

Expeditions

Six things to find out properly, plus warm-ups, French, games and puzzles

THIS BOOK BELONGS TO

Colour a badge in each time you finish an expedition



The Ten-Piece Bar
Sheets 16–20



Ninety Facts, Ten Hard Ones
Sheets 21–25



Take One Away
Sheets 26–30



Bent Light, Bent Sound
Sheets 31–35



Where the Work Is
Sheets 36–40



A Day in 1200
Sheets 41–45

Grade 4 is the big step, and this book knows it. Every expedition is a real question you cannot look up. Some of them will not come out the way you expect. That is the interesting part, and it is also the point.

Why these six. Each one attacks something Grade 4 children reliably get stuck on, and fixes it physically rather than by explanation. The Ten-Piece Bar kills the belief that 0.15 is bigger than 0.7. Ninety Facts turns 100 times-table facts into about ten that actually need learning. Take One Away makes a food web behave like a system. Bent Light teaches a fair test twice over. Where the Work Is shows that geography explains jobs. A Day in 1200 is history without a single date to memorise.

Ontario 2020 · 2022 · 2023 · 2026 · 2019 · 2009 · 2013

Now it goes to the thousand

Last year you rounded to the nearest ten and hundred. This year the thousand joins in. Mark each number on its line first, then decide which end it is closer to.

7 mark

 round

Worked example



3 8 0 0 is past halfway, so it rounds up to **4000**. Notice it is written 3800, with a space, never a comma.

Number	Nearest ten	Nearest hundred	Nearest thousand
2 748			
6 195			
4 502			
9 950			

One to argue about. Round 4 502 to the nearest thousand, then to the nearest hundred, then to the nearest ten. Do you get closer to the real number each time, or further away? Why would anyone round at all?



Fractions keep going past one

Say these out loud. All of them. Out loud is the whole exercise — it takes about ninety seconds and it fixes two things at once.

say aloud

fill in

one third · two thirds · three thirds · four thirds · five thirds · six thirds · seven thirds

Three thirds is exactly 1. Six thirds is exactly 2. Keep going anyway.

Carry each row on. Write the next three.

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

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

$\frac{1}{10}$, $\frac{2}{10}$, $\frac{3}{10}$

$\frac{1}{6}$, $\frac{2}{6}$, $\frac{3}{6}$, $\frac{4}{6}$

Which of these is exactly 1?
Circle every one.

$\frac{5}{5}$ $\frac{8}{4}$ $\frac{10}{10}$ $\frac{6}{8}$ $\frac{3}{3}$

Which of these is bigger than 1?

$\frac{7}{8}$ $\frac{9}{8}$ $\frac{4}{5}$ $\frac{11}{10}$ $\frac{5}{6}$

Grown-ups: counting past one out loud kills two misconceptions at once — that fractions are always less than one, and that a fraction is two separate numbers. Do it in the car.

B1.6 · B1.4



0.7 or 0.15?

This one catches almost everybody. More digits does not mean bigger. Use the line every single time until you stop needing it.

 use the line

 write < or >



Put both numbers on the line, then write < or > in the box.

0.7 0.15

0.5 0.25

0.4 0.9

0.6 0.45

1.2 0.8

0.3 0.30

Say why, in words. Somebody in your class says 0.15 must be bigger than 0.7 because 15 is bigger than 7. Write what you would tell them.



Split it up, then add it back

You already know 200×3 . You already know 40×3 . Put them together and you have done 243×3 without anything new.

7 split

add

Worked example – 243×3

$$\begin{array}{r} 200 \times 3 \\ 600 \end{array}$$

$$\begin{array}{r} 40 \times 3 \\ 120 \end{array}$$

$$\begin{array}{r} 3 \times 3 \\ 9 \end{array}$$

$$600 + 120 + 9 = 729$$

Question	Split into	Answer
132×4		
58×6		
417×2		
64×7		

Then try it the other way. Do 132×4 again using the column method. You should get the same answer. If you do not, one of the two is wrong — find out which.

Grown-ups: both methods are expected. The split version is what makes the column version make sense, which is why it comes first.

B2.5 · B2.1



Nobody bins the last cookie

When a share does not come out evenly, the leftover does not vanish and it is not “remainder 1”. You cut it up and share that too.

- draw
- write the fraction

17 cookies, 4 people
Each person gets 4 whole cookies. That uses 16. One is left. Cut it into 4 and everyone gets a quarter more.
 $17 \div 4 = 4$ and $1/4$ each

Share this	Draw it	Each one gets
$13 \div 2$		
$11 \div 3$		
$22 \div 5$		
$19 \div 4$		

When would you NOT cut the leftover up? Think of buses, or boxes, or shoes. Write one example where the leftover has to stay whole.

Grown-ups: the last question is the sophisticated one. Whether a remainder is a fraction depends entirely on what is being shared.

B2.6 · B1.5



Solve it, then check it

Finding the missing number is only half the job. Putting it back in to see whether both sides really match is the other half, and it is the half people skip.

7 solve

✓ check

Worked example

$$n + 17 = 32 \rightarrow n = 15$$

Check: $15 + 17 = 32$. Both sides match, so it is right.

Equation	The letter is	Check – write it out
$n + 24 = 41$		
$x - 9 = 26$		
$4 \times b = 36$		
$m + 13 = 50$		

Is this true? Somebody writes $6 \times 4 = 12 \times 2$. Is it? What does the equals sign actually mean — “the answer comes next”, or “the same as”?

Grown-ups: if the equals sign still reads as “the answer comes next”, algebra will feel arbitrary for years. A drawn balance scale is still the fix in Grade 4. C2.2 · C2.1



More than one answer

An equation has one answer. An inequality has lots. Shading the line is how you show all of them at once.

solve

shade

$x + 3 < 10 \rightarrow x < 7$



0, 1, 2, 3, 4, 5 and 6 all work. That is what the shading means.

Solve each one, then shade every whole number that works.

$n + 5 < 12$



$n + 2 > 9$



$n - 4 < 6$



$n + 8 > 15$



How many answers? For $n + 5 < 12$, count the whole numbers that work. Now imagine we allowed halves and tenths as well. How many then?

Grown-ups: children who have spent four years hunting for

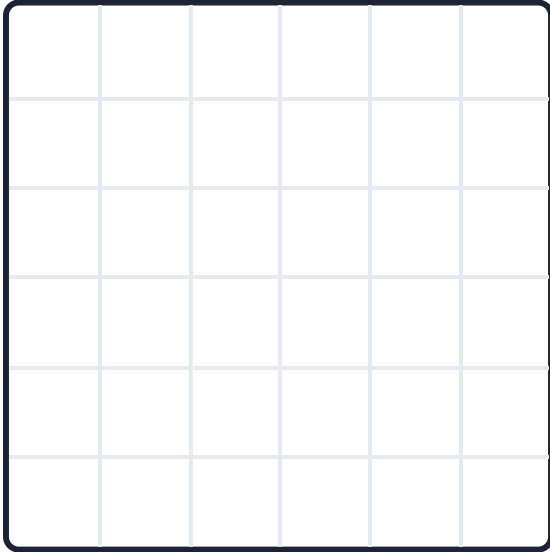
the answer find this genuinely disorienting. The number line is what makes “lots of answers” concrete.

C2.3



Along the corridor, then up the stairs

Coordinates are always written (x, y) — along first, then up. (3, 5) and (5, 3) are two different places, and mixing them up is the classic mistake.

 plot read

Plot these and join them in order:

(1, 1) → (5, 1) → (5, 4) → (1, 4) → back to start

What shape did you make?

Now answer these:

How would you get from (1, 1) to (5, 4)?

..... right and up

Mark point P at (2, 6). Mark point Q at (6, 2).

Are they the same place? Why not?

Play battleship. Genuinely — it is a first-quadrant coordinate grid with something at stake, and one game does more for this than a page of practice.

Grown-ups: this is the beginning of every graph your child will ever read. The order is not a convention to memorise; it is the whole meaning.

E1.2 · E1.3



Count up, never subtract clocks

Time is the only base-60 thing you meet. Taking 2:45 from 4:20 in columns gives nonsense. Jump to the next o'clock instead.

7 jump total

From 2:45 to 4:20

2:45

 →

3:00

 15 min →

4:00

 1 hour →

4:20

 20 min

1 hour 35 minutes altogether

Starts	Ends	Your jumps	How long
1:50	3:15		
9:35	11:10		
4:20	6:05		

minutes in 3 hours

seconds in 4 minutes

hours in 3 days



Area, forwards and backwards

Count the squares once. Then notice you did not need to count — you already knew 6 rows of 4 from your times tables.

7 count

work back

Forwards. Find the area.



rows: each row: area:

Backwards. The area is 24 cm^2 . One side is 6 cm.

24 cm^2

The other side is cm.
Which operation did you use, and why?

Length	Width	Area
7 cm	5 cm	
9 cm		36 cm^2
	4 cm	32 cm^2
8 cm	8 cm	

Careful. Area is measured in cm^2 , not cm. Why do you think it needs the little 2?

Grown-ups: working backwards from the area is a division problem wearing a geometry costume — and it is easy for a child who has their tables.

E2.5 · E2.6 · B2.2



Three ways to say “typical”

The mean, the median and the mode all try to describe a set of numbers with one number. They do not always agree, and that is the interesting bit.

7 work out

argue



How to find each one

Mean — add them all up, then share the total out equally.

Median — put them in order, then point at the middle one.

Mode — the one that turns up most often. There might be none, or more than one.

Set A — goals scored: **3, 5, 4, 5, 3**

mean

median

mode

Now the interesting one. Five children have this much pocket money:

\$2, \$3, \$3, \$4, \$500

Mean: Median:

Which one describes these five children better? Write why.

Grown-ups: the pocket-money set is the whole lesson. A mean of \$102.40 describes nobody. Children find this genuinely funny and never forget it.

D1.5 · D1.6



The lazy vowel trick

In a long word the middle vowel often goes lazy and just says “uh”. You cannot hear which letter it is. So find a relative of the word where that bit is said properly.

[listen](#)[spell](#)

Worked example

defin

?

**define**

In define you can hear the i clearly. So definition has an i in the middle. Solved.

Tricky word	Its relative	So the letter is
comp_sition	compose	
rel_tive	relate	
medic_nal	medicine	
prep_ration	prepare	

Now the Grade 4 word parts. Build a word using each one, and say what it means.

fore-**super-****semi-****en-/em-****-ant****-ent****-ate****-ism**

Grown-ups: this single move does more for a Grade 4 speller than any word list, because it teaches a system instead of nine unrelated words.

Language B2.1



It doesn't mean that

Some sayings do not mean what the words say. That is on purpose. This year you have to be able to explain them, not just recognise them.

 explain

 write

What it says	What it actually means
It's raining cats and dogs.	
My sister is a night owl.	
He had butterflies in his stomach.	
That test was a piece of cake.	

Sort these three. Write S, M or I beside each.

The three kinds

S = simile — uses *like* or *as*. M = metaphor — says one thing *is* another. I = idiom — a saying you just have to know.

Her voice was like honey.

The classroom was a zoo.

Break a leg!

He was as quiet as a mouse.

Collect one. Find an idiom this week that you have never heard before. Write it here with what it means.



Bonjour – c'est nouveau cette année

French starts this year and it never stops until Grade 8. Nobody expects a perfect accent. They expect you to say it out loud and get it wrong cheerfully.

say it

match

Bonjour

hello

Merci

thank you

Ça va ?

how are you?

Au revoir

goodbye

Join each one to its meaning.

rouge

bleu

vert

jaune

green

red

yellow

blue

Tu or vous? French has two words for “you”. Tu is for a friend. Vous is polite — and it is also what you say to more than one person. Write tu or vous for each.

your best friend

your teacher

your little brother

a whole group at once

Do this at home. Stick French labels on twenty things — *la porte, le frigo, le miroir*. You will learn them without trying. Nobody in the house needs to speak French for this to work.



EXPEDITION ONE



The Ten-Piece Bar

Five sheets · you will need a chocolate bar with ten squares, or a strip of paper, plus a ruler and a measuring jug

Everyone believes 0.15 is bigger than 0.7 at some point, because 15 is bigger than 7. You cannot argue somebody out of it. You have to show them.

Step 1

Cut a whole into ten and give the pieces their two names

Step 2

Line 0.7 and 0.15 up next to each other and settle it for good

Step 3

Count past one in tenths, and find where the whole number ticks over

Step 4

Do it again with water, in millilitres, and see the same thing

Step 5

Write down what you would say to somebody who still doesn't believe it

A warning. Step 2 usually goes wrong the first time. Do not fix it by explaining. Get the ruler out and let the answer be obvious.

Grown-ups: decimals arrive this year for the first time — Grade 3 had none at all. Tenths only; hundredths are Grade 5.

B1.4 · B1.6 · B1.7 · B1.9 · B2.7



1

TWO NAMES FOR THE SAME PIECE

Cut it into ten

Take your bar or your paper strip. Cut it into ten equal pieces. Every single piece now has two names that mean exactly the same thing.

 cut label

Shade the strip, then write both names underneath.



as a fraction: as a decimal:



as a fraction: as a decimal:



as a fraction: as a decimal: and also:

That last one has a third name too. Half.

The naming rule. The bottom number of the fraction says how many equal pieces the whole was cut into. The top number says how many you have. Write that in your own words.

Grown-ups: “explain the meanings of the denominator and the numerator” is an actual Grade 4 expectation, not vocabulary practice. A child who can say it their own way can reason about any fraction.

B1.4 · B1.9



2

SETTLE IT WITH A RULER

0.7 against 0.15

Predict first, before you measure. Write down what you think even if you are not sure. Being wrong here is genuinely useful.

predict

measure

Predict. Which is bigger, 0.7 or 0.15? Circle one, and write why you think so.

0.7 0.15

Now measure. Draw a line 0.7 m long, then a line 0.15 m long, on the floor with tape or on a long strip of paper.

0.7 m is the same as

cm

0.15 m is the same as

cm

Were you right? Tick one.

☐

I predicted right

☐

I predicted wrong

Now write the reason it works this way. Start with: *“The 7 is in the tenths place, so it means...”*

Grown-ups: a wrong prediction here is the point of the whole expedition. Do not soften it — let the ruler settle it, and let the surprise do the teaching.

B1.7 • E2.2



3

WHERE THE WHOLE NUMBER TICKS OVER

Counting on in tenths

Lay your ten pieces end to end, then start a second set. Say each one out loud as you add it.

 say aloud count on

Fill in the missing ones. Watch what happens at every tenth step.

Fraction	$\frac{7}{10}$	$\frac{8}{10}$		$\frac{10}{10}$		$\frac{12}{10}$
Decimal	0.7		0.9		1.1	



Mark these on the line above: **0.3 0.9 1.2 1.7**

Round each to the nearest whole.

0.4 → **0.8** →

1.5 → **2.3** →

10/10 is exactly 1. So what is 20/10? And 15/10?

4

SAME IDEA, DIFFERENT STUFF

Now do it with water

A litre jug is a whole. Pour tenths of it into cups and see the same numbers appear in a completely different place.

 pour

 record

Poured	As a fraction of the jug	As a decimal	In millilitres
3 cups	3/10		
5 cups			500 mL
8 cups		0.8	
10 cups			

There are 1000 mL in a litre, so one tenth of a litre is 100 mL.

5

THE FINAL JOB

Convince somebody. Find a person who has not done this expedition. Ask them which is bigger, 0.7 or 0.15. Then explain it to them using anything on this page.

What did they say first?

What finally convinced them?

Badge earned. Go back to the cover and colour in the first badge.

Grown-ups: explaining it to somebody else is the strongest test of whether it has landed — and it is exactly what Level 4 in the Communication category looks like. B1.7 • B1.9 • E2.1



EXPEDITION TWO

Ninety Facts, Ten Hard Ones

Five sheets · you will need coloured pencils and about five minutes a day for a few weeks

This year you have to know every times fact from 1×1 to 10×10 , and the division that goes with each one. That sounds like 100 things. It is nowhere near 100 things.

Step 1

Fill in the whole grid and colour the ones you already know

Step 2

Cross out every fact you get free, and count what is really left

Step 3

Find your own hard ten, and make a card for each

Step 4

Learn the division twin of every fact

Step 5

Track five minutes a day for two weeks and see what happens

No timing, ever. Being rushed uses up the exact part of your brain you need for remembering. Five slow minutes beats forty rushed ones.

Grown-ups: B2.2 is the single highest-stakes expectation of Grade 4. Almost everything else — long multiplication, division, equivalent fractions, area, rates — assumes it is free. Short daily practice on the specific unknown facts is what works.

B2.1 · B2.2 · B2.6 · E2.5



1

THE WHOLE THING, ON ONE PAGE

Fill it in, then colour it

Fill in every square. Then colour green every one you knew straight away, and orange every one you had to work out. Be honest — the orange ones are the useful information.

fill in

colour



knew it straight away



had to work it out

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

Look at the diagonal from the top left. Those are the square numbers — 1, 4, 9, 16, 25... Do you notice anything about the two halves of the grid either side of it?



2

HOW MANY ARE ACTUALLY LEFT

Cross out everything you get free

Go back to your grid and cross these off. Each rule removes a whole load of squares at once.

spot count

Rule	Why it is free	Squares removed
The 1s	anything times 1 is itself	
The 10s	every digit moves one place left	
The 2s	it is just doubling	
The 5s	they all end in 5 or 0, and you already count in fives	
Swapping	7×8 and 8×7 are the same fact, so you only learn it once	
The 9s	the two digits of the answer always add up to 9	

squares in the grid

100

left after crossing out

The 9s trick. $9 \times 4 = 36$, and $3 + 6 = 9$. $9 \times 7 = 63$, and $6 + 3 = 9$. Check it for all of them. It works every time up to 9×10 .

Grown-ups: once commutativity is understood, 100 facts collapse to about 55, and the genuinely hard set to fewer than ten. Making that visible changes how the whole task feels. B2.1 · B2.2



3

YOUR OWN HARD TEN

These are the only ones left

Whatever is still orange on your grid is your list. It will not be the same as anybody else's. For most people it is around 7×8 , 6×8 , 7×6 and 7×4 .

list

make cards

My hard fact	The answer	A way to remember it

Ways to remember a hard one

Build from one you know — 7×8 is 7×4 doubled.

Use a square — 7×8 is one more seven than 7×7 .

Find a rhyme — “five six seven eight” gives you $56 = 7 \times 8$.

Draw the array and count the rows.

4

EVERY FACT HAS A TWIN

Write the division twin for each of your hard facts. If $7 \times 8 = 56$, then $56 \div 8 = 7$ and $56 \div 7 = 8$.

____ $\div$ ____ = ____

____ $\div$ ____ = ____

____ $\div$ ____ = ____

____ $\div$ ____ = ____

Grown-ups: the related division facts are half the expectation and the half most often skipped. Knowing 7×8 should immediately give $56 \div 8$.

B2.2 · B2.6



5

TWO WEEKS, FIVE MINUTES A DAY

The tracker

Colour one square each day you practise. Only your hard ten — not the whole grid. Five minutes, no timer, no pressure.

7 practise

colour a square

	M	T	W	T	F	S	S
Week 1							
Week 2							

Before you start. How many of your hard ten do you know without thinking?

After two weeks. How many now?

Use them for something real. Pick three of your hard facts and write a real question for each — about money, or area, or how many altogether.

Badge earned. Colour in the second badge on the cover. This is the one that pays you back for years.



EXPEDITION THREE

Take One Away

Five sheets · you will need a park, a garden or a patch of grass, and something to write on outdoors

A food web is not a list. It is a system. The only way to find out whether you understand a system is to break it and see what happens.

Step 1

Go outside and find ten living things in one small place

Step 2

Sort them into producers, consumers and decomposers

Step 3

Join them into a web with arrows that mean “is eaten by”

Step 4

Cross one out, and follow what happens to everything else

Step 5

Work out what would run out first if the place got crowded

Habitat or community? The **habitat** is the place — the soil, the water, the shade, the space. The **community** is all the living things using it. Same pond, two different words. Get these straight before you start.

Grown-ups: a real local web beats a textbook one because the child has actually seen the species. A back garden, a school field or a single log is plenty.

B1.1 · B1.2 · B2.1–B2.7



1

GO AND LOOK

Ten living things, one small place

Pick one place and stay in it. A single square metre is enough. Look under things — that is where the interesting ones are.

 observe record

Where I looked: Date:

Living thing	Producer, consumer or decomposer?	What it probably eats

The three jobs

Producer — makes its own food from sunlight. Every plant.

Consumer — eats other living things. Every animal.

Decomposer — breaks dead things down so the goodness goes back into the soil. Fungi, worms, woodlice, beetles, bacteria.

Most people forget the decomposers. Turn a stone or a log over and you will find several.

Grown-ups: if fewer than ten turn up, count differently — moss, lichen, a dandelion, an ant, a spider and a woodlouse all count.

B2.1 · B2.3



3

JOIN THEM UP

Build the web

Write your living things in the circles, then draw arrows between them. The arrow means is eaten by, so it always points at whoever does the eating.

 draw arrows say it aloud

 Say it out loud every time you draw one

grass

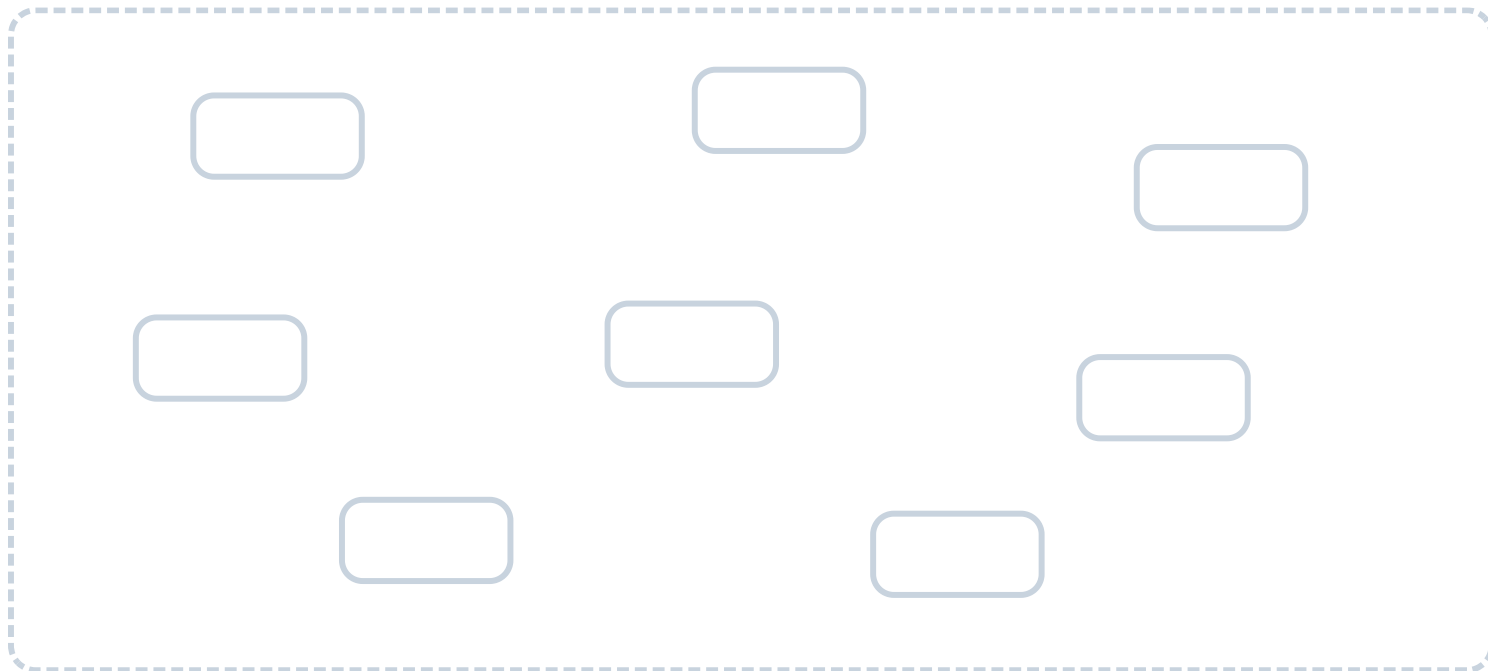
→

rabbit

→

fox

“Grass is eaten by rabbit is eaten by fox.” Not “eats”. That is backwards.



A food chain is one line. A food web is what you get when the lines cross — and real places are always webs.

Grown-ups: the arrow direction is the single most reliable error in this strand. Saying “is eaten by” out loud every time is what fixes it.

B2.3 · B2.4



4

BREAK IT ON PURPOSE

Cross one out

Choose one living thing from your web and cross it out completely. Now follow every arrow that touched it and work out what happens next. Then what happens after that.

trace

predict

The one I removed:

Straight away	Then what	And after that

Which living thing was hit hardest?

Was anything not affected at all?

Now remove the decomposers instead. All of them. What happens to the dead leaves? What happens to the soil? What happens to the plants a year later?

Grown-ups: the decomposer question is the one that surprises. Without them the nutrients never return to the soil, so the producers fail, and everything above them follows.

B1.2 · B2.3 · B2.4



5

WHAT RUNS OUT FIRST

How many can it hold?

No place can support unlimited life. Something always runs out before everything else does. Working out which is the whole idea.

reason

explain

Imagine twice as many of one animal moved into your place tomorrow. Rank what would run out, 1 being first.

food

water

shelter

space

Adaptations. Pick two living things from your list. For each one, name a body part or a behaviour that helps it survive in *this particular place*.

Living thing	What it has, or does	How that helps it here

One thing people do. Name one human activity that affects your place, and one thing that would help protect it.

Badge earned. Colour the third badge on the cover.



EXPEDITION FOUR

Bent Light, Bent Sound

Five sheets · you will need a torch, a glass of water, a pencil, an elastic band, and a table you can put your ear on

Light travels in straight lines until something gets in the way. Sound does not travel at all unless there is something for it to travel through. Both of those are easier to see than to be told.

Step 1

Find out what is really making light in your house

Step 2

Run a fair test on shadows — one thing changed at a time

Step 3

Break a pencil without touching it

Step 4

Prove that sound is a wobble, and that it needs something to wobble through

Step 5

Go looking for light pollution and noise pollution where you live

A fair test. Only **one** thing is allowed to change. Everything else stays exactly the same. If you change two things you will never know which one did it.

Grown-ups: the fair-test discipline in Step 2 is a Grade 4 expectation in its own right, not just good practice.

A1.2 · C1.1 · C1.2 · C2.1–C2.8

1

ALMOST NOTHING MAKES ITS OWN LIGHT

What is actually glowing?

Stand in one room and list everything you can see. Then work out how many of them are actually making light, and how many are just bouncing somebody else's.

 look

7

 sort

Makes its own light

Only reflects light

In most rooms only two or three things are actually making light — in a whole room full of things you can see.

Light source	Natural or artificial?	Does it give off heat too?
the Sun		
a candle		
an LED torch		
a firefly		
a phone screen		

The famous one. The Moon looks bright. Is it making light? Write what is actually happening.



2

ONE THING CHANGED AT A TIME

The shadow test

Stand an object in front of a wall and shine a torch at it. Change one thing, measure the shadow, and write it down. Then change it back and try a different one.

measure **record**

Object I used:

What I changed	Everything I kept the same	Shadow height
torch far away		
torch close up		
torch low down		
torch high up		

What happened when the torch got closer?

.....

Why? Use the words *straight lines* in your answer.

.....

Now spoil it on purpose. Change two things at once — move the torch closer *and* raise it. Can you still tell which one changed the shadow? Write why that matters.

.....

Grown-ups: deliberately spoiling the test is the strongest way to teach why fairness matters. It is far more convincing than being told.

A1.2 • C2.3



3

BEND IT

Break a pencil without touching it

Put a pencil in a glass half full of water and look from the side. It appears broken at the surface. That is **refraction** — light bending as it moves from water into air.

 observe draw

Draw what you see.



Three words for three things. Which is which?

light bounces off →

light gets soaked up →

light bends on the way through →

absorbed**reflected****refracted**

4

SOUND IS A WOBBLE

Try this	What you feel or hear
Hum with your hand on your throat	
Stretch an elastic band tight and twang it	
Stretch it looser and twang it again	
Put your ear flat on a table while somebody taps the far end	

Two conclusions. Finish each sentence.

Sound is made when something ...

Space is silent because ...

Grown-ups: ear-on-the-table is the memorable one — the tap arrives louder and sooner through the solid than through the air.

C2.3 · C2.4 · C2.5



5

TOO MUCH OF A GOOD THING

Light pollution, noise pollution

Light and sound are useful. Too much of either, in the wrong place, causes real harm. Most people have never thought about this at all.

 go outside discuss

Go outside after dark, with an adult. Look up for a full two minutes and let your eyes adjust.

How many stars can you count?

How many outdoor lights can you see from where you stand?

What happens	Light or noise pollution?
Baby turtles crawl toward a bright hotel instead of the sea	
Ship engines drown out the calls whales use to find each other	
Nobody in the city can see the Milky Way any more	
Birds beside a busy road have to sing louder to be heard	

Design one improvement. Pick one outdoor light near you. How could it be changed so it still does its job but causes less harm? Draw or describe it.

Badge earned. Colour the fourth badge on the cover.

Grown-ups: shielding a light so it points down rather than sideways is the usual answer, and it is a real engineering fix used by real councils.

C1.1 · C1.2 · A1.3



EXPEDITION FIVE

Where the Work Is

Five sheets · you will need a map of Canada, and the food packaging from about a week of shopping

Every job in Canada is where it is for a reason, and the reason is almost always the rock, the soil, the water or the weather. This expedition finds the reason.

Step 1

Learn the physical regions, and how they differ from the provinces

Step 2

Collect where your food actually comes from, for one week

Step 3

Put the data into a graph and find the median and the mode

Step 4

Match each industry to the land that made it possible

Step 5

Weigh up one real trade-off between work and the environment

Two kinds of region. **Political** regions were drawn by people — provinces, territories, borders. **Physical** regions were made by the Earth, and they cross borders without noticing them. The Canadian Shield does not care where Ontario ends.

Grown-ups: this expedition deliberately runs Social Studies and Data together, because “where does our food come from” produces real data worth graphing.

SS B1 · B2 · B3 · Math D1.2 · D1.5



1

THE LAND UNDER THE COUNTRY

Eight regions, thirteen names

Find each physical region on a map. Then find which provinces and territories it runs through — most of them run through several.

find on a map

match

Physical region	What it is like	Provinces it runs through
Canadian Shield	ancient rock, thin soil, thousands of lakes	
Great Lakes–St. Lawrence Lowlands	flat and fertile	
Interior Plains	deep soils, wide and flat	
Western Cordillera	mountains	
Appalachian region	older, rounded hills	
Arctic Lowlands	cold and treeless	

Which region do you live in?

Directions. Fill each one in.

Vancouver is of Winnipeg.

Halifax is of Toronto.

Iqaluit is of Ottawa.

Use NE, NW, SE or SW.

2

READ THE PACKAGING

Where did dinner come from?

For one week, write down where each food came from. It is printed on nearly everything. This is real data that nobody has collected before you.

 collect

7

 tally

Food	Where from	Tally

3

TURN IT INTO A PICTURE

Draw a bar graph. Give it a title, label both axes, and choose a sensible scale.

most common place (mode)

how many places altogether

how many from Canada

Is this primary or secondary data? You collected it yourself, so which is it? What would the other kind look like for the same question?

4

WHY THAT JOB, RIGHT THERE

The land explains the work

Match each industry to the reason it grew up where it did. Every single one has a physical answer underneath it.

 reason

 match

Industry	Where	Because the land...
mining	the Canadian Shield	
wheat farming	the Interior Plains	
fishing	the Atlantic provinces	
forestry	British Columbia	
manufacturing	the Great Lakes lowlands	

Your own place. Name three jobs people do near where you live. For each, write what about the land, water or weather makes it possible here.

Job	What about this place makes it possible

The big one. Most Canadians live within 200 km of the American border. Why do you think that is? There are at least two physical reasons.



5

THERE IS NO EASY ANSWER

Work against the land

Industry needs the environment, and it also damages it. Grown-ups argue about this constantly and there is no answer that makes everybody happy. Have a proper go at one.

weigh up

decide

The situation. A mining company wants to open a mine in a forested area. It would bring 300 jobs to a small town that badly needs them. It would also cut a road through the forest and there is a risk to a nearby river.

Reasons to say yes**Reasons to say no**

Whose views should be heard? List three different groups of people who would care about this, and say what each one would want.

Who	What they would want

Your decision, with a reason. There is no right answer here. There are only answers with good reasons and answers without.

Badge earned. Colour the fifth badge on the cover.



EXPEDITION SIX

A Day in 1200

Five sheets · you will need books or a library, and an ordinary object from your own house

This year history goes back further than anybody can remember — as far as 3000 BCE. There is not a single date in this expedition. There is one question instead: what did the land give them, and what did it demand?

Step 1

Choose two societies, one of them a First Nation or Inuit society

Step 2

Find out what the land gave them and what it demanded

Step 3

Walk one ordinary day, hour by hour

Step 4

Work out who decided things, and who did not get a say

Step 5

Leave one object behind and see what it would tell somebody

Not a list of civilisations. Grade 4 requires at least one First Nation and one Inuit society, studied in the same frame as anywhere else in the world. Haudenosaunee, Anishinaabe, Haida, Cree, Mi'kmaq, Thule and Inuit societies all count, alongside Egypt, Japan, the Maya or Greece.

Grown-ups: use authentic sources by Indigenous authors, and where possible a local First Nations cultural centre — it is usually a better visit than a large museum and far less crowded.

SS A1 · A2 · A3



1

CHOOSE TWO

What the land gave them

Pick two societies from different parts of the world. Then answer the same two questions about each, because that is what makes them comparable.

 research compare

	Society one:	Society two:
Where they lived		
What the land gave them		
What the land demanded		
What they ate		
What their homes were made of		
How they travelled		

The connection. Pick one thing from each society and explain how the place they lived caused it. For example: *the Arctic has almost no trees, so...*

Two sources at least, and put everything in your own words. Read it, close the book, say it out loud, then write.

Grown-ups: putting it in their own words is where plagiarism first becomes a live issue. Treat it as a skill to teach rather than a crime to punish.

SS A2.2 · A3.4 · A3.5 · Lang D1



3

ONE ORDINARY DAY

Hour by hour

Pick one of your two societies and one person your own age in it. Walk their whole day. Then walk yours beside it. The comparison is the point.

- imagine carefully
- compare

Time of day	A child there, then	You, today
waking up		
morning		
midday meal		
afternoon		
evening		
going to sleep		

Three things that have changed completely.

Three things that are surprisingly the same.

Grown-ups: sorting daily life into changed and unchanged is the central thinking job of this strand, and the “same” column is usually the more interesting one.

SS A1.2 · A1.3 · A3.3



4

WHO DECIDED, AND WHO DID NOT

Whose voice is missing?

Most of what we know about early societies comes from what the powerful left behind. Noticing who is *not* in the record is a real historian’s skill.

notice

explain

	Society one	Society two
Who made the decisions		
How they got that job		
Who had no say at all		

Three ways to run a place. Match each to a society you know about.

one ruler at the top, and the job passes down the family →

a council, where representatives talk until they agree →

decisions made by whoever is best at that particular thing →

Worth knowing. The Haudenosaunee **Great Law of Peace** brought several nations together to stop fighting and decide things in a council. It is one of the oldest systems of participatory government still working today — older than most of the documents usually given the credit. Write one thing you found out about it.



5

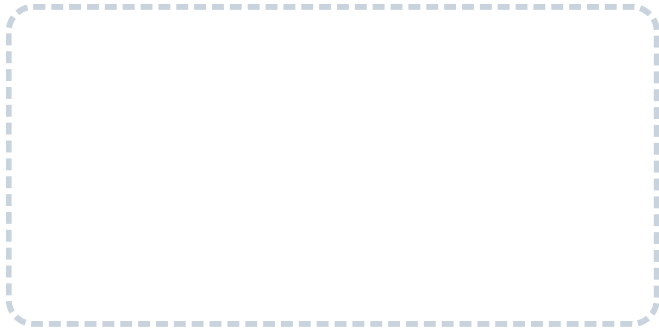
WHAT YOU LEAVE BEHIND

One object, a thousand years

Choose one ordinary object from your house. Imagine somebody digs it up in a thousand years and it is the only thing they find from your whole life.

 choose draw

Draw it carefully.



What it is:

What would they work out correctly?

What would they get completely wrong?

Now the other way round. Archaeologists find one grave filled with gold and a hundred with nothing in them. What does that tell them about how that society was organised?

Badge earned. Colour the last badge on the cover. That is all six expeditions finished.

Grown-ups: the “what would they get wrong” question is the sophisticated half. It teaches the limits of evidence better than any explanation of them.

SS A3.2 · A2.5



Four games worth keeping

All four need almost nothing, and all four practise something Grade 4 actually needs. Cut them out or copy the rules onto card.

Battleship

Two grids each, six squares along and six up. Hide four ships. Call out coordinates — along first, then up. First to sink them all wins.

Practises: the Cartesian plane, E1.2

Get to 1000

Roll two dice. Choose to make a number of tens or hundreds and add it on. Closest to 1000 without going over wins. Going over means you miss a turn.

Practises: place value and mental addition, B1.1, B2.3

Product Hunt

Deal out cards 1 to 10. One player names a product — say 42. The other has to find both factors before you count to ten. Swap over.

Practises: times tables and their division twins, B2.2

Tenths Snap

Write fractions on half the cards and decimals on the other half. Turn them over one at a time. Snap when a pair means the same amount — $\frac{7}{10}$ and 0.7.

Practises: fraction and decimal equivalence, B1.9

House rule. Nothing here is timed except Product Hunt, and even that counts slowly and out loud. If it stops being fun, stop playing.



Number benders

None of these needs anything you have not been taught. All of them need you to think for a minute first.

1. A rectangle has an area of 36 cm^2 . Write down every whole-number pair of sides it could have.

2. I am a decimal between 0.5 and 0.8. I round to 1. What could I be? Give two answers.

3. A film starts at 6:40 pm and lasts 1 hour 50 minutes. What time does it end?

4. Five numbers have a mean of 6. Four of them are 4, 5, 7 and 8. What is the fifth?

5. 23 sweets shared between 4 children. How many each, using a fraction for the leftover?

6. $n + 8 < 15$. List every whole number that works. How many are there?

7. Repeat 4 times: [repeat 3 times: clap], stamp. How many claps? How many stamps?

8. The hard one. A shop sells pens at 3 for \$2. How much do 12 pens cost? Now — how many pens can you buy with \$10?

Grown-ups: number 8 is a rate problem in both directions, which is 'B2.8' doing real work. Answers are on the last sheet.

B2.6 · B2.8 · C2.3 · C3.1 · D1.5 · E2.3 · E2.6



Word benders

Same idea, different subject. Some of these have more than one good answer.

1. Build a real word using *semi-*, and another using *fore-*. Say what each one means.

2. *Success* is a noun. Change it into an adjective, then into an adverb.

3. Which relative of *invitation* tells you how to spell its middle vowel?

4. Turn *Because it was late* into a complete sentence by adding a main clause.

5. Explain *He let the cat out of the bag* without using the words *cat* or *bag*.

6. Punctuate this: *im ready said maya*

7. Write the same fact twice — once for a friend, once for a science report. *It rained a lot yesterday.*

8. **The hard one.** Two newspapers describe the same crowd. One says *concerned neighbours*, the other says *angry troublemakers*. Same crowd. What has each writer done, and why does it matter?



Le coin français

Cut this page out and stick it somewhere you will see it. None of it needs anybody in the house to speak French.

Bonjour

hello

Salut

hi

Merci

thank you

S'il vous plaît

please

Ça va ?

how are you?

Ça va bien

I'm well

Je ne comprends pas

I don't understand

Comment dit-on...?

how do you say...?

Au revoir

goodbye

Five things to do at home this month

1. Label twenty things in the house on sticky notes — *la porte, le frigo, le miroir*.
2. Watch a film you already know, with French audio and English subtitles.
3. Read the French side of the cereal box at breakfast. It is real reading practice.
4. Ask somebody at home to let you teach them five words. Being the expert is worth an hour of drill.
5. Find French on a road sign, a form or a product label and copy it down.

Ma phrase. Write three true sentences about yourself in French. Copy the pattern.

Je m'appelle... · J'ai neuf ans. · J'aime... · Je n'aime pas...

Grown-ups: Core French is compulsory Grades 4–8, roughly 200 minutes a week, with its own report card grade and 600 hours required by the end of Grade 8. Volume and cheerfulness beat accuracy at this stage.

FSL A1 · A3 · B1 · B2 · B3 · D1



Twelve things to go and do

None of these is homework. All of them do more for Grade 4 than a worksheet would.

- ☐ Find a fossil. Southern Ontario limestone is full of shells and you can genuinely find one.
- ☐ Bake something. Halve the recipe. Then double it.
- ☐ Visit a First Nations cultural centre. Usually better than a big museum, and quieter.
- ☐ Take \$20 to the shops with a list and work out the change in your head.
- ☐ Time something with a stopwatch, twice, and compare.
- ☐ Learn a round and sing it in two parts with somebody.
- ☐ Turn a bicycle upside down and turn the pedals by hand. Watch every part.
- ☐ Put a map of Canada under the plates for a month.
- ☐ Go somewhere dark and count the stars. Then count them again from home.
- ☐ Look at the Canadian Shield from a road north of the city. It is billions of years old.
- ☐ Read two news reports of the same event and find three differences.
- ☐ Draw a face with the eyes halfway down. Compare it with your usual way.

Add three of your own. Things you actually want to do, that connect to something in this book.



Bodies change, and that's the plan

This year Health starts talking about puberty. Here is what it actually covers, so nothing arrives as a surprise.

What Grade 4 covers. The physical changes — body hair, breast development, voice and body size changing, more body odour, oilier skin — and how to look after yourself while it happens. That is all of it. Menstruation and the reproductive system come in **Grade 5**, not this year.

The routine gets two extra steps.

- ☐ shower or bath regularly
- ☐ clean clothes, especially socks
- ☐ deodorant if you need it
- ☐ wash your face gently
- ☐ hands and teeth as always

The bit that matters most.

Everybody starts at a different time. The first person in a class and the last person both find it hard, and neither of them chose it. All of it is normal.

Feelings go up and down too. Talking to somebody helps, and that is not a sign anything has gone wrong.

Two or three people you could talk to. Write them down now, on a calm day, so the list already exists when you need it.

In Canada, Kids Help Phone is free at any hour of the day or night: **1-800-668-6868**, or text **CONNECT** to **686868**.

Grown-ups: parents may request exemption from the Human Development and Sexual Health portion — ask the school office. Two things worth weighing: exempted children generally hear it anyway, second-hand and garbled; and the hygiene half is practical and independently useful. The most common regret parents report is waiting too long.

HPE D1.5 · D2.4 · A1.2

Answers, and the ones with no answer

Only the questions with one right answer are here. The expedition pages mostly do not have one, and that is deliberate — they are judged on the reasoning, not the result.

Sheet 2. $2\,748 \rightarrow 2750, 2700, 3000$. $6\,195 \rightarrow 6200, 6200, 6000$. $4\,502 \rightarrow 4500, 4500, 5000$. $9\,950 \rightarrow 9950, 10\,000, 10\,000$.

Sheet 3. Halves: $\frac{5}{2}, \frac{6}{2}, \frac{7}{2}$. Fourths: $\frac{5}{4}, \frac{6}{4}, \frac{7}{4}$. Tenths: $\frac{4}{10}, \frac{5}{10}, \frac{6}{10}$. Sixths: $\frac{5}{6}, \frac{6}{6}, \frac{7}{6}$. Exactly 1: $\frac{5}{5}, \frac{10}{10}, \frac{3}{3}$. Bigger than 1: $\frac{9}{8}, \frac{11}{10}$.

Sheet 4. $0.7 > 0.15 \cdot 0.5 > 0.25 \cdot 0.4 < 0.9 \cdot 0.6 > 0.45 \cdot 1.2 > 0.8 \cdot 0.3 = 0.30$ (they are equal, so neither sign is right — that one is a trap worth talking about).

Sheet 5. $132 \times 4 = 528$. $58 \times 6 = 348$. $417 \times 2 = 834$. $64 \times 7 = 448$.

Sheet 6. $13 \div 2 = 6$ and $1/2$. $11 \div 3 = 3$ and $2/3$. $22 \div 5 = 4$ and $2/5$. $19 \div 4 = 4$ and $3/4$.

Sheet 7. $n = 17 \cdot x = 35 \cdot b = 9 \cdot m = 37$. And yes, $6 \times 4 = 12 \times 2$, because both are 24.

Sheet 8. $n < 7$ (0–6) · $n > 7$ (8–20) · $n < 10$ (0–9) · $n > 7$ (8–20). Seven whole numbers work for the first one. With halves and tenths allowed, endlessly many.

Sheet 9. The four points make a rectangle. From (1,1) to (5,4) is 4 right and 3 up. (2,6) and (6,2) are different points — the order of the two numbers changes where you end up.

Sheet 10. $1:50 \rightarrow 3:15$ is 1 h 25 min. $9:35 \rightarrow 11:10$ is 1 h 35 min. $4:20 \rightarrow 6:05$ is 1 h 45 min. 180 minutes · 240 seconds · 72 hours.

Sheet 11. 6 rows of 4 = 24 squares. $24 \div 6 = 4$ cm. Table: $35 \text{ cm}^2 \cdot 4 \text{ cm} \cdot 8 \text{ cm} \cdot 64 \text{ cm}^2$. It needs the little 2 because area is measured in squares, not lengths.

Sheet 12. Set A: mean 4, median 4, mode 3 and 5 (two modes). Pocket money: mean \$102.40, median \$3. The median describes them far better — one huge value drags the mean away from everybody.

Sheet 13. compOosition (compose) · relAtive (relate) · medicInal (medicine) · prepAration (prepare).

Sheet 14. Raining hard · she stays up late · he was nervous · it was very easy. Similes: honey, mouse. Metaphor: zoo. Idiom: break a leg.

Sheet 15. rouge = red, bleu = blue, vert = green, jaune = yellow. tu, vous, tu, vous.

Sheet 47. 1. $1 \times 36, 2 \times 18, 3 \times 12, 4 \times 9, 6 \times 6$. 2. 0.5, 0.6 or 0.7 all round to 1 (0.5 rounds up). 3. 8:30 pm. 4. 6 — the five must total 30. 5. 5 and $\frac{3}{4}$ each. 6. 0 to 6, so seven of them. 7. 12 claps and 4 stamps. 8. 12 pens cost \$8. With \$10 you can buy 15 pens.

Sheet 48. 2. successful, successfully. 3. *invite*. 4. e.g. *Because it was late, we walked home quickly*. 5. He told a secret he was not supposed to tell. 6. “I’m ready,” said Maya. 8. Each writer has chosen words that take a side, so the same crowd sounds sympathetic or dangerous depending on who is describing it.

The expeditions have no answer key on purpose. They are judged on whether the thinking is sound, the test was fair, and the reasons are given — not on getting a particular result. A prediction that turned out wrong, with a good explanation of why, is worth more than a lucky right one.

Grown-ups: in the four Ontario achievement categories, the expeditions mostly assess

Thinking and **Application**, which is where Level 4 actually lives. Accuracy alone is Level 3.

Growing Success, 2010