Find the first multiple of 9 that is more than 100.

Applied

Q21. In cricket, an over is 6 balls. The Boxing Day Test is a famous cricket match that starts on 26 December each year at the Melbourne Cricket Ground (MCG).

> Source: Marylebone Cricket Club, *The Laws of Cricket*, Law 17 (The Over), lords.org, retrieved 2026-08-20. Source: Wikipedia, *Boxing Day Test*, en.wikipedia.org, retrieved 2026-08-20.



Each over is 6 balls, so the running totals are multiples of 6.

Four groups of 6 red cricket balls, labelled Over 1, Over 2, Over 3 and Over 4, with running totals of 6, 12, 18 and 24 balls.

(a) Write the first five numbers in the sequence of balls bowled after each over.

(b) Describe the pattern in your sequence.

(c) The team bowls 8 overs. How many balls is that?

(d) Mia says: “A cricket match cannot go on for ever, so the sequence 6, 12, 18, … must stop somewhere.” Is Mia right about the maths? Explain.

Answers

Q1. 3. **Q2.** 4, 8, 12, 16, 20. **Q3.** 28, 35. **Q4.** 24, 40. **Q5.** 36, 45. **Q6.** Even. **Q7.** 6, 12, 18, 24. **Q8.** 20. **Q9.** 7, 14, 21, 28, 35, 42. **Q10.** 30, 36, 42; each number is 6 more than the one before (they are the multiples of 6). **Q11.** 24, 20, 16; yes — counting down by 4s stays on the multiples of 4. **Q12.** 27. **Q13.** 20, 24, 28, 32, 36, 40. **Q14.** True. **Q15.** 9, 18, 27, 36, 45, 54; yes, they take turns between odd and even. **Q16.** 49 yes; 50 no. **Q17.** 6, 12, 18, 24, 30; the list is exactly the multiples of 6. **Q18.** 28. **Q19.** See worked answers. **Q20.** 108. **Q21.** (a) 6, 12, 18, 24, 30; (b) each number is 6 more than the one before, and all are even; (c) 48; (d) no — see worked answers.

Worked answers

Q1. Counting on by **3** from 3 lands on 3, 6, 9, 12, … — the multiples of 3.

Q2. 1 × 4 = 4, 2 × 4 = 8, 3 × 4 = 12, 4 × 4 = 16, 5 × 4 = 20. The first five multiples of 4 are **4, 8, 12, 16, 20**.

Q3. 21 + 7 = 28, then 28 + 7 = 35. The sequence is 7, 14, 21, **28, 35**.

Q4. 16 + 8 = **24**, and 32 + 8 = **40**. Check: 24 + 8 = 32. ✓

Q5. 27 + 9 = **36**, then 36 + 9 = **45**.

Q6. Every shaded number on that hundred square is even. Six is even, and even plus even is even, so counting on by 6s never lands on an odd number.

Q7. Counting on by 6s: 6, 12, 18, 24, 30, … So circle **6, 12, 18 and 24**. (10 and 21 get jumped over.)

Q8. 0 + 4 + 4 + 4 + 4 + 4 = 20. You land on **20**, which is 5 × 4.

Q9. 7, 14, 21, 28, 35, 42.

Q10. 24 + 6 = 30, 30 + 6 = 36, 36 + 6 = 42. The pattern: each number is 6 more than the one before — the list is the multiples of 6, and every number is even.

Q11. 28 − 4 = 24, 24 − 4 = 20, 20 − 4 = 16. All of 40, 36, 32, 28, 24, 20, 16 are multiples of 4, because counting **down** by 4s from a multiple of 4 stays on the multiples of 4, just as counting up does.

Q12. 18 + 9 = **27**. Check: 27 + 9 = 36. ✓

Q13. 20, 24, 28, 32, 36, 40. (20 = 5 × 4 and 40 = 10 × 4, so both ends are included.)

Q14. True. Count on by 8s: 8, 16, 24, 32, … Every one of those is shaded on the hundred square of multiples of 4, because 8 is two 4s — adding 8 is the same as adding 4 twice, so you always land on a multiple of 4.

Q15. 9, 18, 27, 36, 45, 54. They take turns: odd, even, odd, even, odd, even — just like the multiples of 3, because 9 is odd.

Q16. 49 **is** a multiple of 7, because 7 × 7 = 49. 50 **is not**: counting on by 7s goes 49, then 56, and jumps straight over 50.

Q17. Multiples of 3 up to 30: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30. Multiples of 6 up to 30: 6, 12, 18, 24, 30. The numbers in both lists are **6, 12, 18, 24, 30** — exactly the multiples of 6. That matches the picture: every second multiple of 3 is a multiple of 6.

Q18. The jump is 7 each time: 21 + 7 = **28**, and 28 + 7 = 35. ✓

Q19. 6 is even. The first multiple of 6 is 6 itself, which is even, and adding 6 (an even number) to an even number always gives an even number. So the count 6, 12, 18, 24, … never lands on an odd number: every multiple of 6 is even.

Q20. 99 is a multiple of 9 (9 × 11 = 99). The next one is 99 + 9 = **108**, which is the first multiple of 9 more than 100.

Q21. (a) After over 1: 6 balls. After over 2: 12. Then 18, 24, 30. The sequence is **6, 12, 18, 24, 30**. (b) Each number is 6 more than the one before; all the numbers are even; they are the multiples of 6. (c) 8 overs is 8 lots of 6 balls: $8 \times 6 =$ **48 balls**. (d) Mia is not right about the maths. A cricket match stops, but the number sequence does not: whatever multiple of 6 you write down, adding 6 gives you one more. The sequence of multiples of 6 can be extended indefinitely, past the number of balls in any real match — it is the match that has a limit, not the maths.

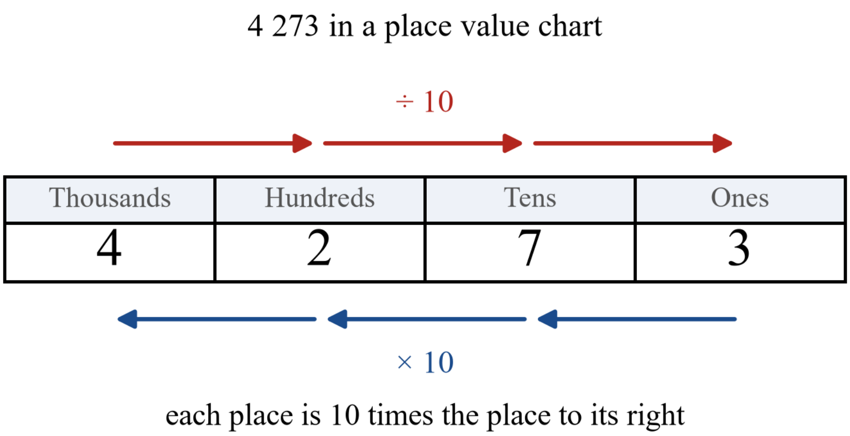
Multiplying and dividing by multiples and powers of 10

Code `VC2M4N05` (Victorian Curriculum F–10 Version 2.0, Mathematics, Level 4; authority file `maths_4.json`): "solve problems involving multiplying or dividing natural numbers by multiples and powers of 10 without a calculator, using the multiplicative relationship between the place value of digits". This section draws on elaborations `VC2M4N05.E01`–`VC2M4N05.E03`.

What you need to know

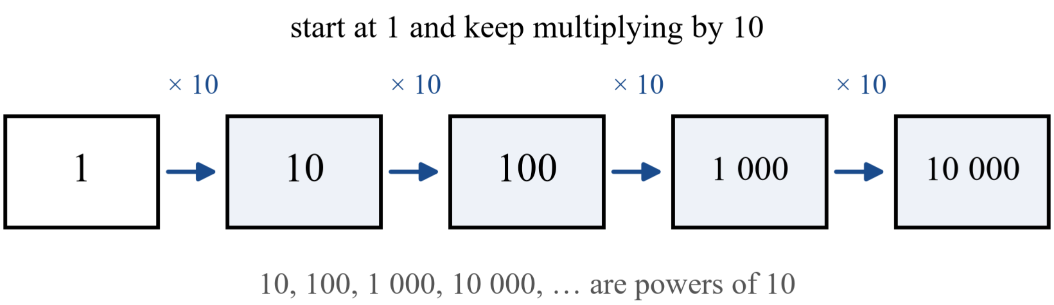
In Year 3 you multiplied and divided numbers made of one or two digits, and you learnt the 3, 4, 5 and 10 times tables. Both come back in this section.

Each place is 10 times the place to its right. Look at 4 273. The 4 is worth 4 000, the 2 is worth 200, the 7 is worth 70 and the 3 is worth 3. Ten ones make 1 ten. Ten tens make 1 hundred. Ten hundreds make 1 thousand. That is the multiplicative relationship between the places, and it is what this whole section runs on.



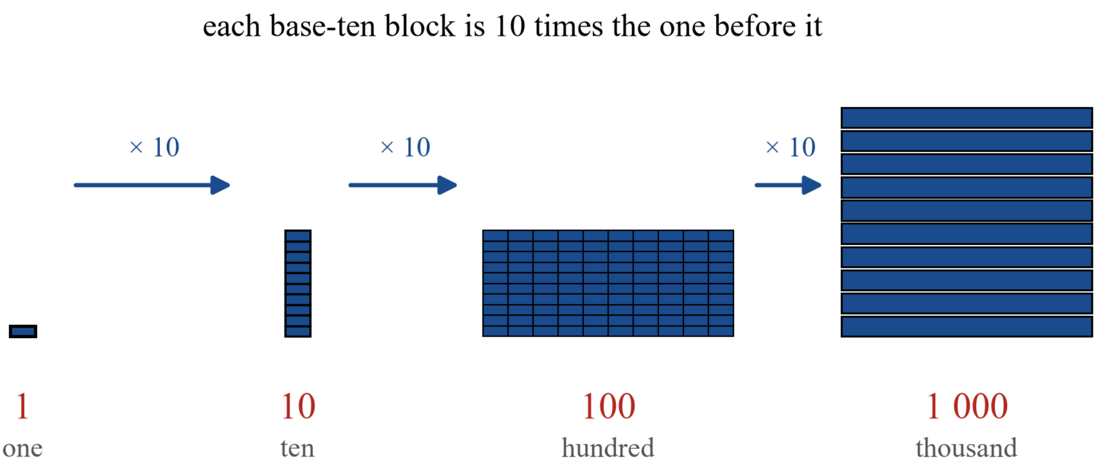
A place value chart showing 4 273. Blue arrows labelled × 10 point left between the places, and red arrows labelled ÷ 10 point right, with the caption "each place is 10 times the place to its right".

Powers of 10. Start at 1 and keep multiplying by 10: 1, 10, 100, 1 000, 10 000, … In this section, *the powers of 10* means the numbers you get by multiplying 10 by 10 again and again: 10, 100, 1 000, 10 000 and so on. The picture shows each step.



Five boxes in a row showing 1, 10, 100, 1 000 and 10 000, joined by blue arrows each labelled × 10, with the caption "start at 1 and keep multiplying by 10".

Base-ten blocks show the same idea. One small cube is 1. A rod of ten cubes is 10. A flat of one hundred cubes is 100. Ten flats stacked make 1 000. Each block is 10 times the block before it.



Base-ten blocks in a row: one small cube labelled 1, a rod of ten cubes labelled 10, a flat of one hundred cubes labelled 100, and a stack of ten flats labelled 1 000, with × 10 arrows between them.

Multiples of 10. Count on by 10s from 10: 10, 20, 30, 40, … Those numbers are the **multiples of 10** — the numbers you say when you count on by 10. Every multiple of 10 is some number of tens: 70 is 7 tens, 100 is 10 tens, 240 is 24 tens. On a hundred square, the multiples of 10 make the last column, and 10 columns of ten make 100.

the multiples of 10 make the last column

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

one column of ten

10 columns of ten make 100

A hundred square from 1 to 100 with the last column (10, 20, 30 up to 100) shaded blue, labelled "one column of ten", with the caption "10 columns of ten make 100".

The moving-digits rule. When you multiply a natural number by 10, every digit moves one place to the left, and a 0 holds the empty ones place: 36 × 10 = 360. When you divide by 10, every digit moves one place to the right: 480 ÷ 10 = 48. The rule works *because* each place is 10 times the place to its right: 36 ones become 36 tens, and 36 tens is 360.

- × 10 moves the digits **one** place left; ÷ 10 moves them **one** place right.
- × 100 moves the digits **two** places left; ÷ 100 moves them **two** places right.
- × 1 000 moves the digits **three** places left; ÷ 1 000 moves them **three** places right.

Patterns to notice. Work a few answers, write them in a table, and look at what happens to the digits. Then say the rule out loud. That is how you make the moving-digits rule your own, all by hand.

write the answers in a table, then look for the rule

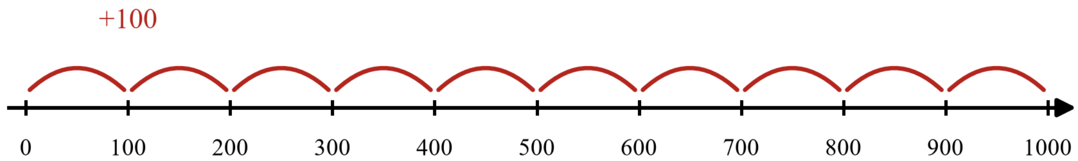
n	n × 10
3	30
7	70
12	120
45	450

what happens to the digits each time?

A two-column table headed n and n × 10 with rows 3 gives 30, 7 gives 70, 12 gives 120 and 45 gives 450, and the caption "what happens to the digits each time?".

A number line shows the same rule for hundreds. Ten jumps of 100 take you from 0 to 1 000, because 10 hundreds make 1 000.

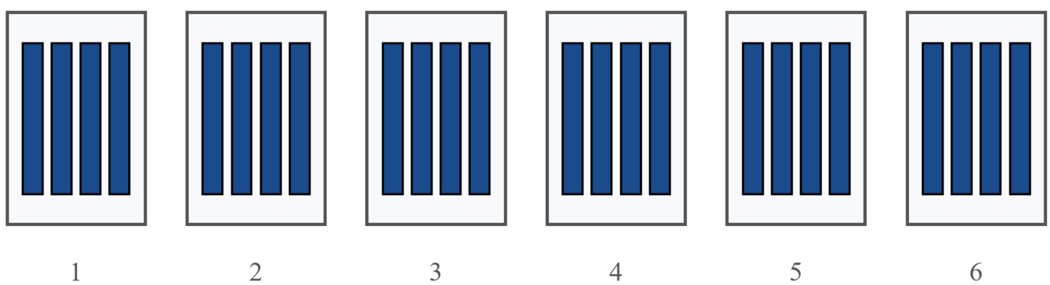
counting on by 100s from 0 to 1 000 — 10 jumps of 100



A number line from 0 to 1 000 with ticks and labels every 100, and ten red jump-arrows each labelled +100, with the caption "counting on by 100s from 0 to 1 000 — 10 jumps of 100".

Multiples of 10 like 20, 30, 40. Split them into a times-table fact and a power of 10. 7 × 30 is 7 × 3 tens = 21 tens = 210. Sharing works the same way with tens: 240 ÷ 40 is 24 tens shared into groups of 4 tens, which is 6 groups.

24 ten-rods shared into groups of 4



24 tens ÷ 4 tens = 6 groups

so 240 ÷ 40 = 6

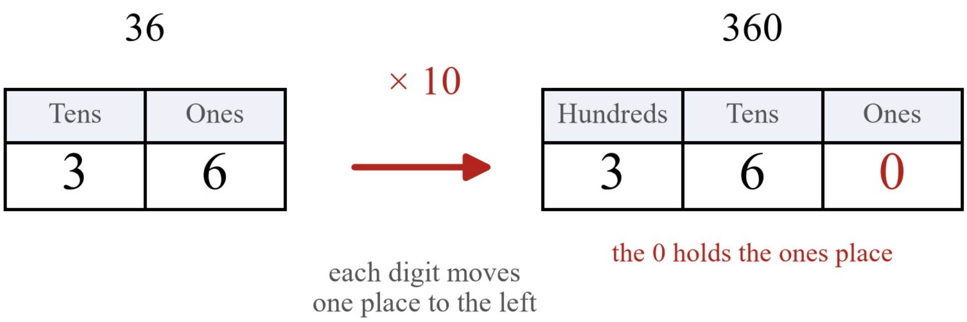
Six boxes, each holding 4 blue ten-rods, showing 24 ten-rods shared into groups of 4, with the captions "24 tens ÷ 4 tens = 6 groups" and "so 240 ÷ 40 = 6".

Teacher note. This section is written to stand alone: it builds on the Year 3 facts (the 3, 4, 5 and 10 tables) and does not assume subtopic 3A has been taught. A teacher may run 3A before Chapter 1 (TOC D6); either way, the facts 1B needs are built from known facts and from arrays on the page. All work in this section is done by hand, as the content description requires, and no digital tool appears anywhere in it, including its questions and the chapter test (TOC D7). The pattern-spotting of `VC2M4N05.E03` is done with place value charts and tables on paper.

Worked examples

Example 1 — 36 × 10 using the chart

Work out 36 × 10 using a place value chart.



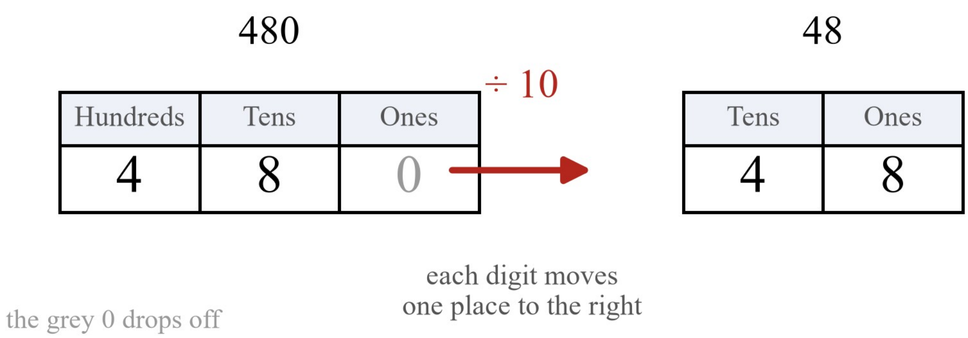
Two place value charts joined by a red × 10 arrow: 36 in Tens and Ones becomes 360 in Hundreds, Tens and Ones, the new 0 in red, with the captions "each digit moves one place to the left" and "the 0 holds the ones place".

Working	Comment
36 is 3 tens and 6 ones.	Say the number in its places.
× 10 moves every digit one place to the left.	The moving-digits rule.
The 3 is now in the hundreds, the 6 in the tens.	36 ones have become 36 tens.
A 0 holds the ones place: 360.	36 × 10 = 360.

36 × 10 = 360. Check the other way: 360 ÷ 10 = 36. ✓

Example 2 — 480 ÷ 10 and 4 800 ÷ 100

(a) Work out 480 ÷ 10.



Two place value charts joined by a red ÷ 10 arrow: 480 in Hundreds, Tens and Ones (the 0 in grey) becomes 48 in Tens and Ones, with the captions "each digit moves one place to the right" and "the grey 0 drops off".

Working	Comment
480 is 4 hundreds, 8 tens and 0 ones.	Say the number in its places.
÷ 10 moves every digit one place to the right.	The moving-digits rule.
The 4 is now in the tens, the 8 in the ones.	480 ones have become 48 tens.

480 ÷ 10 = 48.

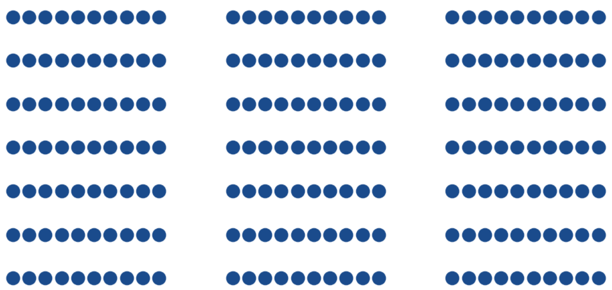
(b) Work out 4 800 ÷ 100. Dividing by 100 is dividing by 10 and then by 10 again, so every digit moves **two** places to the right: 4 800 ÷ 100 = 48. Check: 48 × 100 = 4 800. ✓

Example 3 — 7 × 30, and 210 ÷ 30

Work out 7 × 30 by splitting 30 into 3 tens.

10

3 tens = 30 dots in each row



7 rows of 3 tens = 21 tens = 210

7 × 30 = 210

An array of blue dots in 7 rows of 30, each row grouped as 3 lots of 10 dots, with the captions "7 rows of 3 tens = 21 tens = 210" and "7 × 30 = 210".

Working	Comment
30 is 3 tens.	Split 30 into 3 × 10.
7 × 3 tens = 21 tens.	The 3 times table: 7 × 3 = 21.
21 tens = 210.	So 7 × 30 = 210.

Then 210 ÷ 30: that is 21 tens shared into groups of 3 tens, which is 7 groups. So **210 ÷ 30 = 7**, because 7 × 30 = 210.

Practice questions

Questions with help

Q1. When you multiply a number by 10, every digit moves ____ place(s) to the ____.

Q2. Finish the list of powers of 10: 10, 100, ____, ____.

Q3. Work out: (a) 8 × 10 (b) 15 × 10 (c) 9 × 100.

Q4. Put 27 into a place value chart. Multiply it by 10: move every digit one place to the left and let a 0 hold the ones place. Write the new number.

Q5. Work out: (a) 60 ÷ 10 (b) 250 ÷ 10 (c) 700 ÷ 10.

Q6. Fill in the missing number: (a) 4 × ____ = 40 (b) 6 × 30 = ____.

Q7. Write the first six multiples of 10.

Q8. To work out 5 × 40, first work out 5 × 4, then use your answer. Show both steps.

Questions on your own

Q9. Work out: (a) 6 × 100 (b) 32 × 100 (c) 7 × 1 000.

Q10. Work out: (a) 900 ÷ 100 (b) 5 600 ÷ 100 (c) 8 000 ÷ 1 000.

Q11. Work out: (a) 3 × 20 (b) 6 × 50 (c) 4 × 70.

Q12. Work out: (a) 180 ÷ 30 (b) 350 ÷ 50 (c) 480 ÷ 60.

Q13. Fill in the missing number: (a) 9 × ____ = 900 (b) ____ × 10 = 640 (c) 720 ÷ ____ = 72.

Q14. True or false? Fix any that are false. (a) 25 × 10 = 250 (b) 1 000 ÷ 10 = 10 (c) 8 × 100 = 80.

Q15. A number multiplied by 10 gives 470. What is the number? A different number divided by 10 gives 12. What is that number?

Q16. What is the rule for the list 5, 50, 500, …? Write the next two numbers.

Q17. Use the fact 6 × 4 = 24 to explain why 6 × 40 = 240.

Q18. Work out 12 × 100 and 1 000 ÷ 10. Which answer is higher? Show how you know.

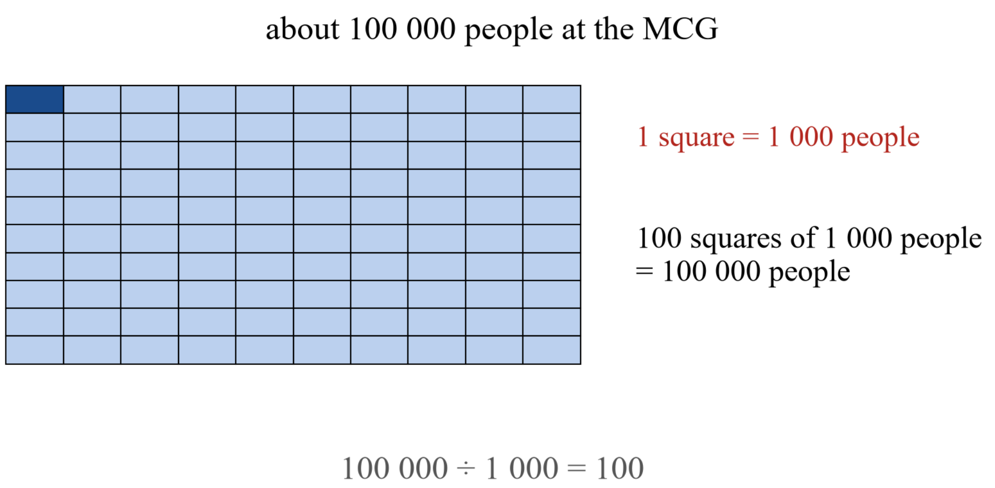
Q19. A library packs books into boxes of 100. It fills 9 boxes. How many books is that?

Q20. A sheet of stickers holds 30 stickers. Priya buys 4 sheets. (a) How many stickers does she have altogether? (b) She shares them equally between 30 students. How many stickers does each student get?

Applied

Q21. The Melbourne Cricket Ground (the MCG) holds about 100 000 people. It is one of the biggest sporting grounds in the world.

> Source: Wikipedia, *Melbourne Cricket Ground*, en.wikipedia.org, retrieved 2026-08-20.



A 10 by 10 grid of light-blue squares with one dark square labelled "1 square = 1 000 people", the caption "about 100 000 people at the MCG", and the note "100 squares of 1 000 people = 100 000 people".

(a) 100 000 is a power of 10. Write it as 10 multiplied by 10 again and again. How many 10s do you multiply together?

(b) After a big match, the crowd goes out 1 000 people at a time. How many groups of 1 000 is that?

(c) Now think of the 100 000 seats in blocks of 100. How many blocks of 100 is that?

(d) Maya says 100 000 ÷ 100 = 1 000. Use the moving-digits rule to show that she is right.

Answers

Q1. one; left. **Q2.** 1 000, 10 000. **Q3.** (a) 80 (b) 150 (c) 900. **Q4.** 270. **Q5.** (a) 6 (b) 25 (c) 70. **Q6.** (a) 10 (b) 180. **Q7.** 10, 20, 30, 40, 50, 60. **Q8.** 5 × 4 = 20, so 5 × 40 = 200. **Q9.** (a) 600 (b) 3 200 (c) 7 000. **Q10.** (a) 9 (b) 56 (c) 8. **Q11.** (a) 60 (b) 300 (c) 280. **Q12.** (a) 6 (b) 7 (c) 8. **Q13.** (a) 100 (b) 64 (c) 10. **Q14.** (a) true (b) false, 100 (c) false, 800. **Q15.** 47; 120. **Q16.** Multiply by 10 each time; 5 000, 50 000. **Q17.** See worked answers. **Q18.** 12 × 100. **Q19.** 900 books. **Q20.** (a) 120 (b) 4. **Q21.** (a) 10 × 10 × 10 × 10 × 10 — five 10s (b) 100 (c) 1 000 (d) see worked answers.

Worked answers

Q1. One place to the left. (÷ 10 moves them one place to the right.)

Q2. 100 × 10 = **1 000**, and 1 000 × 10 = **10 000**. Each power of 10 is 10 times the one before it.

Q3. (a) 8 × 10 = **80**. (b) 15 × 10 = **150**. (c) 9 × 100 = **900**: the 9 moves two places to the left.

Q4. 27 is 2 tens and 7 ones. × 10 moves the digits one place left and a 0 holds the ones: **270**. So 27 × 10 = 270.

Q5. (a) 60 ÷ 10 = **6**. (b) 250 ÷ 10 = **25**. (c) 700 ÷ 10 = **70**. Each time, every digit moves one place to the right.

Q6. (a) 4 × **10** = 40. (b) 6 × 30 is 6 × 3 tens = 18 tens = **180**.

Q7. Count on by 10s: **10, 20, 30, 40, 50, 60**.

Q8. 5 × 4 = 20, so 5 × 40 is 5 × 4 tens = 20 tens = **200**.

Q9. (a) 6 × 100 = **600**. (b) 32 × 100 = **3 200**. (c) 7 × 1 000 = **7 000**. × 100 moves the digits two places left; × 1 000 moves them three places left.

Q10. (a) 900 ÷ 100 = **9**. (b) 5 600 ÷ 100 = **56**. (c) 8 000 ÷ 1 000 = **8**. ÷ 100 moves the digits two places right; ÷ 1 000 moves them three places right.

Q11. (a) 3 × 20 is 3 × 2 tens = 6 tens = **60**. (b) 6 × 50 is 6 × 5 tens = 30 tens = **300**. (c) 4 × 70 is 4 × 7 tens = 28 tens = **280**.

Q12. (a) 180 ÷ 30 is 18 tens ÷ 3 tens = **6**. (b) 350 ÷ 50 is 35 tens ÷ 5 tens = **7**. (c) 480 ÷ 60 is 48 tens ÷ 6 tens = **8**.

Q13. (a) 9 × **100** = 900. (b) **64** × 10 = 640. (c) 720 ÷ **10** = 72.

Q14. (a) **True.** (b) **False**: 1 000 ÷ 10 = 100, not 10 — the digits move one place right, not two. (c) **False**: 8 × 100 = 800, not 80 — the 8 moves two places left.

Q15. The first number is 470 ÷ 10 = **47**. The second is 12 × 10 = **120**.

Q16. The rule is *multiply by 10 each time*: 5 × 10 = 50, 50 × 10 = 500. The next two are 500 × 10 = **5 000** and 5 000 × 10 = **50 000**.

Q17. 40 is 4 tens, so 6 × 40 is 6 × 4 tens = 24 tens = 240. That is why 6 × 40 = 240 follows from 6 × 4 = 24.

Q18. 12 × 100 = 1 200, and 1 000 ÷ 10 = 100. 1 200 is higher than 100, so **12 × 100** gives the higher answer.

Q19. 9 boxes of 100 books is 9 × 100 = **900 books**.

Q20. (a) 4 sheets of 30 is 4 × 3 tens = 12 tens = **120 stickers**. (b) 120 shared between 30 students is 12 tens ÷ 3 tens = **4 stickers each**.

Q21. (a) 10 × 10 × 10 × 10 × 10 = 100 000 — that is **five 10s** multiplied together. (b) 100 000 ÷ 1 000 = **100 groups**: the digits move three places right. (c) 100 000 ÷ 100 = **1 000 blocks**: the digits move two places right. (d) Maya is right. ÷ 100 moves every digit two places to the right, and 100 000 becomes 1 000. The picture agrees: 100 squares of 1 000 people shared into blocks of 100 gives 1 000 blocks.

Efficient mental and written strategies for the four operations

> **Code `VC2M4N06`** (Victorian Curriculum F–10 Version 2.0, Mathematics, Level 4; authority file `maths_4.json`): "develop efficient mental and written strategies and use appropriate digital tools for solving problems involving addition and subtraction, and multiplication and division where there is no remainder". This section draws on elaborations `VC2M4N06.E01`–`VC2M4N06.E06`.

What you need to know

In Year 3 you added and subtracted numbers up to 100, and you learnt the 2, 3, 4, 5 and 10 times tables. Both come back in this section.

An **efficient strategy** is a way of working out an answer that uses what you know about numbers, so you do not have to count one by one. Different numbers suit different strategies, and choosing a good one is what this section is about. This section has two parts. Part (i) is addition and subtraction strategies. Part (ii) is multiplication and division strategies.

> **Teacher note.** Subtopic 3A (`VC2M4A02`, the multiplication facts to 10 × 10) may be taught before or after this chapter. Nothing in 1C needs it to have happened first: where a question calls for a fact beyond the 2, 3, 4, 5 and 10 tables, the student builds it from an array or a known fact (for example 7 × 8 = 5 × 8 + 2 × 8 = 56), and that building is itself one of the strategies of this section.

Digital tools. A program that works with rows and columns of numbers can add and multiply for you. Two real programs like this are **Microsoft Excel** and **Google Sheets**.

> Source: Microsoft, *Microsoft Excel*, retrieved 2026-08-20. Source: Google, *Google Sheets*, retrieved 2026-08-20.

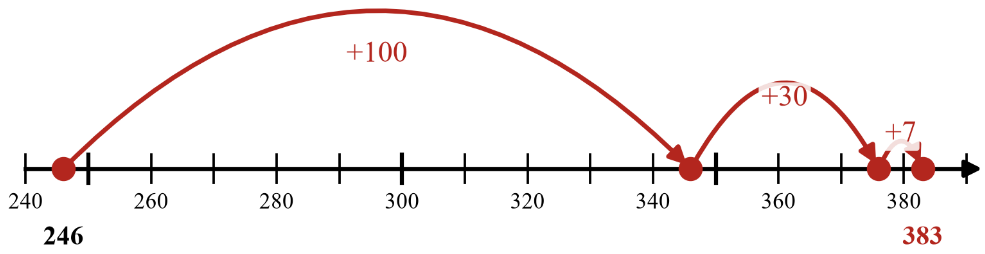
Digital tools are allowed in this section but not required: every question here can be worked out without one.

Part (i) — Addition and subtraction strategies

Place value partitioning. *Partitioning* means splitting a number into its parts: the hundreds, the tens and the ones. To add two numbers, split both, add the matching parts, then put the parts back together. Example 1 shows this.

Jump strategies. Keep the first number in your head and jump along a number line by hundreds, then tens, then ones.

246 + 137: jump the hundreds, the tens, then the ones, so 246 + 137 = 383

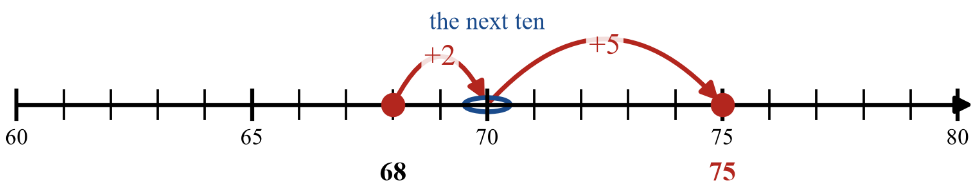


A number line from 240 to 390. Red jumps start at 246: +100 lands on 346, +30 lands on 376, +7 lands on 383, so 246 + 137 = 383.

The jumps can be any sizes that suit the numbers — the number line does not mind.

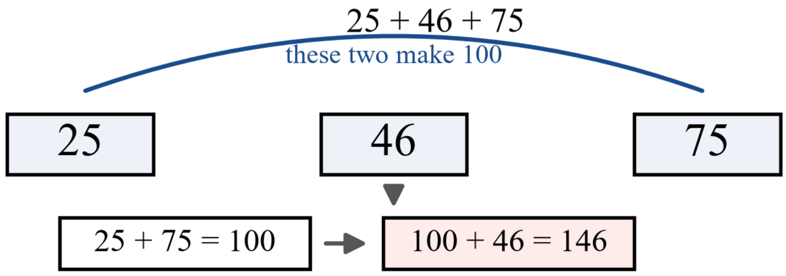
Bridging tens. When a jump crosses the next ten, jump to the ten first, then jump what is left.

68 + 7: first jump to the next ten (68 + 2 = 70), then jump the rest (70 + 5 = 75)



A number line from 60 to 80. A red jump of +2 goes from 68 to the next ten, 70, which is ringed in blue, then a jump of +5 goes to 75, so 68 + 7 = 75.

Compatible numbers. Compatible numbers are numbers that fit together nicely, like 25 and 75, which make 100. When adding three or more numbers, look for a compatible pair first.



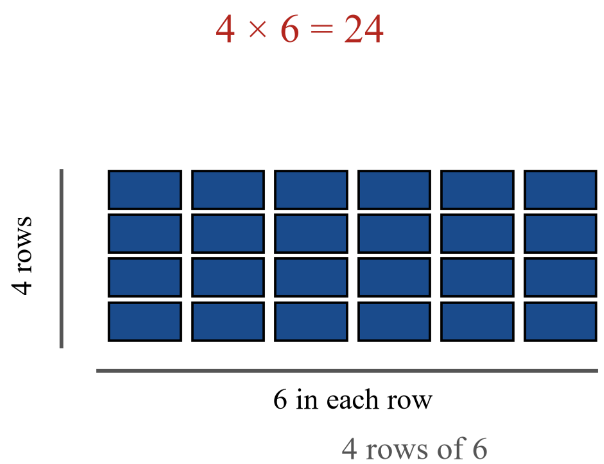
25 + 46 + 75: swap the order so the numbers that make 100 sit together, then add what is left

Number cards 25, 46 and 75. A blue line joins 25 and 75 because these two make 100. Boxes below show 25 + 75 = 100, then 100 + 46 = 146.

The inverse relationship. Addition and subtraction are inverse operations — each one undoes the other. So 132 − 58 can be worked out as a missing part: think 58 + ? = 132. Example 2 shows this.

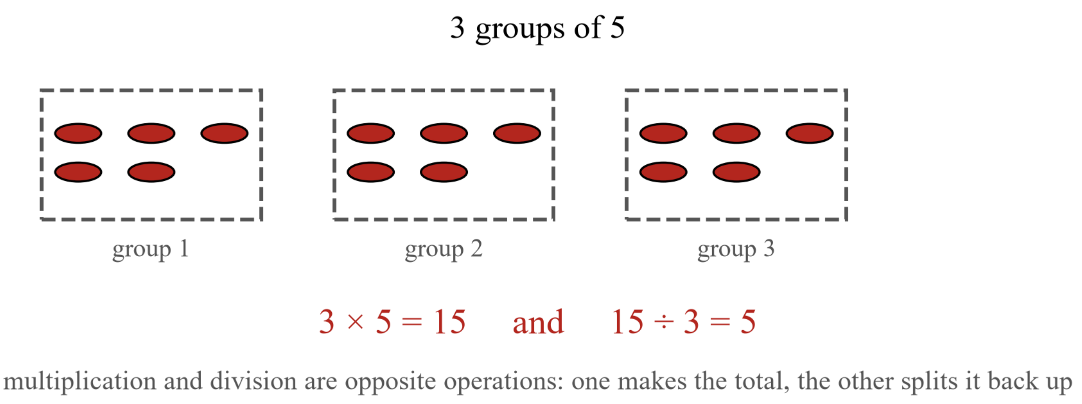
Part (ii) — Multiplication and division strategies

Arrays. An array lines things up in rows and columns. The rows show how many groups there are and the columns show how many are in each group, and the array gives a multiplication number sentence.



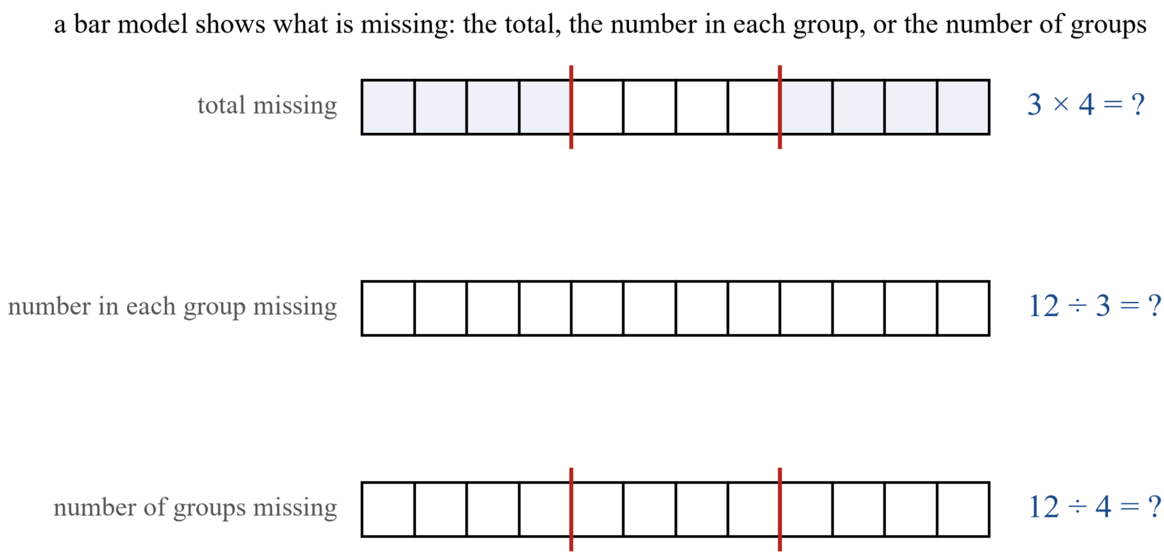
An array of blue squares in 4 rows with 6 in each row, labelled 4 rows at the side and 6 in each row below, showing 4 × 6 = 24.

Groups: multiplication and division. The same picture of equal groups tells two stories. Multiplication makes the total, and division splits the total back into equal groups.



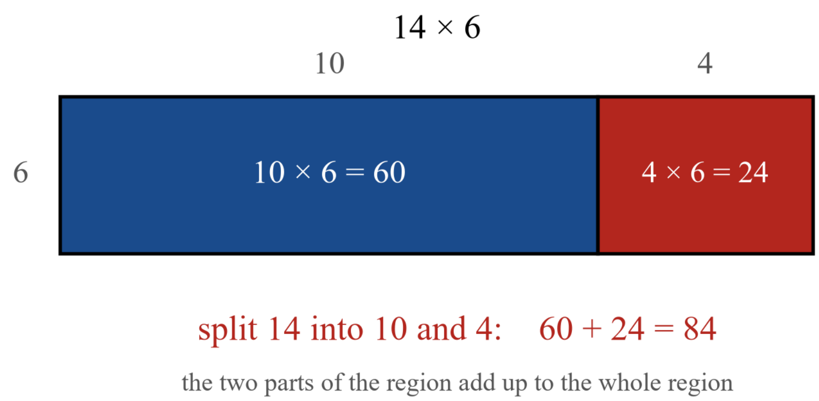
Three dashed boxes each holding 5 red counters, labelled group 1, group 2 and group 3. Below, the two number sentences 3 × 5 = 15 and 15 ÷ 3 = 5.

Bar models: what is missing? A bar model shows the equal groups and helps you see what is missing — the total, the number in each group, or the number of groups. The missing part tells you whether to multiply or to divide.



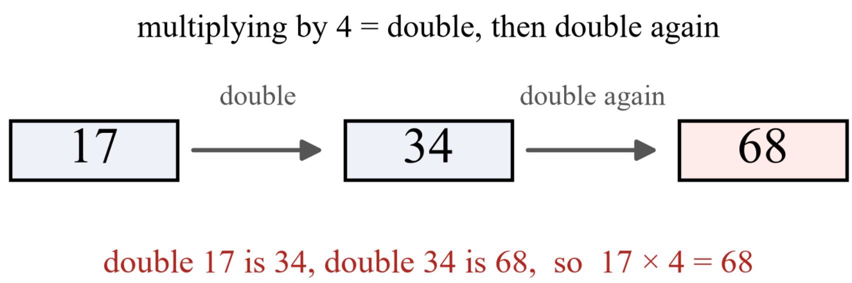
Three bar models built from 12 cells. First: 3 groups of 4 with the total missing, 3 × 4 = ?. Second: the number in each group missing, 12 ÷ 3 = ?. Third: the number of groups missing, 12 ÷ 4 = ?.

An area model. A rectangle can be split into two parts. For 14 × 6, split 14 into 10 and 4: the two parts, 10 × 6 and 4 × 6, add up to the whole rectangle.



A rectangle with height 6 split into a blue part labelled 10 × 6 = 60 and a red part labelled 4 × 6 = 24, showing 14 × 6 = 84 because 60 + 24 = 84.

Double, double. Multiplying by 4 is the same as doubling, then doubling again.



Boxes showing 17, an arrow labelled double to 34, and an arrow labelled double again to 68, so 17 × 4 = 68.

Building facts you do not know yet. If a fact is not quick yet, build it from one you know: 6×8 is 5×8 plus one more 8, so $40 + 8 = 48$. An array makes this easy to see.

Worked examples

Example 1 — adding with place value partitioning: 246 + 137

Split both numbers into hundreds, tens and ones, add the matching parts, then put the parts back together.

246 + 137 split into hundreds, tens and ones

246	=	200	40	6
137	=	100	30	7
add the parts	=	300	70	13

300 + 70 + 13 = 383

add the hundreds, then the tens, then the ones, then put the parts back together

Boxes splitting 246 into 200, 40 and 6, and 137 into 100, 30 and 7. The matching parts are added to make 300, 70 and 13, and 300 + 70 + 13 = 383.

Working	Comment
200 + 100 = 300	Add the hundreds.
40 + 30 = 70	Add the tens.
6 + 7 = 13	Add the ones.
300 + 70 + 13 = 383	Put the parts back together.

So 246 + 137 = **383**.

Example 2 — subtracting with the inverse: 132 − 58

Think of the missing part: 58 + ? = 132. Then count on from 58 to 132 and add the jumps.

132 − 58 = ?

whole = 132

58	?

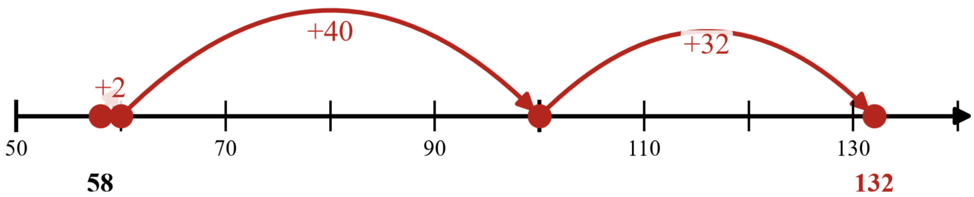
think: 58 + ? = 132

58 + 2 = 60, 60 + 40 = 100, 100 + 32 = 132

the jumps are 2 + 40 + 32 = 74, so 132 − 58 = 74

A bar model with whole 132 split into a part of 58 and a part marked ?. Below: think 58 + ? = 132, with 58 + 2 = 60, 60 + 40 = 100, 100 + 32 = 132, and the jumps 2 + 40 + 32 = 74, so 132 − 58 = 74.

count on from 58 to 132: the jumps are 2, 40 and 32, and 2 + 40 + 32 = 74



A number line from 50 to 140. Red jumps count on from 58: +2 to 60, +40 to 100, +32 to 132. The jumps are 2, 40 and 32, and 2 + 40 + 32 = 74.

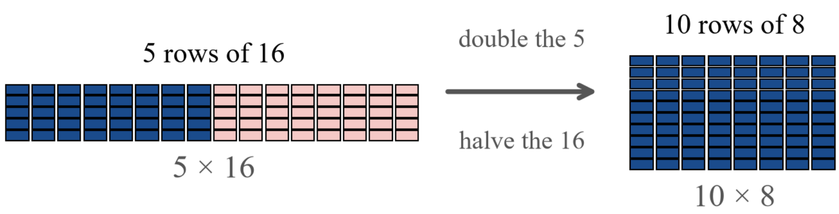
Working	Comment
58 + 2 = 60	Jump to the next ten.
60 + 40 = 100	Jump to the next hundred.
100 + 32 = 132	Jump the rest.
2 + 40 + 32 = 74	The jumps are the answer.

So 132 − 58 = **74**. Check: 58 + 74 = 132. ✓

Example 3 — doubling and halving: 5 × 16

Double one number and halve the other, and the total stays the same. Double 5 is 10, and half of 16 is 8.

5 × 16: halve 16 to get 8, double 5 to get 10 — same number of squares



so 5 × 16 = 10 × 8 = 80

Two grids of squares. Left: 5 rows of 16, with the second half of each row shaded pink. Right: 10 rows of 8. The arrow between them is labelled double the 5 and halve the 16, so 5 × 16 = 10 × 8 = 80.

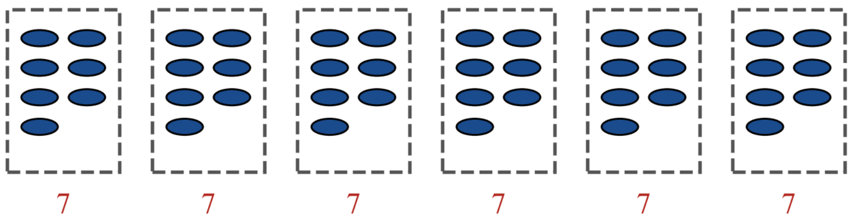
Working	Comment
double 5 is 10	10 is an easy number to multiply by.
half of 16 is 8	halving gives the 16 back in 8s.
10 × 8 = 80	A tens fact.

So 5 × 16 = **80**. Check another way: 10 × 16 = 160, and half of 160 is 80. ✓

Example 4 — sharing with no remainder: 42 ÷ 6

Share 42 into 6 equal groups. In this section we only divide when every group gets the same, with nothing left over.

42 shared equally into 6 groups



42 ÷ 6 = 7 in each group, with none left over

check with multiplication: 7 × 6 = 42

Six dashed boxes each holding 7 blue counters, showing 42 shared equally into 6 groups: 42 ÷ 6 = 7 in each group, with nothing left over. Check with multiplication: 7 × 6 = 42.

Working	Comment
42 shared into 6 groups	7 in each group, nothing left over.
42 ÷ 6 = 7	The division number sentence.
7 × 6 = 42	Multiplication checks the division.

So 42 ÷ 6 = **7**.

Practice questions

Questions with help

Part (i) — addition and subtraction strategies

Q1. Use place value partitioning to work out 325 + 241. Fill in the blanks.

300 + 200 = 500, 20 + 40 = ____, 5 + 1 = ____, then 500 + ____ + ____ = ____.

Q2. Use jumps to work out 265 + 124. Fill in the blanks: start at 265, jump +100 to ____, jump +20 to ____, jump +4 to ____.

Q3. Use bridging to work out 57 + 6. Help: first jump to the next ten — 57 + 3 = 60. What is left to jump?

Q4. Work out 34 + 28 + 66. Help: look for two numbers that make 100.

Q5. Work out 175 − 48 by thinking 48 + ? = 175. Fill in the jumps: 48 + 2 = 50, 50 + ____ = 100, 100 + ____ = 175. Then add the jumps.

Q6. Work out 260 − 198. Help: 198 is close to 200. Start with 260 − 200 = 60. You took away 2 too many, so add 2 back.

Part (ii) — multiplication and division strategies

Q7. Build 6 × 8 from the 5s fact. Help: 6 × 8 is 5 × 8 plus one more 8. 5 × 8 = 40, so 6 × 8 = 40 + ____ = ____.

Q8. Use double, double to work out 12 × 4. Fill in the blanks: double 12 is ____, double that is ____.

Q9. Use doubling and halving to work out 5 × 14. Fill in the blanks: double 5 is 10, half of 14 is ____, so 5 × 14 = 10 × ____ = ____.

Q10. Use an area model to work out 13 × 3. Fill in the blanks: 10 × 3 = 30 and 3 × 3 = ____, so 13 × 3 = 30 + ____ = ____.

Q11. Work out 56 ÷ 7 by thinking 7 × ? = 56. Help: 7 × 8 = 56.

Q12. Work out $60 \div 4$ by halving, then halving again. Fill in the blanks: half of 60 is ____, half of that is ____.

Questions on your own

Part (i) — addition and subtraction strategies

Q13. Work out $346 + 237$ using place value partitioning.

Q14. Work out $182 + 259$ using jumps on a number line. Write the jumps you made.

Q15. Work out $58 + 6$ using bridging.

Q16. Work out $43 + 39 + 57$. Look for a compatible pair first.

Q17. Work out $164 - 38$ by counting on from 38 to 164.

Q18. Work out $355 - 197$. Think about 200.

Q19. Choose an efficient strategy for $299 + 156$. Say which strategy you chose, and work it out.

Q20. True or false: place value partitioning will work for adding any two whole numbers. Explain your answer.

Q21. I think of a number, add 46 and get 120. What is my number?

Part (ii) — multiplication and division strategies

Q22. Work out 14×3 using place value partitioning.

Q23. Work out 15×4 using double, double.

Q24. Work out 5×26 using doubling and halving.

Q25. Build 6×9 from a fact you know. Show your working.

Q26. An array has 4 rows with 7 in each row. Write a multiplication number sentence and a division number sentence for the array.

Q27. The number sentence $12 \div 3 = 4$ comes from sharing 12 into 3 equal groups. Say what each of the numbers 12, 3 and 4 refers to.

Q28. Work out $84 \div 4$ by halving, then halving again.

Q29. Work out $72 \div 8$. Check your answer with multiplication.

Q30. Work out 12×5 in two different ways. Which strategy was more efficient for you? Say why.

Applied

Q31. The Queen Victoria Market is a large open-air market in Melbourne. It opened in 1878, and fruit and vegetables have been sold there ever since.

> Source: Queen Victoria Market, *About the Market*, qvm.com.au, retrieved 2026-08-20. Source: Wikipedia, *Queen Victoria Market*, en.wikipedia.org, retrieved 2026-08-20.

A fruit shop at the market counts its apples.

(a) The shop sold 234 apples on Saturday and 189 apples on Sunday. How many apples did it sell altogether? Name the strategy you used.

(b) The shop had 500 apples at the start of Saturday. After selling 423 apples over the weekend, how many were left?

(c) The apples are packed in trays of 6. The shop sells 13 trays on Monday. How many apples is that?

(d) On Tuesday the shop packs 72 apples into 6 equal boxes for schools. How many apples go in each box? How do you know there is no remainder?

(e) Dana says: “Doubling and halving works for every multiplication.” Is Dana right? Try it on 7 × 9 to help you explain.

Answers

Q1. 60, 6; 500 + 60 + 6 = 566. **Q2.** 365, 385, 389. **Q3.** 3 left; 60 + 3 = 63. **Q4.** 128. **Q5.** 50, 75; jumps 2 + 50 + 75 = 127. **Q6.** 62. **Q7.** 8, 48. **Q8.** 24, 48. **Q9.** 7, 7, 70. **Q10.** 9, 9, 39. **Q11.** 8. **Q12.** 30, 15. **Q13.** 583. **Q14.** 441. **Q15.** 64. **Q16.** 139. **Q17.** 126. **Q18.** 158. **Q19.** 455; see worked answers. **Q20.** True; see worked answers. **Q21.** 74. **Q22.** 42. **Q23.** 60. **Q24.** 130. **Q25.** 54; see worked answers. **Q26.** 4 × 7 = 28 and 28 ÷ 4 = 7 (or 28 ÷ 7 = 4). **Q27.** See worked answers. **Q28.** 21. **Q29.** 9. **Q30.** 60; see worked answers. **Q31.** (a) 423; (b) 77; (c) 78; (d) 12; (e) no — see worked answers.

Worked answers

Q1. 300 + 200 = 500, 20 + 40 = **60**, 5 + 1 = **6**, then 500 + 60 + 6 = **566**.

Q2. 265 + 100 = **365**, 365 + 20 = **385**, 385 + 4 = **389**.

Q3. 57 + 3 = 60, and 6 − 3 = **3** is left to jump: 60 + 3 = **63**.

Q4. 34 and 66 are compatible: 34 + 66 = 100. Then 100 + 28 = **128**.

Q5. 48 + 2 = 50, 50 + **50** = 100, 100 + **75** = 175. The jumps are 2 + 50 + 75 = **127**, so 175 − 48 = 127. Check: 48 + 127 = 175. ✓

Q6. 260 − 200 = 60. I took away 2 too many (198 is 2 less than 200), so add 2 back: 60 + 2 = **62**.

Q7. 5 × 8 = 40, so 6 × 8 = 40 + **8** = **48**.

Q8. Double 12 is **24**; double 24 is **48**. So 12 × 4 = 48.

Q9. Half of 14 is **7**, so 5 × 14 = 10 × **7** = **70**.

Q10. 3 × 3 = **9**, so 13 × 3 = 30 + **9** = **39**.

Q11. 7 × 8 = 56, so 56 ÷ 7 = **8**.

Q12. Half of 60 is **30**; half of 30 is **15**. So 60 ÷ 4 = 15. Check: 15 × 4 = 60. ✓

Q13. 300 + 200 = 500, 40 + 30 = 70, 6 + 7 = 13; then 500 + 70 + 13 = **583**.

Q14. Jumps of +200, +50 and +9: 182 + 200 = 382, 382 + 50 = 432, 432 + 9 = **441**. (Other jumps are fine — the answer is the same.)

Q15. 58 + 2 = 60, then 60 + 4 = **64**.

Q16. 43 + 57 = 100, then 100 + 39 = **139**.

Q17. Count on: 38 + 2 = 40, 40 + 60 = 100, 100 + 64 = 164. The jumps are 2 + 60 + 64 = **126**.

Q18. 355 − 200 = 155. I took away 3 too many, so add 3 back: 155 + 3 = **158**.

Q19. 299 is close to 300, so jump with 300 and fix it: 300 + 156 = 456, then take away 1 to get **455**. (Bridging with a compatible number like 300 is the efficient choice here.)

Q20. True. Every whole number can be split into hundreds, tens and ones, so the matching parts can always be added and put back together. Some other strategies only suit some numbers, but partitioning always works.

Q21. Think 46 + ? = 120. Count on: 46 + 4 = 50, 50 + 70 = 120. The jumps are 4 + 70 = **74**. Check: 74 + 46 = 120. ✓

Q22. 10 × 3 = 30 and 4 × 3 = 12; then 30 + 12 = **42**.

Q23. Double 15 is 30; double 30 is **60**. So 15 × 4 = 60.

Q24. Double 5 is 10; half of 26 is 13; so 5 × 26 = 10 × 13 = **130**.

Q25. One way: 6 × 9 is 5 × 9 plus one more 9: 45 + 9 = **54**. (Building from 10 is also fine: 10 × 9 = 90, take away 4 lots of 9 — 36 — to get 54.)

Q26. 4 rows of 7: **4 × 7 = 28**. The same array gives **28 ÷ 4 = 7** (28 shared into 4 rows is 7 in each row). 28 ÷ 7 = 4 is also correct.

Q27. 12 is the total being shared, **3** is the number of equal groups, and **4** is the number in each group.

Q28. Half of 84 is 42; half of 42 is **21**. So 84 ÷ 4 = 21. Check: 21 × 4 = 84. ✓

Q29. 8 × 9 = 72, so 72 ÷ 8 = **9**. Check: 9 × 8 = 72. ✓

Q30. Doubling and halving: double 5 is 10, half of 12 is 6, so 12 × 5 = 10 × 6 = 60. Partitioning: 10 × 5 + 2 × 5 = 50 + 10 = 60. Both give **60**; doubling and halving was more efficient here because it made a tens fact in one step. (Your choice may differ — say why it was quicker for you.)

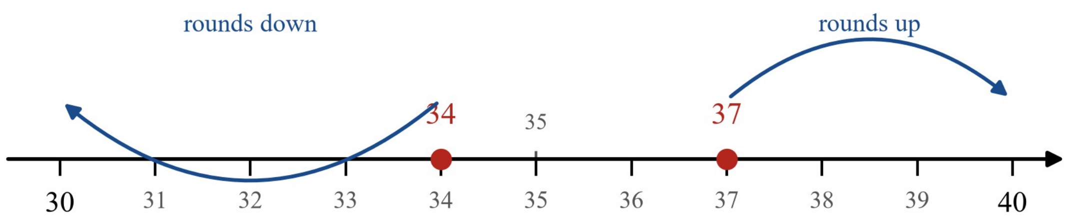
Q31. (a) 234 + 189: partitioning gives 200 + 100 = 300, 30 + 80 = 110, 4 + 9 = 13; then 300 + 110 + 13 = **423 apples**. (Jumping 234 + 200 = 434, then taking away 1 to get 423, is just as good.) (b) 500 − 423: count on 423 + 7 = 430, 430 + 70 = 500; the jumps are 7 + 70 = **77 apples left**. (c) 13 trays of 6: 10 × 6 + 3 × 6 = 60 + 18 = **78 apples**. (d) 72 ÷ 6 = **12 apples** in each box. There is no remainder because 12 × 6 = 72 exactly — the multiplication checks the division. (e) Dana is **not** right. Doubling and halving needs the halved number to split with nothing left over. For 7 × 9, half of 9 is not a whole number, so the strategy does not fit; another strategy does, for example 7 × 9 = 5 × 9 + 2 × 9 = 45 + 18 = 63. Doubling and halving is efficient when it fits, but it is not the right tool for every multiplication.

Rounding and estimating to check that an answer is reasonable

Code `VC2M4N07` (Victorian Curriculum F–10 Version 2.0, Mathematics, Level 4; authority file `maths_4.json`): “choose and use estimation and rounding to check and explain the reasonableness of calculations, including the results of financial transactions”. This section draws on elaborations `VC2M4N07.E01`, `.E02` and `.E03`.

What you need to know

In Year 3 you rounded numbers to the nearest ten and the nearest hundred, and you used rounding to check that an answer made sense. Both ideas come back here, and we build on them.



34 ends in 4, so it rounds down to 30. 37 ends in 7, so it rounds up to 40.

A number line from 30 to 40 with a grey dotted mark at 35, the halfway point. Red dots sit at 34 and 37. A blue arrow goes down from 34 to 30, and a blue arrow goes up from 37 to 40.

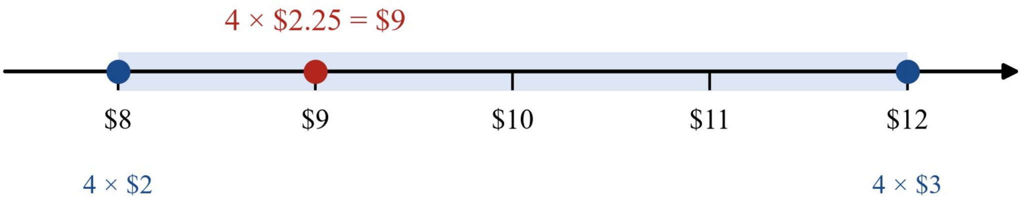
34 ends in 4, so it rounds down to 30. 37 ends in 7, so it rounds up to 40.

Estimates. To **estimate** means to make a careful guess about what an answer will be, without doing the exact working. An **estimate** is close to the exact answer, and you can usually find it quickly, in your head. An estimate is sometimes called an **approximation**.

Between two amounts. One way to estimate is to say what amounts the answer will be between. Think about 4 × \$2.25. Each \$2.25 is more than \$2 and less than \$3, so:

- 4 × \$2 = \$8
- 4 × \$3 = \$12

The answer must be between \$8 and \$12.



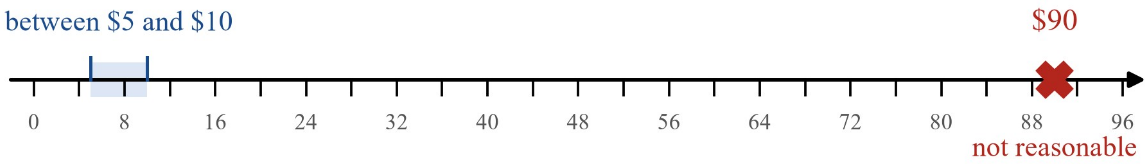
The exact answer, \$9, is between \$8 and \$12.

A number line from 8 dollars to 12 dollars. The part between \$8 and \$12 is shaded light blue. Blue dots sit at \$8 and \$12, and a red dot sits at \$9. The exact answer, \$9, is between \$8 and \$12.

Round first, then work. Another way to estimate is to round each number first, then do the working with the rounded numbers. For 38 + 47: 38 rounds to 40, and 47 rounds to 50, so 38 + 47 is about 40 + 50 = 90. The exact answer is 85, which is close to 90.

Is your answer reasonable? An answer is **reasonable** when it is close to what you expect. When you finish a calculation, ask: *is my answer close to my estimate?* If the two are close, the answer is reasonable — it makes sense. If the answer is far away from the estimate, it is not reasonable, and you should check the working.

Say you worked out 5 × \$1.80 and got \$90. Each \$1.80 is between \$1 and \$2, so the answer must be between 5 × \$1 = \$5 and 5 × \$2 = \$10. \$90 is nowhere near that, so it is not reasonable.



5 × \$1.80 must be between \$5 and \$10, so \$90 tells you to check the working.

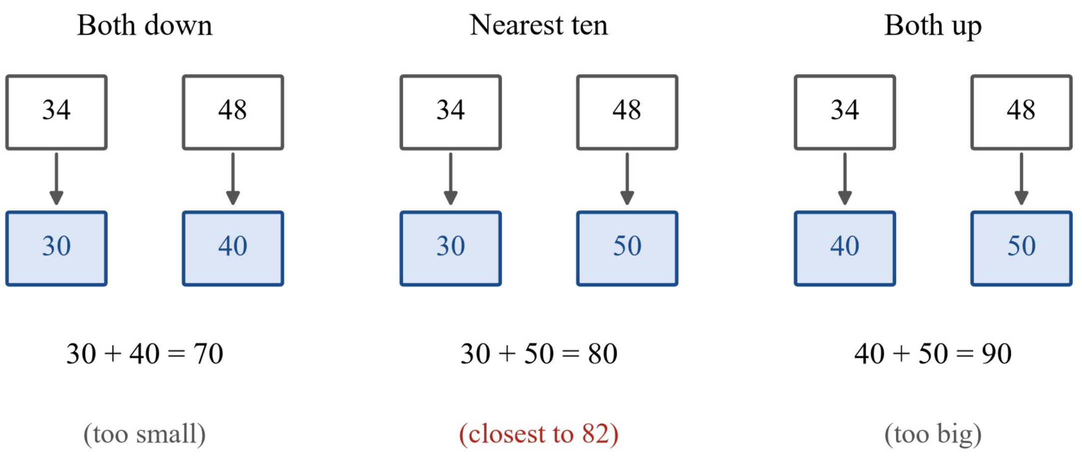
A number line from 0 to 100. The part between \$5 and \$10 is shaded light blue. A red cross sits at \$90 and is marked not reasonable.

\$90 tells you to check the working. (The exact answer is 5 × \$1.80 = \$9.)

Too big or too small. When you add two numbers:

- rounding **both numbers down** gives an estimate that is less than the exact answer;
- rounding **both numbers up** gives an estimate that is more than the exact answer;
- rounding **one number up and one number down** often gives the closest estimate, because the two roundings balance out.

An estimate that is more than the exact answer is called an **overestimate**. When you plan money, an overestimate is the safe one — you know you will have enough.



Rounding one number up and one down balances out — it gives the closest estimate.

Three groups of boxes for 34 plus 48. The first group rounds both numbers down, 30 plus 40 equals 70, and is marked too small. The second group rounds to the nearest ten, 30 plus 50 equals 80, and is marked closest to 82. The third group rounds both numbers up, 40 plus 50 equals 90, and is marked too big.

Money and transactions. A **financial transaction** is any time money is paid or received — buying a ticket, paying for lunch, or getting change. This section uses money transactions to practise estimating. The same ideas work for a shopping trip or an **excursion** (a trip your class goes on): you can use a **budget**, which is a plan for how much money you will need.

Worked examples

Example 1 — What amounts will the answer be between?

Ruby buys 5 packets of biscuits. Each packet costs \$2.60. Estimate the cost, and say what amounts the answer will be between.

The cost is between \$10 and \$15.

Five packets of biscuits, each marked \$2.60, with the words more than \$2, less than \$3 under each packet. A line under all five packets shows 5 times \$2 equals \$10 at one end and 5 times \$3 equals \$15 at the other end.

Working	Comment
\$2.60 is more than \$2 and less than \$3.	Each packet sits between two dollar amounts.
5 × \$2 = \$10	Round down: 5 lots of \$2.
5 × \$3 = \$15	Round up: 5 lots of \$3.

The cost is **between $10 and $15**.

Exact check: 5 × $2.60. We know 5 × $2 = $10, and 5 × 60c = 300c = $3, so the exact cost is $10 + $3 = **$13**. $13 is between $10 and $15. ✓ The estimate is reasonable.

Example 2 — A budget for morning tea

Your class is planning morning tea. The shopping list has four items: a bottle of juice $2.90, a pack of muffins $4.45, a bag of apples $3.85, and a box of strawberries $4.60.

(a) Round each price to the nearest dollar and estimate the total.

(b) Is $15 enough? Explain.

(c) When you plan money, why is it safer to round every price up to the next dollar?

Item	Price	Nearest dollar	Rounded up
Juice	$2.90	$3	$3
Muffins	$4.45	$4	$5
Apples	$3.85	$4	$4
Strawberries	$4.60	$5	$5
Total	**$15.80**	**$16**	**$17**

Rounding up gives $17, so we are sure to bring enough money.

A table for the morning tea budget. The rows show the price, the nearest dollar, and the rounded-up amount for juice, muffins, apples and strawberries. The total is $15.80, which is $16 to the nearest dollar and $17 rounded up.

Working	Comment
$3 + $4 + $4 + $5 = $16	(a) Round each price to the nearest dollar. The estimated total is $16.
$16 is more than $15.	(b) The estimate says $15 is not enough.
Check: $2.90 + $4.45 + $3.85 + $4.60 = $15.80.	The exact total — $15 really is 80c short.
Nearest-dollar rounding took the muffins down: $4.45 became $4.	Rounding to the nearest dollar can make the total less than the real cost.
$3 + $5 + $4 + $5 = $17	(c) Round every price up to the next dollar. The overestimate is $17.

Rounding up gives $17, so bringing $17 means you are sure to have enough money. You might have a little left over, but you will not be short.

Example 3 — Three ways to round: which is best?

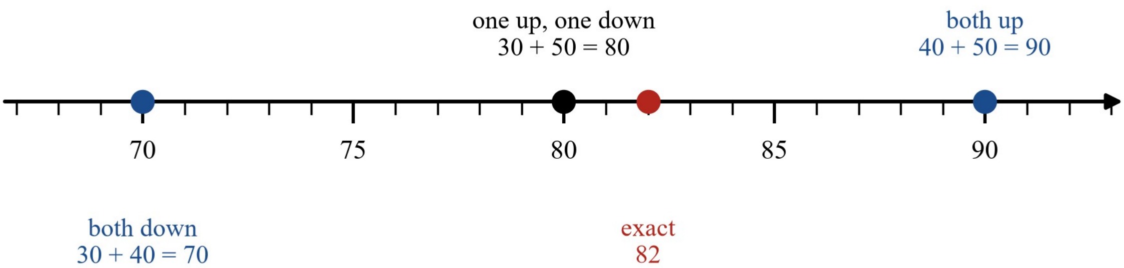
Estimate 34 + 48 three ways: round both numbers down, round both numbers up, and round each number to the nearest ten. Which estimate is best, and why?

Way	Rounded numbers	Estimate
Both down	30 + 40	70
Nearest ten	30 + 50	80

Way	Rounded numbers	Estimate
Both up	40 + 50	90

The exact answer is 34 + 48 = 82. How far is each estimate from 82?

- 82 − 70 = 12
- 82 − 80 = 2
- 90 − 82 = 8



80 is the closest estimate to the exact answer, 82.

A number line from 70 to 90 with dots at 70, 80, 82 and 90. At 70, both numbers rounded down, 30 plus 40 equals 70. At 80, one up and one down, 30 plus 50 equals 80. At 82, the exact answer. At 90, both numbers rounded up, 40 plus 50 equals 90.

The best estimate is **80**, because it is closest to 82. It is best because 34 rounds down and 48 rounds up, so the two roundings balance out.

Practice questions

Questions with help

Q1. Round each number to the nearest ten: 23, 48, 61.

Q2. 47 is between 40 and 50. Rounded to the nearest ten, 47 rounds to ____.

Q3. Complete: 3 × $4 = ____ and 3 × $5 = ____. So 3 × $4.20 is between ____ and ____.

Q4. Round 37 and 52 to the nearest ten, then estimate 37 + 52.

Q5. Round 19 to the nearest ten, then estimate 6 × 19.

Q6. True or false: an estimate must be exactly the same as the exact answer.

Q7. Round each price to the nearest dollar: $3.20, $6.80, $1.45.

Q8. Sam estimated 45 + 38 as 50 + 40 = 90. His exact answer is 83. Is 83 reasonable? Explain.

Questions on your own

Q9. For each calculation, say what amounts the answer will be between.

(a) 4 × $2.30

(b) 6 × $1.70

(c) 5 × $3.90

Q10. Round each number to the nearest ten, then estimate.

(a) $56 + 33$

(b) $84 - 27$

(c) $47 + 41$

Q11. Round each number to the nearest ten, then estimate.

(a) 4×29

(b) 7×62

(c) 5×18

Q12. Zoe worked out $6 \times 47 = 282$. Use estimating to check whether 282 is reasonable. Explain.

Q13. Max worked out $38 + 55 = 193$. Estimate the answer, and explain what Max should do.

Q14. This question is about $34 + 48$.

(a) Round both numbers down and estimate.

(b) Round both numbers up and estimate.

(c) Round each number to the nearest ten and estimate.

(d) The exact answer is 82. Which estimate is closest? Why does that way work best?

Q15. At lunch time, the school sells pies for $3.90 each. Estimate the cost of 8 pies.

Q16. A bottle of water costs $4.60. Priya wants to buy 3 bottles. She can round the price down to $4, or up to $5.

(a) What estimate does rounding down give?

(b) What estimate does rounding up give?

(c) Which estimate is an overestimate?

Q17. Lily has $10 to spend. She wants a notebook for $3.80, a pack of markers for $4.45, and a glue stick for $1.90.

(a) Round each price to the nearest dollar and estimate the total.

(b) The exact total is $10.15. Is $10 enough? Explain.

(c) Round each price up to the next dollar. What is the safe estimate?

Q18. Fill in the blank: when you round both numbers down before you add, the estimate is always ____ than the exact answer.

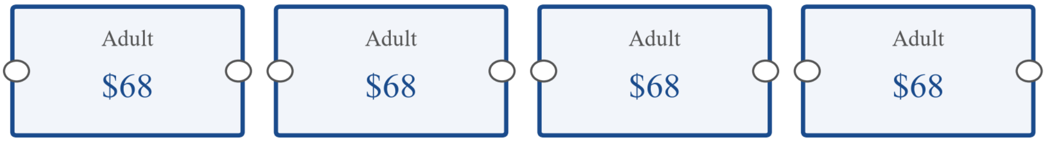
Q19. A school has 297 students. Each student gives $4 to a charity. Round 297 to the nearest hundred and estimate how much money is collected.

Q20. When you plan money for a shopping trip or an excursion, why is it sensible to round the prices up?

Applied

Q21. Sovereign Hill in Ballarat is an outdoor museum about Victoria's gold rush. An adult ticket costs $68. (Ticket prices can change. This question uses $68.)

Source: Sovereign Hill, *Tickets*, sovereignhill.com.au, retrieved 2026-08-20.



Round \$68 to \$70: $4 \times \$70 = \$280$

The exact cost, $4 \times \$68 = \$272$, is between \$240 and \$280.

Four adult tickets, each marked \$68. Below them: round \$68 to \$70, 4 times \$70 equals \$280. The exact cost, 4 times \$68 equals \$272, is between \$240 and \$280.

(a) Round \$68 to the nearest ten.

(b) A group of 4 adults goes together. Using the rounded price, estimate the total cost.

(c) Say what amounts the exact cost will be between.

(d) The exact cost is $4 \times \$68 = \$272$. Is your estimate reasonable? Explain.

(e) The group rounds down and brings only \$240. Is that enough? If not, how much more money do they need?

Answers

Q1. 20, 50, 60. **Q2.** 50. **Q3.** \$12 and \$15; between \$12 and \$15. **Q4.** 40 and 50; about 90. **Q5.** 20; about 120. **Q6.** False — an estimate only needs to be close. **Q7.** \$3, \$7, \$1. **Q8.** Yes — 83 is close to 90. **Q9.** (a) Between \$8 and \$12; (b) between \$6 and \$12; (c) between \$15 and \$20. **Q10.** (a) 90; (b) 50; (c) 90. **Q11.** (a) 120; (b) 420; (c) 100. **Q12.** Yes, reasonable — see worked answers. **Q13.** About 100; 193 is not reasonable — see worked answers. **Q14.** (a) 70; (b) 90; (c) 80; (d) 80. **Q15.** About \$32. **Q16.** (a) \$12; (b) \$15; (c) \$15. **Q17.** (a) \$10; (b) no; (c) \$11. **Q18.** less. **Q19.** \$1200. **Q20.** See worked answers. **Q21.** (a) \$70; (b) \$280; (c) between \$240 and \$280; (d) yes; (e) \$32 more.

Worked answers

Q1. 23 ends in 3, so it rounds down to **20**. 48 ends in 8, so it rounds up to **50**. 61 ends in 1, so it rounds down to **60**.

Q2. 47 ends in 7, and 47 is closer to 50 than to 40, so it rounds to **50**.

Q3. 3 × \$4 = **\$12** and 3 × \$5 = **\$15**. \$4.20 is between \$4 and \$5, so 3 × \$4.20 is **between \$12 and \$15**.

Q4. 37 rounds to 40 and 52 rounds to 50, so 37 + 52 is about 40 + 50 = **90**.

Q5. 19 rounds to 20, so 6 × 19 is about 6 × 20 = **120**.

Q6. False. An estimate is close to the exact answer, but not exactly the same.

Q7. \$3.20 rounds to **\$3**, \$6.80 rounds to **\$7**, and \$1.45 rounds to **\$1**.

Q8. Yes. 83 is close to Sam's estimate of 90, so 83 is reasonable.

Q9. (a) \$2.30 is between \$2 and \$3: 4 × \$2 = \$8 and 4 × \$3 = \$12, so the answer is **between \$8 and \$12**. (b) \$1.70 is between \$1 and \$2: 6 × \$1 = \$6 and 6 × \$2 = \$12, so the answer is **between \$6 and \$12**. (c) \$3.90 is between \$3 and \$4: 5 × \$3 = \$15 and 5 × \$4 = \$20, so the answer is **between \$15 and \$20**.

Q10. (a) 56 rounds to 60 and 33 rounds to 30: 60 + 30 = **90**. (b) 84 rounds to 80 and 27 rounds to 30: 80 − 30 = **50**. (c) 47 rounds to 50 and 41 rounds to 40: 50 + 40 = **90**.

Q11. (a) 29 rounds to 30: 4 × 30 = **120**. (b) 62 rounds to 60: 7 × 60 = **420**. (c) 18 rounds to 20: 5 × 20 = **100**.

Q12. 47 rounds to 50, so 6 × 47 is about 6 × 50 = 300. Also 6 × 40 = 240, so the answer must be between 240 and 300. 282 is between 240 and 300, and close to 300, so **282 is reasonable**. (Exact: 6 × 47 = 282. ✓)

Q13. 38 rounds to 40 and 55 rounds to 60: 40 + 60 = 100. 193 is nowhere near 100, so it is **not reasonable** — Max should **check his working**. (The exact answer is 38 + 55 = 93.)

Q14. (a) 30 + 40 = **70**. (b) 40 + 50 = **90**. (c) 30 + 50 = **80**. (d) **80** is closest to 82. It works best because 34 rounds down and 48 rounds up, so the two roundings balance out.

Q15. \$3.90 rounds up to \$4: 8 × \$4 = **\$32**. The cost is about **\$32**. (Exact: 8 × \$3.90 = \$31.20, which is close to \$32.)

Q16. (a) 3 × \$4 = **\$12**. (b) 3 × \$5 = **\$15**. (c) **\$15** — rounding up gives an estimate that is more than the real cost, so it is the overestimate.

Q17. (a) \$3.80 → \$4, \$4.45 → \$4, \$1.90 → \$2: \$4 + \$4 + \$2 = **\$10**. (b) **No.** The exact total is \$10.15, so \$10 is 15c short. (c) \$4 + \$5 + \$2 = **\$11**. Bringing \$11 means Lily is sure to have enough.

Q18. less. Rounding both numbers down makes each number less than it really is, so the estimate is less than the exact answer.

Q19. 297 rounds to 300: 300 × \$4 = **\$1200**.

Q20. Rounding up gives an overestimate — the estimate is more than you will really pay. So you are sure to have enough money: you might have a little left over, but you will not be short. Rounding down could leave you short.

Q21. (a) \$68 rounds to **\$70**. (b) $4 \times \$70 =$ **\$280**. (c) $4 \times \$60 = \$240$ and $4 \times \$70 = \$280$, so the exact cost is **between \$240 and \$280**. (d) **Yes.** \$272 is between \$240 and \$280, and close to \$280, so the estimate is reasonable. (e) **No** — $\$272 - \$240 =$ **\$32**, so the group needs \$32 more. Rounding down gives an estimate that is less than the real cost. When you plan money, round up.

Algorithms that generate sets of numbers

> **Code `VC2M4N10`** (Victorian Curriculum F–10 Version 2.0, Mathematics, Level 4; authority file `maths_4.json`): "follow and create algorithms involving a sequence of steps and decisions that use addition or multiplication to generate sets of numbers; identify and describe any emerging patterns". This section draws on elaborations `VC2M4N10.E01`, `.E02`, `.E03` and `.E04`.

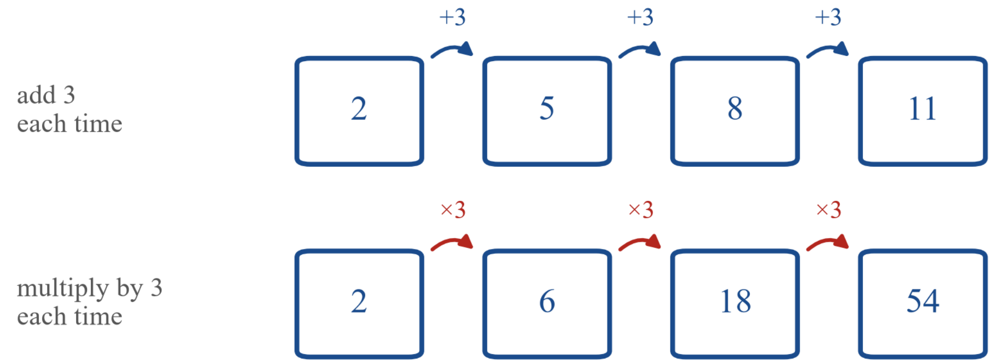
What you need to know

The Victorian Curriculum uses the term **algorithm** but does not say what it means. So in this section, an algorithm is **a list of steps to follow in order, where each step tells you to do one thing**, and every question here can be answered on that definition alone.

You already met number patterns in 1A. There, you listed multiples of numbers like 3, 4, 6, 7, 8 and 9. Here you go one step further. Instead of just listing a pattern, you write down the exact steps that **build** the pattern, so that anyone — or any machine — can follow your steps and get the same numbers. That list of steps is the algorithm.

The four ideas in this section.

Idea	What it means
Sequence of steps	The steps happen one after another, in a fixed order. You do step 1, then step 2, then step 3, and so on.
Decisions	A step can ask a yes-or-no question, like *Is the number even?* You answer, then keep going.
Addition or multiplication	The number work in these algorithms uses only adding or multiplying — no other operations.
Generate a set of numbers	To **generate** numbers means to produce them one at a time by following the steps. A **set** of numbers is just a group of numbers.



same start — multiplying by 3 grows the numbers faster than adding 3

Two rows of number cards starting at 2. The top row adds 3 each time to give 2, 5, 8, 11. The bottom row multiplies by 3 each time to give 2, 6, 18, 54, growing faster.

As you follow the steps and the numbers appear, you **identify** and **describe** any **emerging patterns**. A pattern *emerges* when you can spot something that keeps happening in the numbers, like "every number is even" or "each number is 4 more than the one before."

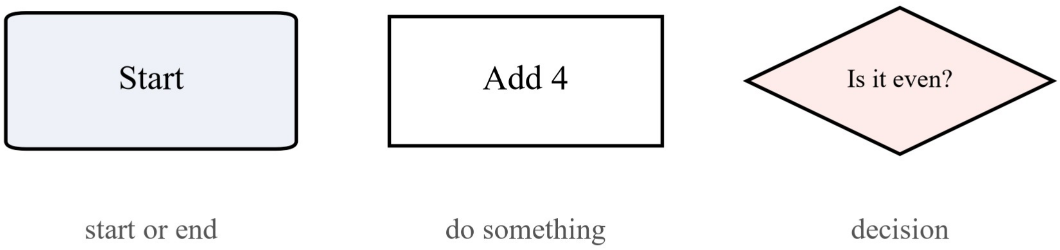
Writing the set down. As you follow an algorithm, write down the number you start with, and every new number you make. The numbers you write down make the set.

One step at a time. In this section, the steps of an algorithm go forward only, one after another. In Year 5 you will meet algorithms that go back and repeat a step.

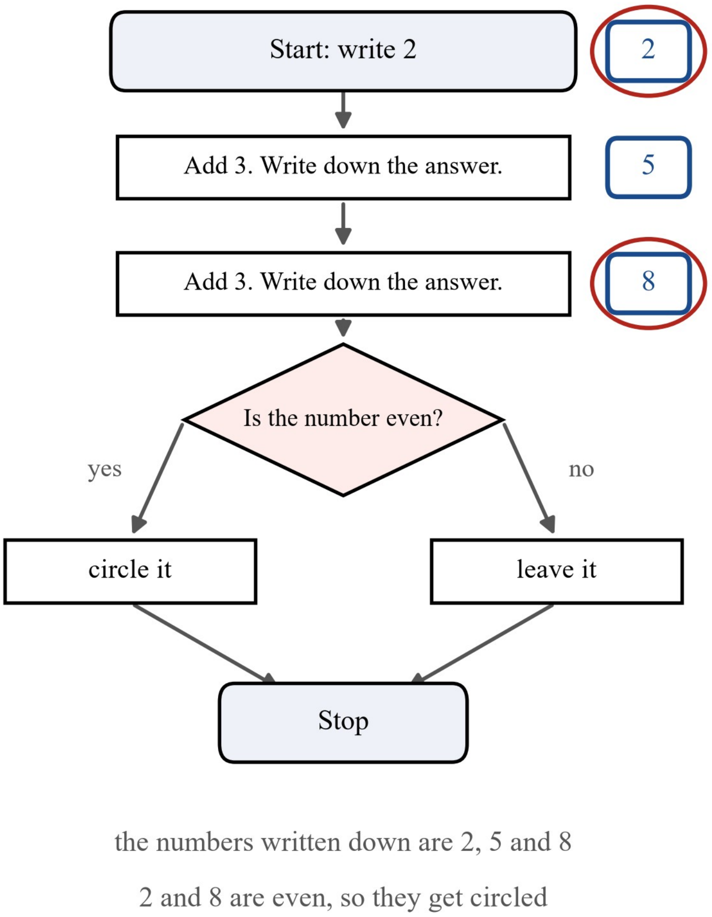
Writing an algorithm as a flow chart. A **flow chart** is a drawing that shows an algorithm's steps as boxes joined by arrows. Each box holds one step, and the arrows show the order to follow.

Box	What it stands for
Start and End	Where the algorithm starts and where it stops
Do something	A step that does number work, like *Add 4* or *Multiply by 3*
Decision	A yes-or-no question, like *Is the number even?*

the three flow chart boxes



The three flow chart boxes side by side: a rounded box labelled Start, a rectangle box labelled Add 4, and a diamond box labelled Is the number even?, with the names start or end, do something and decision below them.



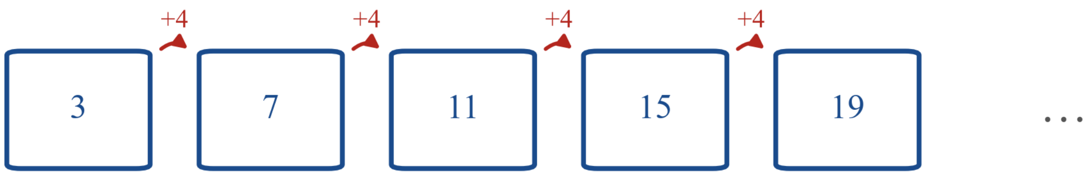
A flow chart going down. A start box says write 2, then two add-3 boxes write 5 then 8, then a diamond box asks Is the number even?. The yes arrow goes to circle it, the no arrow goes to leave it, and both arrows go to a stop box. The cards 2, 5 and 8 sit beside the steps, and 2 and 8 are circled.

Using tools. You can follow an algorithm by hand, with a **calculator**, or with a **spreadsheet**. A spreadsheet is a program that works with numbers laid out in a grid of boxes called **cells**. Two real spreadsheet programs are **Microsoft Excel** and **Google Sheets**.

> Source: Microsoft, *Microsoft Excel*, retrieved 2026-08-19. Source: Google, *Google Sheets*, retrieved 2026-08-19.

Digital tools are permitted in this section but not required. Learn both ways: a good mathematician can follow an algorithm with or without a screen.

No end in sight. A number pattern that keeps following a rule can be **extended** as far as you like — there is always one more number. We say the sequence can go on **indefinitely**. You will never reach a last number, because you can always do the next step.



each step adds 4 — there is always one more number

Number cards showing 3, 7, 11, 15 and 19 with red +4 jumps between them, then dots to show one more number can always be added.

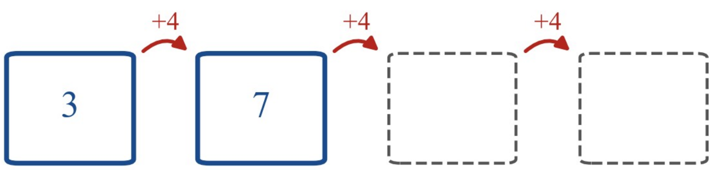
Worked examples

Example 1 — step by step: following an addition algorithm

Here is an algorithm.

1. Start with the number 3. Write it down.
2. Add 4. Write down the answer.
3. Add 4 to your new number. Write down the answer.
4. Add 4 to your new number. Write down the answer.
5. Stop.

Follow the algorithm. What set of numbers does it generate? Describe the pattern you can see.



start at 3, then add 4 each time

Number cards showing 3 and 7, then two blank cards, with red +4 jumps between the cards.

Working	Comment
Start: write 3.	Step 1 says start with 3 and write it down.
$3 + 4 = 7$.	Step 2 says add 4. Write down 7.
$7 + 4 = 11$.	Step 3 says add 4 again. Write down 11.
$11 + 4 = 15$.	Step 4 says add 4 again. Write down 15.
Stop.	Step 5 says stop.

The algorithm generates the set **3, 7, 11, 15**.

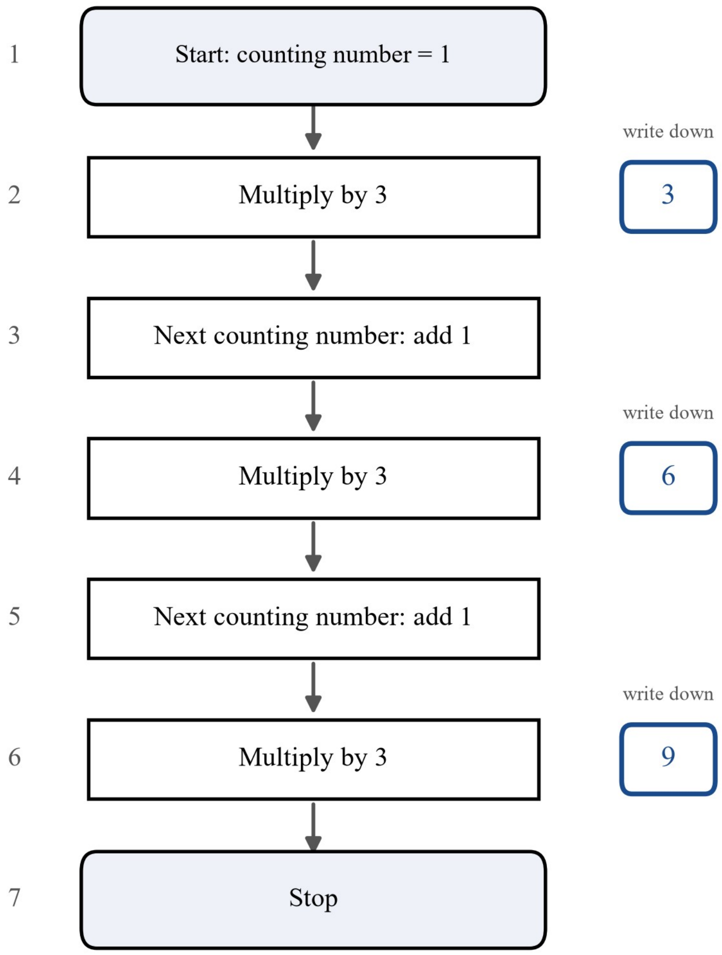
Now describe the emerging pattern.

What you notice	Why
Each number is 4 more than the one before.	The rule is *add 4* every time.
All the numbers are odd.	Start at 3 (odd), and adding 4 keeps it odd.

Example 2 — step by step: creating a flow chart with multiplication

Create a flow chart for an algorithm that generates the multiples of 3. Use a calculator to follow the algorithm, record the numbers, check them, and describe the pattern.

The flow chart below starts counting at 1, multiplies each counting number by 3, and writes down the answer. The number 3 is a **constant**: it stays the same at every step. The chart then moves to the next counting number and does the same again.



the arrows go down from box 1 to box 7, in order

A flow chart with seven boxes numbered 1 to 7, joined by arrows going down. Box 1 is a start box: counting number = 1. Boxes 2, 4 and 6 say multiply by 3, each with a card beside it writing down 3, then 6, then 9. Boxes 3 and 5 say next counting number: add 1. Box 7 is a stop box.

Box number	Box	Running value	Number written down
1	Start: counting number = 1	1	—
2	Multiply by 3	$1 \times 3 = 3$	3
3	Next counting number: add 1	2	—
4	Multiply by 3	$2 \times 3 = 6$	6
5	Next counting number: add 1	3	—
6	Multiply by 3	$3 \times 3 = 9$	9

Box number	Box	Running value	Number written down
7	Stop	—	—

The arrows go down the table, from box 1 to box 7, in order.

Now follow the algorithm on a calculator and record the numbers.

Working	Comment
$1 \times 3 = 3$	Press `1` `×` `3` `=`. The display shows 3.
$2 \times 3 = 6$	Press `2` `×` `3` `=`. The display shows 6.
$3 \times 3 = 9$	Press `3` `×` `3` `=`. The display shows 9.
Record: 3, 6, 9.	Write the numbers down as you go.

Check the results: 3, 6 and 9 are all in the 3 times-table, so the algorithm worked.

The algorithm generates the set **3, 6, 9**. The counting numbers 1, 2 and 3 help the algorithm along, but they are not part of the set — the set is the numbers written down.

The emerging pattern: these are the multiples of 3, and each number is 3 more than the one before.

Example 3 — on your own: a spreadsheet generates the 4 times-table

You can use a spreadsheet to generate a long set of numbers very quickly.

Put the number 1 in cell A1. Use the **fill down** tool to fill column A down to cell A100. Column A now holds the counting numbers 1, 2, 3, … all the way to 100.

Next, type the formula `=A1*4` into cell B1. A **formula** is a rule you type into a cell. This formula means "take the number in cell A1 and multiply it by 4." Use **fill down** on column B.

	A	B
1	1	4
2	2	8
3	3	12
4	4	16
5	5	20
	⋮	⋮

the formula =A1*4 goes into cell B1

fill down copies the rule down column B

column A holds the counting numbers
1, 2, 3, … all the way to 100

column B holds the multiples of 4
4, 8, 12, … all the way to 400

one formula, typed once, does the work 100 times

*Part of a spreadsheet. Column A holds 1, 2, 3, 4 and 5, with dots going down to 100. Column B holds 4, 8, 12, 16 and 20, with dots going down to 400. An arrow shows the formula =A1*4 going into cell B1, and fill down copies the rule down column B.*

What numbers appear in column B? Describe the pattern.

Column B multiplies every counting number by 4. So column B holds:

$1 \times 4 = 4$, $2 \times 4 = 8$, $3 \times 4 = 12$, $4 \times 4 = 16$, … all the way to $100 \times 4 = 400$.

The set generated is **4, 8, 12, 16, … , 400** — the multiples of 4.

The emerging pattern: every number is a multiple of 4, each number is 4 more than the one before, and all the numbers are even.

Notice how much work the spreadsheet did for you. You wrote just one formula, and the fill down tool applied it 100 times to generate 100 numbers. That is the power of an algorithm: a short set of steps can generate a very long set of numbers.

Investigation activity — your turn to make and run one

Now make and run your own algorithm that generates a set of numbers.

Step 1 — Plan. Choose a starting number and a rule. Your rule must use only addition or multiplication. For example: *Start at 2 and add 5*, or *Start at 1 and multiply by 2.* Decide how many numbers you want to generate.

Step 2 — Draw the flow chart. Draw your algorithm as boxes joined by arrows. Use a Start box, a box for each number step, and a Stop box. You may add one decision box with a yes-or-no question, like *Is the number even?*

Step 3 — Run it by hand. Follow your own steps on paper. Record every number you generate, in order. This is your set of numbers.

Step 4 — Check it another way. Run the same algorithm again using a calculator or a spreadsheet. Do you get the same set of numbers? If not, find where the mistake is and fix it.

Step 5 — Describe the pattern. Write down two things you notice about your set of numbers.

Write up your work, showing your flow chart, your set of numbers, and your two pattern observations. Your teacher may use this activity for the class investigation task.

Practice questions

Questions with help

Q1. An algorithm is a list of __________ to follow in order.

Q2. In this section, the number work in an algorithm uses only two operations. Name them.

Q3. Follow this algorithm.

1. Start with 5. Write it down.
2. Add 3. Write down the answer.
3. Add 3 to your new number. Write down the answer.
4. Stop.

(a) What set of numbers does it generate?
(b) Describe the pattern.

Q4. Fill in the missing numbers. This algorithm starts at 2 and multiplies by 3 each time.

2, 6, ____, ____, 162.

Q5. A flow chart has these boxes in order: *Start with 10 and write it down*, *Add 2 and write the answer*, *Add 2 and write the answer*, *Stop*. What set of numbers is written down?

Q6. Use a calculator to follow this algorithm: start at 4, then multiply by 2 four times. Record each number you get.

Q7. In a spreadsheet, the number 5 is in cell A1. The formula `=A1*3` is typed into cell B1. What number appears in cell B1?

Q8. An algorithm generates the set 6, 12, 18, 24. It has a decision box that asks: *Is the number more than 15?* Which numbers in the set get a "yes" answer?

Questions on your own

Q9. Follow this algorithm.

1. Start with 7. Write it down.
2. Add 6. Write down the answer.
3. Add 6 to your new number. Write down the answer.
4. Add 6 to your new number. Write down the answer.
5. Stop.

(a) What set of numbers does it generate?
(b) Are the numbers odd or even? Explain how you know.

Q10. Create an algorithm (write the steps) that generates the multiples of 5, starting from 5. Your algorithm should generate at least four numbers.

Q11. An algorithm starts at 1 and multiplies by 2 each time. The first three numbers are 1, 2, 4. What are the next three numbers?

Q12. Describe the emerging pattern in each set.

(a) 4, 8, 12, 16, 20
(b) 3, 6, 12, 24, 48

Q13. A number pattern follows the rule *add 9*, starting at 0. A student says the pattern must stop one day, because the numbers get too big. Is the student right? Explain.

Q14. Draw a flow chart for an algorithm that starts at 3, adds 5 three times, and writes down every number, starting with the first. Use a Start box, number boxes, and a Stop box joined by arrows.

Q15. Sam followed an algorithm that starts at 10 and adds 4 three times. He wrote down 10, 14, 18, 23. Is his last number right? If not, what should it be?

Q16. Use a calculator to follow this algorithm: start at 3, then multiply by 3 four times. Record each number. Describe the pattern.

Q17. In a spreadsheet, cell A1 holds 10 and cell A2 holds 20. The formula `=A1*2` is typed into cell B1. Without a computer, work out what number appears in cell B1, and explain what the formula means.

Q18. Two algorithms both start at 2.

- Algorithm A adds 3 each time.
- Algorithm B multiplies by 3 each time.

Write the first four numbers from each algorithm. Which set grows faster? Explain why.

Q19. Explain why an algorithm that starts with an even number and adds 2 every time will only ever generate even numbers.

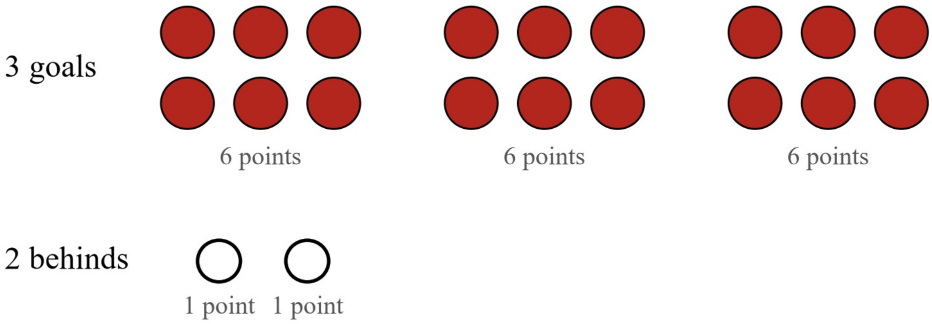
Q20. Make up your own algorithm that uses a decision. It must have a Start, at least two number steps using addition or multiplication, one yes-or-no decision, and a Stop. Then follow your algorithm and write down the set of numbers it generates.

Applied

Q21. In Australian rules football (AFL), a goal is worth 6 points and a behind is worth 1 point.

Source: Australian Football League, *Laws of Australian Football* (13 February 2026), afl.com.au, retrieved 2026-08-19.

a goal is worth 6 points and a behind is worth 1 point



$3 \times 6 = 18 \quad 2 \times 1 = 2$

$18 + 2 = 20$ points

Three groups of 6 red dots for 3 goals worth 6 points each, and 2 open dots for 2 behinds worth 1 point each. Below: 3 × 6 = 18 and 2 × 1 = 2, so 18 + 2 = 20 points.

A team's score can be worked out with this algorithm.

1. Multiply the number of goals by 6.
2. Multiply the number of behinds by 1.
3. Add the two answers together.

(a) A team kicks 4 goals and 3 behinds. Follow the algorithm to find the team's score.
(b) Another team kicks 2 goals and 9 behinds. Find this team's score.
(c) Which team scored more points, and by how many?
(d) A team kicks 5 goals and 0 behinds. Without doing every step, predict the score and explain how you know.

Answers

Q1. steps. **Q2.** addition and multiplication. **Q3.** (a) 5, 8, 11; (b) each number is 3 more than the one before. **Q4.** 18, 54. **Q5.** 10, 12, 14. **Q6.** 4, 8, 16, 32, 64. **Q7.** 15. **Q8.** 18 and 24. **Q9.** (a) 7, 13, 19, 25; (b) all odd. **Q10.** Example: start at 5, add 5 four times → 5, 10, 15, 20, 25. **Q11.** 8, 16, 32. **Q12.** (a) multiples of 4, each number is 4 more than the one before; (b) each number is double (2 times) the one before. **Q13.** No. The rule can always do one more step, so the pattern goes on indefinitely. **Q14.** Start with 3 (write 3) → Add 5 (write 8) → Add 5 (write 13) → Add 5 (write 18) → Stop. **Q15.** No. 18 + 4 = 22, not 23. **Q16.** 3, 9, 27, 81, 243; each number is 3 times the one before. **Q17.** 20. The formula means "multiply the number in cell A1 by 2." **Q18.** A: 2, 5, 8, 11. B: 2, 6, 18, 54. Set B grows faster: multiplying by 3 grows the numbers more than adding 3 does. **Q19.** An even number plus 2 is always even, so every new number stays even. **Q20.** Answers will vary. Example: start at 2 and write it, add 3 (write 5), add 3 (write 8), then ask *Is the number even?* for each number. The set is 2, 5, 8; circle 2 and 8. **Q21.** (a) 27; (b) 21; (c) the first team, by 6 points; (d) 30.

Worked answers

Q1. An algorithm is a list of **steps** to follow in order. Each step tells you to do one thing.

Q2. The two operations are **addition** and **multiplication**. These algorithms add or multiply — they do not use any other operation.

Q3. (a) Follow each step in order. * Start with 5. Write it down. * 5 + 3 = 8. Write down 8. * 8 + 3 = 11. Write down 11.

The set is **5, 8, 11**. (b) The pattern: each number is 3 more than the one before, because the rule is *add 3* every time.

Q4. Multiply by 3 each time: 2 × 3 = 6, 6 × 3 = 18, 18 × 3 = 54, 54 × 3 = 162. ✓ The missing numbers are **18** and **54**.

Q5. Start with 10. Add 2 → 12. Add 2 → 14. The set written down is **10, 12, 14**.

Q6. Start at 4, then multiply by 2 four times: 4 × 2 = 8; 8 × 2 = 16; 16 × 2 = 32; 32 × 2 = 64. The numbers are **4, 8, 16, 32, 64**.

Q7. The formula `=A1*3` means "multiply the number in cell A1 by 3." Cell A1 holds 5, so 5 × 3 = 15. Cell B1 shows **15**.

Q8. Check each number against the decision *Is the number more than 15?* * 6 — no. 12 — no. 18 — yes. 24 — yes. The "yes" numbers are **18 and 24**.

Q9. (a) Follow each step. * Start with 7. Write it down. * 7 + 6 = 13. Write 13. * 13 + 6 = 19. Write 19. * 19 + 6 = 25. Write 25.

The set is **7, 13, 19, 25**. (b) All the numbers are **odd**. Start at 7 (odd) and add 6 (even). Adding an even number to an odd number keeps it odd, so every number stays odd.

Q10. One correct algorithm: 1. Start with 5. Write it down. 2. Add 5. Write down the answer. 3. Add 5 to your new number. Write down the answer. 4. Add 5 to your new number. Write down the answer. 5. Add 5 to your new number. Write down the answer. 6. Stop.

This generates **5, 10, 15, 20, 25** — the multiples of 5. (Any algorithm that generates the multiples of 5 using only addition or multiplication is correct.)

Q11. Multiply by 2 each time: 4 × 2 = 8, 8 × 2 = 16, 16 × 2 = 32. The next three numbers are **8, 16, 32**.

Q12. (a) 4, 8, 12, 16, 20: each number is 4 more than the one before, so these are the multiples of 4. (b) 3, 6, 12, 24, 48: each number is double (2 times) the one before. This is a multiplying pattern, not an adding one.

Q13. The student is **not right**. The rule *add 9* can always do one more step: whatever the last number you wrote, you can add 9 to get one more. There is no last number, so the pattern can be extended indefinitely — it never has to stop.

Q14. The flow chart is a straight line of boxes joined by arrows:

Start with 3, write 3 → Add 5, write 8 → Add 5, write 13 → Add 5, write 18 → Stop.

Each box holds one step, and the arrows show the order to follow. The set written down is **3, 8, 13, 18**.

Q15. Check Sam's work step by step. Start at 10. Add 4 → 14. ✓ Add 4 → 18. ✓ Add 4 → 18 + 4 = 22, not 23. ✗ His last number is wrong. It should be **22**.

Q16. Start at 3, then multiply by 3 four times: 3 × 3 = 9; 9 × 3 = 27; 27 × 3 = 81; 81 × 3 = 243. The numbers are **3, 9, 27, 81, 243**. The pattern: each number is 3 times the one before.

Q17. The formula `=A1*2` means "take the number in cell A1 and multiply it by 2." Cell A1 holds 10, so 10 × 2 = 20. Cell B1 shows **20**. (Cell A2 holding 20 is not used by this formula.)

Q18. Algorithm A (add 3): 2, 5, 8, 11. Algorithm B (multiply by 3): 2, 6, 18, 54. **Set B grows faster.** Adding 3 adds 3 more each time, so the numbers go up by the same amount. Multiplying by 3 makes each number 3 times as big as the one before, so the numbers grow faster and faster.

Q19. Start with an even number. Adding 2 to an even number always gives another even number (for example, 4 + 2 = 6, and 6 + 2 = 8). Because the starting number is even and every step adds 2, every number the algorithm generates must be even. The pattern never breaks.

Q20. Answers will vary. Here is one correct example.

Algorithm: 1. Start with 2. Write it down. 2. Add 3. Write down the answer. 3. Add 3 to your new number. Write down the answer. 4. Decision: for each number you wrote, ask *Is it even?* If yes, circle it. If no, leave it as it is. 5. Stop.

Following it: 2, then 2 + 3 = 5, then 5 + 3 = 8. The set generated is **2, 5, 8**. The decision answers: 2 is even (yes), 5 is not even (no), 8 is even (yes). Circle 2 and 8.

To be correct, your algorithm needs a Start, at least two number steps using only addition or multiplication, one yes-or-no decision, and a Stop — and the set of numbers you write down must match your own steps.

Q21. (a) Follow the algorithm for 4 goals and 3 behinds. * Step 1: 4 goals × 6 = 24. * Step 2: 3 behinds × 1 = 3. * Step 3: 24 + 3 = 27.

The team's score is **27 points**. (b) For 2 goals and 9 behinds. * Step 1: 2 × 6 = 12. * Step 2: 9 × 1 = 9. * Step 3: 12 + 9 = 21.

The score is **21 points**. (c) Compare 27 and 21. The **first team** scored more, by 27 − 21 = **6 points**. (d) 5 goals and 0 behinds. Step 1: 5 × 6 = 30. Step 2: 0 × 1 = 0. Step 3: 30 + 0 = 30. The score is **30 points**. You can predict this quickly because each goal is worth 6, so 5 goals give 5 × 6 = 30, and 0 behinds add nothing.

Test

Test T1 · Chapter 1 — Number: whole numbers, the four operations and algorithms

Mathematics Level 4 (Year 4) · Victorian Curriculum 2.0

Codes assessed: `VC2M4N02` · `VC2M4N05` · `VC2M4N06` · `VC2M4N07` · `VC2M4N10`

Name: ______________________________ Date: ______________

Total marks	25
Guidance duration	30 minutes
Timing	This is a classroom check, not an exam. There is no strict time limit. Your teacher will let you finish.
Equipment	You may use counters, base-ten blocks, a number line, a hundred square, a place value chart and a pencil.
Calculators	Question 2 must be done **without a calculator**. The content description `VC2M4N05` says this multiplying and dividing is done "without a calculator". For the other questions you do not need one — every question on this test can be worked out by hand.

Attempt every question. Show your working where the question asks for it.

Question 1 — Number sequences (4 marks)

(a) Which number is a multiple of 7? (1 mark)

A. 26

B. 35

C. 39

D. 46

(b) Count on by 8s to finish the sequence: 8, 16, 24, ____, ____. (1 mark)

(c) Fill in the missing number in this sequence of multiples of 9: 9, 18, ____, 36, 45. (1 mark)

(d) Here are the first five multiples of 6: 6, 12, 18, 24, 30. Describe the pattern you can see. (1 mark)

Question 2 — Multiplying and dividing by multiples and powers of 10 (5 marks)

No calculator for this question. Show your working.

(a) Work out 46 × 10. (1 mark)

(b) Work out 2 700 ÷ 100. (1 mark)

(c) Work out 7 × 30. Split 30 into tens, and show your working. (2 marks)

(d) Fill in the box: 840 ÷ □ = 84. (1 mark)

Question 3 — Efficient strategies for the four operations (6 marks)

Show your working. Choose a strategy that suits the numbers.

(a) Work out 248 + 137. Use place value partitioning, and show the parts you add. (2 marks)

(b) Work out 162 − 78. You may count on from 78, or use another strategy. (2 marks)

(c) Work out 13 × 4. (1 mark)

(d) Work out 78 ÷ 6. Check your answer with a multiplication. (1 mark)

Question 4 — Rounding and estimating (5 marks)

(a) Round 468 to the nearest hundred. (1 mark)

A. 400

B. 460

C. 470

D. 500

(b) Round 63 and 28 to the nearest ten, then estimate 63 + 28. (1 mark)

(c) Sovereign Hill in Ballarat is an outdoor museum about Victoria's gold rush. An adult ticket costs $68. (Ticket prices can change. This question uses $68.)

Source: Sovereign Hill, *Tickets*, sovereignhill.com.au, retrieved 2026-08-20.

Round $68 to the nearest ten, then estimate the cost of 4 adult tickets. (1 mark)

(d) Sam works out 4 × $68 = $172. Use your estimate from part (c) to check Sam's answer. Is $172 reasonable? Explain how you know. (2 marks)

Question 5 — Algorithms (5 marks)

(a) Follow this algorithm.

Step 1: Start at 3. Write it down. Step 2: Add 6. Write down the answer. Step 3: Add 6 to your new number. Write down the answer. Step 4: Add 6 to your new number. Write down the answer. Step 5: Stop.

What set of numbers does the algorithm generate? (1 mark)

(b) Describe a pattern you can see in the set. (1 mark)

(c) Now ask this decision for each number in the set: *Is the number more than 10?* Which numbers get a yes answer? (1 mark)

(d) Write the steps of an algorithm that generates the first four multiples of 9: 9, 18, 27, 36. Your steps may use only addition or multiplication. (2 marks)

Total: 25 marks

Solutions

Teacher-facing. Test T1 is a classroom check, not an exam: untimed in principle with a 30-minute guidance duration, equipment permitted, and Question 2 (`VC2M4N05`) calculator-free per the CD wording. No question needs a digital tool.

Coverage and mark map

CD	Subtopic	Questions	Marks
`VC2M4N02`	1A Number sequences: multiples of 3, 4, 6, 7, 8 and 9	Q1	4
`VC2M4N05`	1B Multiplying and dividing by multiples and powers of 10	Q2	5
`VC2M4N06`	1C Efficient mental and written strategies for the four operations	Q3	6
`VC2M4N07`	1D Rounding and estimating to check that an answer is reasonable	Q4	5
`VC2M4N10`	1E Algorithms that generate sets of numbers	Q5	5
	Total		**25**

Every owned CD contributes at least one separately scored item, as §7 requires. Multiple choice is 2 marks of 25 (8%), inside the one-quarter cap: Q1(a) and Q4(a), four options A–D each, both authored for this paper. Rubric language maps to each CD's achievement-standard extract as carried in `maths_4.json` (quoted verbatim in the file header) — `VC2M4N02` and `VC2M4N06` share the one proficiency extract.

Answer key

Q	Part	Answer	Marks
1	(a)	B (35)	1
1	(b)	32, 40	1
1	(c)	27	1
1	(d)	Each number is 6 more; all are even	1
2	(a)	460	1
2	(b)	27	1
2	(c)	210, split into tens shown	2
2	(d)	10	1
3	(a)	385, parts shown	2
3	(b)	84, working shown	2
3	(c)	52	1
3	(d)	13, with a multiplication check	1
4	(a)	D (500)	1
4	(b)	60 + 30; about 90	1
4	(c)	\$70; about \$280	1

Q	Part	Answer	Marks
4	(d)	No — \$172 is far below the estimate of about \$280	2
5	(a)	3, 9, 15, 21	1
5	(b)	Each number is 6 more; all are odd	1
5	(c)	15 and 21	1
5	(d)	Steps that generate 9, 18, 27, 36	2

Worked solutions

Q1. (a) Count on by 7s: 7, 14, 21, 28, 35, … The count lands on 35 (5 × 7 = 35) and jumps over 26, 39 and 46. The answer is **B**.

(b) 24 + 8 = **32**, and 32 + 8 = **40**. The sequence is 8, 16, 24, 32, 40 — the multiples of 8.

(c) 18 + 9 = **27**. Check: 27 + 9 = 36. ✓

(d) Each number is **6 more than the one before**, and **all the numbers are even** — 6 is even, and adding 6 keeps the count even. Accept also: the numbers are the multiples of 6.

Marks: (d) awards 1 for any true pattern description from the 1A work; both "6 more each time" and "all even" are expected, and one is enough.

Q2. Calculators are not used in this question (`VC2M4N05`).

(a) × 10 moves every digit one place to the left, and a 0 holds the ones place: 46 × 10 = **460**.

(b) ÷ 100 moves every digit two places to the right: 2 700 ÷ 100 = **27**.

(c) 30 is 3 tens. 7 × 3 = 21, so 7 × 3 tens = 21 tens = **210**.

(d) To get from 840 to 84, the digits move one place to the right, and that is ÷ 10. So 840 ÷ **10** = 84.

Marks: (c) awards 1 for splitting 30 into 3 tens and using 7 × 3 = 21, and 1 for 210. Award full marks for a correct place-value method even where the student puts it into words rather than a chart.

Q3. (a) 248 = 200 + 40 + 8 and 137 = 100 + 30 + 7. Add the matching parts: 200 + 100 = 300, 40 + 30 = 70, 8 + 7 = 15. Then 300 + 70 + 15 = **385**.

(b) Count on from 78: 78 + 2 = 80, 80 + 80 = 160, 160 + 2 = 162. The jumps are 2 + 80 + 2 = **84**, so 162 − 78 = 84. Accept any correct place-value strategy, e.g. equal amounts: 162 − 78 = 164 − 80 = 84.

(c) Double 13 is 26, and double 26 is **52**, so 13 × 4 = 52. Partitioning is just as good: 10 × 4 = 40 and 3 × 4 = 12, and 40 + 12 = 52.

(d) 6 × 10 = 60, and 78 − 60 = 18, and 6 × 3 = 18, so 78 ÷ 6 = 10 + 3 = **13**. Check: 13 × 6 = 78. ✓ There is no remainder.

Marks: for (a) and (b), 1 mark for a strategy shown in the working and 1 mark for the correct answer; a correct answer with no working earns 1 mark only. Award the marks for any efficient strategy, not just the ones modelled here — counting on by ones earns the answer mark only.

Q4. (a) 468 is past halfway between 400 and 500, so it is closer to 500. The answer is **D**. (460 and 470 round to the nearest ten, not the nearest hundred.)

(b) 63 rounds to 60, and 28 rounds to 30. 60 + 30 = 90, so 63 + 28 is **about 90**. (Check: 63 + 28 = 91, which is close to 90.)

(c) \$68 rounds to **\$70**. 4 × \$70 = **\$280**, so the cost is about \$280.

(d) The estimate is about \$280. Also, each \$68 ticket is more than \$60, and $4 \times \$60 = \$240$, so the exact cost is more than \$240. \$172 is well below \$240, so **\$172 is not reasonable** — Sam should check the working. (Exact: $4 \times \$68 = \$272$.)

Marks: for (d), 1 mark for a comparison with the estimate or a between-range, and 1 mark for the correct judgement with a reason.

Q5. (a) Start at 3. Add 6 → 9. Add 6 → 15. Add 6 → 21. The set is **3, 9, 15, 21**.

(b) Each number is **6 more than the one before**, because the rule is *add 6* every time. All the numbers are **odd**, and they are all multiples of 3. Any one true pattern earns the mark.

(c) 3 — no; 9 — no; 15 — yes; 21 — yes. The yes numbers are **15 and 21**.

(d) The steps can be worded in different ways. Accept any clear, ordered set of steps that uses only addition or multiplication and generates 9, 18, 27, 36, for example:

Step 1: Start at 9. Write it down. Step 2: Add 9. Write down the answer. Step 3: Add 9 to your new number. Write down the answer. Step 4: Add 9 to your new number. Write down the answer. Step 5: Stop.

Also accept: multiply the counting numbers 1, 2, 3 and 4 by 9, and write down each answer.

Marks: 1 mark for a clear, ordered set of steps with a start and a repeated rule using only addition or multiplication; 1 mark for steps that generate exactly 9, 18, 27, 36. Steps may be numbered or written as a sentence.