

Grade 2 Math

Level Up!

36 sheets • every strand • new powers unlocked

THIS BOOK BELONGS TO

Find your grid



Number

to 200 • facts to 20 • $\times$ and $\div$ • fractions

Sheets 1–15



Algebra

patterns • mystery symbols • coding

Sheets 16–20



Data

Venn • Carroll • bar graphs • the mode

Sheets 21–25



Spatial Sense

shapes • symmetry • maps • the ruler

Sheets 26–33



Money

making amounts lots of ways

Sheet 34

New powers you unlock this year

$\times$ Multiplication
equal groups and arrays

Even and odd
and why it matters

$\div$ Division
sharing things out fairly

Numbers to 200
hundreds, tens and ones

Centimetres & metres
your first real ruler

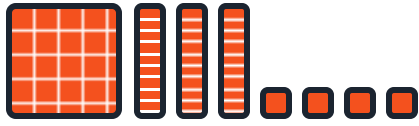
Two robots at once
code that runs together

For the grown-up Grade 2 is a steeper year than Grade 1 — multiplication, division and standard measurement all arrive at once. If you only have ten minutes a day, spend it on **sheet 7** (addition facts to 20) and **sheets 13–14** (multiplication and division). Instant fact recall by June is what makes Grade 3 feel easy instead of brutal.



Hundreds, tens and ones

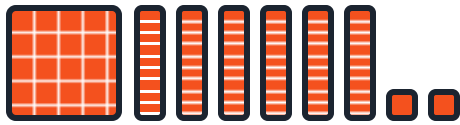
The big square is 100. The tall rod is 10. The little cube is 1.



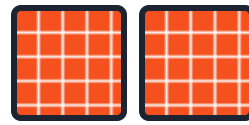
H T O =



H T O =



H T O =



H T O =

Now you draw it

Draw 178



Draw 105



Draw 140



Careful! In 105 the zero is doing an important job. It says "no tens here." If you leave it out you get 15, which is a completely different number. Zero is a placeholder, not nothing.



Break it apart, build it back

Big numbers are just smaller numbers stuck together. Fill in the missing piece.

a $156 = 100 + 50 + \boxed{}$

b $143 = 100 + \boxed{} + 3$

c $128 = \boxed{} + 20 + 8$

d $190 = 100 + \boxed{}$

e $100 + 70 + 5 = \boxed{}$

f $50 + 50 + 60 = \boxed{}$

Four different ways to make 120

There is no single right answer. Try to make one of them surprising.

$$\boxed{} + \boxed{} = 120$$

$$\boxed{} + \boxed{} = 120$$

$$\boxed{} + \boxed{} + \boxed{} = 120$$

$$\boxed{} + \boxed{} + \boxed{} = 120$$

★ Odd one out

Three of these are worth 145. One is an impostor. Cross it out.

$$100 + 40 + 5$$

$$140 + 5$$

$$130 + 15$$

$$120 + 35$$

How did you find it without adding all four?



Which is bigger?

Write $>$, $<$ or $=$. Check the hundreds first, then the tens, then the ones.

137 173

145 145

199 200

108 80

152 125

116 161

Smallest first

148 · 84 · 184 · 118

 ▶ ▶ ▶

Biggest first

200 · 102 · 120 · 20

 ▶ ▶ ▶

Mystery numbers

Use every clue. Only one number fits each one.

1. I am between 130 and 140. I am even. My digits add up to 8. I am

2. I have 1 hundred and 7 tens. My ones digit is 3 more than 2. I am

3. I am 10 more than 145. I am 4. I am 100 less than 168. I am



Your turn

Write a mystery number clue for someone else. Give three clues.

.....



Good guessing

A good estimate is close, not correct. Look for a few seconds only — then guess.



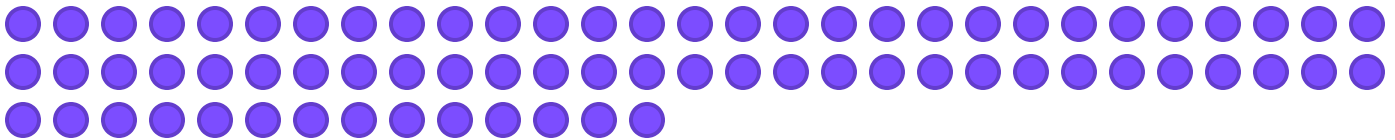
Robot tip. Don't guess wildly. Find a group of 10 first, then ask yourself "how many groups that size would fit?" That turns a guess into a good estimate.



My estimate

Real count

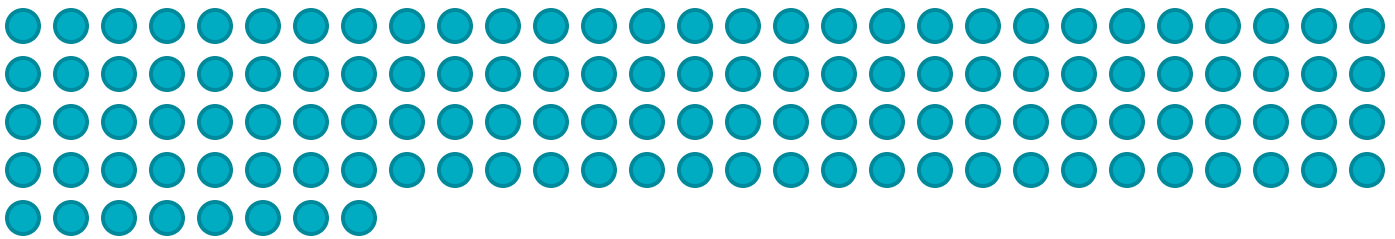
Out by



My estimate

Real count

Out by



My estimate

Real count

Out by

Which estimate is sensible?

A jar holds a handful of marbles. Someone guesses. Tick the sensible guesses and cross out the silly ones.

3

40

2000

150

Which of your three counts above was your best estimate? What did you do differently that time?

.....



Skip counting power-ups

You already know 2s, 5s and 10s. This year you unlock 20s, 25s and 50s.

By 2s

100	102		106		110		
-----	-----	--	-----	--	-----	--	--

By 5s

105	110		120		130		
-----	-----	--	-----	--	-----	--	--

By 10s

110	120		140		160		
-----	-----	--	-----	--	-----	--	--

By 20s



20	40		80		120		
----	----	--	----	--	-----	--	--

By 25s



25	50		100		150		
----	----	--	-----	--	-----	--	--

By 50s



50		150	
----	--	-----	--

The 25s maze

Colour every number you say when counting by 25s. The coloured squares make a path from the top-left corner to the bottom. Draw the path when you find it.

25	50	33	12	44	61
18	75	41	29	55	13
22	100	125	150	37	48
66	31	19	175	52	26



Even or odd?

A number is even if you can pair everything up with nothing left over. If one is left on its own, it's odd.



Circle pairs. Left over: So 8 is



Circle pairs. Left over: So 7 is



Circle pairs. Left over: So 12 is



Circle pairs. Left over: So 15 is

Sort them without counting anything out

46

31

70

125

98

153

164

89

200

77

Even

Odd

What is the only digit you actually need to look at?

☆ Investigation

Try each one at least three times with different numbers. Then write the rule you found.

even + even = try: $4 + 6 = \underline{\quad}$ $10 + 8 = \underline{\quad}$ $20 + 14 = \underline{\quad}$

odd + odd = try: $3 + 5 = \underline{\quad}$ $7 + 9 = \underline{\quad}$ $11 + 13 = \underline{\quad}$

even + odd = try: $6 + 3 = \underline{\quad}$ $8 + 5 = \underline{\quad}$ $12 + 7 = \underline{\quad}$

Surprised by the middle one? Two odd numbers each have one left over — and those two leftovers pair up with each other.

For the grown-up The rule "look at the ones digit" is useless if it's just memorised. Pair up real counters first so they can see *why*. The odd + odd = even result is genuinely surprising and worth letting them discover rather than telling them.

B1.5



Secret picture

Work out every answer. Colour each square using the key. Something is hiding in there.

☐ 11 or 12	☐ 13 or 14	☐ 15 or 16	☐ 17 or 18	☐ 19 or 20
-----------------------------------	-----------------------------------	-----------------------------------	-----------------------------------	-----------------------------------

2+9	3+8	4+9	5+8	6+7	7+6	8+5	9+4	4+7	5+6
9+2	10+3	3+10	5+9	6+8	7+7	8+6	9+5	10+4	8+3
7+4	4+10	6+9	7+8	4+9	5+8	8+7	9+6	6+7	6+5
10+1	7+6	10+5	8+9	8+5	9+4	9+8	5+10	10+3	1+10
3+9	3+10	5+9	6+8	7+7	8+6	9+5	10+4	4+10	4+8
5+7	4+9	9+10	5+8	10+7	7+10	6+7	10+9	7+6	6+6
9+3	8+5	9+4	9+9	10+8	8+10	8+9	10+3	3+10	8+4
7+5	10+2	5+9	6+8	7+7	8+6	9+5	10+4	2+10	2+9



These 24 facts are the most important thing in this whole book. By June you should be able to answer any addition fact up to 20 *without counting* — the answer just arrives. Do this sheet again next week and see if it's faster. Time yourself: Try 1 Try 2 Try 3

For the grown-up Watch the fingers, not the page. A child who still counts up from 8 to reach $8 + 7$ in June will struggle badly with Grade 3 multiplication, because every multiplication step will cost them an extra count. Five minutes daily on the specific facts they hesitate on beats twenty minutes on all of them.

B2.2



Fact families to 20

Three numbers that live together make four facts. Subtraction is just addition's undo button.

___ + ___ = ___
___ + ___ = ___
___ - ___ = ___
___ - ___ = ___

___ + ___ = ___
___ + ___ = ___
___ - ___ = ___
___ - ___ = ___

___ + ___ = ___
___ + ___ = ___
___ - ___ = ___
___ - ___ = ___

___ + ___ = ___
___ - ___ = ___
Only two facts. Why?

Find the missing number

$8 + \square = 15$

$\square + 7 = 16$

$14 - \square = 6$

$\square - 9 = 8$

$6 + \square = 13$

$20 - \square = 11$

$\square + 9 = 17$

$18 - \square = 9$



The undo button. If you get stuck on $14 - 6$, flip it round and ask "6 plus what makes 14?" That's much easier, and it's exactly the same question.

For the grown-up The yellow family makes only two facts because both parts are the same, so swapping them changes nothing. Spotting that unprompted is Level 4 reasoning. Missing-number problems are harder than plain facts and are what actually build fluency.

B2.1 • B2.2



Four mental math moves

No pencil for the middle bit — do it in your head, then write the answer *and* the move you used.

1 • Bridge through ten

$28 + 7 \rightarrow 28 + 2 = 30$, then $+ 5 = 35$

2 • Tens first, then ones

$34 + 12 \rightarrow 34 + 10 = 44$, then $+ 2 = 46$

3 • Round and fix

$29 + 15 \rightarrow$ pretend it's $30 + 15 = 45$, then take the extra 1 back = 44

4 • Use a double

$23 + 24 \rightarrow 23 + 23 = 46$, then $+ 1 = 47$

In your head	Answer	Which move? (1, 2, 3 or 4)
37 + 8		
42 + 13		
19 + 16		
24 + 25		
46 - 9		
35 - 12		
41 - 19		

★ Two ways

Do $28 + 19$ using move 2, then again using move 3. Same answer, different route. Which felt faster to you?

For the grown-up The third column matters more than the second. A Level 4 student picks the move that suits the numbers — round-and-fix for anything ending in 9, doubles for near-doubles — rather than using the same one every time. Ask "why that one?" **B2.3**



Adding to 100 – trading up

When the ones column reaches ten or more, you trade ten ones for one ten.

How the trade works: $47 + 28$

Ones: $7 + 8 = 15$. That's too many for one column — so trade ten of them for one ten. Write the 5 in the ones and carry the 1 over to the tens.

Tens: $4 + 2 + 1$ traded = 7. Answer: 75.

$$\begin{array}{r} 34 \\ + 25 \\ \hline \end{array}$$

$$\begin{array}{r} 47 \\ + 28 \\ \hline \end{array}$$

$$\begin{array}{r} 56 \\ + 37 \\ \hline \end{array}$$

$$\begin{array}{r} 68 \\ + 24 \\ \hline \end{array}$$

$$\begin{array}{r} 45 \\ + 45 \\ \hline \end{array}$$

$$\begin{array}{r} 39 \\ + 39 \\ \hline \end{array}$$

Which ones need a trade?

Before you add anything, tick the ones where you'll need to trade. Just look at the ones digits.

☐

$52 + 31$

☐

$26 + 17$

☐

$43 + 25$

☐

$38 + 49$

Spot the mistake

Someone wrote: $47 + 38 = 715$. What did they do wrong?

.....

The right answer is



Subtracting to 100 – trading down

Not enough ones to take from? Break one ten open into ten ones and use those.

How the trade works: $72 - 45$

Ones: you can't take 5 from 2. So break one of the 7 tens open. Now you have 6 tens and 12 ones.

Ones: $12 - 5 = 7$. Tens: $6 - 4 = 2$. Answer: 27.

Check it: $27 + 45$ should get you back to 72. It does.

$$\begin{array}{r} 58 \\ - 23 \\ \hline \end{array}$$

$$\begin{array}{r} 72 \\ - 45 \\ \hline \end{array}$$

$$\begin{array}{r} 64 \\ - 38 \\ \hline \end{array}$$

$$\begin{array}{r} 90 \\ - 27 \\ \hline \end{array}$$

$$\begin{array}{r} 81 \\ - 46 \\ \hline \end{array}$$

$$\begin{array}{r} 100 \\ - 35 \\ \hline \end{array}$$

Check every answer by adding back

Pick three from above. Add your answer to the number you subtracted. You should land on the top number.

+ ____ = ____

+ ____ = ____

+ ____ = ____



The 100 one is special. There are no ones *and* no tens to take from, so you have to trade twice. Some people find it easier to think "35 plus what gets me to 100?" Both ways are allowed.



Two-step problems

These need two calculations. Do step 1, write the middle number down, then do step 2.

1. The class library has 46 books. They borrow 25 more from the school library, then lend 12 to Room 4. How many books does the class have now?

Step 1

.....

Step 2

.....

Answer

2. A stall starts with 80 apples. It sells 34 in the morning and 28 in the afternoon. How many apples are left?

Step 1

.....

Step 2

.....

Answer

3. Zoe has 27 stickers. Ravi has 15 more than Zoe. How many stickers do they have altogether?

Step 1

.....

Step 2

.....

Answer

4. The hall has 100 seats. 38 children sit down, then 25 more arrive and sit down. How many seats are still empty?

Step 1

.....

Step 2

.....

Answer

☆ Write your own

Invent a two-step problem about your own life. Then give it to a grown-up to solve.

.....



New power: multiplying ★ brand new

Multiplying is just a fast way of adding equal groups. Every group has to be the same size.

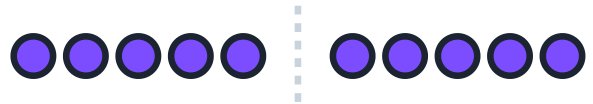
One idea, three ways to write it

4 groups of 3 → $3 + 3 + 3 + 3$ → $4 \times 3 = 12$

Read 4×3 as "four groups of three". The $\times$ sign means "groups of".



___ groups of ___ · ___ $\times$ ___ =



___ groups of ___ · ___ $\times$ ___ =



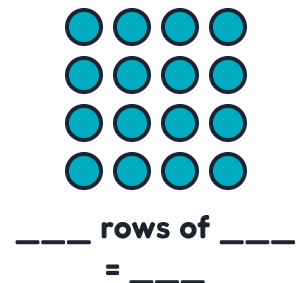
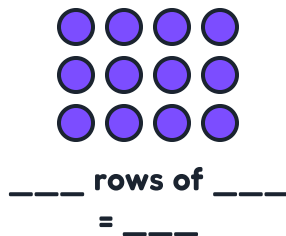
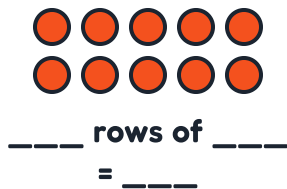
___ groups of ___ · ___ $\times$ ___ =



Careful — is this one equal groups? Why not?

Arrays — rows and columns

An array is equal groups lined up in a neat rectangle. Count the rows, then the columns.



Groups of a half

You can have groups smaller than one! Two halves make one whole.



8 groups of one half = ___ whole apples · 4 groups of one half = ___



New power: dividing ★ brand new

Dividing is sharing out fairly. Everyone must end up with the same amount.

How to share things out

Deal them out like cards — one for you, one for you, one for you, round and round — until they run out. Then count what one person got. Written down: $12 \div 3 = 4$, read as "twelve shared by three is four each".

12 stickers shared by 3 children



Each gets ____ · $12 \div 3 =$ ____

10 pencils shared by 2 children



Each gets ____ · $10 \div 2 =$ ____

12 marbles shared by 4 children



Each gets ____ · $12 \div 4 =$ ____

9 grapes shared by 3 children



Each gets ____ · $9 \div 3 =$ ____

Multiplying and dividing are opposites

Fill in both. Notice they use exactly the same three numbers.

$$12 \div 3 = \text{____} \quad \text{so} \quad 3 \times \text{____} = 12$$

$$10 \div 2 = \text{____} \quad \text{so} \quad 2 \times \text{____} = 10$$

$$8 \div 4 = \text{____} \quad \text{so} \quad 4 \times \text{____} = 8$$

$$12 \div 6 = \text{____} \quad \text{so} \quad 6 \times \text{____} = 12$$

★ Leftovers

Not everything shares out neatly. 11 cherries shared by 3 children.



Each child gets ____ · Left over: ____

What could they fairly do with the leftovers?

For the grown-up Deal real objects out like cards — that physical action *is* division and it makes the abstract symbol obvious. The opposites section is the important one: knowing $3 \times 4 = 12$ immediately gives you $12 \div 3 = 4$, which halves how much there is to learn in Grade 3.

B2.6 · B2.1



Fair shares and halves

Sometimes a fair share isn't a whole number. Then you have to cut something up.

Treats	Sharers	Each one gets	Left over?
6 cookies	3 friends		
12 grapes	6 friends		
5 cookies	2 friends		
10 muffins	4 friends		
9 pancakes	6 friends		

Draw the sharing: 5 cookies, 2 friends

Give out the whole ones first. Then deal with what's left.



Each friend gets 2 whole cookies and of one more.

Written as a number, that's

Two halves, four fourths – same amount

These two chocolate bars are exactly the same size. Colour one half of the first and two fourths of the second.



cut into halves · colour 1



cut into fourths · colour 2

Is the coloured amount the same on both? So one half = fourths.

For the grown-up Nine shared by six is the hard row — one and a half each. Use real paper circles and scissors. The chocolate bar activity only works if both bars are genuinely identical, which is why they're printed the same width; don't let them draw their own.

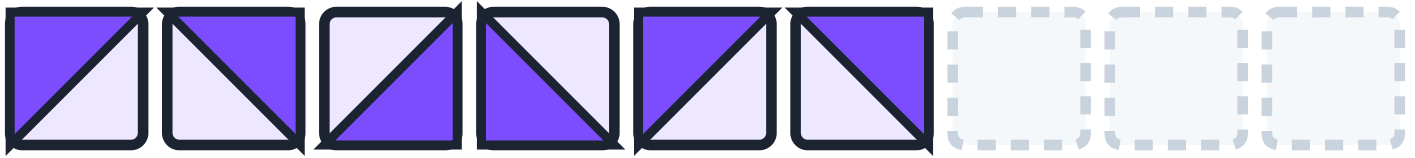
B1.6 · B1.7



Patterns that turn

This year patterns don't just repeat along a line — they can spin and spread in two directions.

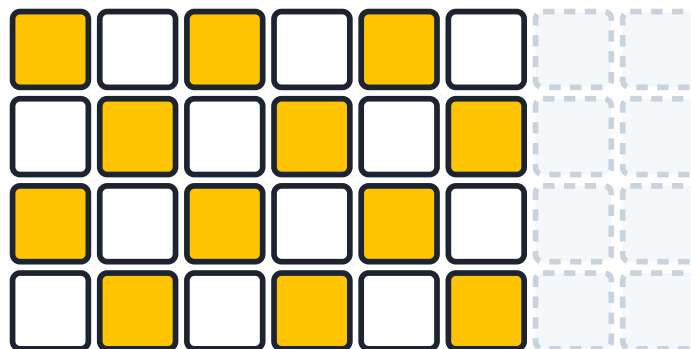
Each tile turns a quarter turn. Draw the next three.



The rule is: turn the tile each time.

How many tiles before it looks exactly like the first one again?

Finish the quilt — colour the last two columns



Look along a row, then down a column, then along a diagonal. What do you notice?

★ Design your own

Make a quilt block pattern in this grid. Use at least two colours and repeat your idea across the whole grid. Then write the rule so someone else could copy it.



My rule:

For the grown-up The step up from Grade 1 is that these patterns work in **two directions** at once. On the quilt, the diagonals are all one colour — that's the observation worth fishing for. Real quilts, tiled floors and

C1.1 · C1.2 · C1.3



The hundred chart is a pattern machine

Fill in the missing numbers first. Then hunt for patterns.

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

Move down one row. What happens to the number?

.....

Move right one square. What happens?

.....

Start at 24. Go down 3 rows. You land on

.....

You added

Start at 67. Go up 2 rows, then right 1. You land on

Colour hunt

☐ Colour every number you say counting by 5s. What shape do they make?

☐ Circle every number you say counting by 10s. Where are they all?



What's hiding in the shape?

A shape can stand in for a number you don't know yet. Your job is to work out what it is.



Two rules. The *same* shape always hides the *same* number in one puzzle. A *different* shape can hide a different number. Grown-ups call these shapes **variables**.

$$\triangle + 3 = 10$$

$$\triangle = \dots\dots\dots$$

$$\square + \square = 12$$

$$\square = \dots\dots\dots$$

$$5 + \bigcirc = 14$$

$$\bigcirc = \dots\dots\dots$$

$$\blacklozenge - 4 = 6$$

$$\blacklozenge = \dots\dots\dots$$

$$\triangle + \triangle + \triangle = 15$$

$$\triangle = \dots\dots\dots$$

$$20 - \star = 13$$

$$\star = \dots\dots\dots$$

Two shapes at once

Work out the easier shape first, then use it to find the other one.

$$\square = 4 \cdot \square + \triangle = 11$$

$$\triangle = \dots\dots\dots$$

$$\bigcirc + \bigcirc = 10 \cdot \bigcirc + \blacklozenge = 13$$

$$\bigcirc = \dots\dots\dots \blacklozenge = \dots\dots\dots$$

Where else do you see this?

A blank on a form, a box in a puzzle, a letter in a formula — all the same idea. Write a puzzle of your own with a shape in it. Then swap with someone.

My shape stands for (keep it hidden!)



The equals sign means "the same as"

It does not mean "the answer comes next". Both sides have to weigh the same.

$7 + 6$

$8 + 5$



___ and ___ · balanced / not

$9 + 4$

$6 + 6$



___ and ___ · balanced / not

$15 - 3$

$5 + 7$



___ and ___ · balanced / not

$20 - 8$

$7 + 6$



___ and ___ · balanced / not

Make them balance

$7 + 5 = 6 + \square$

$9 + 4 = \square + 8$

$15 - 3 = 8 + \square$

$20 - \square = 5 + 7$

$30 + 20 = 40 + \square$

$60 + 40 = \square + 50$

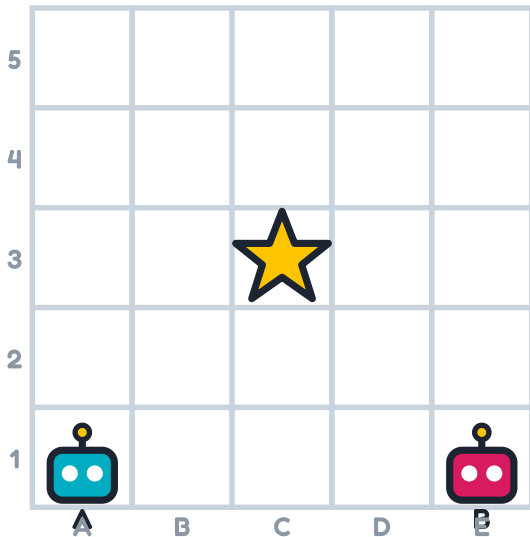
☆ Fix the balance

These aren't equal. Say what to add or take away from the right-hand side to fix each one.



Two robots at once ☆ new

Last year one robot moved at a time. This year both robots move together — one step each, at the same moment.



1 • Run it together

Both robots start on row 1. They run these two codes at the same time, one step each.

Robot A: → → ↑ ↑

Robot B: ← ← ↑ ↑

A lands on B lands on

Do they meet?

2 • Write your own pair

Send both robots to the star, both arriving on the same step. They must not bump into each other on the way.

A:

B:

3 • Break it on purpose

Give Robot A one extra step at the start. Now what happens when they both run? Do they still meet?

.....

Other things that happen at the same time

In a real program, lots of things run together — a character walks while music plays while the score counts up. Name two things that happen at the same time in a game or app you know.

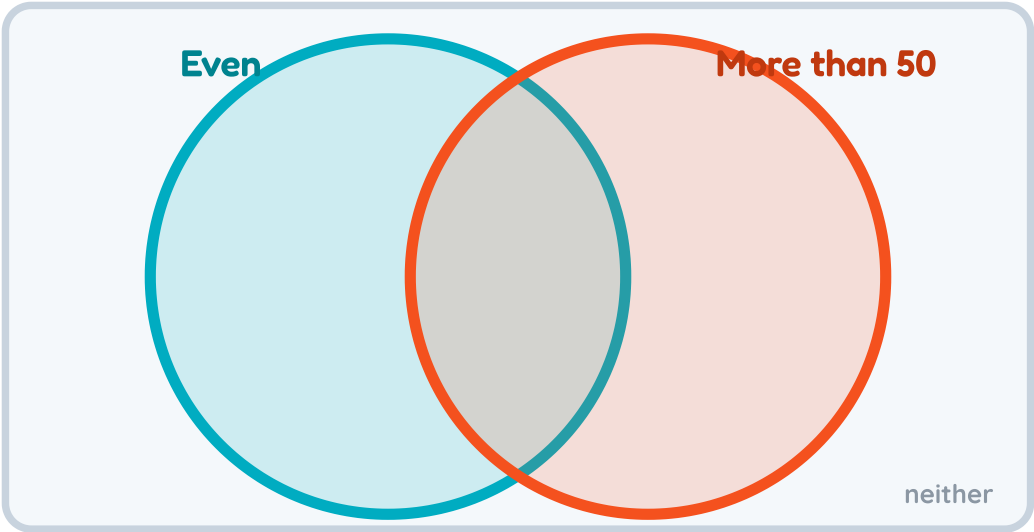
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Two rules at once

A Venn diagram sorts by two rules. The middle bit is for things that follow *both*.

Sort these numbers

- 24
- 63
- 48
- 71
- 90
- 35
- 12
- 57
- 86
- 100
- 43
- 68



Check your sorting

In the middle: Even only: More than 50 only: Outside both:

The four groups should add up to 12. Do they?

★ Guess my rules

Someone made a Venn diagram of animals. In the left circle: bat, butterfly, bee. In the middle: eagle, owl. In the right circle: penguin, ostrich. Outside both: dog, fish.

Left circle rule:

Right circle rule:

For the grown-up The overlap is the whole point and the commonest error is putting a number in both circles instead of the middle. The region *outside* both circles gets forgotten too — ask “where do the leftovers go?” Guess-my-rule is sorting in reverse and much harder. D1.1

Carroll diagrams

☆ new

A Carroll diagram is a box with four rooms. Every single thing has exactly one room it belongs in.

Same numbers as last sheet: 24 63 48 71 90 35 12 57 86 100 43 68. This time there's no overlap — every number goes in exactly one room.

	More than 50	NOT more than 50
Even		
NOT even		

Now check it against your Venn

The "Even + more than 50" room should hold the same numbers that were in the middle of your Venn diagram. And the "NOT even + NOT more than 50" room should hold the ones that were outside both circles. Do they match?

Your own Carroll diagram

Sort the shapes below. You choose the two rules — write them in the headings.



		NOT
.....		
NOT		

For the grown-up

A Carroll diagram shows the same information as a Venn but with the "neither" group given a proper room, which many children find clearer. Doing both with identical data — as these two sheets do — is what makes the connection land.

D1.1

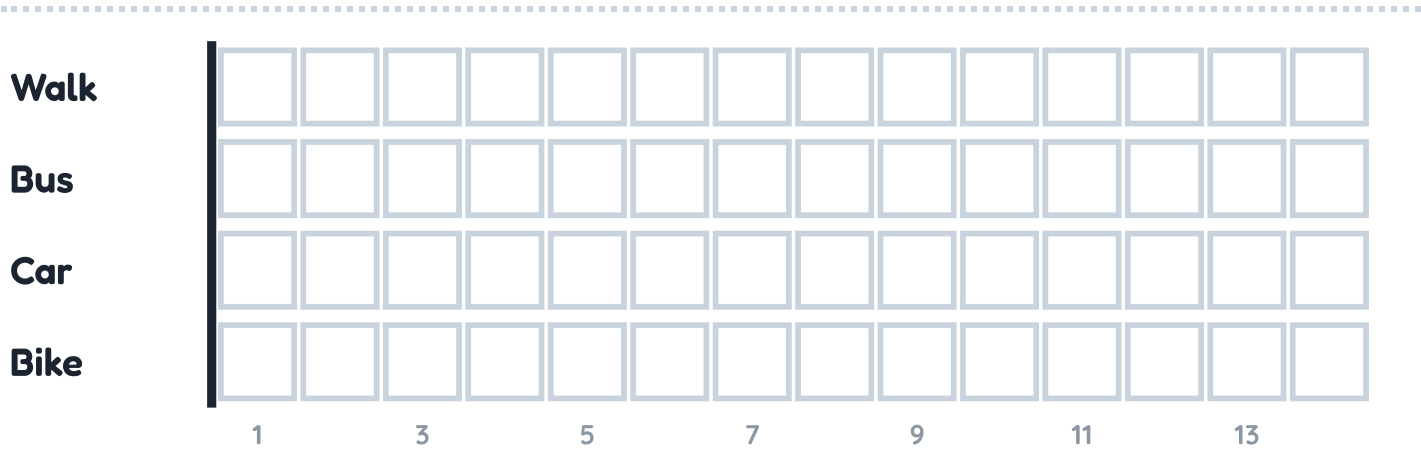
Two-way tally table

This table holds two pieces of information about every person: how they travel *and* what grade they're in.

How we travel	Grade 2	Grade 3	Total
Walk	/	/	
Bus	/	/	
Car			
Bike			
Total			

Now draw the bar graph

Use the Total column. One square = one person. Don't forget a title and labels!



- a Most popular way to travel?

b How many people altogether?

c How many more walk than take the car?

d Which two ways are tied?

e Did more Grade 2s or Grade 3s take the bus?

f Something the graph does *not* tell you:

Line plots and the mode ☆ new

A line plot stacks a mark above a number line. The mode is the answer that came up most often.

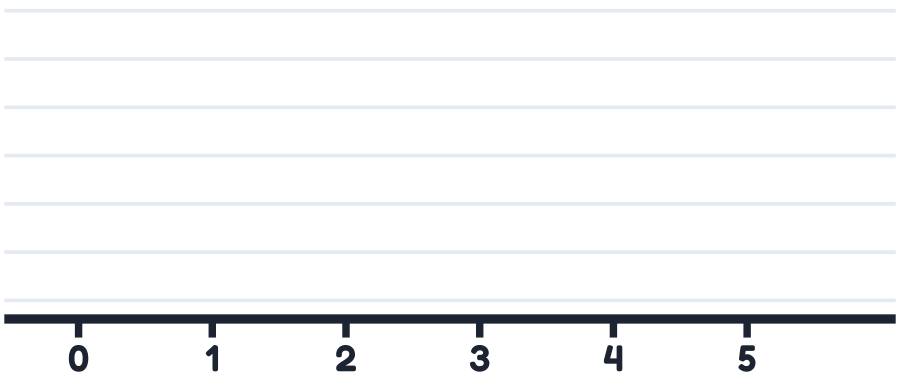
The question: "How many pets do you have?"

Twenty children answered. Here are their answers in the order they were collected:

1 2 0 1 3 1 2 4 1 0 2 1 5 3 1 2 0 3 1 2

Put an X above the number each time it appears

number of pets



a How many children answered altogether?

.....
Count your Xs — it should be 20.

b The mode is
The tallest stack of Xs.

c How many children have no pets at all?

.....

d How many have more than 2 pets?

☆ Tricky modes

1. 3, 5, 3, 8, 5, 2 → mode is (careful — there might be two!)

2. 1, 2, 3, 4, 5 → mode is (what if nothing repeats?)

3. 7, 7, 7, 7 → mode is

What does knowing the mode actually tell you about a group of people?

The opposite chance

☆ new

Every event has an opposite. If something is *certain*, its opposite must be *impossible*.

Bag A



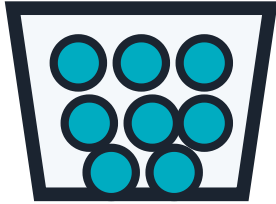
8 orange cubes

Bag B



5 orange, 3 blue

Bag C



8 blue cubes

Bag	Pulling out orange is...	Pulling out NOT orange is...
A		
B		
C		

Use only these three words: impossible · possible · certain

Fill in the opposite

It is certain the sun will come up tomorrow. → It is that it will not.

It is possible it will rain on Saturday. → It is that it will not.

It is impossible to roll a 7 on a normal dice. → It is that you will not.



Here's the trick. An event and its opposite cover *every single possibility* between them. Nothing else can happen. So if you know one of them, you always know something about the other.

For the grown-up The idea to land is that "orange" and "not orange" together cover everything — there's no third option. Do it with a real bag and real cubes; pulling one out twenty times and tallying makes "possible" feel different from "certain" in a way a page can't. **D2.1**



Shape detective

This year you don't just name shapes — you check their sides, side lengths and corners.

Shape	Name	Sides	Corners	All sides equal?	Any square corners?
					
					
					
					
					
					
					
					

Names: triangle · square · rectangle · rhombus · trapezoid · pentagon · hexagon · circle

The four-sided family argument

A square, a rectangle and a rhombus all have four sides. So how are they different? Use the words *side lengths* and *square corners*.



4 equal sides
4 square corners



opposite sides equal
4 square corners



4 equal sides
no square corners

So a square is a rectangle where



How many fold lines?

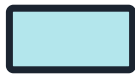
A line of symmetry is a fold line where both halves match exactly. Some shapes have several. Some have none at all.

Draw every fold line you can find, then write how many



square

.....



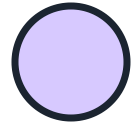
rectangle

.....



triangle

.....



circle

.....



pentagon

.....



hexagon

.....



trapezoid

.....



parallelogram

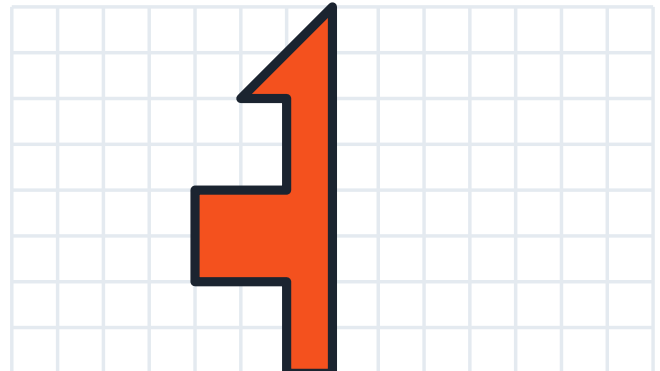
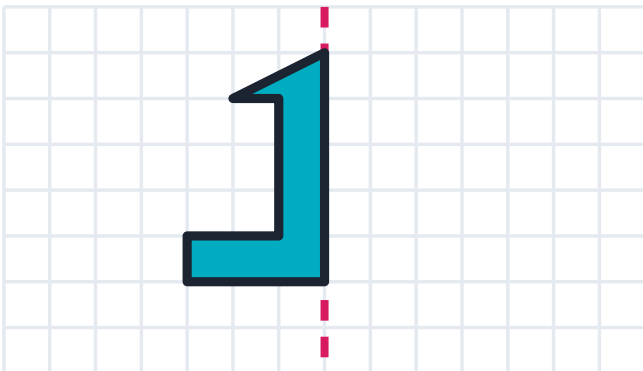
.....



The parallelogram is a trap! It *looks* like it should fold in half neatly, but try it with paper — the halves never match. It has zero lines of symmetry. Cut one out and prove it to yourself.

Complete the other half

The red dashed line is the fold. Copy the shape across so both halves match. Count squares out from the fold.

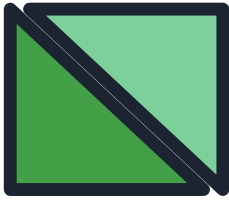




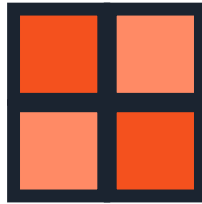
Same amount of space ☆ new

You can cut a shape up and rebuild it as a different shape. It still covers exactly the same amount of space.

Build a new shape from the small pieces

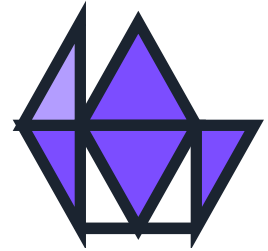


2 triangles make a



4 small squares make a

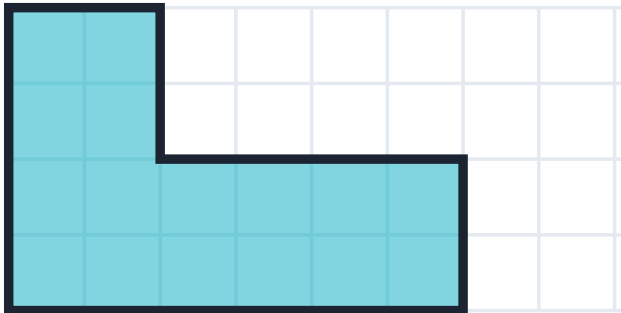
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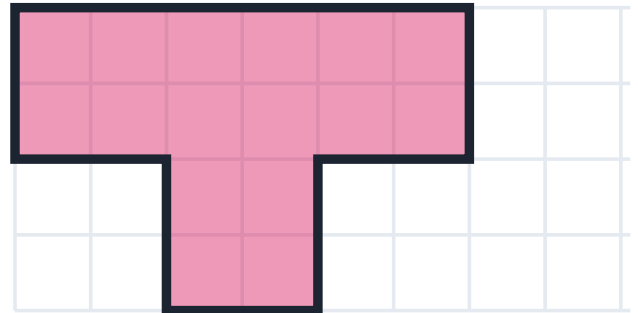
6 triangles make a

Count the squares – before and after

These two shapes look completely different. Count the squares inside each one.



Shape A = _____ squares



Shape B = _____ squares

Do they cover the same amount of space?

☆ Prove it yourself

Cut a square of paper in half along a diagonal. Slide the two triangles together a different way to make a new shape.

Did you add any paper? Did you take any away?

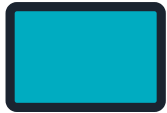
So what happened to the amount of space it covers?



Congruent = identical twins

Two shapes are congruent if they are the same shape AND the same size. You could lay one exactly on top of the other.

Find the congruent pairs. Join them with a line.



A



B



C



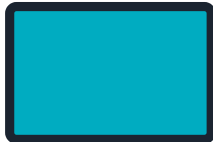
D



E



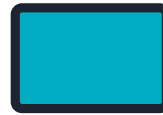
F



G



H



I



J

Pairs: ____ & ____ · ____ & ____ · ____ & ____ · ____ & ____

Two shapes end up with no partner. Which two? and

One of them is *almost* a match for another shape. Which one, and what is different about it?

.....



Two traps. A shape that has been turned round is still congruent — turning doesn't change its size. But a shape that is the same shape and a **different size** is *not* congruent. Same shape isn't enough. It has to be the same size too.

Congruent or not? Tick one.

These two shapes...	Congruent	Not
are both squares, one with 4 cm sides and one with 4 cm sides		
are both squares, one with 3 cm sides and one with 6 cm sides		
are matching triangles, but one has been turned upside down		
are a square and a rectangle, both 4 cm tall		

How could you check two shapes are congruent without a ruler?



Reading a map

A map shows a place from above. Use the letters and numbers to say exactly where something is.



a Home is at square

b What is directly north of Home?

c What is directly east of Home?

d Directions from Home to School:

go squares

e Directions from Home to the Library:

.....

f Start at the Shop. Go 3 squares north.

You are at the

g Start at the School. Go 3 east, then 3 south.

You are at the

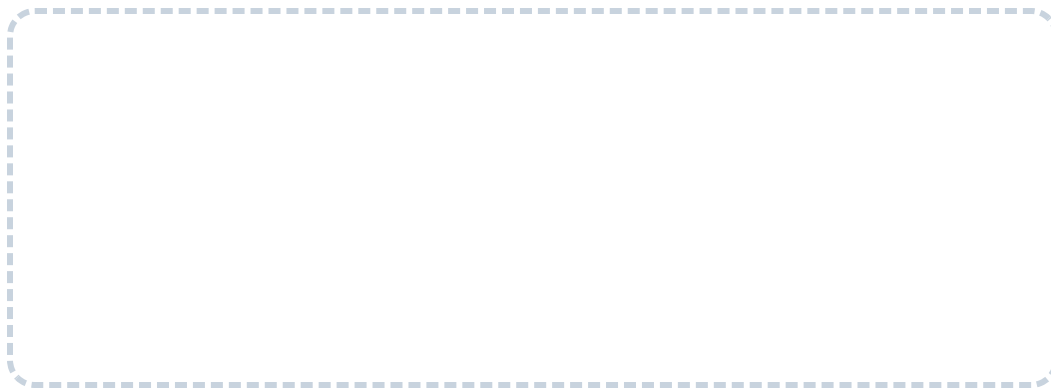
h Which is closer to the Park — the Library or

the Shop?

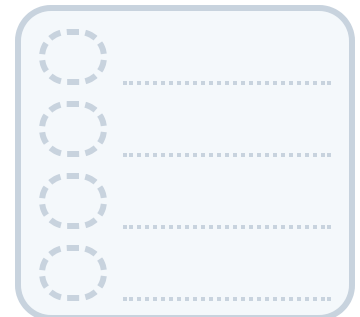
How do you know?

Draw your own map

Map your bedroom, your classroom, or the route from your home to school. It needs a title, a legend and a north arrow.



Legend



Title:

For the grown-up The hard part is the bird's-eye view — most first maps get drawn from the side. Stand on a chair and look down at a table of objects, then draw that. Then actually walk their route directions and see whether you end up in the right place.

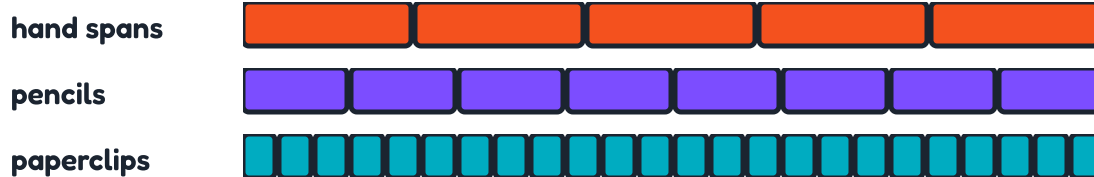
E1.4 · E1.5



The big secret of measuring

Here is the same desk measured three times with three different units. Watch what happens.

One desk, three units



Unit used	Is the unit big or small?	How many did it take?
hand spans		
pencils		
paperclips		



Did you spot it? The desk never changed size. But the smaller the unit, the more of them you needed. Small unit → big number. Big unit → small number. They go in opposite directions. This is the most important idea about measuring there is.

Predict before you measure

Choose something in the room. Guess the count for each unit *first*, then actually measure it.

I measured my	Unit	My guess	Real count
.....	hand spans		
	cubes or blocks		
	paperclips		

Which unit gave the biggest number? Was that the biggest or smallest unit?

Two rules for measuring properly

1. Start right at the end.

2. No gaps and no overlaps.



Real units: cm and m ☆ new

Everyone in the world agrees on these. 100 centimetres = 1 metre.

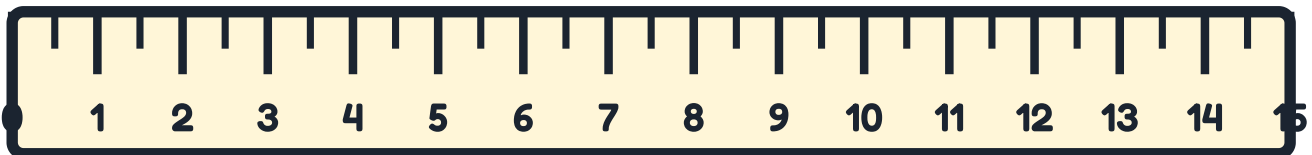
Handy things to remember

About 1 cm
your little fingernail

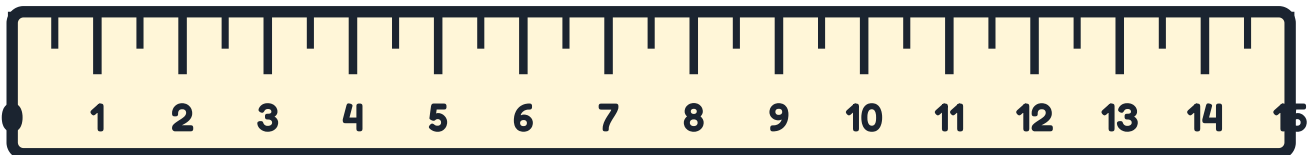
About 1 m
one big step, or a door handle's height

100 cm = 1 m
so 250 cm = 2 m and 50 cm

Easy ones – everything starts at zero



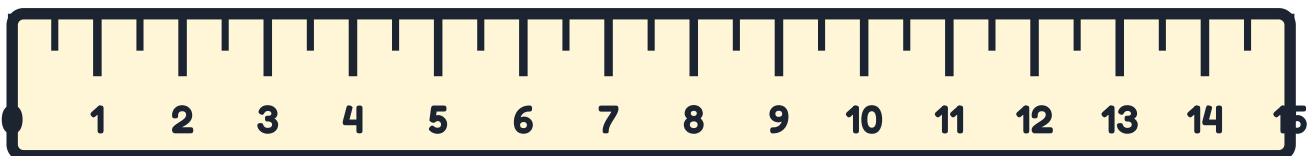
The pencil is cm long.



The leaf is cm long.

☆ Tricky ones

These don't start at zero! You can't just read the number at the end — you have to work out the distance.



The crayon goes from to, so it is cm long.



How long? What day?

Some things take seconds. Some take minutes. Some take hours. Pick the sensible one.

How long does it take?	seconds	minutes	hours
Clapping your hands once			
Brushing your teeth			
A whole school day			
Tying your shoelace			
Sleeping at night			
Eating lunch			

Now put these in order from **shortest** to **longest**: a sneeze · a birthday party · a song · a summer holiday

▶▶▶

Time yourself

Get a grown-up to time you. Guess first!

Task	My guess	Real time
How many jumping jacks in 30 seconds?		
How long to write your name 5 times?		
How long can you balance on one foot?		

Reading a calendar

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13



Same amount, different coins

There is never just one way to make an amount of money. Your job this year is to find lots of ways.



dime
10¢



nickel
5¢



quarter
25¢



loonie
100¢



toonie
200¢

Make 75¢ three different ways

Way	Quarters	Dimes	Nickels	How many coins?
1				
2				
3				

Which of your ways uses the fewest coins? Which uses the most?

Bigger amounts

Make \$1 using only quarters: quarters

Make \$1 using only dimes: dimes

Make \$2 using only quarters: quarters

Make 200¢ using only nickels: nickels

Notice that \$2 and 200¢ are exactly the same amount, just written differently.

Now with bills

\$5**\$10****\$20****\$50****\$100**

Make this amount	Way 1	Way 2 (must be different!)
\$35		
\$75		

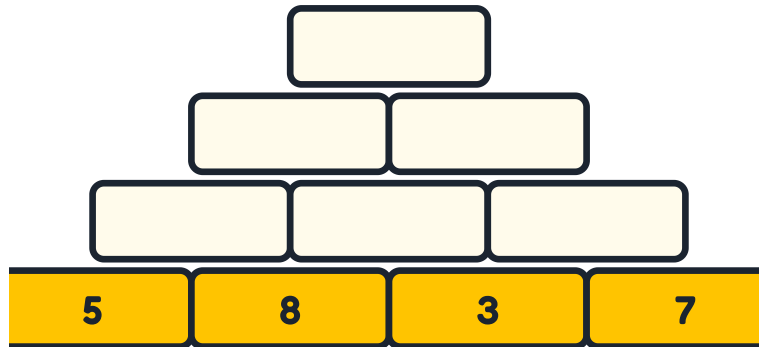


Brain benders

These are meant to be hard. Take your time, try things out, and cross out what doesn't work.

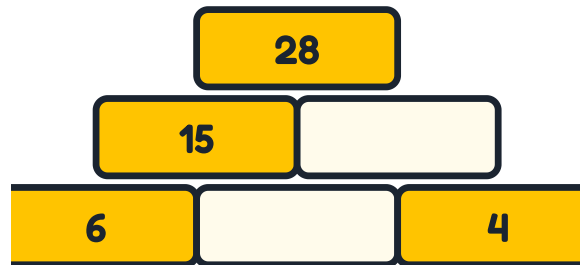
1 • Number pyramid

Add the two bricks below to get the brick above. Work your way to the top.



2 • Backwards pyramid

This time you know the top. Work downwards. There is only one answer.



3 • Magic square

Use each of 1 to 9 once. Every row, every column and both diagonals must add to 15.

2		6
	5	
4		8

4 • Missing digits

One digit is hidden in each. Work out what it must be.

$$2 \dots + 15 = 41$$

$$\dots 7 - 12 = 25$$

$$5 \dots - 18 = 34$$

$$\dots 0 + 45 = 75$$

5 • Who am I?

Three games to play

All you need is two dice, some coins, and someone to play against. Grown-ups are allowed to lose.

Game 1 • Race to Cover

You need: two dice, and a pencil each.

How to play: Roll both dice and add them. Cross that number off your row. If it's already crossed off, you lose your turn. First player to cross off every number wins.

Player 1

2	3	4	5	6	7	8	9	10
11	12							

Player 2

2	3	4	5	6	7	8	9	10
11	12							

Think about it: which numbers were hardest to roll? Why do you think 2 and 12 are so rare?

.....

Game 2 • Target 100

You need: two dice.

How to play: Roll both dice and make a two-digit number — you choose which digit goes first! Add it to your running total. Take five turns each. The winner is whoever ends up closest to 100 without going over. Going over means you're out.

Turn	Player 1 – number rolled	Running total	Player 2 – number rolled	Running total
1				
2				
3				
4				
5				

If you roll a 4 and a 2 when your total is 70, do you make it 42 or 24? Why?

Game 3 • Coin Grab

You need: a bowl of mixed coins.

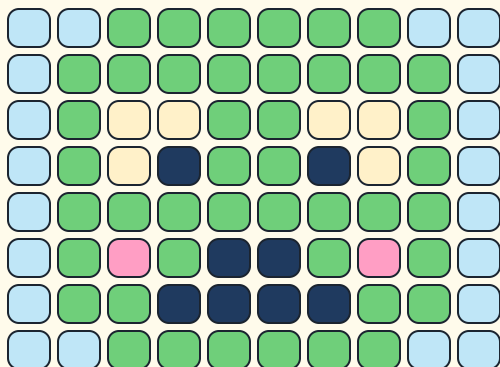
How to play: Each player grabs one handful. Count the value of your handful (not how many coins!). Biggest value wins the round. Then — the real challenge — make the same value again using a different set of coins.

Round	My coins	My value	Who won?
-------	----------	----------	----------

Answers

Where a task is open-ended it says so — any sensible answer counts.

Sheet 7 · the secret picture is a friendly monster



Colour bands: 11–12 sky blue · 13–14 green · 15–16 cream · 17–18 dark blue · 19–20 pink. If a square comes out the wrong colour, that fact is the one to practise.

1 · Hundreds, tens and ones 1H 3T 4O = **134** · 1H 0T 7O = **107** · 1H 6T 2O = **162** · 2H 0T 0O = **200**. Draw 178 = 1 flat, 7 rods, 8 cubes · 105 = 1 flat, 5 cubes (no rods) · 140 = 1 flat, 4 rods.

2 · Break it apart a 6 · b 40 · c 100 · d 90 · e 175 · f 160. Ways to make 120 are open — 60+60, 100+20, 75+45, 63+57 all work. Odd one out: **120 + 35**, because it makes 155.

3 · Which is bigger? 137<173 · 145=145 · 199<200 · 108>80 · 152>125 · 116<161. Smallest first: 84, 118, 148, 184. Biggest first: 200, 120, 102, 20. Mystery numbers: 1 **134** · 2 **175** · 3 **155** · 4 **68**.

4 · Good guessing Real counts: **36, 72, 124**. Estimates vary — close is the goal. Sensible jar guess: **40**. 3 is far too few and 2000 is absurd; 150 would only fit a very big jar.

5 · Skip counting

2s: 104, 108, 112, 114 · 5s: 115, 125, 135, 140 · 10s: 130, 150, 170, 180
20s: 60, 100, 140, 160 · 25s: 75, 125, 175, 200 · 50s: 100, 200
Maze path: 25 → 50 → 75 → 100 → 125 → 150 → 175 → 200.

6 · Even or odd? 8 → 0 left, **even** · 7 → 1 left, **odd** · 12 → 0 left, **even** · 15 → 1 left, **odd**. Even: 46, 70, 98, 164, 200. Odd: 31, 125, 153, 89, 77. You only need the **ones digit**.
even + even = **even** (10, 18, 34) · odd + odd = **even** (8, 16, 24) ·
even + odd = **odd** (9, 13, 19).

7 · Secret picture See the picture above. The 24 facts practised are every addition fact with a sum from 11 to 20.

8 · Fact families

8, 9, 17 → 8+9=17 · 9+8=17 · 17–8=9 · 17–9=8

6, 7, 13 → 6+7=13 · 7+6=13 · 13–6=7 · 13–7=6

10, 7, 17 → 10+7=17 · 7+10=17 · 17–10=7 · 17–7=10

9, 9, 18 → 9+9=18 · 18–9=9 only, because both parts are the same.

Missing numbers: 7 · 9 · 8 · 17 · 7 · 9 · 8 · 9.

9 · Four mental math moves 37+8=**45** (move 1) · 42+13=**55** (2) · 19+16=**35** (3) · 24+25=**49** (4) · 46–9=**37** · 35–12=**23** · 41–19=**22**.
28+19=**47** either way. Accept any move they can justify.

10 · Adding to 100 59 · 75 · 93 · 92 · 90 · 78. Needs a trade: **26+17** and **38+49** (their ones digits total more than 10). Not 52+31 or 43+25.

The mistake: they added the tens and the ones separately and wrote both totals down (70 and 15 → "715"). The right answer is **85**.

11 · Subtracting to 100 35 · 27 · 26 · 63 · 35 · 65. Checks: 35+23=58, 27+45=72, 26+38=64, 63+27=90, 35+46=81, 65+35=100.

12 · Two-step problems

1. 46+25=71, then 71–12 = **59** books

2. 34+28=62, then 80–62 = **18** apples

3. Ravi has 27+15=42, then 27+42 = **69** stickers

4. 38+25=63, then 100–63 = **37** empty seats

13 · Multiplying Orange: 4 groups of 3, 4×3=**12**. Violet: 2 groups of 5, 2×5=**10**. Cyan: 5 groups of 2, 5×2=**10**. Green: **not** equal groups — the groups are 6, 6 and 1, so it can't be written as a multiplication.

Arrays: 2 rows of 5 = **10** · 3 rows of 4 = **12** · 4 rows of 4 = **16**.

8 groups of one half = **4** whole apples · 4 groups of one half = **2**.

Answers, continued

16 · Patterns that turn The rule is: turn the tile a **quarter turn** (90°) clockwise each time. After **4** tiles it looks exactly like the first one again.

The quilt is a checkerboard, so the last two columns continue alternating. The thing to notice: every **diagonal** is all one colour. Own design is open — check the rule they write actually describes what they drew.

17 · The hundred chart Missing numbers: 3, 7, 12, 14, 15, 19, 21, 24, 26, 27, 30, 31, 33, 36, 38, 41, 45, 48, 50, 53, 61, 68, 72, 79, 84, 90, 95, 100 — whichever cells were dashed.

Down one row **adds 10**. Right one square **adds 1**.

24 down 3 rows → **54**, which is **30** more. 67 up 2 rows then right 1 → **48**.

Counting by 5s makes **two vertical stripes** (the 5s column and the 10s column). Multiples of 10 are all in the **last column**. Even numbers are in columns 2, 4, 6, 8 and 10.

Diagonal: 1, 12, 23, 34, 45, 56, 67, 78, 89, 100 — each jump **adds 11**, because going down adds 10 and going right adds 1.

18 · What's hiding in the shape? $\triangle=7$ · $\square=6$ · $\circ=9$ · $\diamond=10$ · $\triangle=5$ · $\star=7$.

Two shapes at once: if $\square=4$ then $\triangle=7$. If $\circ+\circ=10$ then $\circ=5$, so $\diamond=8$.

Always check by putting the answer back into the equation.

19 · The equals sign

$7+6=13$ and $8+5=13$ → **balanced**

$9+4=13$ and $6+6=12$ → **not balanced**

$15-3=12$ and $5+7=12$ → **balanced**

$20-8=12$ and $7+6=13$ → **not balanced**

Make them balance: $7+5=6+6$ · $9+4=5+8$ · $15-3=8+4$ · $20-8=5+7$ · $30+20=40+10$ · $60+40=50+50$.

Fix the balance: $8+6$ (14) vs $9+4$ (13) → the right side needs **1 more**. $12+7$ (19) vs $10+6$ (16) → needs **3 more**. $20-5$ (15) vs $8+9$ (17) → needs **2 taken away**.

20 · Two robots at once Robot A runs → → ↑ ↑ from A1 and lands on **C3**. Robot B runs ← ← ↑ ↑ from E1 and also lands on **C3**. Yes, they meet — on the star.

Worth spotting: they also collide earlier! On step 2 they are *both* on C1. If your child notices that, it's an excellent observation and exactly what concurrent code makes you think about.

Own code is open — check both robots take the same number of steps. Giving A an extra step at the start shifts everything: they no longer arrive together, and the C1 collision disappears.

21 · Two rules at once

Middle (even AND more than 50): **90, 86, 100, 68** — 4 numbers

Even only: **24, 48, 12** — 3 · More than 50 only: **63, 71, 57** — 3 ·

Outside both: **35, 43** — 2

$4+3+3+2=12$ ✓

Guess my rules: left circle = **can fly**, right circle = **has feathers**.

Eagles and owls do both; dogs and fish do neither.

22 · Carroll diagrams

Even + more than 50: **90, 86, 100, 68**

Even + NOT more than 50: **24, 48, 12**

NOT even + more than 50: **63, 71, 57**

NOT even + NOT more than 50: **35, 43**

Yes — these match the Venn exactly. The "both" room is the Venn's overlap, and the "neither" room is the space outside both circles. Own shape diagram is open; any two workable rules are fine.

23 · Two-way tally table

Walk $8+6=14$ · Bus $5+7=12$ · Car $4+3=7$ · Bike $3+4=7$

Grade 2 total **20** · Grade 3 total **20** · everyone **40**

a **walking** · b **40** · c **7 more** · d **car and bike**, both **7** · e **Grade 3** (7 versus 5)

f Things the graph doesn't tell you: *why* people travel that way, how far they live, who they are, or what the weather was like.

24 · Line plots and the mode Xs above each number: 0 → **3**, 1 → **7**, 2 → **5**, 3 → **3**, 4 → **1**, 5 → **1**.

a **20** children · b the mode is **1** · c **3** children have no pets · d **5** children have more than 2

Tricky modes: 1 → **3 and 5** (two modes) · 2 → **no mode**, nothing repeats · 3 → **7**

The mode tells you the most **typical** answer in the group.

25 · The opposite chance

Bag A: orange is **certain**, not orange is **impossible**

Bag B: orange is **possible**, not orange is **possible**

Bag C: orange is **impossible**, not orange is **certain**

Opposites: certain → **impossible** · possible → **possible** ·

impossible → **certain**

Notice that "possible" is the only one whose opposite is the same word.

Answers, continued

26 • Shape detective

triangle 3 sides, 3 corners, equal sides, no square corners · square 4, 4, equal, yes · rectangle 4, 4, not all equal, yes · rhombus 4, 4, equal, no · trapezoid 4, 4, not equal, no · pentagon 5, 5, equal, no · hexagon 6, 6, equal, no · circle 0 straight sides, 0 corners, no square corners.

A square is a rectangle where **all four sides are the same length**.

27 • How many fold lines? square **4** · rectangle **2** · triangle **3** (it's equilateral — an isosceles one would have just 1) · circle **countless** · pentagon **5** · hexagon **6** · trapezoid **1** · parallelogram **0**.

The parallelogram is the trap and it genuinely has none — prove it by folding paper. The two grid shapes should mirror exactly across the dashed line; check by counting squares out from the fold.

28 • Same amount of space 2 triangles make a **square** · 4 small squares make a **bigger square** · 6 triangles make a **hexagon**. Shape A = **16** squares. Shape B = **16** squares. Yes — they cover exactly the same amount of space even though they look nothing alike.

Cutting and sliding adds no paper and removes none, so the area cannot change. (The **perimeter** does change, which is a great thing to notice.)

29 • Congruent = identical twins Pairs: **A & I** · **C & F** · **E & J** · **B & H**. Left over: **D** and **G**. **D** is the near-miss — it's the same *shape* as B and H but **smaller**, so it is not congruent. **G** is a rectangle but a different size from any other rectangle here. F and J are rotated, and rotating doesn't change size — so they still count.

Congruent or not: same-size squares **congruent** · 3 cm and 6 cm squares **not** · matching triangles, one flipped **congruent** · a square and a rectangle **not**.

To check without a ruler: **trace one and lay the tracing on top of the other**.

30 • Reading a map a **B2** · b the **School** · c the **Shop** · d **3** squares **north** · e **2 east then 2 north** (either order) · f the **Park** · g the **Shop** · h the **Library** — it's only 2 squares from the Park, while the Shop is 3.

Own map is open, but it must have a title, a legend and a north arrow. Then walk their directions literally and see where you end up.

31 • The big secret of measuring hand spans = **big** unit, **5** needed · pencils = **medium**, **8** needed · paperclips = **small**, **24** needed. The biggest number came from the **smallest** unit. Small unit → big count; big unit → small count.

Leaving gaps makes the count come out **too small**, because each gap is length you never counted.

32 • Real units: cm and m pencil **9 cm** · leaf **6 cm**.

Crayon goes from **3** to **11**, so it is **8 cm** — not 11. Clip goes from **5** to **8**, so it is **3 cm**.

Sensible units: pencil cm · classroom m · thumb cm · bus m · book cm · playground m · shoe cm · tree m.

200 cm = **2 m** · 3 m = **300 cm** · 150 cm = **1 m** and **50 cm**.

33 • How long? What day? seconds: clapping once, tying a shoelace · **minutes:** brushing teeth, eating lunch · **hours:** a school day, sleeping at night.

Shortest to longest: a sneeze, a song, a birthday party, a summer holiday.

Calendar: a **Monday** · b **4** Saturdays (6, 13, 20, 27) · c the 3rd Friday is the **19th** · d **14** days · e **Friday** · f **30** days.

Note: reading a clock face is Grade 3, so don't worry if that isn't secure yet.

34 • Same amount, different coins Ways to make 75¢ include: 3 quarters (3 coins) · 2 quarters + 2 dimes + 1 nickel (5) · 1 quarter + 5 dimes (6) · 7 dimes + 1 nickel (8) · 15 nickels (15). Fewest coins is **3 quarters**.

\$1 = **4** quarters or **10** dimes · \$2 = **8** quarters · 200¢ = **40** nickels. \$2 and 200¢ are the same amount written two ways. \$35 = \$20+\$10+\$5, or three \$10s + \$5, or \$20 + three \$5s. \$75 = \$50+\$20+\$5, or \$50+\$10+\$10+\$5, or three \$20s+\$10+\$5. \$200 = two \$100s, or \$100+\$50+\$50, or four \$50s.

Shop: book + toy = **\$20**. All three = \$12+\$8+\$25 = **\$45**, so **yes**, \$50 is enough, with \$5 left over.

35 • Brain benders

1 Pyramid up from 5, 8, 3, 7 → 13, 11, 10 → 24, 21 → top **45**.

2 Backwards from top 28: the missing middle brick is 28–15 =

13. The missing bottom brick is 15–6 = **9**. Check: 9+4 = 13 ✓

3 Magic square — every line totals 15:

2 7 6

9 5 1

4 3 8

4 Missing digits: 26+15=41 · 37–12=25 · 52–18=34 · 30+45=75.

5 Who am I? **154** · a **rhombus** · **125**.

36 • Three games No fixed answers, but two things worth drawing out:

Game 1: 6, 7 and 8 come up most often because more dice combinations make them (7 has six ways: 1+6, 2+5, 3+4 and their reverses). 2 and 12 are rarest — only one combination each. That’s a first taste of probability.

Game 2: with a total of 70 and a roll of 4 and 2, choose **24** — that gives 94, safely under 100. Choosing 42 would give 112 and bust.

Game 3: no, the player with the most coins doesn’t always win, because a few quarters can beat a big pile of nickels. Value and quantity are different things — which is the whole point of the sheet.

If you only revisit a few sheets

Sheet 7 is the one to repeat weekly — instant recall of addition facts to 20 is the year’s most important outcome. **Sheets 13 and 14** matter because Grade 3 assumes multiplication and division already make sense as ideas. **Sheet 19** fixes the “equals means write the answer” misreading before it becomes an algebra problem years later. **Sheets 31 and 32** cover the two measurement ideas children most reliably get wrong: the inverse unit relationship, and the broken ruler.

Curriculum reference Codes on each sheet match *The Ontario Curriculum, Grades 1–8: Mathematics, 2020*. B = Number · C = Algebra · D = Data · E = Spatial Sense · F = Financial Literacy. Full expectations at dcp.edu.gov.on.ca.