Mathematics Level 3

Chapter 2 — Number: fractions, money and modelling

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Unit fractions and their multiples

Code: VC2M3N03 (.E01, .E02, .E03, .E04)

A **fraction** names equal parts of a whole. In earlier years you made halves and quarters by folding and cutting. In this topic you will meet one-third and one-fifth, count parts to make fractions like two-thirds and three-quarters, put parts together to make a whole, and find a fraction of a group of counters.

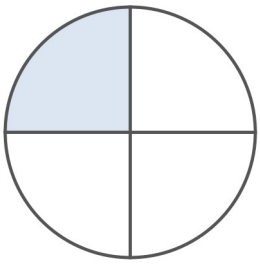
You will need: counters, paper, scissors and a pencil.

Learn about unit fractions

1. Fractions need equal parts

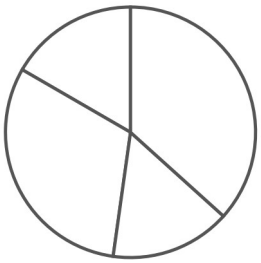
Cut a whole into parts. If the parts are all the same size, they are **equal parts**, and each part is a fraction of the whole.

Equal parts



4 equal parts — each part is one-quarter

Not equal parts



4 parts, but they are not the same size — they are not quarters

Two circles cut into 4 parts each. The left circle has 4 equal parts with one part shaded blue. The right circle has 4 parts that are not the same size.

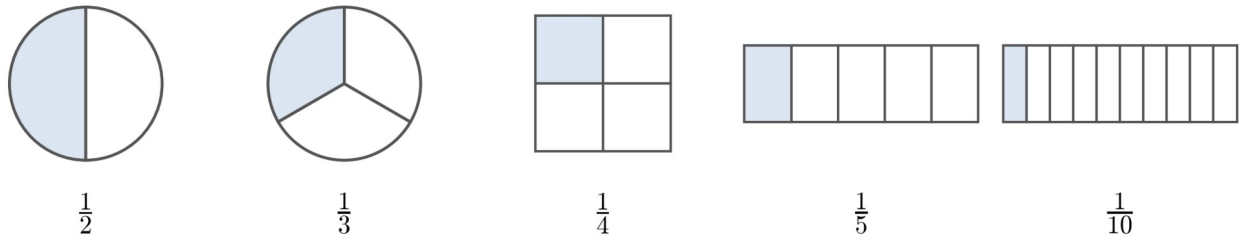
On the left, the circle is cut into 4 equal parts. Each part is **one-quarter** of the circle, $\frac{1}{4}$. On the right, the circle is cut into 4 parts too, but the parts are not the same size, so they are **not** quarters. A fraction always names equal parts.

A **fraction** names equal parts of a whole. If the parts are not equal, they are not fractions of that whole.

2. Unit fractions: one of the equal parts

A **unit fraction** is one of the equal parts of a whole. This year you use five of them: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$ and $\frac{1}{10}$.

A unit fraction is one of the equal parts of a whole



$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{10}$

one half one third one quarter one fifth one tenth

Five wholes, each with one equal part shaded blue: a circle in 2 parts, a circle in 3 parts, a square in 4 parts, a strip of 5 cells, and a strip of 10 cells. Under each whole is its fraction and its word name.

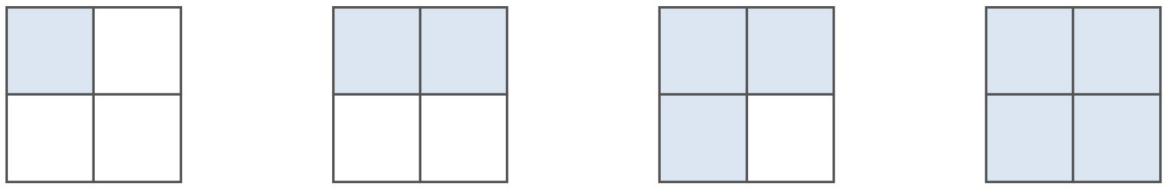
The **bottom number** tells you how many equal parts the whole is cut into. The **top number** tells you how many of those parts you have. A unit fraction always has 1 on top, because you have one of the parts.

Say each fraction in words too: $\frac{1}{3}$ is one-third and $\frac{1}{5}$ is one-fifth.

3. Counting the parts

You can count more than one part. Start at one quarter and count on: one quarter, two quarters, three quarters, four quarters.

Counting quarters: each time we count one more quarter



$\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{4}{4}$

one quarter two quarters three quarters four quarters = 1 whole

Four squares each cut into 4 equal cells. The first has 1 cell shaded blue, the second 2, the third 3 and the fourth all 4. Under the squares: one quarter, two quarters, three quarters, and four quarters equals one whole.

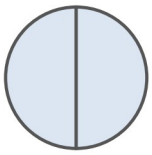
$\frac{3}{4}$ is three-quarters. It is 3 of the 4 equal parts. It is also $\frac{1}{4}$ counted 3 times — three-quarters is a **multiple** of one-quarter.

A fraction like $\frac{3}{4}$ is a multiple of the unit fraction $\frac{1}{4}$: it is the unit fraction counted 3 times.

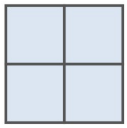
4. Putting parts together to make a whole

When you put all the equal parts back together, they make 1 whole.

All the equal parts together make 1 whole



two halves make 1 whole $\frac{2}{2} = 1$



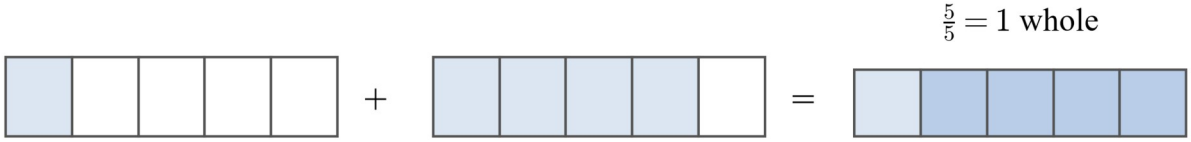
four quarters make 1 whole $\frac{4}{4} = 1$

five fifths make 1 whole $\frac{5}{5} = 1$

ten tenths make 1 whole $\frac{10}{10} = 1$

Four rows showing all the equal parts of a whole shaded blue: a circle of 2 halves, a square of 4 quarters, a strip of 5 fifths, and a strip of ten equal parts. Each row says how many parts make one whole.

You can also put *some* parts together to complete the whole. $\frac{1}{5}$ and $\frac{4}{5}$ fit together to make $\frac{5}{5}$, and $\frac{5}{5}$ is 1 whole:



$\frac{1}{5} + \frac{4}{5} = \frac{5}{5}$ — the parts have the same bottom number, so they fit together to make 1 whole

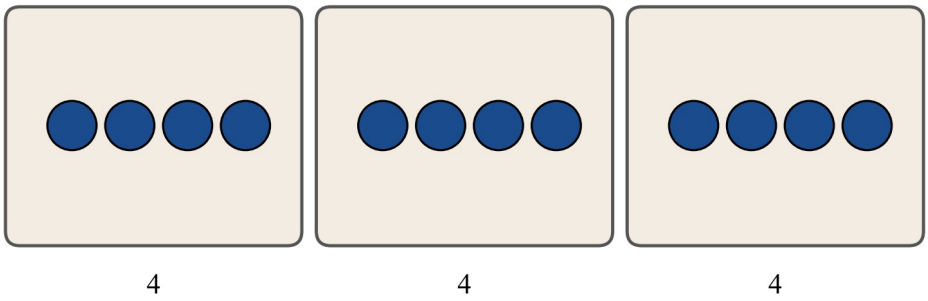
A strip with 1 of 5 cells shaded blue, plus a strip with 4 of 5 cells shaded blue, makes a whole strip with all 5 cells shaded. One fifth plus four fifths equals five fifths, one whole.

The two parts have the **same bottom number** (they are both fifths), so they fit the same whole. To find the part that completes the whole, count on: $\frac{2}{5}$ and $\frac{3}{5}$ make $\frac{5}{5}$, so $\frac{2}{5}+\frac{3}{5}=\frac{5}{5}=1$.

5. Sharing: a fraction of a collection

Fractions work with groups of things too. Share 12 counters between 3 friends so each friend gets the same.

Share 12 counters between 3 friends

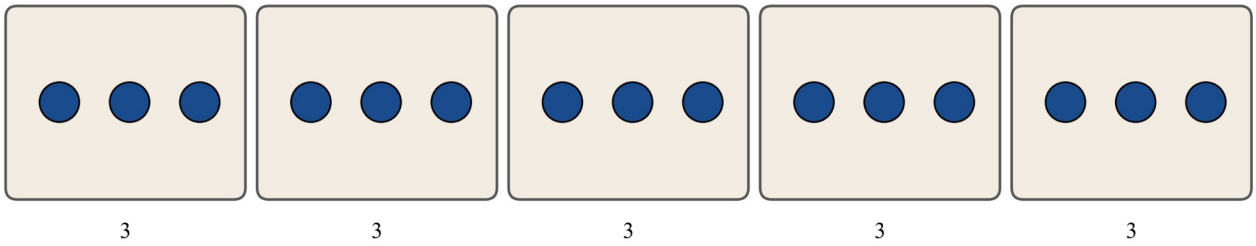


12 ÷ 3 = 4 — one-third of 12 is 4

Twelve blue counters shared onto 3 plates with 4 counters on each plate. Twelve divided by three is four, so one-third of twelve is four.

Each friend gets 4 counters. $12 \div 3 = 4$. Each friend gets **one-third** of the counters: $\frac{1}{3}$ of 12 is 4.

Share 15 counters between 5 friends



15 ÷ 5 = 3 — one-fifth of 15 is 3

Fifteen blue counters shared onto 5 plates with 3 counters on each plate. Fifteen divided by five is three, so one-fifth of fifteen is three.

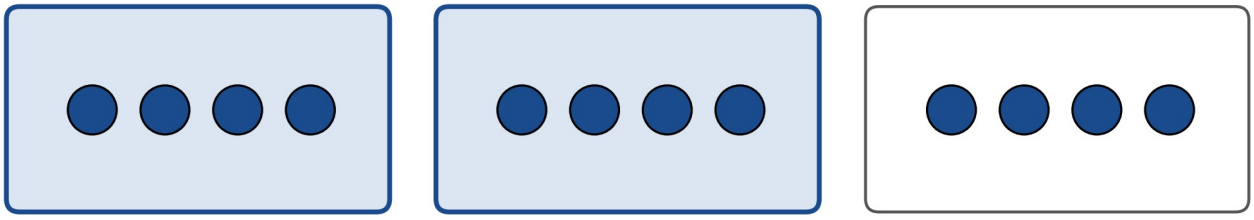
Here each friend gets 3 counters. $15 \div 5 = 3$, so $\frac{1}{5}$ of 15 is 3.

Sharing equally is division. Share a collection between 3 and each share is $\frac{1}{3}$ of it. Share it between 5 and each share is $\frac{1}{5}$ of it.

6. More parts of a collection

To find two-thirds of 12, split 12 into 3 equal groups and take 2 of the groups.

Split 12 counters into 3 equal groups, then take 2 of the groups



Two-thirds of 12: $\frac{2}{3}$ of 12 is 8

Twelve blue counters in 3 equal groups of 4. Two of the groups have a blue box around them. Two-thirds of twelve is eight.

Each group is $\frac{1}{3}$ of 12, which is 4. Two groups is 8, so $\frac{2}{3}$ of 12 is 8.

Worked examples

Example 1 — with help

A strip is cut into 5 equal cells. 2 of the cells are shaded. What fraction of the strip is shaded? Say it in words too.

Working	What we did
The strip has 5 equal cells.	Counted the equal parts. The bottom number is 5.
2 cells are shaded.	Counted the parts we have. The top number is 2.
The fraction is $\frac{2}{5}$.	Wrote the fraction.
$\frac{2}{5}$ is two-fifths.	Said it in words.

Example 2 — with help

A shop makes 15 sandwiches for 5 people. The sandwiches are shared equally. How many does each person get? What fraction of the sandwiches is that?

Working	What we did
$15 \div 5 = 3$	Shared 15 between 5.
Each person gets 3 sandwiches.	Wrote the answer.
Each share is $\frac{1}{5}$ of the 15.	One of 5 equal shares is one-fifth.
Check: $5 \times 3 = 15$. ✓	Used the multiplication fact.

Example 3 — on your own

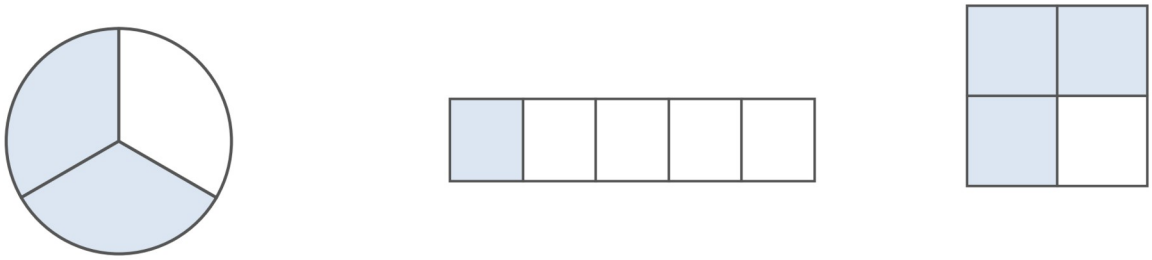
A pizza is cut into 4 equal quarters. Later, $\frac{2}{4}$ of the pizza is left. What fraction of the pizza was eaten? How do you know?

$\frac{2}{4}$ was eaten. The whole pizza is $\frac{4}{4}$, and $\frac{2}{4} + \frac{2}{4} = \frac{4}{4}$, so the part that was eaten must be $\frac{2}{4}$.

Practice questions

With help

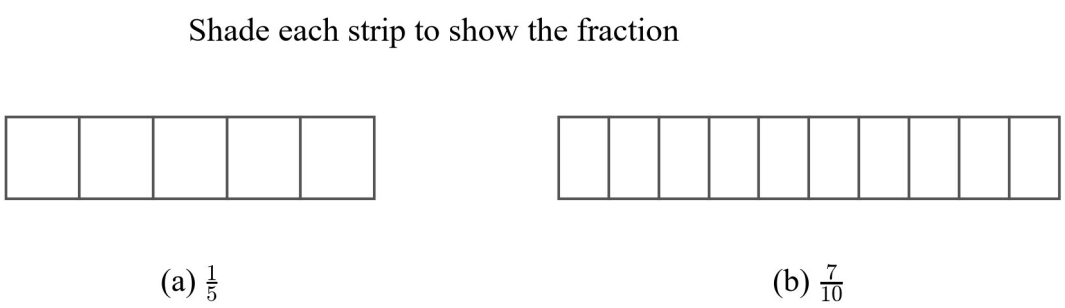
Q1. Write the fraction of each shape that is shaded. Say each one in words too.



(a) (b) (c)

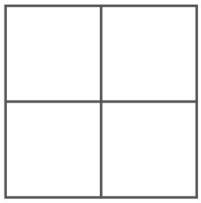
Three shapes: (a) a circle cut into 3 equal parts with 2 parts shaded blue; (b) a strip of 5 equal cells with 1 cell shaded blue; (c) a square cut into 4 equal cells with 3 cells shaded blue.

Q2. Shade each strip to show the fraction.

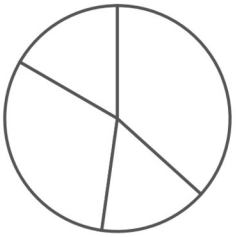


Two empty strips: (a) a strip of 5 equal cells to shade one fifth; (b) a strip of 10 equal cells to shade seven of the ten cells.

Q3. Which shape shows quarters? How do you know?



(a)



(b)

(c)

Three shapes: (a) a square cut into 4 equal parts; (b) a circle cut into 4 parts that are not the same size; (c) a circle cut into 3 equal parts.

Q4. Fill in the missing number. (a) 2 halves make __ whole. (b) 4 quarters make __ whole. (c) 5 fifths make __ whole. (d) $\frac{10}{10}$ makes __ whole.

Q5. Match each word to its fraction: one-third, three-quarters, two-fifths, two-thirds.

$\frac{2}{5}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{1}{3}$

Q6. Do these make 1 whole? Write yes or no. (a) $\frac{1}{4}+\frac{3}{4}$ (b) $\frac{2}{5}+\frac{3}{5}$ (c) $\frac{1}{2}+\frac{1}{2}$ (d) $\frac{1}{3}+\frac{1}{3}$

Q7. 12 counters are shared equally between 4 friends. How many counters does each friend get? What fraction of the counters is that?

Q8. $\frac{1}{3}$ of 12 is 4. Use that to find: (a) $\frac{2}{3}$ of 12 (b) $\frac{3}{3}$ of 12.

On your own

Q9. Write each fraction in words. (a) $\frac{1}{2}$ (b) $\frac{1}{5}$ (c) $\frac{3}{4}$ (d) $\frac{4}{5}$

Q10. True or false. (a) To make quarters, the 4 parts must be the same size. (b) A whole cut into 5 equal parts gives fifths. (c) 3 thirds of a whole is more than the whole.

Q11. Fill in the missing top number so the two parts make 1 whole. (a) $\frac{1}{5}$ and $\frac{\square}{5}$ (b) $\frac{2}{10}$ and $\frac{\square}{10}$ (c) $\frac{2}{3}$ and $\frac{\square}{3}$

Q12. Find. (a) $\frac{1}{2}$ of 10 (b) $\frac{1}{3}$ of 15 (c) $\frac{1}{4}$ of 20 (d) $\frac{1}{5}$ of 20 (e) $\frac{1}{10}$ of 30

Q13. Find. (a) $\frac{2}{3}$ of 12 (b) $\frac{3}{4}$ of 20 (c) $\frac{2}{5}$ of 15 (d) $\frac{3}{10}$ of 30

Q14. Mia eats $\frac{2}{5}$ of a sandwich. What fraction of the sandwich is left?

Q15. A teacher shares 20 icy pole sticks equally between 5 children. How many sticks does each child get? What fraction of the sticks is that?

Q16. Sam says $\frac{1}{3}$ of 12 is 3. Is he right? Use counters or a drawing to show why.

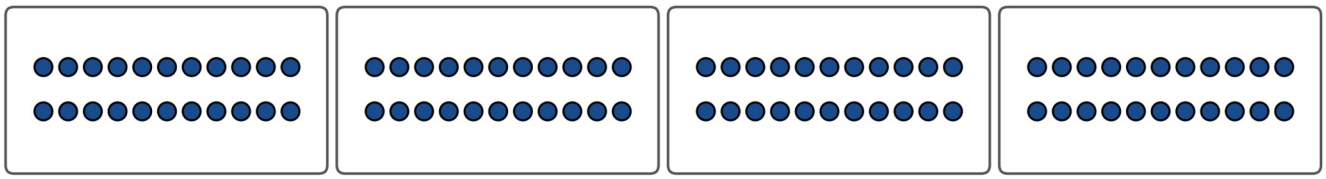
Q17. Do the two parts make 1 whole? Write yes or no, and if not, say the part that is still needed. (a) $\frac{1}{3}$ and $\frac{2}{3}$ (b) $\frac{1}{4}$ and $\frac{1}{4}$ (c) $\frac{4}{10}$ and $\frac{6}{10}$

Q18. A baker cuts a loaf into 10 equal slices. $\frac{7}{10}$ of the slices are sold. How many slices are sold? How many slices are left?

Q19. The Parliament of Victoria meets in Melbourne. The Legislative Assembly has 88 members.

Source: Wikipedia, *Victorian Legislative Assembly*, retrieved 2026-08-20.

88 members of the Legislative Assembly of Victoria



88 members split equally into 4 groups of 22

Eighty-eight blue dots in 4 equal groups of 22. Each group is 2 rows of 11 dots.

(a) The 88 members split equally into 4 groups for a meeting. How many members are in each group?

(b) What fraction of the members is one group?

(c) Three of the groups meet together in one room. What fraction of the members is in the room? How many members is that?

(d) Could the 88 members be split equally into 5 groups with nothing left over? How do you know?

Answers

Q1. (a) $\frac{2}{3}$, two-thirds. (b) $\frac{1}{5}$, one-fifth. (c) $\frac{3}{4}$, three-quarters. **Q2.** (a) 1 of the 5 cells shaded. (b) 7 of the 10 cells shaded. **Q3.** (a); it has 4 equal parts. **Q4.** (a) 1 (b) 1 (c) 1 (d) 1. **Q5.** one-third is $\frac{1}{3}$; three-quarters is $\frac{3}{4}$; two-fifths is $\frac{2}{5}$; two-thirds is $\frac{2}{3}$. **Q6.** (a) yes (b) yes (c) yes (d) no. **Q7.** 3 each; one-quarter, $\frac{1}{4}$. **Q8.** (a) 8 (b) 12. **Q9.** (a) one-half (b) one-fifth (c) three-quarters (d) four-fifths. **Q10.** (a) true (b) true (c) false; 3 thirds makes the whole. **Q11.** (a) 4 (b) 8 (c) 1. **Q12.** (a) 5 (b) 5 (c) 5 (d) 4 (e) 3. **Q13.** (a) 8 (b) 15 (c) 6 (d) 9. **Q14.** $\frac{3}{5}$. **Q15.** 4 each; one-fifth, $\frac{1}{5}$. **Q16.** No; $\frac{1}{3}$ of 12 is 4. **Q17.** (a) yes (b) no; $\frac{2}{4}$ more is needed (c) yes. **Q18.** 7 sold; 3 left. **Q19.** (a) 22 (b) one-quarter, $\frac{1}{4}$ (c) three-quarters, 66 (d) no.

Worked answers

Q1. (a) 3 equal parts and 2 are shaded: $\frac{2}{3}$, two-thirds. (b) 5 equal cells and 1 is shaded: $\frac{1}{5}$, one-fifth. (c) 4 equal cells and 3 are shaded: $\frac{3}{4}$, three-quarters.

Q2. (a) Shade 1 cell of the strip of 5. (b) Shade 7 cells of the strip of 10.

Q3. Shape (a) shows quarters, because its 4 parts are equal. Shape (b) has 4 parts but they are not the same size, so they are not quarters. Shape (c) has 3 equal parts, and those are thirds.

Q4. 2 halves make 1 whole; 4 quarters make 1 whole; 5 fifths make 1 whole; $\frac{10}{10}$ makes 1 whole.

Q5. one-third is $\frac{1}{3}$; three-quarters is $\frac{3}{4}$; two-fifths is $\frac{2}{5}$; two-thirds is $\frac{2}{3}$.

Q6. (a) $\frac{1}{4}+\frac{3}{4}=\frac{4}{4}$, yes. (b) $\frac{2}{5}+\frac{3}{5}=\frac{5}{5}$, yes. (c) $\frac{1}{2}+\frac{1}{2}=\frac{2}{2}$, yes. (d) $\frac{1}{3}+\frac{1}{3}=\frac{2}{3}$, no; one more third is needed.

Q7. $12\div 4=3$, so each friend gets 3 counters. Each share is one of 4 equal shares, so it is $\frac{1}{4}$ of the counters.

Q8. (a) $\frac{2}{3}$ of 12 is 2 groups of 4, which is 8. (b) $\frac{3}{3}$ of 12 is all 3 groups, which is 12.

Q9. (a) one-half (b) one-fifth (c) three-quarters (d) four-fifths.

Q10. (a) true; quarters must be equal parts. (b) true. (c) false; 3 thirds makes the whole, not more.

Q11. (a) $\frac{1}{5}+\frac{4}{5}=\frac{5}{5}$, so 4. (b) $\frac{2}{10}+\frac{8}{10}=\frac{10}{10}$, so 8. (c) $\frac{2}{3}+\frac{1}{3}=\frac{3}{3}$, so 1.

Q12. (a) $10\div 2=5$. (b) $15\div 3=5$. (c) $20\div 4=5$. (d) $20\div 5=4$. (e) $30\div 10=3$.

Q13. (a) $\frac{1}{3}$ of 12 is 4, so $\frac{2}{3}$ of 12 is 8. (b) $\frac{1}{4}$ of 20 is 5, so $\frac{3}{4}$ of 20 is 15. (c) $\frac{1}{5}$ of 15 is 3, so $\frac{2}{5}$ of 15 is 6. (d) $\frac{1}{10}$ of 30 is 3, so $\frac{3}{10}$ of 30 is 9.

Q14. The whole sandwich is $\frac{5}{5}$. $\frac{2}{5}+\frac{3}{5}=\frac{5}{5}$, so $\frac{3}{5}$ of the sandwich is left.

Q15. $20 \div 5 = 4$. Each child gets 4 sticks, and that is $\frac{1}{5}$ of the sticks.

Q16. No. Split 12 counters into 3 equal groups: each group is 4, so $\frac{1}{3}$ of 12 is 4, not 3.

Q17. (a) yes; $\frac{1}{3}+\frac{2}{3}=\frac{3}{3}$. (b) no; $\frac{1}{4}+\frac{1}{4}=\frac{2}{4}$, so $\frac{2}{4}$ more is needed. (c) yes; $\frac{4}{10}+\frac{6}{10}=\frac{10}{10}$.

Q18. $\frac{7}{10}$ of 10 slices is 7 slices, so 7 slices are sold. $10 - 7 = 3$, so 3 slices are left.

Q19. (a) $88 \div 4 = 22$ members. (b) One group is one of 4 equal groups: $\frac{1}{4}$ of the members. (c) Three groups is $\frac{3}{4}$ of the members; $3 \times 22 = 66$ members. (d) No. A number that is 5 lots of something ends in 0 or 5, and 88 does not; $5 \times 17 = 85$, so 3 members would be left over.

Dollars and cents

Code: VC2M3N07 (.E01, .E02)

> *recognise the relationships between dollars and cents and represent money values in different ways* — VC2M3N07

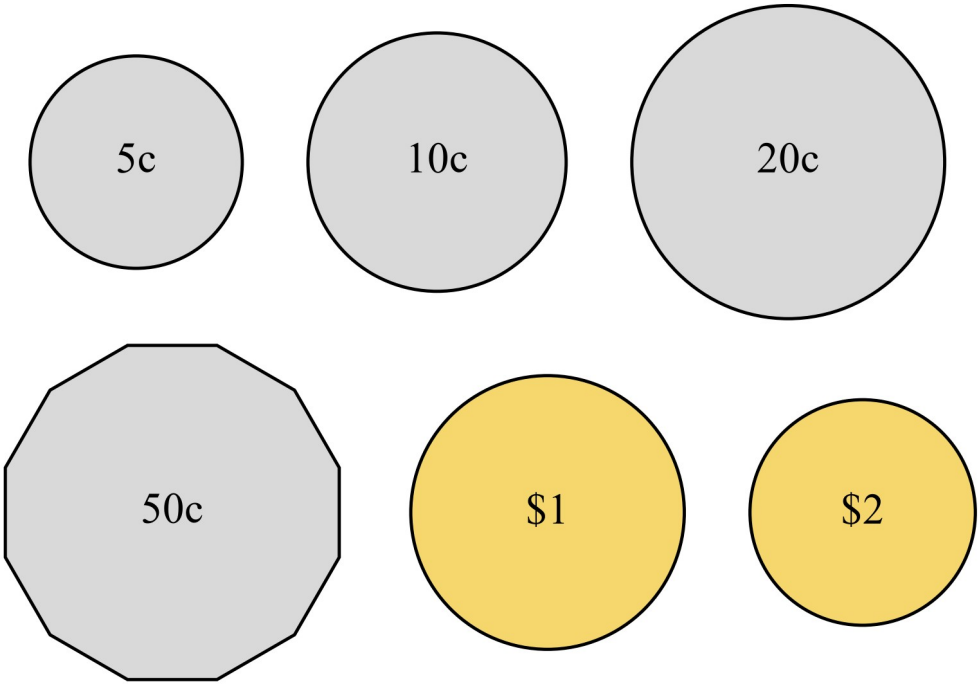
You already know the coins and notes in your purse or pocket. In this topic you will find out how dollars and cents fit together, make the same amount with different coins, and count on to work out change.

You will need: coins (toy or real), a pencil and paper.

Learn about dollars and cents

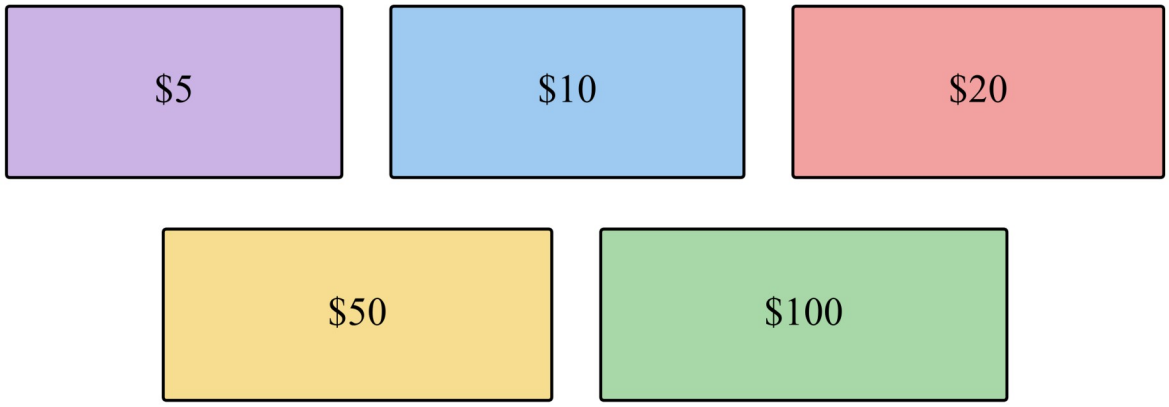
1. The coins and notes we use

Australia's money is the dollar. We write it with the sign $.



The six Australian coins drawn at their real sizes. Top row: the small silver 5c, the 10c and the 20c. Bottom row: the big twelve-sided 50c, the gold $1 and the gold $2.

We use six coins: 5c, 10c, 20c, 50c, $1 and $2. The 50c coin has twelve sides. The $1 and $2 coins are gold-coloured, and the other four are silver.



The five Australian notes. Top row: the purple $5, the blue $10 and the red $20. Bottom row: the yellow $50 and the green $100.

We use five notes: $5, $10, $20, $50 and $100.

Source: Wikipedia, *Banknotes of the Australian dollar*, retrieved 2026-08-20.

Long ago there were 1c and 2c coins too. We stopped using them in 1992, so you will not find them in your money today.

Source: Wikipedia, *Australian coins*, retrieved 2026-08-20.

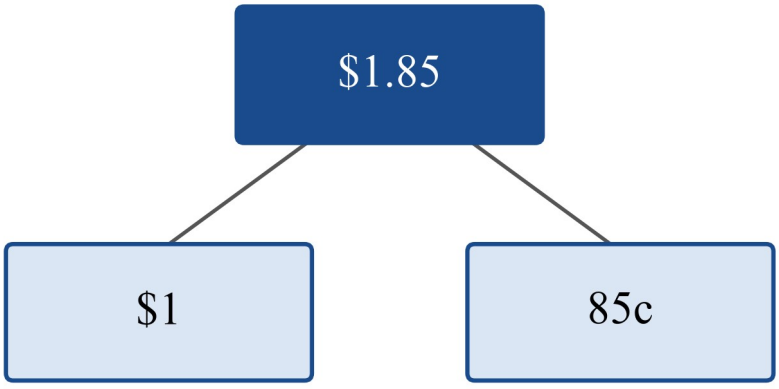
2. One dollar is 100 cents

Dollars and cents are the same money. One dollar is the same as one hundred cents:

$1 = 100c

So $2 = 200c, $3 = 300c, and 500c = $5.

We write money like $1.85. The number in front of the dot is the dollars. The number after the dot is the cents. We say $1.85 as *1 dollar and 85 cents*.

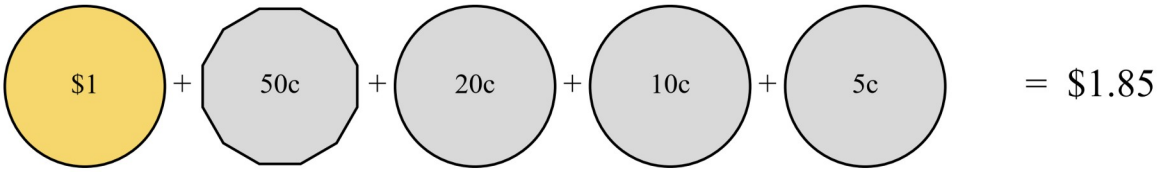


A part-part-whole diagram. $1.85 at the top splits into two parts: $1 and 85c.

$1.85 is $1 and 85c. The parts make the whole.

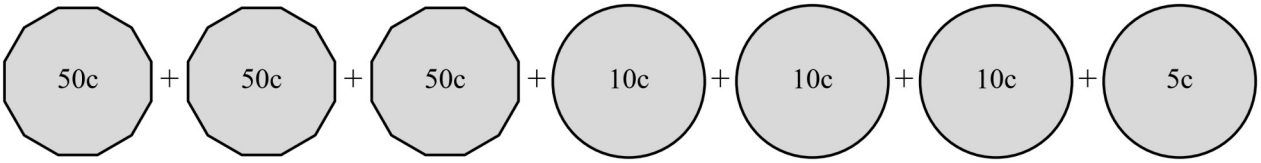
3. The same amount in different ways

One amount of money can be made with different coins. Here are two ways to make $1.85.



1 dollar and 85 cents

A row of coins: $1 + 50c + 20c + 10c + 5c = $1.85.



= $1.85, the same amount with different coins

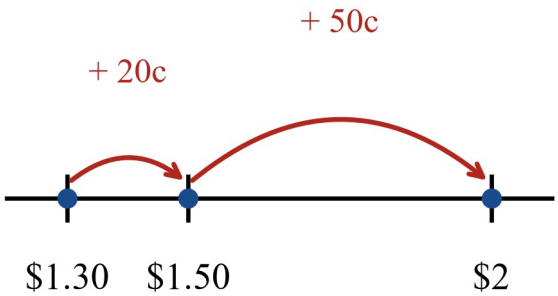
A row of coins: 50c + 50c + 50c + 10c + 10c + 10c + 5c = $1.85, the same amount with different coins.

Both rows make $1.85. The coins are different, but the amount is the same.

4. Counting on to find change

When you buy something, you often get **change** — money you get back.

A toy costs $1.30. You pay with a $2 coin. To work out the change, count on from $1.30 to $2.



the change is 20c + 50c = 70c

A number line from $1.30 to $2. A jump of 20c goes from $1.30 to $1.50, then a longer jump of 50c goes to $2. The change is 20c + 50c = 70c.

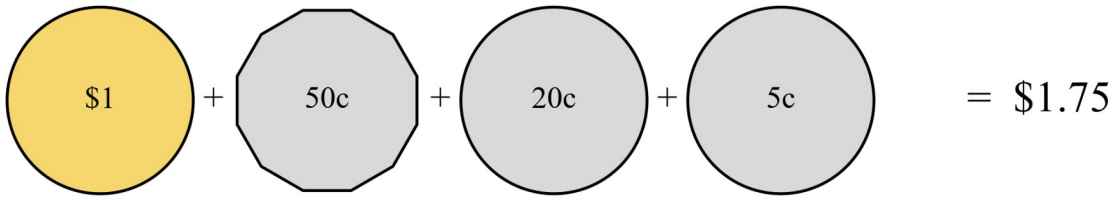
Count on 20c to $1.50, then 50c to $2. The jumps are the change: 20c + 50c = 70c.

Change is the money you get back when you pay more than the price.

Worked examples

Example 1 — with help

What money is shown? Write the amount two ways.



A row of coins: $1 + 50c + 20c + 5c = $1.75.

Working	What we did
$1 + 50c + 20c + 5c	Read the coins.
100c + 50c + 20c + 5c = 175c	Counted the $1 coin as 100c.
$1.75, or 1 dollar and 75 cents. ✓	Wrote the amount two ways.

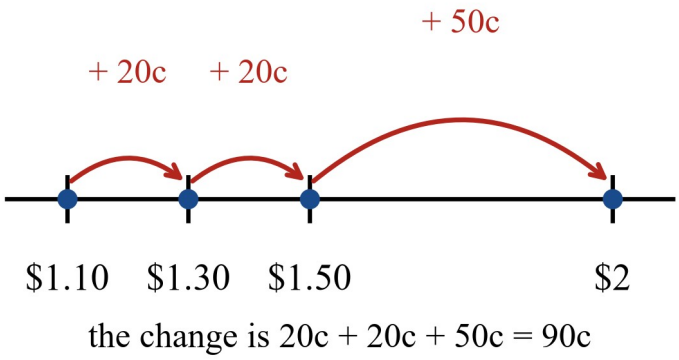
Example 2 — with help

Show 65c two different ways.

Working	What we did
50c + 10c + 5c = 65c	Started with the 50c coin.
20c + 20c + 20c + 5c = 65c	Used three 20c coins and a 5c coin.
Both ways make 65c. ✓	Checked each way counts on to 65c.

Example 3 — on your own

A drink costs $1.10. You pay with $2. Count on to find the change.



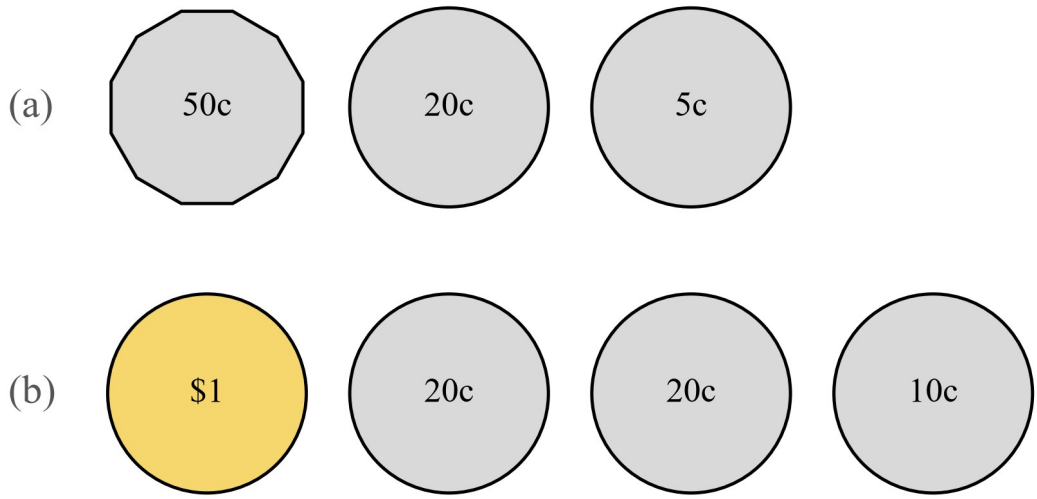
A number line from $1.10 to $2. Jumps of 20c, 20c and 50c land on $1.30, $1.50 and $2. The change is 20c + 20c + 50c = 90c.

Count on from $1.10: a jump of 20c lands on $1.30, another 20c lands on $1.50, then 50c lands on $2. The jumps are the change: 20c + 20c + 50c = 90c.

Practice questions

With help

Q1. How much is each set of coins?



Two rows of coins. (a) 50c, 20c and 5c. (b) $1, 20c, 20c and 10c.

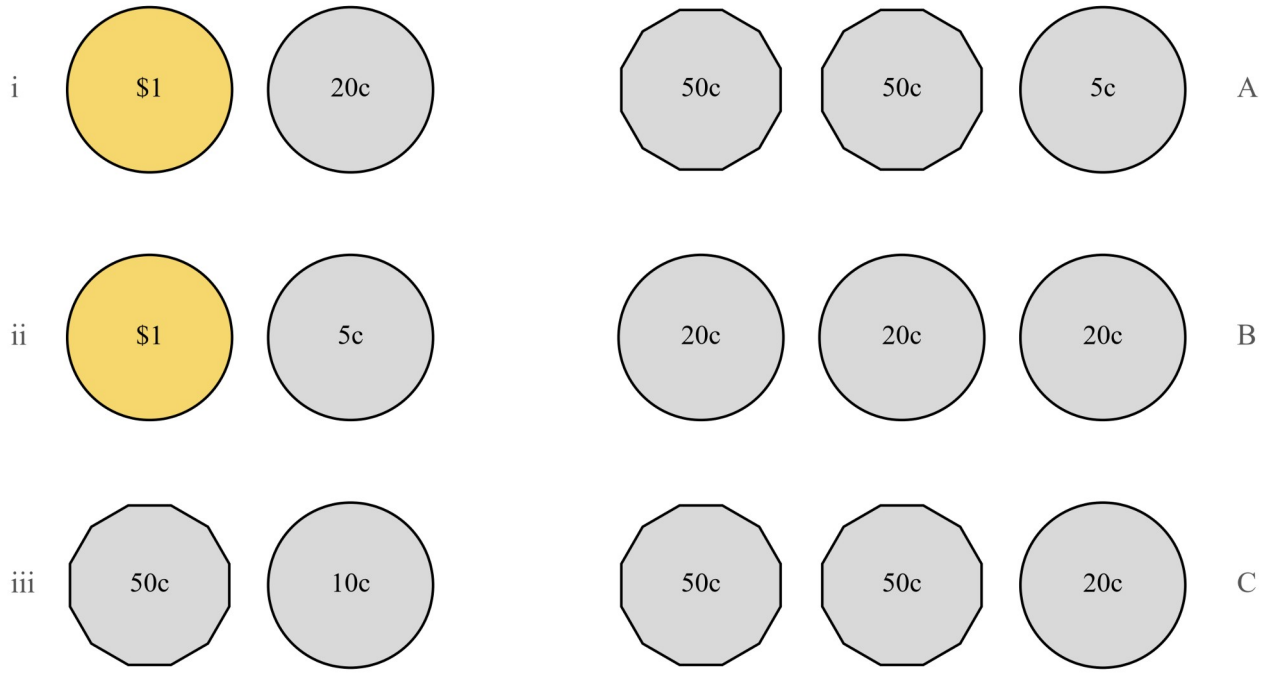
Q2. Fill in the missing numbers. (a) $1 = __ c (b) $3 = __ c (c) 200c = $ __ (d) $2.50 = $2 and __ c

Q3. Write each amount in words. (a) $1.25 (b) $2.70

Q4. Show 45c two different ways.

Q5. A sticker costs 60c. You pay with $1. Count on to find the change.

Q6. Draw a line from each set on the left to the set on the right that makes the same amount.



Coin sets to match. Left: (i) $1 and 20c; (ii) $1 and 5c; (iii) 50c and 10c. Right: (A) 50c, 50c and 5c; (B) 20c, 20c and 20c; (C) 50c, 50c and 20c.

Q7. Zac has $1, 20c, 20c and 5c. He wants a toy car that costs $1.40. Does he have enough? How do you know?

Q8. An apple costs 70c. You pay with $1. What change do you get back?

On your own

Q9. Write each amount as cents. (a) $2 (b) $4 (c) $1.50

Q10. Show 65c three different ways.

Q11. Which is more, 175c or $1.70? How do you know?

Q12. You have 50c, 50c, 20c and 5c. How much do you have? Write it as $ __ .

Q13. A book costs $1.60. You pay with $2. The change is 40c. Show the change two different ways.

Q14. (a) How many 20c coins make $1? (b) How many 50c coins make $2?

Q15. Write $3.40 two different ways, using notes and coins.

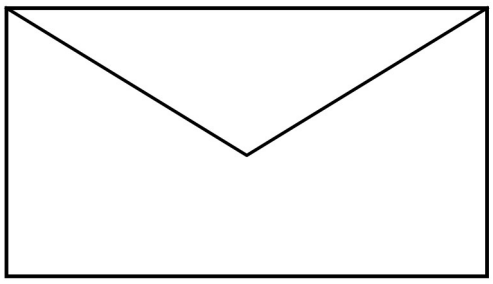
Q16. Make 35c with exactly three coins.

Q17. True or false: (a) $2.05 = 205c (b) 50c + 50c + 50c is more than $2 (c) 10 × 10c = $1

Q18. Make $3.60 with exactly six coins.

Q19. It costs $1.70 to post a letter in Australia. Your class in Melbourne posts a letter to its buddy class.

Source: Wikipedia, *Australia Post*, retrieved 2026-08-20.



ready to post

A $1.70 letter stamp and an envelope, ready to post.

(a) You pay with a $2 coin. Count on from $1.70 to $2 to find the change.

(b) Show the change with two coins.

(c) Make the stamp price, $1.70, with exactly three coins.

(d) In 2024, the stamp cost $1.50. How much more does it cost now?

Answers

Q1. (a) 75c (b) $1.50. **Q2.** (a) 100c (b) 300c (c) $2 (d) 50c. **Q3.** (a) 1 dollar and 25 cents (b) 2 dollars and 70 cents. **Q4.** Any two of: 20c + 20c + 5c; 20c + 10c + 10c + 5c; 10c + 10c + 10c + 10c + 5c. **Q5.** 40c. **Q6.** (i)–(C), (ii)–(A), (iii)–(B). **Q7.** Yes; Zac has $1.45, and $1.45 is more than $1.40. **Q8.** 30c. **Q9.** (a) 200c (b) 400c (c) 150c. **Q10.** Any three of: 50c + 10c + 5c; 20c + 20c + 20c + 5c; 20c + 20c + 10c + 10c + 5c; 10c + 10c + 10c + 10c + 10c + 5c. **Q11.** 175c, because 175c = $1.75 and $1.75 is more than $1.70. **Q12.** $1.25. **Q13.** Any two of: 20c + 20c; 20c + 10c + 10c; 10c + 10c + 10c + 10c. **Q14.** (a) 5 (b) 4. **Q15.** Any two of: $2 + $1 + 20c + 20c; $2 + $1 + 20c + 10c + 10c; $1 + $1 + $1 + 20c + 20c. **Q16.** 20c + 10c + 5c. **Q17.** (a) true (b) false, it is $1.50 (c) true. **Q18.** $1 + $1 + $1 + 20c + 20c + 20c (or $2 + $1 + 20c + 20c + 10c + 10c). **Q19.** (a) 30c (b) 20c + 10c (c) $1 + 50c + 20c (d) 20c more.

Worked answers

Q1. (a) 50c + 20c = 70c, and 70c + 5c = 75c. (b) $1 is 100c; count on 20c, 20c, 10c to get 150c, which is $1.50.

Q2. (a) $1 = 100c. (b) $3 is 3 lots of 100c, so 300c. (c) 200c is 2 lots of 100c, so $2. (d) The 50 after the dot is 50c, so $2.50 is $2 and 50c.

Q3. (a) $1.25 is 1 dollar and 25 cents. (b) $2.70 is 2 dollars and 70 cents.

Q4. One way is 20c + 20c + 5c. Another way is 10c + 10c + 10c + 10c + 5c. Both count on to 45c.

Q5. Count on from 60c to $1 (100c): 60c + 40c = 100c, so the change is 40c.

Q6. (i) $1 + 20c = $1.20, and (C) 50c + 50c + 20c = $1.20. (ii) $1 + 5c = $1.05, and (A) 50c + 50c + 5c = $1.05. (iii) 50c + 10c = 60c, and (B) 20c + 20c + 20c = 60c.

Q7. $1 + 20c + 20c + 5c = $1.45. $1.45 is more than $1.40, so yes, Zac has enough. He would get 5c change.

Q8. Count on from 70c to $1: 70c + 30c = 100c, so the change is 30c.

Q9. (a) $2 = 200c. (b) $4 = 400c. (c) $1.50 is 100c + 50c = 150c.

Q10. Three ways: 50c + 10c + 5c; 20c + 20c + 20c + 5c; and 10c + 10c + 10c + 10c + 10c + 5c. Each row counts on to 65c.

Q11. 175c is $1.75. $1.75 is more than $1.70, so 175c is more.

Q12. 50c + 50c = $1, and 20c + 5c = 25c, so you have $1.25.

Q13. Count on from $1.60: 20c + 20c gets to $2, so one way is 20c + 20c. Another way is 20c + 10c + 10c.

Q14. (a) 20c + 20c + 20c + 20c + 20c = $1, so 5 coins. (b) 50c + 50c = $1, so $2 takes 4 coins.

Q15. One way: $2 + $1 + 20c + 20c. Another way: $2 + $1 + 20c + 10c + 10c. Both make $3.40.

Q16. 20c + 10c + 5c = 35c. That is the only way with exactly three coins.

Q17. (a) True: $2.05 is 200c + 5c = 205c. (b) False: 50c + 50c + 50c = $1.50, which is less than $2. (c) True: 10 lots of 10c is 100c = $1.

Q18. $1 + $1 + $1 = $3, and 20c + 20c + 20c = 60c, so $3 and 60c is $3.60 — six coins in all.

Q19. (a) Count on from $1.70: 10c + 10c + 10c gets to $2, so the change is 30c. (b) 30c is 20c + 10c. (c) $1 + 50c + 20c = $1.70. (d) Count on from $1.50 to $1.70: 20c. The stamp costs 20c more now.

Modelling additive and multiplicative problems, including money

Code: VC2M3N08 (.E01, .E02, .E03, .E04, .E05)

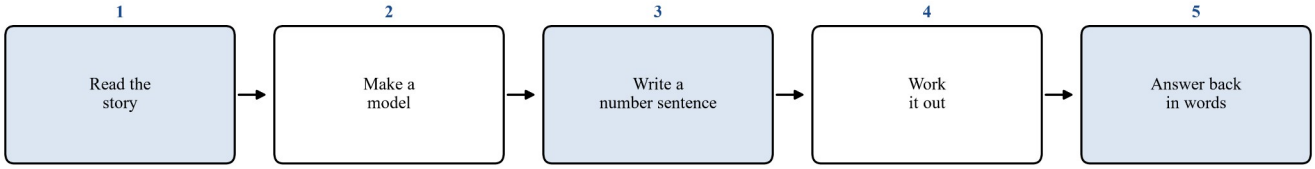
A maths **model** is a picture or a number sentence that tells the same story as a problem. In this topic you will turn real problems into number sentences, decide when to add, subtract, multiply or divide, use bar models and equal-group pictures, solve money problems in two steps, and check your answers with a calculator. Then you will answer back in words about the story.

You will need: counters, grid paper, a pencil, and a calculator for some parts.

Learn about modelling problems

1. Five steps for any problem

Every problem in this topic can be solved with the same five steps.



Five boxes joined by arrows showing the steps: read the story, make a model, write a number sentence, work it out, answer back in words.

Let us try the steps on a small story: *There are 8 birds on a fence. 5 more birds land on the fence. How many birds are on the fence now?*

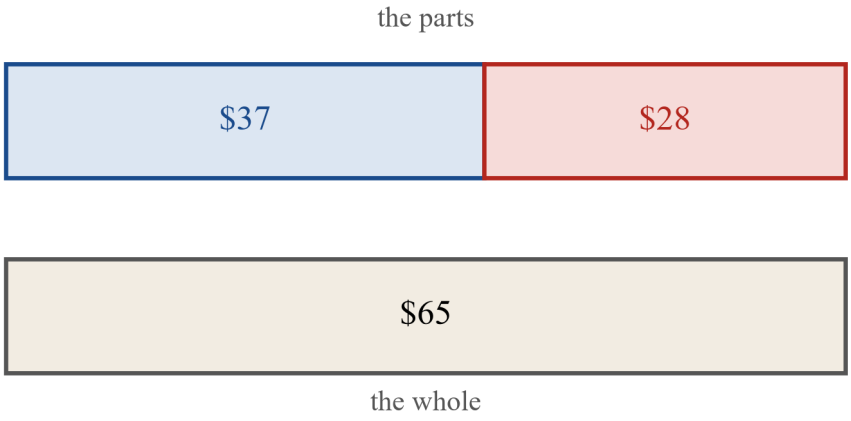
1. **Read the story.** We know 8 birds and 5 more. We want to find how many in all.
2. **Make a model.** Draw 8 dots, then 5 more dots.
3. **Write a number sentence.** 8 + 5 = □
4. **Work it out.** 8 + 5 = 13.
5. **Answer back in words.** There are 13 birds on the fence now.

Modelling means turning a real story into maths, working it out, and answering back about the story.

2. Bar models show the parts and the whole

A **bar model** is a model made of bars. Each bar stands for a number in the story.

Mia saved $37. For her birthday she got $28 more. How much money does Mia have now?



37 + 28 = 65. Two parts make the whole, so we add.

A bar model. A blue bar labelled $37 and a red bar labelled $28 sit side by side on top, and one bar labelled $65, as long as both together, sits below.

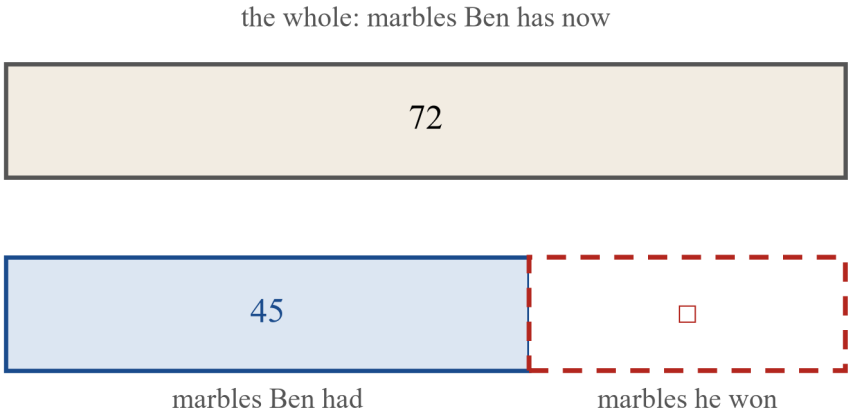
The $37 and the $28 are the **parts**. The $65 is the **whole**. Two parts make the whole, so we add: 37 + 28 = 65. Mia has $65 now.

When two **parts** make a **whole**, add the parts to find the whole.

3. When a part is a blank

Sometimes you know the whole and one part, and the other part is a blank.

Ben had 45 marbles. He won some more at lunch. Now he has 72 marbles. How many marbles did Ben win?



45 + □ = 72

Find the missing part by subtracting: 72 − 45 = 27

A bar model. The whole bar labelled 72 sits on top. Below are a bar labelled 45 and a blank box for the marbles he won. The sentences read 45 plus a blank equals 72, and find the missing part by subtracting: 72 take away 45 equals 27.

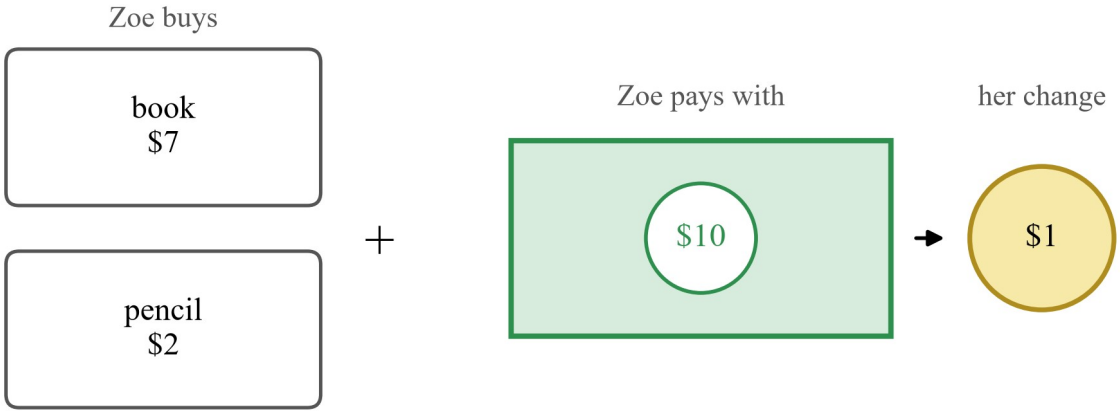
The number sentence is 45 + □ = 72. To find the missing part, subtract the part we know from the whole: 72 − 45 = 27. Ben won 27 marbles.

Each number is connected to the story: 45 is the marbles Ben had, 72 is the marbles he has now, and 27 is the marbles he won.

To find a missing **part**, subtract the part you know from the **whole**.

4. Money stories can take two steps

Zoe buys a book for $7 and a pencil for $2. She pays with a $10 note. How much change does Zoe get?



Step 1: $7 + 2 = 9$

Step 2: $10 - 9 = 1$

Zoe gets $1 change.

Price tags for a book $7 and a pencil $2, a $10 note, and a $1 coin of change. The sentences below read: step 1, 7 plus 2 equals 9; step 2, 10 take away 9 equals 1; Zoe gets $1 change.

- **Step 1 — find the total cost.** $7 + 2 = 9$. The book and the pencil cost $9 in all.
- **Step 2 — find the change.** $10 - 9 = 1$. Zoe gets $1 change.

This story used addition and subtraction, one after the other. Always ask: *what do I need to find first?*

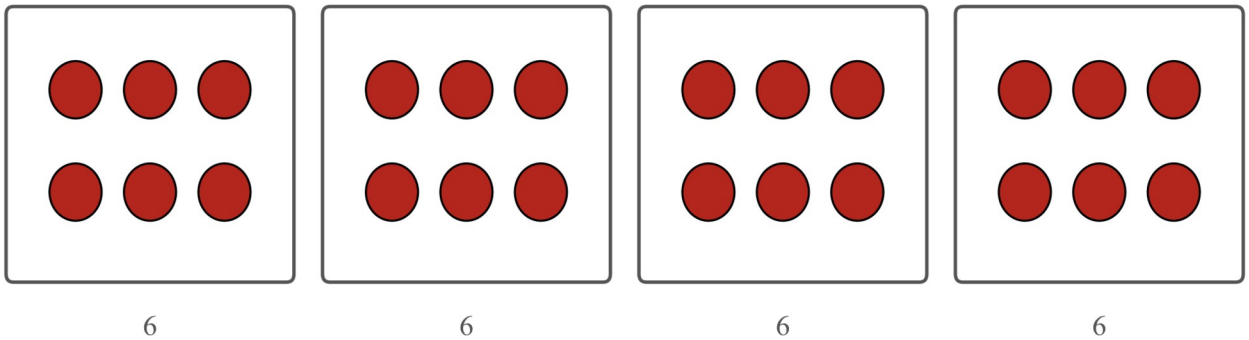
Some money problems need **two steps**. Do one step at a time.

5. Equal groups: add or multiply?

When every group has the same number, you can add the groups — or you can multiply.

There are 4 boxes. Each box has 6 apples. How many apples are there in all?

4 boxes, 6 apples in each box



$6 + 6 + 6 + 6 = 24$

$4 \times 6 = 24$

4 boxes × 6 apples in each = 24 apples

Four boxes, each holding 6 apples. The sentences below read 6 plus 6 plus 6 plus 6 equals 24, and 4 times 6 equals 24.

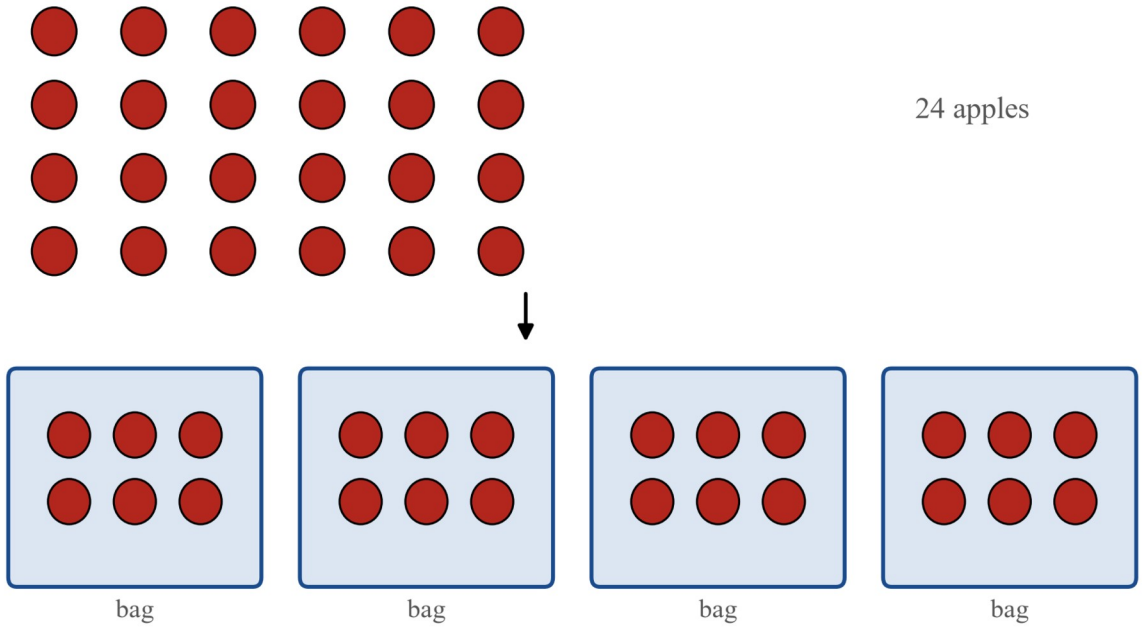
6 + 6 + 6 + 6 = 24, or 4 × 6 = 24. Both number sentences tell the story, and multiplication is the quicker one. The numbers are connected to the story: 4 is the number of boxes, 6 is the apples in each box, and 24 is the apples in all.

Equal groups mean the same number in every group. You can add the groups or multiply.

6. Division sorts into equal groups

Division answers two kinds of question about equal groups: *how many groups?* and *how many in each group?*

24 apples are packed into bags. Each bag holds 6 apples. How many bags are filled?



24 ÷ 6 = 4 bags

Check: 4 × 6 = 24

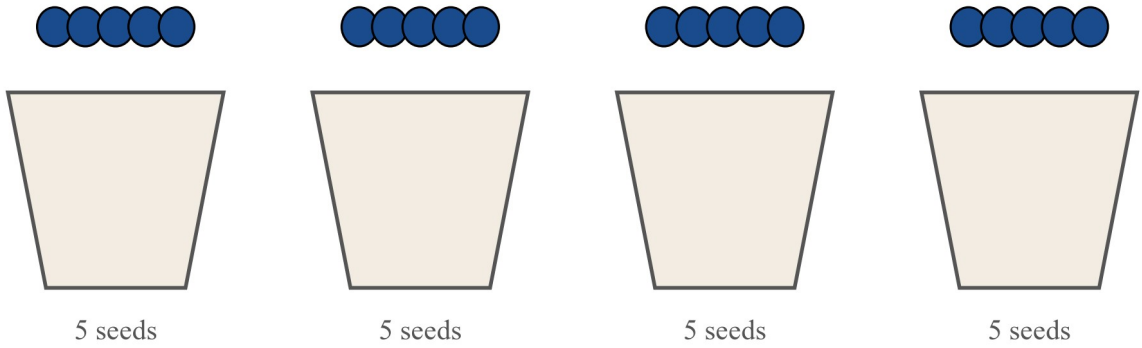
24 apples in rows on top, with an arrow down to 4 bags each holding 6 apples. The sentences read 24 divided by 6 equals 4 bags, and check: 4 times 6 equals 24.

24 ÷ 6 = 4, so 4 bags are filled. Check with multiplication: 4 × 6 = 24. The two number sentences tell the same story — the division sorts the apples into bags, and the multiplication checks it.

7. Share equally and check

20 seeds are shared equally into 4 pots. How many seeds go in each pot?

20 seeds shared equally into 4 pots



$20 \div 4 = 5$

Check: $4 \times 5 = 20$

Four pots, with 5 seeds above each pot. The sentences read 20 divided by 4 equals 5, and check: 4 times 5 equals 20.

$20 \div 4 = 5$, so each pot gets 5 seeds. Check: $4 \times 5 = 20$. Counting the seeds in the pots, $5 + 5 + 5 + 5 = 20$, so the answer is right.

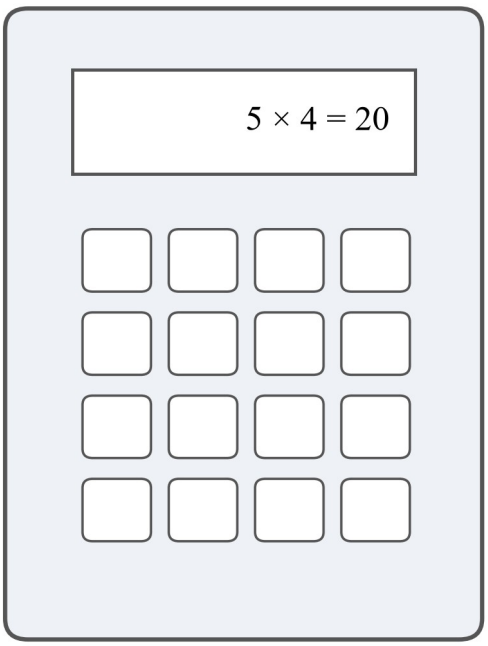
The same 20 seeds can be shared equally in other ways too.

Pots	Seeds in each pot	Number sentences
2	10	$20 \div 2 = 10$, and $2 \times 10 = 20$
4	5	$20 \div 4 = 5$, and $4 \times 5 = 20$
5	4	$20 \div 5 = 4$, and $5 \times 4 = 20$
10	2	$20 \div 10 = 2$, and $10 \times 2 = 20$

8. Digital tools can do the calculating

A **calculator** is a machine that works out number sums for you. Windows Calculator is a real calculator that comes with Windows computers.

Source: Microsoft, *Windows Calculator*, retrieved 2026-08-20.



You decide what to type.
The calculator works it out.

A calculator with 5 times 4 equals 20 on the screen. Words below say you decide what to type, and the calculator works it out.

The calculator does the calculating, but it does not do the thinking. You still have to:

- decide whether to add, subtract, multiply or divide;
- type in the right numbers;
- read the answer; and
- check that the answer makes sense in the story.

If 5 children each have 4 stickers, you type 5 × 4 and read 20. The calculator worked it out, but *you* knew it was a multiplication.

Worked examples

Example 1 — with help

At the market, pies cost $6 each. Tom buys 3 pies. He pays with a $20 note. How much change does Tom get?

Working	What we did
3 × 6 = 18	3 pies at $6 each cost $18.
20 − 18 = 2	The change is $20 take away $18.
Tom gets $2 change. ✓	Answered back in words.

Example 2 — with help

Ava is saving for a game that costs $65. She has $38. How much more money does Ava need?

Working	What we did
38 + □ = 65	The money she has and the money she needs make the whole $65.
65 − 38 = 27	Found the missing part by subtracting.

Working	What we did
Ava needs $27 more. ✓	Check: 38 + 27 = 65.

Example 3 — on your own

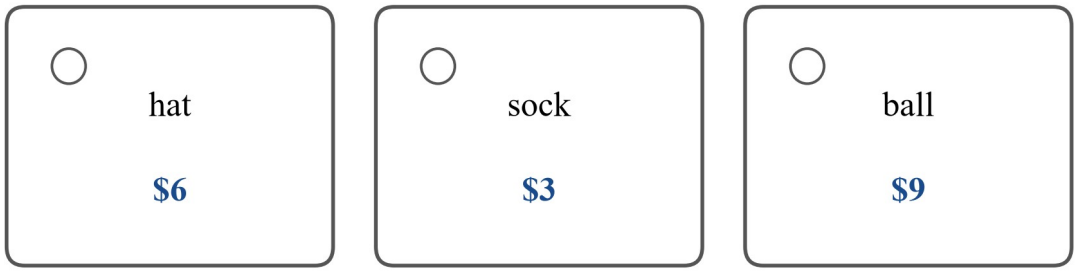
30 biscuits are shared equally onto 5 plates. How many biscuits are on each plate? Write a division number sentence and a multiplication number sentence, and use the multiplication to check.

30 ÷ 5 = 6, so there are 6 biscuits on each plate. Check: 5 × 6 = 30. ✓ The two number sentences tell the same story.

Practice questions

With help

Q1. Look at the price tags.

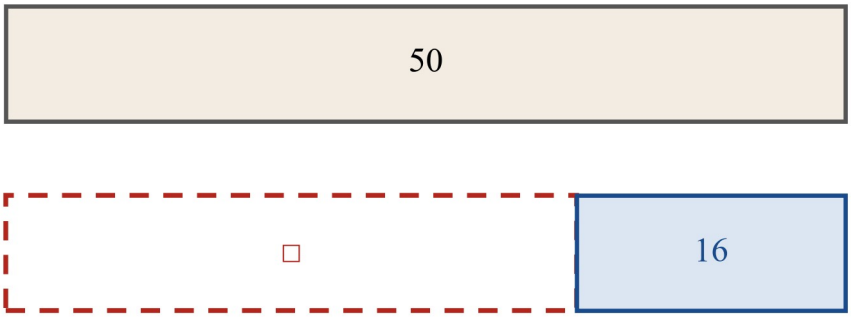


Three price tags: hat $6, sock $3, ball $9.

(a) How much do the hat and the ball cost in all?

(b) You pay with a $20 note. How much change do you get?

Q2. Look at the bar model. Mia had some stickers. Her grandma gave her 16 more. Now she has 50 stickers. How many stickers did Mia have at the start?

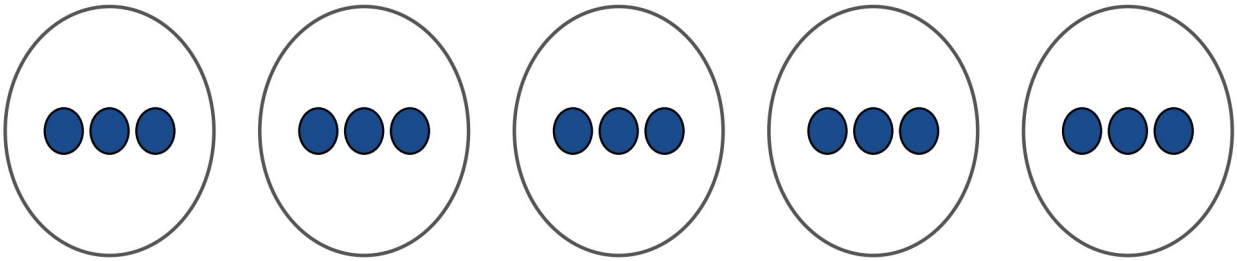


□ + 16 = 50

A bar model. The whole bar labelled 50 sits on top. Below are a blank box and a bar labelled 16. The sentence reads a blank plus 16 equals 50.

Q3. Find the missing number: 7 + □ = 23. Tell a partner what you did to find it.

Q4. Look at the groups. Write an addition number sentence and a multiplication number sentence for the dots.



Five circles, each holding 3 blue dots.

Q5. 18 oranges are packed into bags. Each bag holds 3 oranges. How many bags are filled? Write a division number sentence, then check it with a multiplication number sentence.

Q6. Pencils cost $2 each. Noah buys 3 pencils. He pays with a $10 note. How much change does Noah get?

Q7. Mia types 4 × 5 into a calculator. What number will the screen show? Write a story that 4 × 5 could tell.

Q8. 16 shells are shared equally between 2 friends. How many shells does each friend get? Is anything left over?

On your own

Q9. Sam had 63 cards. He gave 18 cards to his brother. How many cards does Sam have now?

Q10. Tickets for the school disco cost $3 each. Four friends each buy a ticket. They pay with a $20 note. How much change do the friends get?

Q11. There are 6 rows of chairs. Each row has 5 chairs. How many chairs are there in all?

Q12. Noah puts 28 stickers onto cards. Each card holds 4 stickers. How many cards does he fill? Check your answer with a multiplication number sentence.

Q13. 35 counters are shared equally between 5 friends. How many counters does each friend get? Check your answer.

Q14. 5 × 6 = 30. Write the two division number sentences that tell the same story.

Q15. Ben says: if 12 ÷ 3 = 4, then 3 × 4 must be 12. Is Ben right? Use a picture or a story to explain.

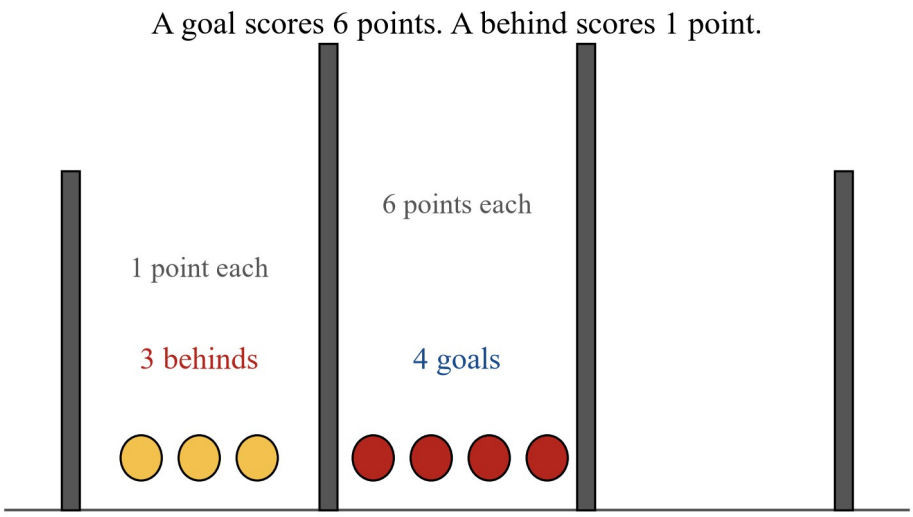
Q16. Ribbons cost $4 each. Mia has $20. She wants to buy 4 ribbons. Does she have enough money? How much will be left?

Q17. Find the missing numbers. (a) □ × 6 = 24 (b) 30 ÷ □ = 5

Q18. A bus has 32 people on it. At the first stop, 9 people get off and 12 people get on. How many people are on the bus now?

Q19. In Australian rules football, a goal scores 6 points and a behind scores 1 point.

Source: Wikipedia, *Australian rules football*, retrieved 2026-08-20.



Four goal posts. Four red balls between the two tall middle posts are 4 goals, worth 6 points each, and three yellow balls between an outer post and a middle post are 3 behinds, worth 1 point each.

(a) In one quarter, Geelong scored 4 goals and 3 behinds. How many points is that?

(b) In the next quarter, Geelong scored 18 points with goals only. How many goals did they score?

(c) North Melbourne scored 3 goals and some behinds. Their score was 25. How many behinds did they score?

Answers

Q1. (a) $15 (b) $5. **Q2.** 34 stickers. **Q3.** 16. **Q4.** 3 + 3 + 3 + 3 + 3 = 15 and 5 × 3 = 15. **Q5.** 18 ÷ 3 = 6 bags; check 6 × 3 = 18. **Q6.** $4. **Q7.** 20; any story of 5 groups of 4 or 4 groups of 5. **Q8.** 8 shells each; nothing is left over. **Q9.** 45 cards. **Q10.** $8. **Q11.** 30 chairs. **Q12.** 7 cards; check 7 × 4 = 28. **Q13.** 7 counters; check 5 × 7 = 35. **Q14.** 30 ÷ 5 = 6 and 30 ÷ 6 = 5. **Q15.** Yes. **Q16.** Yes; $4 left. **Q17.** (a) 4 (b) 6. **Q18.** 35 people. **Q19.** (a) 27 points (b) 3 goals (c) 7 behinds.

Worked answers

Q1. (a) 6 + 9 = 15, so the hat and the ball cost $15 in all. (b) 20 − 15 = 5, so you get $5 change.

Q2. The whole is 50 and one part is 16. The missing part is 50 − 16 = 34. Mia had 34 stickers at the start. Check: 34 + 16 = 50.

Q3. 23 − 7 = 16, so the missing number is 16. Check: 7 + 16 = 23.

Q4. There are 5 groups of 3 dots. Adding the groups: 3 + 3 + 3 + 3 + 3 = 15. Multiplying: 5 × 3 = 15.

Q5. 18 ÷ 3 = 6, so 6 bags are filled. Check: 6 × 3 = 18 oranges.

Q6. 3 pencils at $2 each cost 3 × 2 = $6. The change is 10 − 6 = $4.

Q7. The screen shows 20, because 4 × 5 = 20. A story: 4 bags each hold 5 apples, so there are 20 apples in all (your story can be different).

Q8. 16 ÷ 2 = 8, so each friend gets 8 shells. Nothing is left over, because 8 + 8 = 16.

Q9. 63 − 18 = 45, so Sam has 45 cards now.

Q10. 4 tickets at $3 each cost 4 × 3 = $12. The change is 20 − 12 = $8.

Q11. 6 rows of 5 chairs is 6 × 5 = 30 chairs.

Q12. 28 ÷ 4 = 7, so Noah fills 7 cards. Check: 7 × 4 = 28 stickers.

Q13. 35 ÷ 5 = 7, so each friend gets 7 counters. Check: 5 × 7 = 35.

Q14. 30 ÷ 5 = 6 (30 sorted into 5 groups of 6) and 30 ÷ 6 = 5 (30 sorted into 6 groups of 5). Both match 5 × 6 = 30.

Q15. Yes. 12 ÷ 3 = 4 means 12 shared into 3 equal groups gives 4 in each group. Putting the groups back, 3 groups of 4 is 3 × 4 = 12.

Q16. 4 ribbons at $4 each cost 4 × 4 = $16. $16 is less than $20, so Mia has enough money. 20 − 16 = 4, so $4 will be left.

Q17. (a) 4 × 6 = 24, so the missing number is 4. (b) 30 ÷ 6 = 5, so the missing number is 6.

Q18. 32 − 9 = 23 people after 9 get off. Then 23 + 12 = 35, so there are 35 people on the bus now.

Q19. (a) 4 goals score 4 × 6 = 24 points. The 3 behinds score 3 points. 24 + 3 = 27 points. (b) 18 ÷ 6 = 3, so Geelong scored 3 goals. (c) 3 goals score 3 × 6 = 18 points. 25 − 18 = 7, so North Melbourne scored 7 behinds.

Test

Chapter 2 test (T2) — Number: fractions, money and modelling

Codes: VC2M3N03 (2A) · VC2M3N07 (2B) · VC2M3N08 (2C) · **Marks:** 15 · **Guided duration:** 25 min

This is a classroom check, not an exam. There is no time limit; the 25 minutes is a guide for planning a lesson. Answer every question. You may use counters and coins for any question, and you may use a calculator if you want to — no question needs one, and no content description in this chapter says to work without one (VC2M3N08 says digital tools may be used where appropriate).

Q1. (2 marks) Look at each strip. ■ is a shaded cell. □ is a cell that is not shaded. Write the fraction of each strip that is shaded. Say each one in words too.

(a) (1 mark)

|—|—|—| | ■ | □ | □ |

(b) (1 mark)

|—|—|—|—|—|—|—|—|—|—| | ■ | ■ | ■ | ■ | ■ | ■ | ■ | □ | □ | □ |

Q2. (1 mark) What fraction must be added to $\frac{2}{5}$ to make 1 whole?

Q3. (2 marks) 12 strawberries are shared equally between 3 friends. You may use counters.

(a) How many strawberries does each friend get? (1 mark)

(b) What fraction of the strawberries is each friend's share? (1 mark)

Q4. (1 mark) Which set of coins makes 85c? Circle the letter.

A 50c + 20c + 10c + 5c

B 50c + 20c + 10c

C 20c + 20c + 20c + 20c

D 50c + 20c + 20c

Q5. (2 marks) Show $2.35 two different ways, using notes and coins. You may use toy coins. (1 mark for each correct, different way.)

Q6. (1 mark) A muffin costs $1.25. You pay with a $2 coin. Count on to find the change.

Q7. (2 marks) Zoe had some marbles. She won 18 more. Now she has 53 marbles. How many marbles did Zoe have at the start? Show how you worked it out. A bar model may help.

Q8. (2 marks) In Australian rules football, a goal scores 6 points and a behind scores 1 point.

Source: Wikipedia, *Australian rules football*, retrieved 2026-08-20.

In one quarter, Geelong scored 5 goals and 4 behinds. How many points did Geelong score in that quarter? Show your working.

Q9. (2 marks) 20 biscuits are shared equally onto 4 plates. How many biscuits are on each plate? Write a division number sentence and a multiplication number sentence that checks it.

Solutions

Worked solutions

Q1. (a) The strip has 3 equal cells and 1 is shaded. The bottom number is 3 and the top number is 1, so the fraction is $\frac{1}{3}$, one-third. (b) The strip has 10 equal cells and 7 are shaded, so the fraction is $\frac{7}{10}$, seven-tenths.

Q2. 1 whole is $\frac{5}{5}$. $2+3=5$, so $\frac{2}{5}+\frac{3}{5}=\frac{5}{5}=1$. The fraction needed is $\frac{3}{5}$.

Q3. (a) $12 \div 3 = 4$, so each friend gets 4 strawberries. (b) Each friend gets one of 3 equal shares, so each share is $\frac{1}{3}$ of the strawberries. Sharing between 3 gives one-third to each.

Q4. Count each set. A: 50c + 20c + 10c + 5c = 85c ✓. B: 50c + 20c + 10c = 80c. C: 20c + 20c + 20c + 20c = 80c. D: 50c + 20c + 20c = 90c. The answer is **A**.

Q5. Any two different ways that count on to $2.35 score the marks. Two ways: $2 + 20c + 10c + 5c = $2.35, and $1 + $1 + 20c + 10c + 5c = $2.35. Check the first: $2 and 35c is $2.35 ✓. Check the second: $1 + $1 = $2, and 20c + 10c + 5c = 35c, so $2 and 35c is $2.35 ✓.

Q6. Count on from $1.25 to $2. A jump of 25c lands on $1.50, then a jump of 50c lands on $2. 25c + 50c = 75c, so the change is 75c.

Q7. The marbles Zoe had and the 18 she won make the whole 53: □ + 18 = 53. To find the missing part, subtract the part we know from the whole: 53 − 18 = 35. Zoe had 35 marbles at the start. Check: 35 + 18 = 53 ✓. Award 1 mark for a number sentence or model with a subtraction, and 1 mark for the answer 35.

Q8. 5 goals score 5 × 6 = 30 points. The 4 behinds score 4 × 1 = 4 points. 30 + 4 = 34, so Geelong scored 34 points. Award 1 mark for the goal points (5 × 6 = 30) and 1 mark for the total 34.

Q9. $20 \div 4 = 5$, so there are 5 biscuits on each plate. Check: $4 \times 5 = 20$ ✓. The division shares the biscuits, and the multiplication puts the shares back together, so the two number sentences tell the same story. Award 1 mark for 20 ÷ 4 = 5 and 1 mark for the multiplication check.

Answer key

Question	Answer	Marks	Code
Q1(a)	$\frac{1}{3}$, one-third	1	VC2M3N03
Q1(b)	$\frac{7}{10}$, seven-tenths	1	VC2M3N03
Q2	$\frac{3}{5}$	1	VC2M3N03
Q3(a)	4 strawberries	1	VC2M3N03
Q3(b)	one-third, $\frac{1}{3}$	1	VC2M3N03
Q4	A	1	VC2M3N07
Q5	first correct way to make $2.35	1	VC2M3N07
Q5	second correct, different way	1	VC2M3N07
Q6	75c	1	VC2M3N07
Q7	number sentence or model with a subtraction, e.g. □ +	1	VC2M3N08

Question	Answer	Marks	Code
	18 = 53, 53 − 18		
Q7	35 marbles	1	VC2M3N08
Q8	5 × 6 = 30 goal points	1	VC2M3N08
Q8	total 34 points	1	VC2M3N08
Q9	20 ÷ 4 = 5, so 5 biscuits on each plate	1	VC2M3N08
Q9	multiplication check, 4 × 5 = 20	1	VC2M3N08
Total		**15**	

Marks by content description. VC2M3N03 — 5 marks (Q1–Q3) · VC2M3N07 — 4 marks (Q4–Q6) · VC2M3N08 — 6 marks (Q7–Q9). Every content description contributes at least 3 separately scored marks. The only multiple-choice item is Q4, 1 mark of 15, inside the cap of a quarter of any test.

Achievement standard extracts (verbatim from maths_3.json): VC2M3N03 — *Students represent unit fractions and their multiples in different ways.* VC2M3N07 — *They represent money values in different ways.* VC2M3N08 — *They use a range of strategies to apply mathematical modelling to solve practical problems involving single-digit multiplication and division, recalling multiplication facts for twos, threes, fours, fives and tens.*