Place value

The value of each digit in a number depends on its position. Digits that are further to the left are worth more. You can use a place value diagram to help you read and write numbers.

Worked example

Target grade 1

Write these amounts in order, smallest first.

(1 mark)

£2908   £2950   £5011   £925   £10 430

£925
£925   £10 430
£925   £5011   £10 430
£925   £2908   £2950   £5011   £10 430

Check it!
Have you included all the amounts in your final answer? ✓
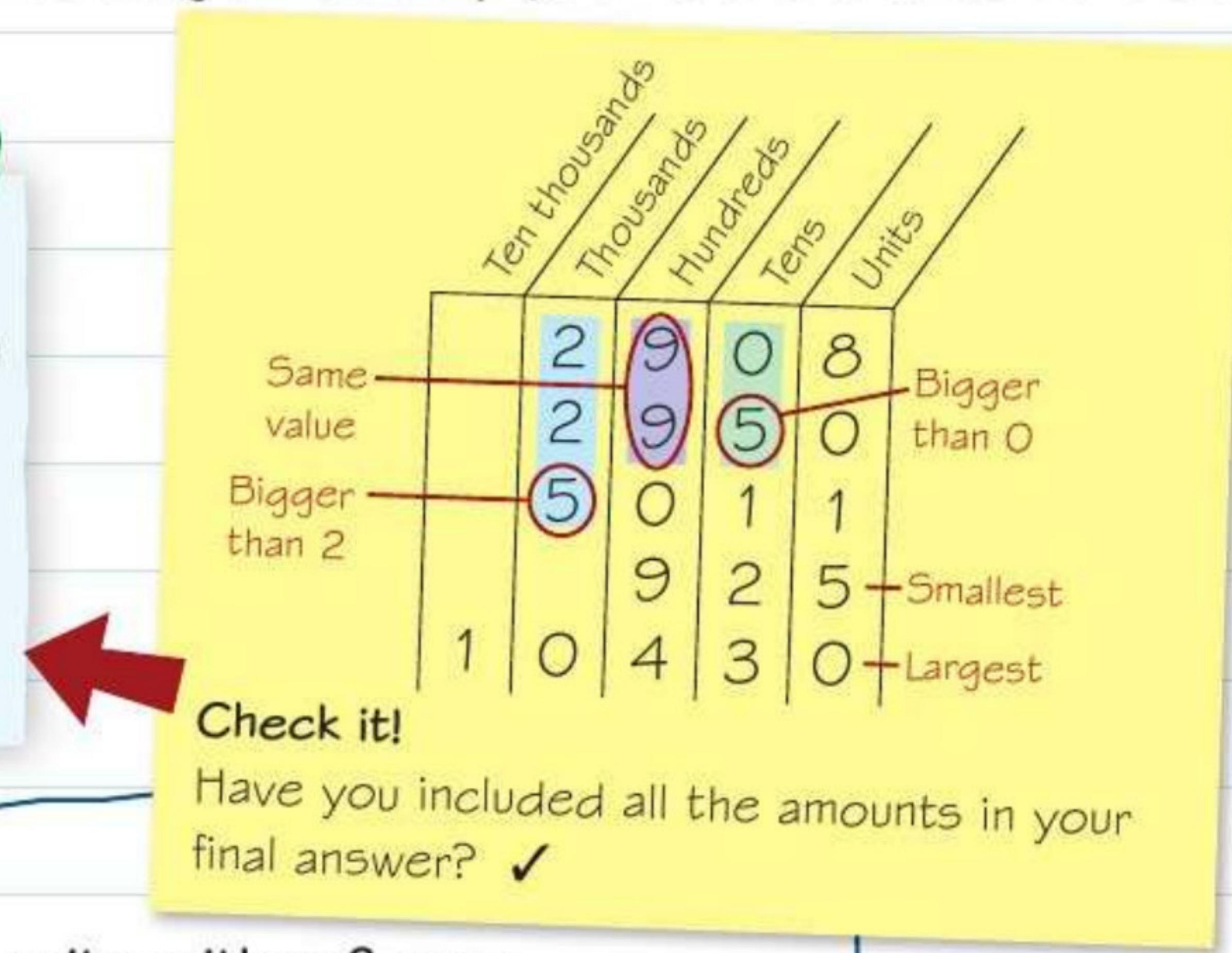
Working with money

✓ Do all your calculations in the same units, either £ or p.

✓ Write either £ or p in your answer, but not both.

✓ 100p = £1

✓ Amounts in pounds need 2 decimal places. Write 280p as £2.80.

Worked example

Target grade 1

A music website sells songs and albums.
Songs cost 79p each.
Albums cost £6.99 each.
Aaron has a £25 gift card.
He buys 2 albums and spends the rest on songs.
How many songs can he afford?   **(2 marks)**

2 × 6.99 = 13.98
25 − 13.98 = 11.02
11.02 ÷ 0.79 = 13.949…
Aaron can buy 13 songs.

Examiners' report

You can get credit for attempting the correct calculation, so make sure you show all your working. Write neatly, and copy any numbers from the question carefully.
Make sure you read the question carefully – your final answer needs to be a **number of songs**, not an amount of money.
Choose whether you want to work in pounds or pence, and remember to round down because Aaron can only buy a **whole number** of songs.

Real students have struggled with questions like this in recent exams – **be prepared!**

Now try this

Target grade 1

1 Write these amounts in order, smallest first:
£1974   £974   £1749   £1497   £1947

(1 mark)

Profit is money you make, and **loss** is money you lose. You need to **add** the individual profits, then **subtract** the individual losses.

2 Mark buys and sells used cars. The table shows information about five cars that Mark bought and sold.

Car	A	B	C	D	E
bought	£2200	£7800	£4200	£……	£6500
sold	£2900	£9000	£……	£11 200	£5750
profit or loss	£700 profit	£…… ……	£1500 loss	£500 profit	£…… ……

(a) Complete the table.   **(2 marks)**

(b) Work out Mark's total profit or loss for these five cars.   **(2 marks)**

Negative numbers

Numbers less than than 0 are called **negative** numbers.

◄ NEGATIVE NUMBERS │ POSITIVE NUMBERS ►

$-5 \ -4 \ -3 \ -2 \ -1 \ \ 0 \ \ 1 \ \ 2 \ \ 3 \ \ 4 \ \ 5$
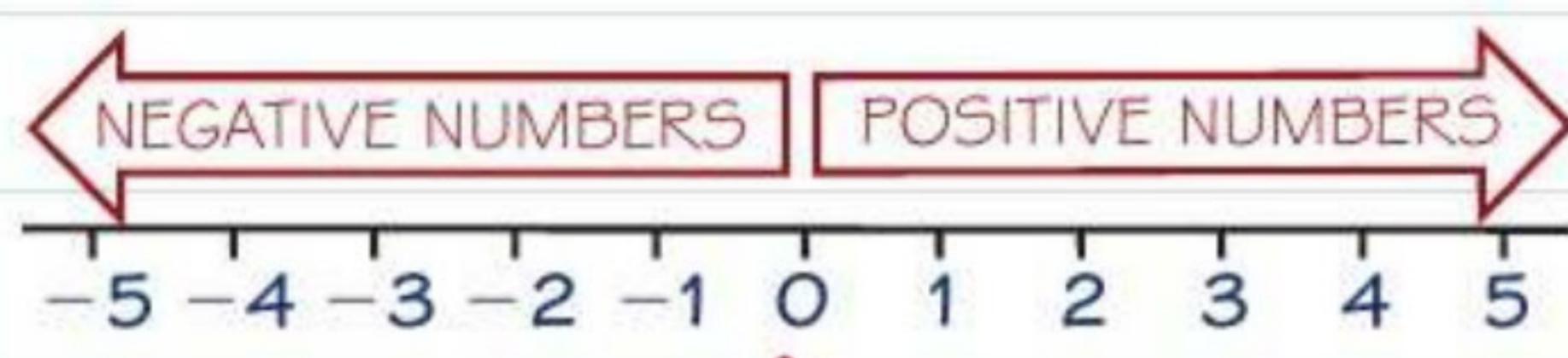
0 is neither positive nor negative.

You can use a number line to write numbers in order of size. The numbers get bigger as you move to the right.

Number lines

You can use number lines to help when adding and subtracting.

$-6 + 4 = -2$ $4 - 5 = -1$

$-6 \ -5 \ -4 \ -3 \ -2 \ -1 \ \ 0 \ \ 1 \ \ 2 \ \ 3 \ \ 4 \ \ 5$
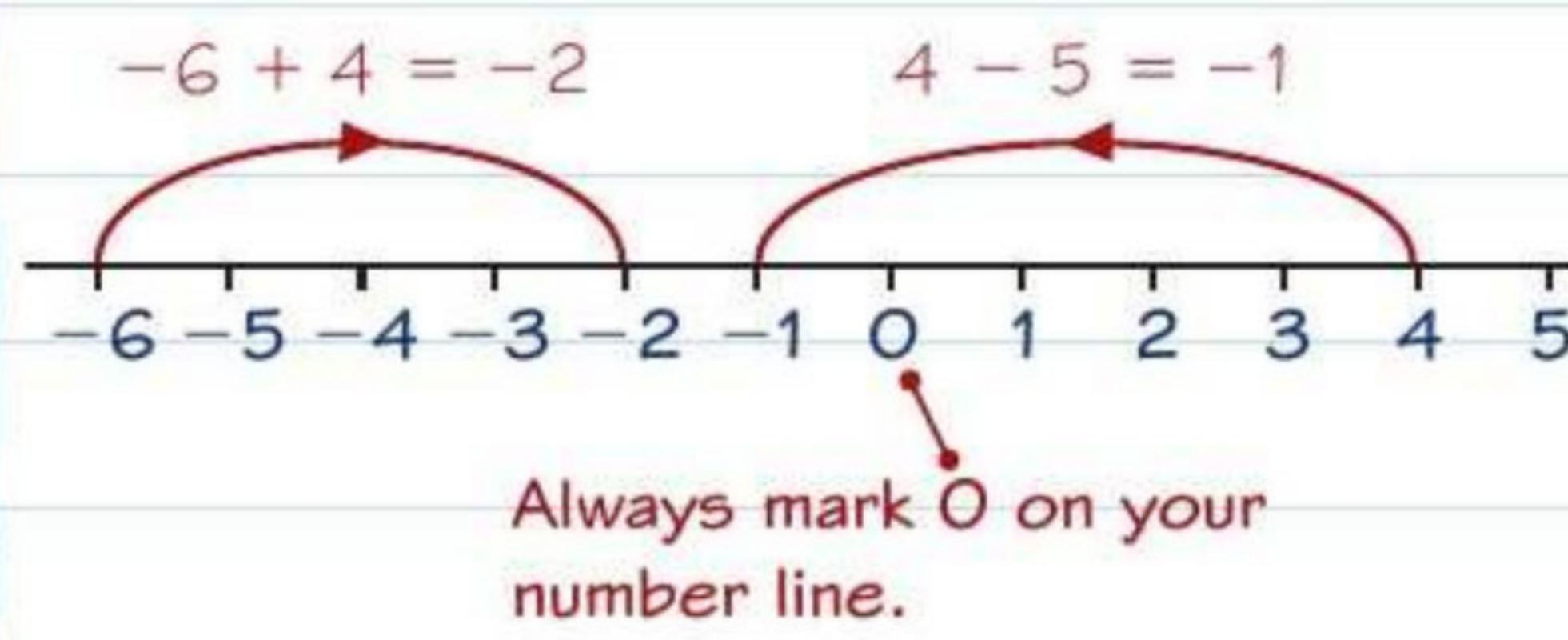
Always mark 0 on your number line.

Adding and subtracting

To add or subtract a negative number, change the double signs first.

$+ - \ \rightarrow \ -$

$12 + -3 = 12 - 3 = 9$

$- - \ \rightarrow \ +$

$5 - -9 = 5 + 9 = 14$

Golden rule

When you **add** a negative number the answer is **lower**.

When you **subtract** a negative number the answer is **higher**.

Multiplying and dividing

When multiplying and dividing, use these rules to decide whether the answer will be positive or negative.

1 If numbers have the **same** sign then the answer is **positive**.
$-3 \times -7 = 21$

2 If numbers have **different** signs then the answer is **negative**.
$+80 \div -10 = -8$
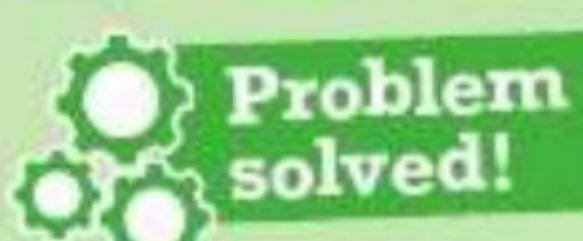
Problem solved! One strategy is to try a few pairs and add up the totals.
You could also work out what each total should be by adding together all 6 cards then dividing by 3:

$-4 + -3 + 0 + 2 + -6 + -1 = -12$

$-12 \div 3 = -4$

Check it!

Make sure you have used each card exactly once. ✔

Worked example

Target grade 1

Here are six number cards.
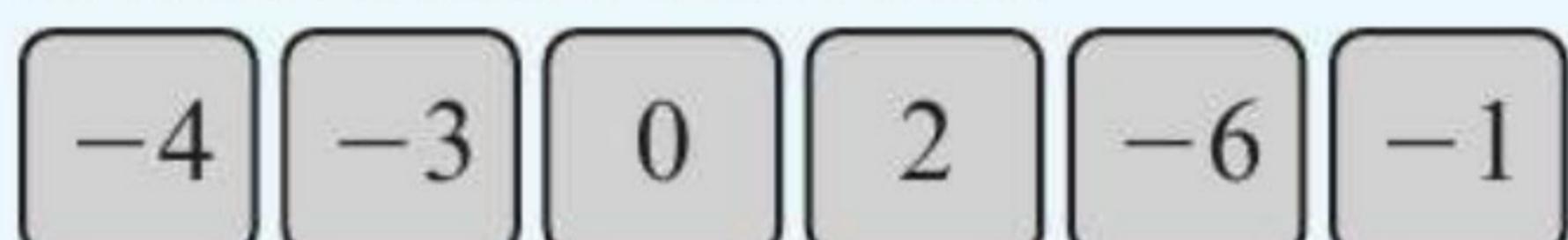
$\boxed{-4} \ \boxed{-3} \ \boxed{0} \ \boxed{2} \ \boxed{-6} \ \boxed{-1}$

Sort the cards into three pairs so that each pair has the same total.   **(2 marks)**

$\boxed{-4}$ and $\boxed{0}$ Total $= -4$

$\boxed{-3}$ and $\boxed{-1}$ Total $= -4$

$\boxed{-6}$ and $\boxed{2}$ Total $= -4$

Now try this

Target grade 1
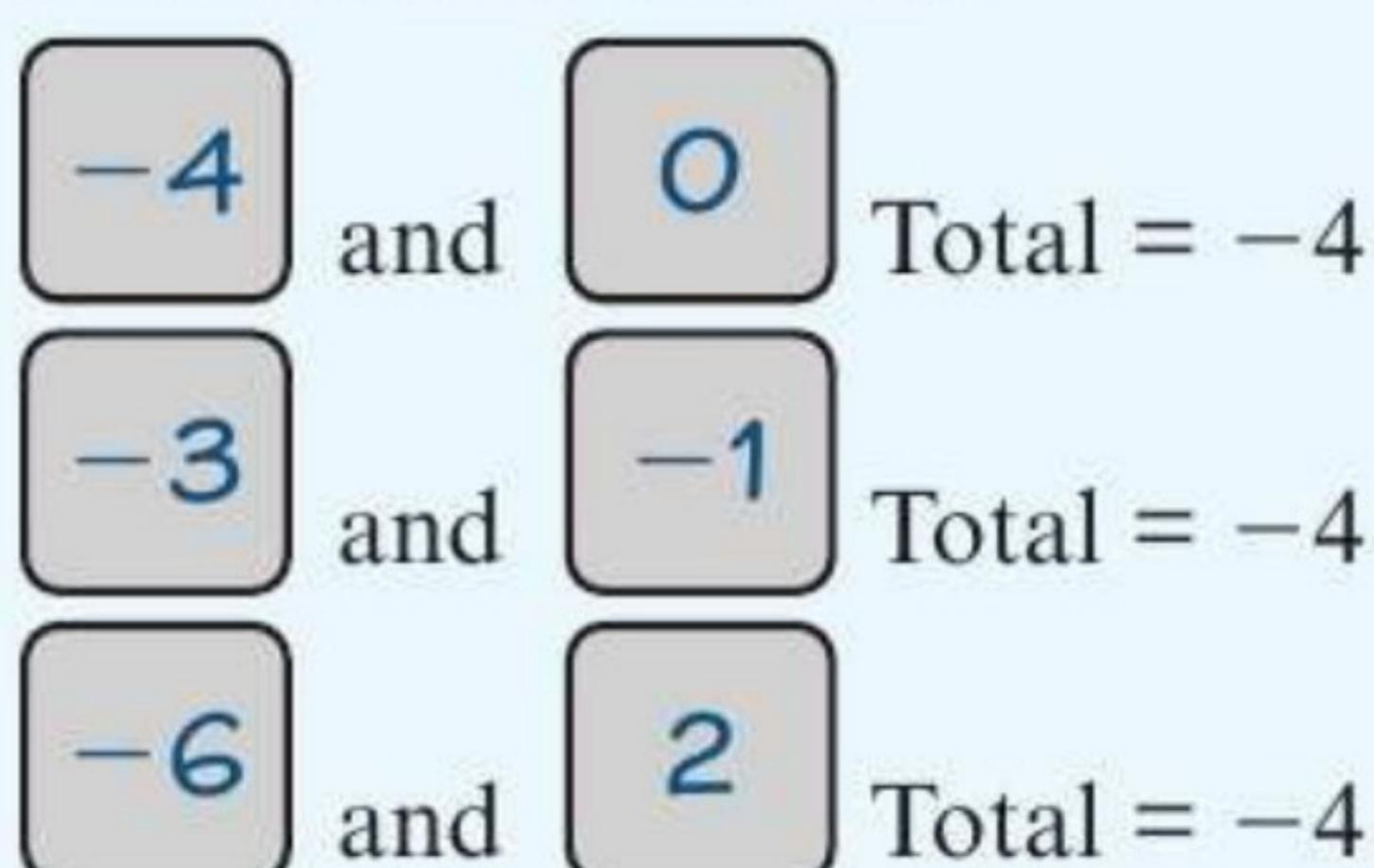
Worked solution video

1 (a) Work out $-2 + -4$
   (b) Work out $-1 - -6$
          (2 marks)

2 (a) Work out -4×-12
   (b) Work out $30 \div -5$
          (2 marks)

3 Here are six number cards.

$\boxed{-10} \ \boxed{-3} \ \boxed{1} \ \boxed{2} \ \boxed{-9} \ \boxed{-5}$

Sort the cards into three pairs so that each pair has the same total.   **(2 marks)**

Try a few pairs and add up the totals.

Rounding numbers

To **round** a number, you look at the next digit to the right on a place value diagram.

5 or more → round up, less than 5 → round down

To round to the nearest 100, you look at the digit in the tens column. It is a 5, so round up. 3250 rounded to the nearest 100 is 3300.

Thousands	Hundreds	Tens	Units	.	tenths	hundredths	thousandths
3	2	5	0				
			5	.	0	4	3
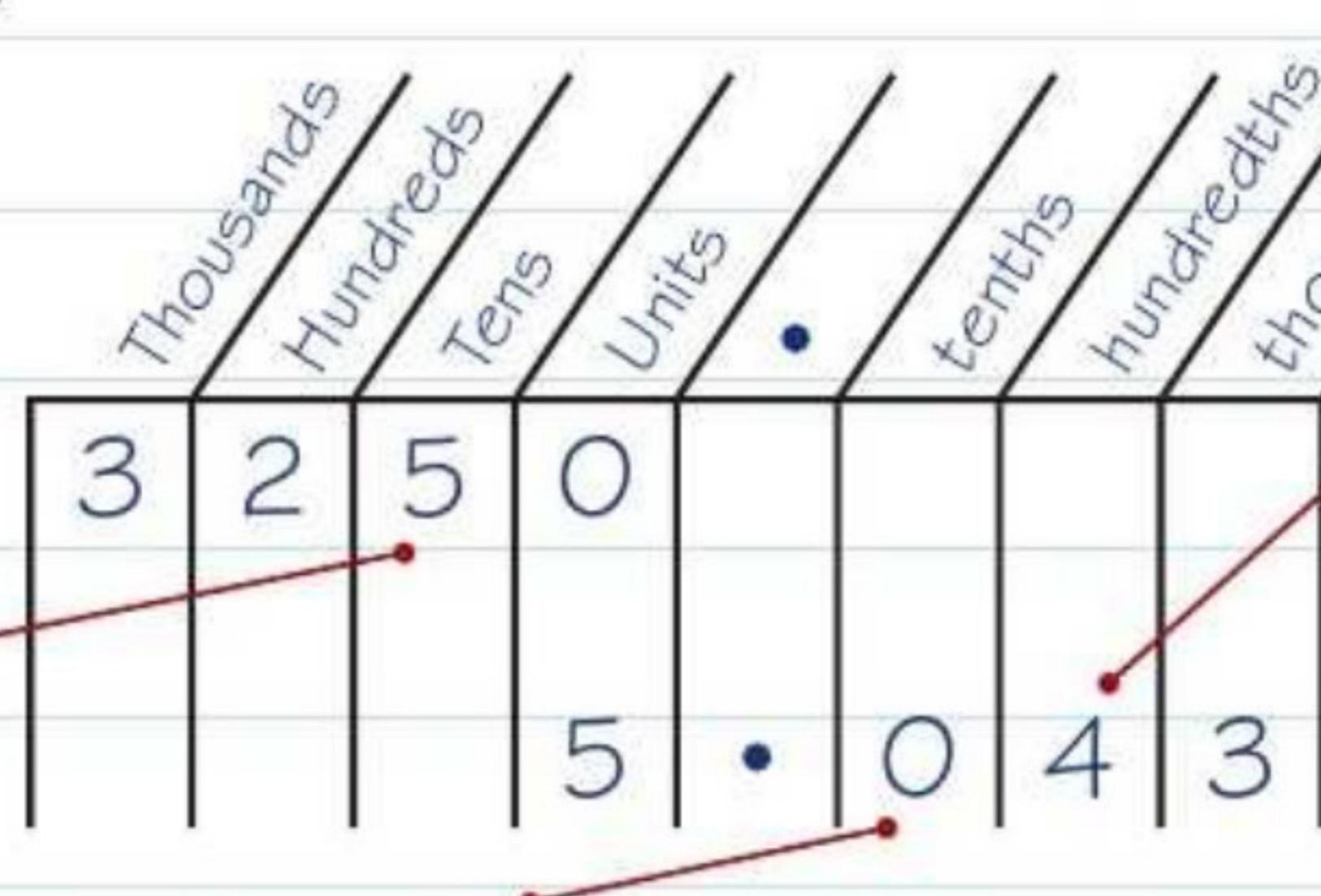
To round to 1 decimal place (1 d.p.), you look at the digit in the second decimal place.
It is a 4, so round down.
5.043 rounded to 1 d.p. is 5.0
You **need** to write the 0 to show that you have rounded to 1 d.p.

To round to the nearest whole number look at the digit in the tenths column.
It is a 0, so round down.
5.043 rounded to the nearest whole number is 5.

Significant figures

You always start counting **significant figures** from the first non-zero on the left.

27.05 rounded to 1 s.f. is 30 — The first non-zero digit is 2. The next digit is 7, so round up to give an answer of 30.

27.05 rounded to 2 s.f. is 27 — Look for the two digits furthest to the left, which are 2 and 7. The next digit is 0, so round down to give an answer of 27.

27.05 rounded to 3 s.f. is 27.1 — The first three significant figures are 2, 7 and 0. The next digit is 5 so round up to 27.1.

Numbers less than 1

When rounding numbers less than 1 to a given number of significant figures, remember **not** to count zero digits that are on the left.

0.0085 rounded to 1 s.f. is 0.009 — Look for the digit which is furthest to the left and which is **not** a zero. This digit is 8. The next digit is 5 so round up to give an answer of 0.009.

Worked example

Target grade 3

Round 6.9083 correct to
(a) 1 significant figure
(b) 2 significant figures
(c) 3 significant figures.   **(3 marks)**

(a) 7 (1 s.f.)
(b) 6.9 (2 s.f.)
(c) 6.91 (3 s.f.)

The width of the cooker is given to the nearest whole unit. So it might be **inaccurate** by up to half a unit in either direction. Show Supraj is wrong by giving an example of a width larger than 76 cm that would round to 76 cm.

Now try this

Target grade 1
1 Round the number 3756
   (a) to the nearest 100   **(1 mark)**
   (b) to the nearest 10   **(1 mark)**

Target grade 2
2 Write these numbers correct to 1 significant figure:
   (a) 48   **(1 mark)**
   (b) 3025   **(1 mark)**
   (c) 0.00939   **(1 mark)**
   (d) 6.5   **(1 mark)**

Worked solution video

Target grade 3
3 Round 0.179554 to 3 significant figures.   **(1 mark)**

Target grade 4
4 Supraj is installing a kitchen. He orders a cooker that is 76 cm wide, to the nearest cm. He says: 'If I leave a gap exactly 76 cm wide the cooker will definitely fit perfectly.' Explain why Supraj is wrong.   **(1 mark)**

Decimals and place value

You can use a place value diagram to help you understand and compare decimal numbers. Remember that decimal numbers with more digits are not necessarily bigger. Try writing extra Os so that all the numbers have the same number of decimal places.

Tens	Units	•	tenths	hundredths	thousandths
0	•	7	5	8	
0	•	7	6	0	
0	•	7	9	0	
0	•	8	0	0	

The value of the 5 in this number is 5 hundredths.

0.76 is the same as 0.760
0.76 is bigger than 0.758
6 hundredths is bigger than 5 hundredths.

0.79 is smaller than 0.8 because the digit in the tenths place is smaller.
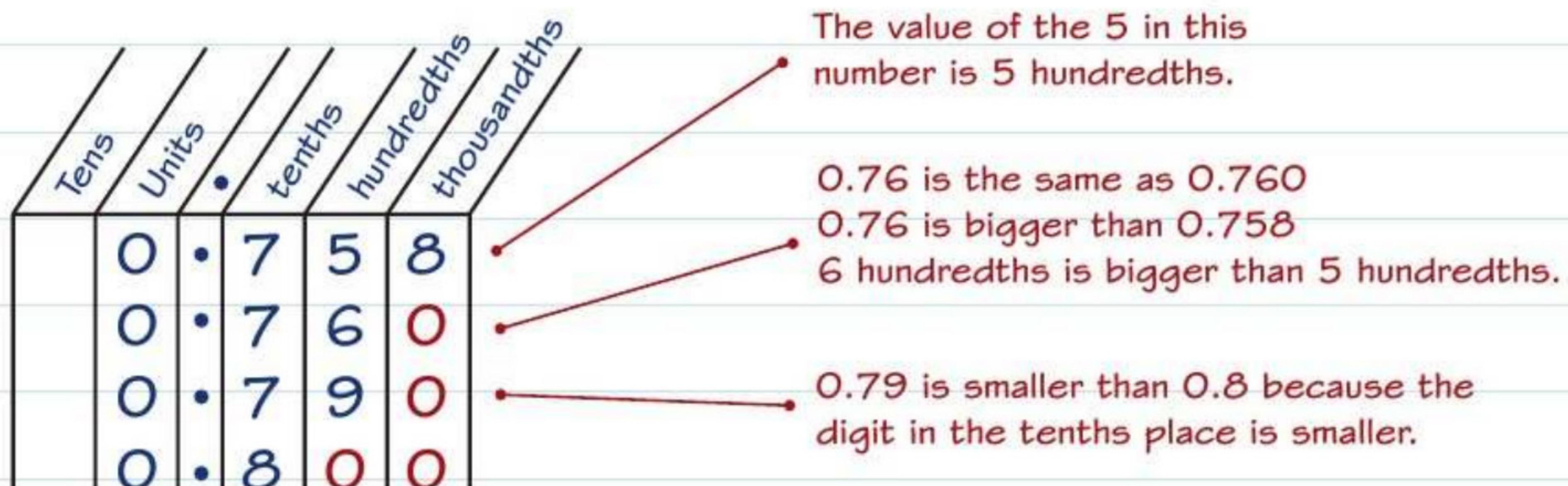
Worked example

Target grade 1

Write these numbers in order, smallest first:
0.43   0.425   0.4   0.48   0.459
(2 marks)

~~0.43~~ ~~0.425~~ ~~0.4~~ ~~0.48~~ ~~0.459~~
0.4   0.425
0.4   0.425   0.43
0.4   0.425   0.43   0.459
0.4   0.425   0.43   0.459   0.48

All these numbers have the same tenths digit. You need to look at the hundredths digit first.
0.4 is the same as 0.40 so this is the smallest number.
0.425 has the next smallest hundredths digit so this is the next number.

Check it!
Cross out each number to make sure you include them all in your final answer. ✓

Worked example

Target grade 2

Using the information that
58 × 71 = 4118
write down the value of
(a) 58 × 0.71   **(1 mark)**
41.18
(b) 5800 × 7.1   **(1 mark)**
41180

(a) 71 has been divided by 100 and 58 hasn't been changed. So the answer needs to be divided by 100.   4118 ÷ 100 = 41.18
(b) 58 has been multiplied by 100 and 71 has been divided by 10.

─ ×100 ─ ÷10 ─→ is the same as ─ ×10 ─→

The answer needs to be multiplied by 10:
4118 × 10 = 41180

To revise multiplying and dividing by 10, 100 and 1000 see page 61.

Now try this

Target grade 1

1 Write down the place value of the 8 in these numbers:
(a) 2.84   **(1 mark)**   (b) 0.3086   **(1 mark)**
2 Write these numbers in order of size:
0.517 0.508 0.58 0.571 0.51   **(2 marks)**

Target grade 2

3 Using the information that
672 × 13 = 8736
write down the value of
(a) 0.672 × 13   **(1 mark)**
(b) 8736 ÷ 67.2   **(1 mark)**

You could start with the smallest number or the largest.