Grade 5 Math
The Same Thing, Three Ways

48 sheets · every strand · the year everything joins up

THIS BOOK BELONGS TO

.....

Find your strand

Brand new this year

Percents
the third way to write a fraction

11s and 12s
the tables finish

Area formulas
worked out, not handed over

Hundredths
two decimal places

A protractor
and knowing how it works

Sales tax
13% in Ontario

Adding fractions
when the bottoms match

Rotations
turning, not just sliding

if-then code
the computer decides

Grown-ups: Grade 5 finishes almost everything Grade 4 started. That makes it quieter than last year and, in one way, less forgiving — a gap left open in Grade 4 gets built on rather than revisited. If something here is hard, it is usually last year's brick, not this year's.

Ontario 2020 · 51 expectations

Up to a hundred thousand

Say each one out loud before you write anything. The spaces are there to help you — Canada writes 45 600, never 45,600.

write say it

Ten thousands	Thousands	Hundreds	Tens	Ones	The number
4	7	3	0	6	
9	0	0	5	2	
					68 401
					30 070

What is the 7 worth?

in 47 306 .....

in 70 152 .....

in 3 720 .....

Break it apart three ways. 52 400 =

_____

_____

_____

The zero still has a job. In 30 070 there are two zeros doing completely different work. Say what each one is holding open.

Grown-ups: Grade 5 assumes rounding of whole numbers is already secure — there is no expectation for it this year. If it isn't, this is the sheet where you'll notice. B1.1 · B1.2

Ordering big numbers

Compare the biggest place first. Only look further along if those match.

write < or > · order

47 306 ☐ **47 360**

9 850 ☐ **10 200**

60 004 ☐ **6 004**

88 888 ☐ **88 889**

Put each row in order, smallest first.

Numbers	In order
12 400 · 4 120 · 41 200	
70 050 · 70 500 · 7 500	
99 099 · 90 999 · 99 909	

Make the biggest number you can using each of these digits once: **3 · 0 · 8 · 1 · 5**

Now the smallest. Careful — where can the zero not go?

Grown-ups: the digit puzzle at the bottom catches more children than the comparisons above it. A leading zero doesn't count.

The fraction wall

Colour each row a different colour. Then use it for the rest of the book — this page is a tool, not a test.

colour compare

One whole · halves · thirds · fourths · sixths · eighths · twelfths

Use the wall. Write = or < or >.

1/2 ..... **6/12** **1/3** **1/4**

2/3 ..... **8/12** **3/4** **5/8**

Find every fraction on your wall that equals 1/2.

What do you notice about the two numbers each time?

Why twelfths? Twelve divides by 2, 3, 4 and 6. That makes it the meeting point for nearly every fraction you already know.

Grown-ups: keep this page. Equivalent fractions (`B1.3`) are the machinery behind comparing, adding and everything Grade 6 does with common denominators. B1.3 · B1.4

Top-heavy and mixed

7/4 and 1¾ are the same amount wearing different clothes. Draw each one before you write it.

shade convert

Worked example

7/4 = 1 and 3/4

Four fourths make one whole. Three left over.

Top-heavy	Mixed number	Top-heavy	Mixed number
9/4		11/3	
5/2			2 and 1/6
	3 and 1/2	17/12	

Put these in order, smallest first.

5/4 2/3 1 and 1/2 11/12 7/6

Say it out loud. One fourth, two fourths, three fourths, **four fourths**, five fourths, six fourths… Fractions keep counting past one, exactly like whole numbers.

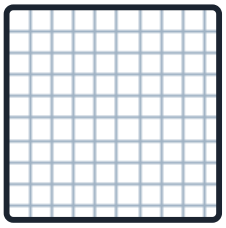
Grown-ups: if counting past one was skipped in Grade 4, do it now — ninety seconds, out loud. It makes improper fractions obvious rather than alarming.

B1.3 · B1.4

The second decimal place

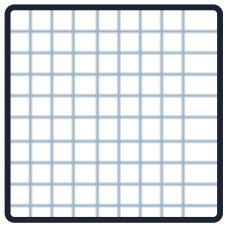
Each big square is one whole, cut into a hundred. Shade it, then write the number three ways.

shade | three ways



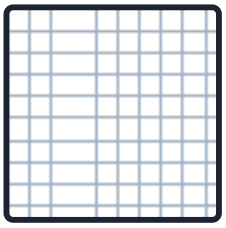
shade **0.7**

= ____/100 = ____%



shade **0.07**

= ____/100 = ____%



shade **0.70**

= ____/100 = ____%

Two of those three are the same. Which two, and how do you know?

Write <, > or =.

0.6 ☐ **0.06**

0.4 ☐ **0.40**

0.25 ☐ **0.3**

1.05 ☐ **1.5**

Grown-ups: 0.7 versus 0.70 versus 0.07 is the Grade 5 version of last year's 0.7 versus 0.15. The hundred-square is the only thing that settles it.

B1.5

Rounding to the nearest tenth

Mark the number on its line, then decide which tenth it is closer to.

mark round

3.47 rounds to 3.5

It sits past halfway, so it goes up.

Number	Between which tenths?	Rounds to
2.63		
7.18		
0.95		
12.04		

Careful with 0.95. What happens to the whole number when the tenths round up past 9?

Grown-ups: 0.95 → 1.0 is the one worth talking through. Rounding cascades, and children rarely expect it.

B1.6

The same thing, three ways

A fraction, a decimal and a percent are three ways of writing one amount. Fill in every gap.

shade convert

Picture	Fraction	Decimal	Percent
	50/100		
		0.25	
			10%
	3/4		
		0.01	

The bridge

Percent means "out of a hundred." So get the fraction into hundredths first, and the percent is just the top number. 1/4 = 25/100 = 0.25 = 25%.

Money already does this. A quarter is 25¢, which is 25/100 of a dollar, which is 0.25, which is 25%. Write the same four things for a dime.

Grown-ups: this sheet is the keystone of the year. Money is the context children already believe — start there and generalise outward. B1.7

Finishing the tables

You already know most of this grid. Fill it all in, then colour green anything you knew instantly and orange anything you had to work out.

fill in colour

×	1	2	3	4	5	6	7	8	9	10	11	12
6												
7												
8												
9												
11												
12												

The 11s and 12s are cheaper than they look

11s: up to 11 × 9, just double the digit. 11 × 7 = 77.
12s: the 10s plus the 2s. 12 × 7 = 70 + 14 = 84.
Zero: anything times zero is zero. Free.
Once you count 7 × 8 and 8 × 7 as one fact, the genuinely new ones are about three: 11 × 11, 11 × 12 and 12 × 12.

My hard ones. Write down every fact still orange. That short list is the whole job.

Grown-ups: five minutes a day on the orange list only, never timed. This is the highest-value practice available all year.

Every fact has a divide twin

If you know 7 × 12 = 84, you already know two division facts. Write all four members of each family.

write check

One family, four facts

7 × 12 = 84 · 12 × 7 = 84 · 84 ÷ 7 = 12 · 84 ÷ 12 = 7

Start with	×	÷	÷
6 × 11			
9 × 12			
8 × 7			
11 × 11			

Fill the gap.

? × 12 = 96

132 ÷ 11 = ?

7 × ? = 77

Why this matters. A missing factor is a division question in disguise. Once you see that, half of algebra stops being frightening.

Grown-ups: the related division facts are half of `B2.2` and the half most often skipped.

B2.1 · B2.2

Two ways to multiply — and they're the same way

Draw the four rectangles first. Then do it in columns. The four numbers turn up in both.

area model | algorithm

☑ **24 × 36 split into (20 + 4) × (30 + 6)**

×	30	6
20	600	120
4	120	24

600 + 120 + 120 + 24 = 864

Now you. Draw the grid, then check with columns.

32 × 24

×		

Answer .....

47 × 15

×		

Answer .....

Where did the four numbers go? Do 32 × 24 again in columns, then find each of your four rectangle answers hidden inside the column working.

Grown-ups: both methods are required, *and* the connection between them. The last box is the actual expectation. B2.6

Dividing by a two-digit number

Estimate first — always. Then work it out, and say what the leftover means.

estimate | divide

Question	Roughly?	Answer	Left over
368 ÷ 16			
525 ÷ 25			
431 ÷ 12			
700 ÷ 14			

The leftover depends on the question. 431 pencils shared between 12 classes.

How many whole pencils each? .....

How many left in the box? .....

Now: 431 metres of ribbon shared between 12 people. Can the leftover be shared? Write what each person gets.

Same numbers, different answer. Whether a remainder gets shared depends entirely on what is being shared. Pencils can't be cut. Ribbon can.

Grown-ups: "expressing any remainder appropriately" is written into the expectation. The pencil/ribbon pair is the whole point. B2.7

Adding fractions — when the bottoms match

The bottom number says how big the pieces are. Adding doesn't change the piece size, so it doesn't change the bottom.

shade add

☑ **3/8 + 2/8**

Three eighths, then two more eighths. **Five eighths.** The pieces are still eighths.

3/8 + 2/8 = ...

7/10 − 3/10 = ...

2/4 + 3/4 = ...

5/12 + 4/12 = ...

5/6 − 1/6 = ...

9/12 − 5/12 = ...

Two of those go past one. Find them, and write the answer as a mixed number as well.

A classmate writes **3/8 + 2/8 = 5/16.** Use the strip above to explain what they've misunderstood.

Grown-ups: adding the denominators is *the* Grade 5 fraction error. Explaining it to somebody else is the strongest test that it has landed.

B2.5

Dividing can make things bigger

This one surprises everybody. Draw it before you decide.

draw explain

☑ **How many quarter-pizzas can you cut from 3 pizzas?**

3 ÷ 1/4 = 12

2 ÷ 1/4 = ...

4 ÷ 1/2 = ...

3 ÷ 1/6 = ...

5 ÷ 1/3 = ...

Now the other way. Multiplying by a unit fraction makes things smaller.

6 × 1/2 = ...

8 × 1/4 = ...

9 × 1/3 = ...

12 × 1/6 = ...

Why does dividing by a quarter make the answer bigger? Write it in one sentence, starting: *"Because you are asking how many…"*

_____

Grown-ups: this contradicts four years of "dividing makes smaller." The pizza question is the only framing that makes it obvious. B2.8

Adding and taking away decimals

Line up the decimal points, not the last digits. Fill any gaps with zeros so both numbers have the same number of places.

line up | calculate

4.7 + 12.35

4.70
+12.35

17.05

4.7 became 4.70. Same number, easier to line up.

6.4 + 3.28 = ...

15.2 – 7.85 = ...

0.75 + 0.9 = ...

20 – 4.6 = ...

Estimate first, then check. Is your answer sensible?

Question	Roughly	Exactly
9.87 + 4.15		
30.4 – 12.75		

And the two big whole numbers.

46 800 + 27 350 = ...

80 000 – 34 600 = ...

Grown-ups: writing 4.7 as 4.70 is the move that prevents almost every decimal alignment error.

B2.4

Multiplying by a tenth

Multiplying by 0.1 makes a number **smaller**. That's not a mistake — 0.1 *is* a tenth, so multiplying by it is the same as dividing by 10.

8 in your head write

Number	× 0.1	× 0.01	÷ 10
60			
450			
8			
1200			

Look at columns 2 and 4. They match every time. Why?

Estimate. Do not calculate exactly.

6.87 + 3.09 is about .....

19.8 − 4.95 is about .....

0.48 + 0.51 is about .....

12.2 + 7.9 is about .....

Grown-ups: "multiplying makes bigger" has been true for four years. Say plainly that it stops being true once the multiplier is under 1. B2.3

For every, there are

A ratio compares two amounts. Keep the relationship and you can scale it up or down as far as you like.

scale complete

☑ **The recipe uses 2 cups of flour for every 3 eggs**

Flour	**2**	**4**	**6**	**8**
Eggs	**3**	**6**	**9**	**12**

Red counters	**3**	**6**		**15**
Blue counters	**5**		**15**	

Rates. A tap fills 4 litres every minute.

In 5 minutes: _____ L

In 12 minutes: _____ L

To fill 60 L takes _____ min

Scaling a recipe. It serves 12 and you need it to serve 18. What do you multiply everything by?

300 g of flour becomes _____ g

Grown-ups: `B2.9` is the groundwork for `F1.5` unit rates later in this book, and for all of Grade 6 proportional reasoning. Cooking is the best context there is.

Problems that need more than one go

Read it twice. Write down what you're finding first, before you find the answer.

plan check

1. A school orders 24 boxes of books. Each box holds 15 books. They give 90 books to the library. How many are left?

First I need to find: .....

2. A tin of paint costs $18.75. Ravi buys 4 tins and pays with a $100 bill. How much change?

First I need to find: .....

3. 3/8 of a class of 32 walk to school. How many walk? How many don't?

4. Check number 1 a different way from how you solved it. Did you get the same answer?

Grown-ups: "including those requiring more than one operation, and check calculations" is the actual wording of `B2.1`. Checking a different way is the expectation, not a nicety. B2.1

Number — how am I doing?

Tick honestly. Nothing here is marked. A blank is information, not a failure.

tick

- ☐ I can read and write numbers to 100 000
- ☐ I can find equivalent fractions to twelfths
- ☐ I know 0.7 and 0.70 are the same
- ☐ I can write a fraction as a decimal and a percent
- ☐ I know the division twin of every fact
- ☐ I can divide by a two-digit number
- ☐ I know why 3 ÷ 1/4 is bigger than 3
- ☐ I know × 0.1 is the same as ÷ 10
- ☐ I can compare and order them
- ☐ I can swap between top-heavy and mixed
- ☐ I can round a decimal to the nearest tenth
- ☐ I know my tables to 12 × 12
- ☐ I can multiply two-digit by two-digit
- ☐ I can add fractions with the same bottom
- ☐ I can add and subtract decimals
- ☐ I can scale a ratio up and down

The one I want to get better at is…

_____

…and the sheet that would help is number .....

Grown-ups: a cluster of three or four blanks in one area is the thing to mention to a teacher. One or two blanks is normal in February.

B1.1–B2.9

Patterns that shrink

Growing patterns add. Shrinking patterns take away. Find the rule, then keep going as far as you can.

find the rule · continue

Pattern	The rule	Next three
40, 35, 30, 25		
3, 9, 27, 81		
96, 48, 24, 12		
2.5, 3.0, 3.5, 4.0		
1.2, 1.05, 0.9, 0.75		

Keep going. Take 40, 35, 30, 25 all the way down. What comes after 5? And after that?

You've just met a kind of number you'll study properly in Grade 6. What would you call it?

Two rules can make the same start. 96, 48, 24 could be "halve it" or "take away 48, then 24…". Which one keeps working? Test it.

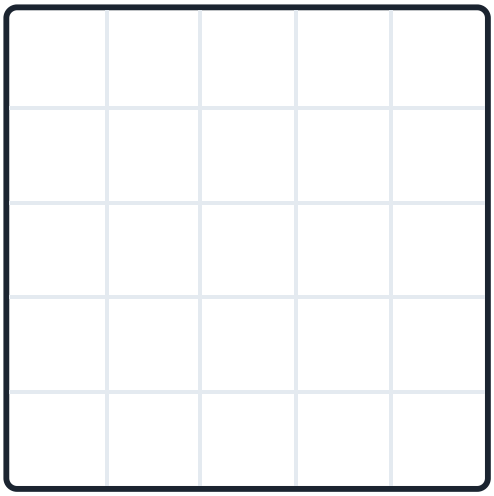
Grown-ups: shrinking patterns are the only place Grade 5 walks up to negative numbers. Let them look over the edge. C1.1 · C1.3

Table, graph, rule

One pattern, three ways to show it. Fill the table, plot the points, then say the rule.

table plot

Term	Value
1	3
2	5
3	
4	
5	
10	



The rule is: start at _____ and _____ each time.

Without drawing it — what is the value at term 20? Explain how you know.

Grown-ups: jumping to term 20 without listing all of them is the point. That is the beginning of a formula.

C1.2 · C1.4

Words, letters, picture

Three ways to say one relationship. Complete each row.

translate draw

In words	In algebra	What it means
four more than a number	**n + 4**	
three times a number		
	2n + 5	
a number shared between six		
	10 − n	

Careful. "Three less than a number" is **n − 3**, not 3 − n. The order matters, and it catches nearly everybody once.

Write your own. Invent a situation for **5n + 2**. Anything real — pocket money, packets of something, a taxi fare.

Grown-ups: `C2.1` is the skill that makes word problems startable. Moving fluently between words, symbols and a picture is the whole expectation.

Putting a number in

Evaluating means: you're told what the letter stands for, so swap it in and work it out. This is exactly what Grade 9 will ask, in the same words.

substitute | calculate

If n = 7, what is 3n + 4?

3 × 7 + 4 = 21 + 4 = 25

3n means 3 × n. The multiplication sign is left out on purpose.

Expression	n = 3	n = 5	n = 10
n + 8			
4n			
2n + 6			
20 − n			
5n − 3			

Which expression grows fastest as n gets bigger? Look at your table and say how you can tell.

Grown-ups: this is genuine algebra arriving without fanfare. Getting comfortable with substitution now is worth a great deal later. C2.2

Solve it, then prove it

Finding the number is half the job. Putting it back in to check is the other half — and it's the half people skip.

8 solve ☑ verify

Equation	n =	Check — write it out
n + 37 = 82		
n − 24 = 51		
6n = 84		
n ÷ 4 = 19		
3n + 5 = 32		

Is this true? 8 × 6 = 12 × 4. Does the equals sign mean "the answer comes next", or "the same as"? Both sides are 48 — so which is it?

Make your own. Write an equation whose answer is 15. Now write a harder one with the same answer.

Grown-ups: if "=" still reads as "the answer comes next," algebra will feel arbitrary for years. Worth five minutes to check even now. C2.3

More than one answer

An equation has one answer. An inequality has lots. Shade every whole number that works.

solve shade

☑ $n + 6 < 14 \rightarrow n < 8$

0 through 7 all work. Eight does not — it isn't less than eight.

$n + 9 < 20$

$n - 5 > 12$

$4n < 40$

$n + 14 > 30$

How many answers? For n + 9 < 20, count the whole numbers. Now imagine halves and tenths were allowed too. How many then?

Grown-ups: children who have spent five years hunting for *the* answer find "lots of answers" disorienting. The number line makes it concrete.

C2.4

If this, then that

A loop repeats. A **conditional** decides. This is the year your code starts behaving differently depending on what it finds.

trace predict

Trace this code

for each number from 1 to 10:

if the number is even → add 10 to the score

otherwise → add 1 to the score

Number	1	2	3	4	5	6	7	8	9	10
Adds										

Final score: .....

Change one thing. If "even" became "odd", what would the score be?

Predict first. If the range became 1 to 20, would the score more than double? Say why *before* you work it out.

No computer needed. Play it as a board game. "If you roll an even number, move forward two; if odd, move back one." Then change the condition and predict.

Grown-ups: predicting *before* running is `C3.2`, and it is the harder half.

C3.1 · C3.2

Build a model of something real

Pick one. There is no single right answer — you are judged on whether the reasoning holds together.

decide justify

Choose one:
- How much would it cost to give everyone in your class a snack for a week?
- If you saved the same amount every week, how long to afford something you want?
- How much water does your household use in a day?

1. What exactly am I working out?

2. What do I need to know or assume?

3. My working

4. My answer, and is it sensible?

5. What would change the answer a lot?

Grown-ups: `C4` has no specific expectations — it is assessed through the others. Question 5 is the one that separates Level 3 from Level 4.

C4 · B2.1

Who did you ask?

A sample only tells you something useful if the people in it are like the people you're asking about.

judge explain

The question, and who was asked	Good sample?	Why / why not
Does the whole school want a later start? — asked the 12 people in the chess club		
What is the school's favourite sport? — asked everyone leaving the football practice		
How do students get to school? — asked 5 people from each class, chosen at random		
What do families think of the new menu? — asked every third family on the list		

Design a fair one. You want to know the favourite lunch of the whole school. Who would you ask, and how would you choose them?

The word to remember is *representative.* A sample doesn't have to be big. It has to be like the group you're asking about.

Grown-ups: `D1.1` is one of the two most useful expectations in Grade 5 mathematics, and it involves no calculation at all. D1.1

Out of how many?

A relative-frequency table doesn't just say how many. It says how many **out of the total** — which is a fraction, a decimal and a percent.

calculate convert

Thirty children were asked how they get to school.

Way	How many	Fraction	Decimal	Percent
Walk	**12**	**12/30**		
Bus	**9**			
Car	**6**			
Bike	**3**			
Total	**30**	**30/30**	**1.0**	**100%**

Check yourself. Your four percents should add up to 100. If they don't, one of them is wrong.

Same data, different school. A school of 300 has the same proportions. How many walk?

Grown-ups: relative frequency is `B1.7` doing the same work in a different strand. Pointing that out helps both. D1.2

Stacked bars

A stacked bar shows the parts **and** the whole at the same time. Read both.

build read

Four classes were asked whether they walk, bus or ride. Colour in a stacked bar for each.

Class	Walk	Bus	Bike	Total
5A	12	9	4	
5B	8	14	3	
5C	15	6	5	
5D	10	10	6	

Which class is biggest? .....

Which has most walkers? .....

Which has most bus users? .....

Why a stacked bar here rather than four separate bar graphs? Give one reason.

Grown-ups: `D1.3` requires the child to *justify* the choice of graph, not just draw one. The right-hand box is the expectation. D1.3 · D1.4

Mean, median, mode

Three ways to say "typical". They don't always agree, and that disagreement is the interesting part.

calculate argue

How to find each

Mean — add them all, share the total equally. **Median** — put in order, point at the middle. **Mode** — the one that turns up most.

Set A — test scores: 6, 8, 7, 8, 6, 8, 4

mean	median	mode

Set B — with decimals: 2.5, 3.0, 2.5, 4.0, 3.5

mean	median	mode

The interesting one. Six people's monthly earnings: $1800, $1900, $2000, $2000, $2100, $40 000.

Mean: _____ Median: _____

Which one describes these six people better, and why?

_____

_____

Grown-ups: the earnings set is the whole lesson. A mean that describes nobody is exactly why news reports quote medians for income. D1.5

Is this graph trying to fool me?

Three tricks turn up again and again. Once you can name them you will see them everywhere — because they genuinely are everywhere.

inspect | name the trick

The three tricks

1. **The axis doesn't start at zero** — a tiny difference looks enormous.
2. **Uneven intervals** — the gaps between numbers aren't the same size.
3. **Pictures scaled two ways** — doubling the height also doubles the width, so the ink quadruples.

What the graph does	Which trick?
The vertical axis runs from 48 to 52, and one bar looks twice the other	
The years along the bottom go 2010, 2015, 2016, 2020, spaced equally	
Two money bags — one is twice as tall and twice as wide	
A bar chart with no numbers on the vertical axis at all	

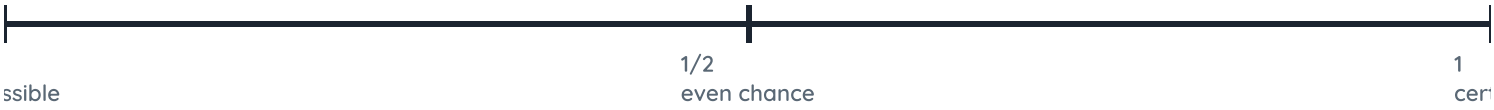
Draw the honest version. Sales were 51 in one year and 52 the next. Sketch a graph that makes it look enormous, then one that tells the truth.

Grown-ups: `D1.6` says "challenging preconceived notions" in the expectation itself. Find a real graph in a news story and check the axis together. D1.6

Chance as a fraction

Last year chance was five words. This year it's a number between 0 and 1.

as a fraction | 8 mark the line



ssible

cer

Event	As a fraction	Mark it on the line
A fair coin lands heads		←
A six-sided die shows a 3		←
A die shows an even number		←
Picking red from 3 red and 5 blue		←
A die shows a number under 7		←

Try it. Flip a coin 20 times and tally. How many heads did you predict? How many did you get?

Predicted _____ Actual _____

Does a 1/2 chance mean exactly 10 heads? Explain.

_____

Grown-ups: the coin experiment usually doesn't come out even, and that *is* the lesson. Probability describes the long run, not the next twenty flips.

Would another group give the same answer?

Predict first, then find out. Being wrong here is useful information, not a mistake.

predict · test

Class 5A recorded how many books each person read last month.

3, 5, 2, 8, 5, 4, 5, 6, 3, 9

mean	median	mode

Predict. Would Class 5B give the same mean, median and mode? Circle one and say why.

all three the same · some the same · none the same

Now go and collect it. Ask ten people.

their mean	their median	their mode

Grown-ups: `D2.2` is genuinely about testing a prediction, not computing three averages. The prediction must be written down before the data arrives.

D2.2

Make an infographic

An infographic tells a story with data. Everything on it has to be true, and everything on it has to earn its place.

design | make it clear

My question: .....

Who I asked, and how I chose them: .....

Must include

- [ ] a title that says what it shows
- [ ] a graph with labelled axes
- [ ] at least one percent or fraction
- [ ] where the data came from

The headline. One true sentence your data actually supports:

.....

Grown-ups: the hardest part is the headline — writing a claim the data genuinely supports, and no more.

D1.4 · D1.2

Triangles get their proper names

Every triangle has **two** names — one for its sides, one for its angles. A triangle can be isosceles and right at the same time.

measure · name

Two lists

By sides: equilateral (three equal) · isosceles (two equal) · scalene (none equal)
By angles: acute (all under 90°) · right (one exactly 90°) · obtuse (one over 90°)

Sides	Angles	Name by sides	Name by angles
5, 5, 5 cm	60, 60, 60°		
6, 6, 8 cm	70, 70, 40°		
3, 4, 5 cm	37, 53, 90°		
5, 5, 9 cm	25, 25, 130°		

Construct one. Draw a triangle with sides 6 cm, 8 cm and 10 cm. Then measure its angles. What kind is it?

Try to draw a triangle with two right angles. Go on. Then write down why it can't be done.

Grown-ups: the impossible triangle is the best question on the page — the angles must total 180°, so two right angles leaves nothing. E1.1

Exactly the same, exactly the same size

Congruent means identical — same shape **and** same size. Turning it or flipping it doesn't change that.

measure construct

Construct a congruent copy of a rectangle 7 cm by 4 cm.

Construct a parallelogram with sides 6 cm and 4 cm, and one angle of 60°.

Two rectangles both have an area of 24 cm². Must they be congruent? Draw two that aren't.

Grown-ups: same area does not mean congruent, and it does not mean same perimeter either. Sheet 45 comes back to this.

From above, from the front, from the side

This is how engineers, architects and flat-pack instructions all talk. It's harder than it looks, and finding it hard is normal.

build it | draw it

Build this from cubes or blocks, then draw the three views without moving it.

from the top | from the front | from the side

Now the test. Give your three drawings to somebody else, with the blocks but not the original. Can they rebuild it?

They rebuilt it: ☐ yes ☐ not quite

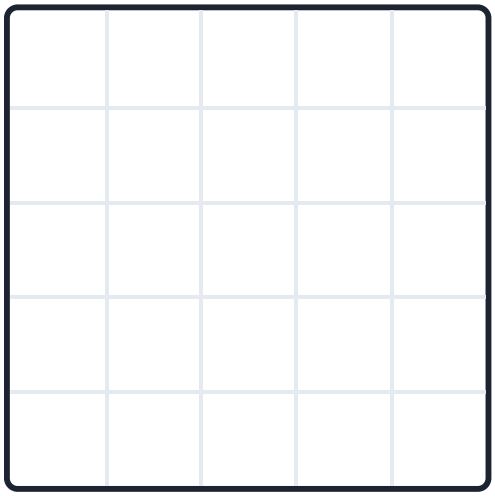
If not quite — which view needed to be clearer?

Grown-ups: the rebuild test is the honest assessment. A drawing that somebody else can build from is a drawing that works.

Along, then up — but count the labels

This year the grid might go up in 2s, 5s or 10s. Read the **numbers** on the axis, not the squares.

plot read



Label the axes going up in 5s, starting at 0.

Now plot: **(5, 10)** **(15, 20)** **(20, 5)**

How do you get from (5, 10) to (15, 20)?

_____ right and _____ up

Careful — that's not the same as counting squares.

Why does the scale matter? If the same grid went up in 1s instead of 5s, would the point (15, 20) be in the same place on the paper? Explain.

Grown-ups: "using various scales" is new in `E1.4`. Reading squares instead of labels is the reliable error. E1.4

Slide, flip, and now turn

A rotation needs three things: a **centre** to turn around, a **direction**, and an **amount**. Tracing paper and a pin is the honest way to do it.

transform draw

Transformation	What changes	What stays the same
Translation (slide)		
Reflection (flip)		
Rotation (turn)		

Rotate 90° clockwise about the dot.

Rotate 180° about the dot.

Predict before you draw. A 180° turn — is that the same as a flip? Try it with a shape that isn't symmetrical and find out.

Grown-ups: a 180° rotation and a reflection give the same result for symmetrical shapes and different results otherwise. That comparison is worth doing.

E1.5

Sliding the decimal point

Every metric step is ten, a hundred or a thousand. Converting a bigger unit into a smaller one always makes the number bigger.

convert · estimate

The base-ten ladder

1 km = 1000 m · 1 m = 100 cm · 1 cm = 10 mm
1 kg = 1000 g · 1 L = 1000 mL

From	To	From	To
2.5 km		4.2 kg	
3 m		0.75 L	
6.4 cm		1.08 m	

Choose the sensible unit, then estimate.

The length of this book _____ The mass of an apple _____

Water in a bathtub _____ The distance to school _____

Notice. Converting to a smaller unit is the same digit-shifting as multiplying by 10, 100 or 1000 back on sheet 15. It is one skill in two costumes.

Grown-ups: cooking and DIY are the natural contexts. "The recipe says 1.5 kg — how many grams?"

Comparing angles without a protractor

Before the instrument arrives, get a feel for size. Use the corner of a piece of paper as your right angle.

compare sort

Draw five different angles above, then label each one A to E.

Sort them using the paper corner.

Smaller than a right angle: .....

Exactly a right angle: .....

Bigger than a right angle: .....

Order them smallest to biggest, without measuring anything.

How did you decide between the two closest ones?

Grown-ups: `E2.3` comes before `E2.4` deliberately — informal comparison first, then the instrument. Skipping this step is why protractors get misread. E2.3

How a protractor actually works

It has two scales running in opposite directions, which is why it gets misread. The fix isn't care — it's estimating first.

measure construct

The rule that prevents every mistake

Decide acute or obtuse before you read anything. If it's acute, the answer must be under 90. So if you read 130 on an acute angle, you're on the wrong scale. Look at the other number.

Benchmark angles — learn these by sight.

45°	90°	135°	180°
half a right angle	a square corner	a right angle and a half	a straight line

Angle	Estimate first	Acute or obtuse?	Measured
A			
B			
C			

Construct these with a protractor and a ruler: 40°, 90°, 125°.

Grown-ups: the expectation says *explain how protractors work*, not just use one. Ask why there are two sets of numbers. E2.4

Working out the formula yourself

Do not be told these. Cut them out and discover them — formulas you find yourself are the ones you remember.

cut and slide | write the rule

☑ Step 1 — the parallelogram

Cut out a parallelogram. Slice the triangle off one end. Slide it round to the other end. **It becomes a rectangle.** So its area is the same as that rectangle's.

Area of a parallelogram = ... × .....

Notice the slanted side never came into it.

☑ Step 2 — the triangle

Cut any rectangle along its diagonal. You get **two identical triangles.** So one triangle is…

Area of a triangle = ... × ..... ÷ .....

Shape	Base	Height	Area
rectangle	**8 cm**	**5 cm**	
parallelogram	**8 cm**	**5 cm**	
triangle	**8 cm**	**5 cm**	
triangle	**12 cm**		**30 cm²**

The height is the perpendicular height — straight up from the base, not along the slanted side. For a very stretched triangle it can even fall outside the shape.

Grown-ups: using the slanted side as the height is the single most reliable Grade 5 area error. Cutting and sliding prevents it. E2.5

Same area, different fence

Area is the grass inside. Perimeter is the fence around. Twelve tiles can make three different fences.

arrange | measure both

Arrange 12 square tiles into every rectangle you can. Draw each one and work out both measurements.

Rectangle	Area	Perimeter
1 × 12		
2 × 6		
3 × 4		

Which has the smallest perimeter? .....

Which has the largest? .....

A farmer has 24 m of fencing. What shape of rectangular pen gives the most grass? Try three and compare.

Say it in one sentence. Two shapes with the same area can have…

Grown-ups: Grade 3 did this activity too. That it is still needed in Grade 5 tells you how stubborn the perimeter/area confusion is. E2.6

Spatial Sense — how am I doing?

Tick honestly. A blank is information.

tick

- ☐ I can name a triangle by its sides and its angles
- ☐ I know what congruent means
- ☐ I read the axis labels, not the squares
- ☐ I can convert km to m, kg to g, L to mL
- ☐ I estimate before I use a protractor
- ☐ I can work out the area of a parallelogram
- ☐ I know the height is the perpendicular one
- ☐ I can construct a triangle from measurements
- ☐ I can draw top, front and side views
- ☐ I can rotate a shape 90° and 180°
- ☐ I can compare angles without measuring
- ☐ I can measure and construct angles to 180°
- ☐ I can work out the area of a triangle
- ☐ I know same area doesn't mean same perimeter

The one I want to get better at is…

_____

…and the sheet that would help is number .....

Grown-ups: the protractor and the triangle-height rows are the two most common blanks. Both are fixed by doing rather than explaining.

E1.1–E2.6

Working out the tax

In Ontario the tax is **13%**. The trick is to do 10% first, then add about a third of that again.

8 estimate | calculate

☑ **A $40 item**

10% of $40 is **$4.00**. A third of that is about **$1.20**. So the tax is about **$5.20**, and the total is about **$45.20**.

Price	10% is	Tax (about)	Total (about)
$20.00			
$50.00			
$35.00			
$12.00			

A real shop. Three items: $8.99, $14.50 and $22.75.

Subtotal ..... Tax ..... Total .....

You have $50. Enough? ☐ yes ☐ no. How much change or how much short?

Not everything is taxed. Basic groceries in Ontario mostly aren't. Look at a real receipt and find which lines had tax added.

Grown-ups: being able to estimate the total before reaching the till is exactly what `F1.2` asks for. A real receipt is the best resource here.

Which is actually cheaper?

The bigger box isn't always better value. Work out what one unit costs and compare that.

unit rate · choose

Option A	Option B	Price per 100 g / per item	Better value
500 g for $4.50	800 g for $6.80		
6 for $3.00	10 for $4.50		
2 L for $3.20	750 mL for $1.35		

Value isn't only price. The big box is better value per gram — but when might you still buy the small one? Give two real reasons.

Go and look. Supermarket shelf labels print the unit price in tiny type. Find one. Most adults have never noticed it is there.

Grown-ups: `F1.5` is `B2.9`'s ratios doing honest work. The "why buy the small one" question is the Level 4 half. F1.5

A budget, and what borrowing costs

A budget is a plan for money you haven't spent yet. Make it add up.

plan decide

You get **$40** a month. Plan it.

What for	How much	Why
Spending		
Saving		
Giving		
Total	**$40.00**	

Something costs $150. At your saving rate, how many months?

Credit and debt, in three sentences

Credit is borrowing money you don't have yet. **Debt** is what you owe. Borrowing usually costs extra — and the longer you take to pay it back, the more it costs.

Two ways to get the $150 thing. Save for it, or borrow and pay back $10 extra. Which would you choose, and what does the extra $10 buy you?

And where taxes go. Match each to the level that collects it: income tax _____ sales tax _____ property tax _____ (federal · provincial · municipal)

Grown-ups: `F1.6` connects straight to Social Studies, where Grade 5 studies the three levels of government. Teach them together.

F1.3 · F1.4 · F1.6

Answers — Number

> Only the questions with one right answer are here. Anything asking "explain" or "why" is judged on the reasoning, not a particular wording.

1. 47 306 · 90 052 · 6/8/4/0/1 · 3/0/0/7/0. The 7 is worth 7000, 70 000, 700. 52 400 = 50 000+2000+400 (and other correct splits).

2. < · < · > · <. Ordered: 4120, 12400, 41200 · 7500, 70050, 70500 · 90999, 99099, 99909. Biggest 85310, smallest 10358 (zero can't lead).

3. 1/2 = 6/12 · 1/3 > 1/4 · 2/3 = 8/12 · 3/4 > 5/8. Halves on the wall: 2/4, 3/6, 4/8, 6/12 — the top is always half the bottom.

4. 9/4 = 2¼ · 5/2 = 2½ · 7/2 · 11/3 = 3⅔ · 13/6 · 17/12 = 1 5/12. Order: 2/3, 11/12, 5/4, 7/6, 1½. *(5/4 = 1.25 and 7/6 ≈ 1.17, so 7/6 comes first.)*

5. 0.7 = 70/100 = 70% · 0.07 = 7/100 = 7% · 0.70 = 70/100 = 70%. **0.7 and 0.70 are equal.** Then > · = · < · <.

6. 2.63 → 2.6 · 7.18 → 7.2 · 0.95 → 1.0 · 12.04 → 12.0. In 0.95 the tenths round past 9, so the whole number goes up.

7. 50/100 = 0.5 = 50% · 25/100 = 0.25 = 25% · 10/100 = 0.1 = 10% · 3/4 = 0.75 = 75% · 1/100 = 0.01 = 1%. A dime: 10¢, 10/100, 0.10, 10%.

9. 6×11 = 66, 66÷6 = 11, 66÷11 = 6 · 9×12 = 108 · 8×7 = 56 · 11×11 = 121. Gaps: 8 · 12 · 11.

10. 32×24: 600+120+60+48 → **768**. 47×15: 400+200+105+35 → **705**.

11. 368÷16 = 23 exactly · 525÷25 = 21 exactly · 431÷12 = 35 r 11 · 700÷14 = 50 exactly. Pencils: 35 each, 11 left. Ribbon: 35 and 11/12 m each.

12. 5/8 · 9/12 · 4/10 · 4/6 · 5/4 (= 1¼) · 4/12. The two past one are 2/4+3/4 and — check — only that one exceeds 1.

13. 8 · 8 · 18 · 15. Then 3 · 2 · 3 · 2.

14. 9.68 · 7.35 · 1.65 · 15.4. Estimates ≈ 14 and ≈ 18; exactly 14.02 and 17.65. 74 150 · 45 400.

15. ×0.1: 6, 45, 0.8, 120. ×0.01: 0.6, 4.5, 0.08, 12. ÷10 matches ×0.1 every time, because 0.1 *is* one tenth.

16. Red 3,6,9,15 / Blue 5,10,15,25. Tap: 20 L, 48 L, 15 min. Recipe ×1.5, so 450 g.

17. 1: 24×15 = 360, minus 90 = **270**. 2: 4×$18.75 = $75, change **$25**. 3: 3/8 of 32 = 12 walk, 20 don't.

Grown-ups: in sheet 4, comparing 5/4 with 7/6 is the hardest single question in the Number section. Both are just over 1 — the fraction wall settles it. B1.1–B2.9

Answers — Algebra, Data

19. Take away 5 → 20, 15, 10 · Multiply by 3 → 243, 729, 2187 · Halve → 6, 3, 1.5 · Add 0.5 → 4.5, 5.0, 5.5 · Take away 0.15 → 0.6, 0.45, 0.3. After 5 comes 0, then below zero — negative numbers.

20. Values 7, 9, 11, and term 10 gives 21. Rule: start at 3, add 2 each time. Term 20 = 3 + 2×19 = **41**.

21. n+4 · 3n · "five more than double a number" · n÷6 · "a number taken away from ten". Watch the order in "three less than a number" — n−3.

22. n+8 → 11, 13, 18 · 4n → 12, 20, 40 · 2n+6 → 12, 16, 26 · 20−n → 17, 15, 10 · 5n−3 → 12, 22, 47. 5n−3 grows fastest — the biggest multiplier wins.

23. n = 45 · 75 · 14 · 76 · 9. And yes, 8×6 = 12×4 — both are 48, so "=" means "the same as".

24. n < 11 (0–10) · n > 17 (18–25) · n < 10 (0–9) · n > 16 (17–25). Eleven whole numbers work for the first. With halves and tenths, endlessly many.

25. Odds add 1, evens add 10: 1+10+1+10+1+10+1+10+1+10 = **55**. Swapped to odd, also 55 — five of each either way. Doubling the range to 20 gives 110, exactly double.

27. Chess club: no — 12 people who chose one club aren't like the school. Football practice: no — you've asked people who already like one sport. Random 5 per class: yes. Every third family: yes, that's systematic sampling.

28. Walk 12/30 = 0.4 = 40% · Bus 9/30 = 0.3 = 30% · Car 6/30 = 0.2 = 20% · Bike 3/30 = 0.1 = 10%. They total 100%. In a school of 300, 120 walk.

29. Totals 25, 25, 26, 26. Biggest: 5C and 5D tie at 26. Most walkers 5C. Most bus 5B.

30. Set A: mean 47÷7 = **6.71** (about 6.7), median 7, mode 8. Set B: mean 3.1, median 3.0, mode 2.5. Earnings: mean **$8300**, median **$2000** — the median describes them, the mean describes nobody.

31. Trick 1 (axis not at zero) · trick 2 (uneven intervals) · trick 3 (scaled two ways) · trick 1 again, in its worst form.

32. 1/2 · 1/6 · 3/6 = 1/2 · 3/8 · 6/6 = 1. A ½ chance does *not* mean exactly 10 heads in 20 — it describes the long run.

33. Books: mean 50÷10 = **5**, median 5, mode 5. Unusually, all three agree — which is why it's a good set to predict from.

Grown-ups: sheet 25's "would doubling the range double the score" is the best prediction question in the book — and the answer is yes, which surprises people who expect a catch. C1.1–D2.2

Answers — Spatial Sense, Money

35. equilateral / acute · isosceles / acute · scalene / right · isosceles / obtuse. The 6-8-10 triangle is scalene and right-angled. Two right angles is impossible — the three angles must total 180°, and 90+90 leaves nothing for the third.

36. Two rectangles with area 24 cm²: 6×4 and 8×3, or 12×2 and 24×1. Same area, not congruent.

38. (5,10) to (15,20) is **10 right and 10 up** — two squares each way on a scale of 5, which is exactly the trap. On a scale of 1 the point sits somewhere completely different on the paper.

39. Translation: position changes, everything else stays. Reflection: it faces the other way; size and shape stay. Rotation: orientation changes; size and shape stay. A 180° rotation matches a reflection only for symmetrical shapes.

40. 2.5 km = 2500 m · 3 m = 300 cm · 6.4 cm = 64 mm · 4.2 kg = 4200 g · 0.75 L = 750 mL · 1.08 m = 108 cm. Sensible units: cm, g, L, km.

43. Parallelogram = base × height. Triangle = base × height ÷ 2. Table: 40 cm² · 40 cm² · 20 cm² · height 5 cm.

44. All three have area 12. Perimeters: 1×12 → 26 · 2×6 → 16 · 3×4 → 14. Smallest perimeter is the squarest one. With 24 m of fence, a 6×6 square gives the most grass — 36 m².

46. 10% of $20/$50/$35/$12 = $2.00/$5.00/$3.50/$1.20. Tax ≈ $2.60/$6.50/$4.55/$1.56. Totals ≈ $22.60/$56.50/$39.55/$13.56. Shop: subtotal $46.24, tax ≈ $6.01, total ≈ **$52.25** — **not** enough with $50, about $2.25 short.

47. $0.90 vs $0.85 per 100 g → the 800 g box. $0.50 vs $0.45 each → the 10-pack. $1.60 vs $1.80 per litre → the 2 L. Reasons to buy small anyway: it would go off before you used it, you can't carry it, or you don't have the money today.

48. $150 at $10 a month is 15 months; at $15 a month, 10 months. Taxes: income tax → federal (and provincial), sales tax → federal and provincial together as HST, property tax → municipal.

The sheets with no answers here are not mistakes. Anything asking you to explain, design, predict or justify is judged on whether the reasoning holds up — not on matching a particular sentence. A prediction that turned out wrong, with a good explanation of why, is worth more than a lucky right one.

Grown-ups: in Ontario's four achievement categories these open sheets assess **Thinking** and **Application**, which is where Level 4 actually lives. Accuracy alone is Level 3. Growing Success, 2010