Division Widget Proofs

Bus-stop frames and chunking examples across carries, decimals, prompts, remainders, and long working.

Bus-stop / short division

empty prompt - whole number

$$4\overline{)484}$$

empty prompt - decimal

$$8\overline{)7.000}$$

intro carry

$$3\overline{)\overset{4}{1^{1}2}}$$

whole number, no carry

$$4\overline{)\overset{121}{484}}$$

whole number, carry + remainder

$$4\overline{)\overset{231\ r1}{9^{1}25}}$$

leading zero quotient + carries

$$5\overline{)\overset{075\ r3}{3^{3}7^{2}8}}$$

decimal answer

$$3\overline{)\overset{1.66}{4.^{1}9^{1}8}}$$

decimal dividend, added zero

$$5\overline{)\overset{1.52}{7.^{2}6^{1}0}}$$

long decimal expansion

$$7\overline{)\overset{0.5714}{4.^{4}0^{5}0^{1}0^{3}0}}$$

Rule gap invariance

bus stop: no carry vs carry

no carry

$$4\overline{)\overset{121}{484}}$$

carry

$$4\overline{)\overset{231\ r1}{9^{1}25}}$$

chunk rows: no carry vs carry

no carry

$$\begin{array}{rll} 14\overline{)252} & & \\ -140 & -10 \times 14 & \\ \hline 112 & & \\ -\ 70 & -5 \times 14 & \\ \hline 42 & & \\ -\ 42 & -3 \times 14 & \\ \hline 0 & & \end{array}$$

carry

$$\begin{array}{rll} 18\overline{)^{5}6^{1}33.6} & & \\ -360 & -20 \times 18 & \\ \hline {}^{1}{}^{1}273.6 & & \\ -180 & -10 \times 18 & \\ \hline 93.6 & & \\ -\ 90 & -5 \times 18 & \\ \hline 3.6 & & \\ -\ 3.6 & -0.2 \times 18 & \\ \hline 0 & & \end{array}$$

Chunking / long division

whole number, exact

```
14 ) 252
   -140      −10 × 14
   ----
    112
   - 70      −5 × 14
   ----
     42
   - 42      −3 × 14
   ----
      0
```

whole number, leading zero remainder

```
17 ) 546
   -340      −20 × 17
   ----
    206
   -170      −10 × 17
   ----
     036
   - 034     −2 × 17
   ----
      2
```

decimal answer step

```
15 ) 186
   -150      −10 × 15
   ----
     36
   - 30      −2 × 15
   ----
      6
   -  6      −0.4 × 15
   ----
      0
```

decimal dividend + borrow marks

```
18 ) 6 5 1 3 3.6
   -360      −20 × 18
   ----
     1 1
     273.6
   -180      −10 × 18
   ----
      93.6
   - 90      −5 × 18
   ----
       3.6
   -   3.6   −0.2 × 18
   ----
       0
```

Column Arithmetic Widget Proofs

Addition carry rows and subtraction borrow superscripts across whole numbers, decimals, zeros, and longer examples.

Column addition

no carry

	Hundreds	Tens	Units
	3	1	6
+		3	2
	3	4	8

single carry row

	Hundreds	Tens	Units
	7	5	8
+	3	2	7
	10	8	5
		1	

carry into hundreds

	Hundreds	Tens	Units
	4	5	2
+	3	7	7
	8	2	9
	1		

decimal carry

	Tens	Units	.	Tenths
	1	2	.	3
+		1	.	9
	1	4	.	2
		1		

decimal with zeros

	Tens	Units	.	Tenths	Hundredths
	2	5	.	0	8
+		4	.	9	2
	3	0	.	0	0
	1	1		1	

longer whole number

	Thousands	Hundreds	Tens	Units
	9	8	7	6
+	5	4	3	2
	15	3	0	8
	1	1		

Column subtraction

no borrow

	Hundreds	Tens	Units
	3	6	5
−		4	2
	3	2	3

one borrow

	Hundreds	Tens	Units
	7	$^{4}5$	$^{1}3$
−	3	2	6
	4	2	7

borrow across zero

	Thousands	Hundreds	Tens	Units
	$^{7}8$	$^{9}0$	$^{9}0$	$^{1}2$
−	4	5	6	7
	3	4	3	5

decimal borrow

	Units	.	Tenths	Hundredths
	9	.	$^{2}3$	$^{1}6$
−	0	.	2	8
	9	.	0	8

decimal zeros

	Tens	Units	.	Tenths	Hundredths
	2	$^{4}5$	.	$^{9}0$	$^{1}0$
−		4	.	2	3
	2	0	.	7	7

longer decimal

	Hundreds	Tens	Units	.	Tenths	Hundredths
	$^{0}1$	$^{9}0$	$^{9}0$	.	$^{9}0$	$^{1}0$
−		3	7	.	4	8
	0	6	2	.	5	2

Scale checks

addition 10 pt

	Hundreds	Tens	Units
	7	5	8
+	3	2	7
	10	8	5
		1	

addition 16 pt

	Hundreds	Tens	Units
	7	5	8
+	3	2	7
	10	8	5
		1	

subtraction 10 pt

	Hundreds	Tens	Units
	7	4 5	1 3
−	3	2	6
	4	2	7

subtraction 16 pt

	Hundreds	Tens	Units
	7	4 5	1 3
−	3	2	6
	4	2	7

Multiplication Widget Proofs

Table method and column method across whole-number partitioning, decimal products, zero partials, and multi-digit factors.

Table / box method

2 by 2 whole numbers

×	30	6
20	600	120
5	150	30

3 by 2 whole numbers

×	400	20	5
30	12000	600	150
2	800	40	10

decimal products supplied

×	3	0.6
5	15	3
0.4	1.2	0.24

mixed place values

×	200	40	7
60	12000	2400	420
8	1600	320	56

larger grid

×	3000	400	20	5
70	210000	28000	1400	350
6	18000	2400	120	30

scale check

×	30	6
20	600	120
5	150	30

Column multiplication

two by two digits

```
  36
× 25
----
 180   36 × 5
+720   36 × 20
----
 900
```

three by two digits

```
  425
× 32
-----
 850   425 × 2
+12750 425 × 30
-----
13600
```

zero in multiplier

```
  408
× 205
-----
 2040   408 × 5
+81600  408 × 200
-----
83640
```

three partial products

```
  247
× 368
-----
 1976   247 × 8
+14820  247 × 60
+74100  247 × 300
-----
90896
```

small scale

```
 36
× 25
---
180   36 × 5
+720  36 × 20
---
900
```

large scale

```
  36
× 25
----
 180   36 × 5
+720   36 × 20
----
 900
```

Place Value, Number Line, and Timeline Proofs

Place-value columns and number-line/timeline arrows across long values, decimals, zeros, negatives, and different scales.

Place-value charts

whole number

Thousands	Hundreds	Tens	Units
2	5	6	3

internal zero

Thousands	Hundreds	Tens	Units
1	0	9	5

decimal

Tens	Units	.	Tenths	Hundredths
3	1	.	0	5

trailing zeros

Tens	Units	.	Tenths	Hundredths
2	5	.	0	0

long whole number

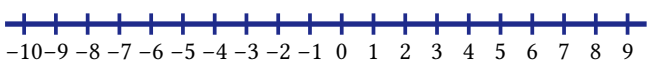
Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Units
1	2	3	4	5	6	7

long decimal

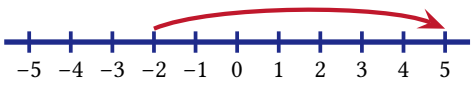
Thousands	Hundreds	Tens	Units	.	Tenths	Hundredths	Thousandths	Ten Thousandths
1	0	0	2	.	3	0	4	5

Number lines / timeline-style arrows

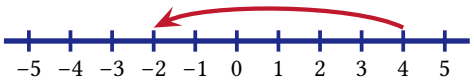
standard negative-to-positive



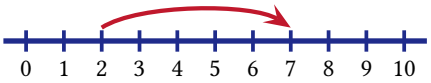
positive jump



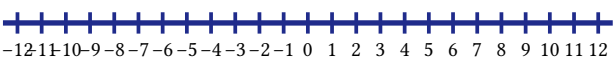
negative jump



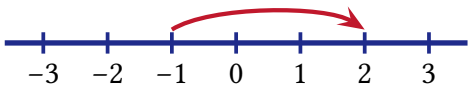
small positive range



wide scale



large type



Squares and Times Table Widget Proofs

Square arrays and multiplication tables across small arrays, larger arrays, table scale, and diagonal highlighting.

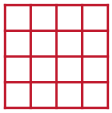
Square arrays

1 by 1

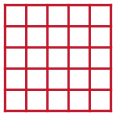
2 by 2

3 by 3

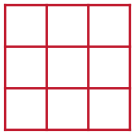
4 by 4



5 by 5 compact



large cells



Times tables

standard

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

small

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

large

×	1	2	3	4	5	6	7	8	9	10
1	**1**	2	3	4	5	6	7	8	9	10
2	2	**4**	6	8	10	12	14	16	18	20
3	3	6	**9**	12	15	18	21	24	27	30
4	4	8	12	**16**	20	24	28	32	36	40
5	5	10	15	20	**25**	30	35	40	45	50
6	6	12	18	24	30	**36**	42	48	54	60
7	7	14	21	28	35	42	**49**	56	63	70
8	8	16	24	32	40	48	56	**64**	72	80
9	9	18	27	36	45	54	63	72	**81**	90
10	10	20	30	40	50	60	70	80	90	**100**

Fraction Visuals and Divisibility Proofs

Native Typst math handles ordinary fractions; these proofs cover the visual teaching models missing from the screenshot coverage map.

Calculator fraction key

inline

Enter $\frac{12}{62}$ using the fraction button.

labelled

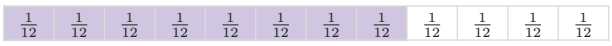
fraction button

large

Fraction strips

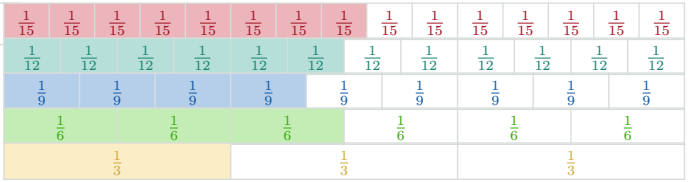
single strip, fifths

single strip, twelfths



blank student strip

equivalent fraction stack



fraction multiply table

	× 2	× 3	× 4	× 5
$\frac{1}{2}$	$\frac{2}{4}$	$\frac{3}{6}$	$\frac{4}{8}$	$\frac{5}{10}$
$\frac{1}{4}$				
$\frac{1}{3}$				
$\frac{1}{5}$				
$\frac{1}{10}$				
$\frac{3}{4}$				

Fraction pies

halves

fifths

eighths

compact set

large no label

large labelled

Divisibility

standard rule table

A number will divide by:	Example
2 If it is an even number.	Try 317. The last digit, 7, is not even. 317 will not divide by 2.
3 If the sum of its digits can be divided by 3.	Try 411. $4+1+1=6$. 6 can be divided by 3. 411 can be divided by 3.
4 If the last 2 digits can be divided by 4.	Try 316. The number from the last 2 digits, 16, can be divided by 4.
5 If the last digit is 0 or 5.	Try 345. The last digit is 5. 345 can be divided by 5.
6 If it can be divided by 2 and 3.	Try 342. It is even and $3+4+2=9$. 342 can be divided by 6.
9 If the sum of its digits can be divided by 9.	Try 522. $5+2+2=9$. 522 can be divided by 9.
10 If the last digit is 0.	Try 780. The last digit is 0. 780 can be divided by 10.

compact rule table

A number will divide by:	Example
2 If it is an even number.	Try 317. The last digit, 7, is not even. 317 will not divide by 2.
3 If the sum of its digits can be divided by 3.	Try 411. $4+1+1=6$. 6 can be divided by 3. 411 can be divided by 3.
4 If the last 2 digits can be divided by 4.	Try 316. The number from the last 2 digits, 16, can be divided by 4.
5 If the last digit is 0 or 5.	Try 345. The last digit is 5. 345 can be divided by 5.
6 If it can be divided by 2 and 3.	Try 342. It is even and $3+4+2=9$. 342 can be divided by 6.
9 If the sum of its digits can be divided by 9.	Try 522. $5+2+2=9$. 522 can be divided by 9.
10 If the last digit is 0.	Try 780. The last digit is 0. 780 can be divided by 10.

Structured Textbook Widget Proofs

Worked examples, exercises, inline worked solutions, generated answers/solutions, callouts, support boxes, glossary and grade data.

Proof Chapter

Grade 2

Worked examples

two-column structured steps

Example 0.1 — Multiply using partitioning

36×25	Split 36 into 30 and 6.
$30 \times 25 = 750$	Multiply the tens part.
$6 \times 25 = 150$	Multiply the units part.
$750 + 150 = 900$	Add the partial products.

stacked structured steps

Example 0.2 — Subtract with a borrow

$13 - 6 = 7$ — Borrow ten into the units column.

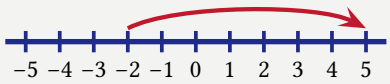
$4 - 2 = 2$ — The tens digit was reduced by one.

$7 - 3 = 4$ — Subtract the hundreds.

free-form body

Example 0.3

Draw a number line from −5 to 5, start at −2, then move 7 places to the right.



Callouts and support blocks

key point

Key point

Keep digits in the same place-value column when adding or subtracting.

definition + glossary data

Definition: Dividend

The number being divided in a division calculation.

rule box

Rule

$a \times (b + c) = a \times b + a \times c$

tip

Tip

For decimal division, add zeros after the decimal point if you run out of digits.

note

Note
This note uses the cooler note styling rather than the key-point styling.

support: hint + see-also

Hints / Notes	*Trouble with this? Jump to:*
Line up the decimal points before subtracting.	Proof Chapter (p. 11)

Exercises, answers, and worked solutions

Questions A

Teacher edition: answers and worked solutions should appear inline.

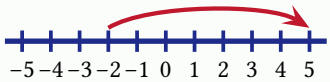
1. 7×8
   Answer: 56

   Solution
   $7 \times 8 = 56$

2. Calculate these values. (a) 36×25, (b) $925 \div 4$
   Answer: (a) 900 (b) 231 r1

   Solution
   (a) Use $30 \times 25 + 6 \times 25$.
   (b) Use short division and keep the remainder.

3. Use the number line to calculate $-2 + 7$.



   Answer: 5

   Solution
   Start at −2 and move 7 places right.

Generated Answers Proof

Proof Chapter · Questions A

1. 56
2. (a) 900 (b) 231 r1
3. 5

Improvement Proof · Questions A

1. 7
2. 8
3. 10
4. 29
5. 76
6. 14

Improvement Proof · Questions D

1. 9
2. 12

Improvement Proof · Mixed Widget Questions

1. 231 r1
2. 5
3. 1085
4. 427

Generated Worked Solutions Proof

Proof Chapter · Questions A

1. *Answer:* 56

   $7 \times 8 = 56$
2. *Answer:* (a) 900 (b) 231 r1

   (a) Use $30 \times 25 + 6 \times 25$.

   (b) Use short division and keep the remainder.
3. *Answer:* 5

   Start at -2 and move 7 places right.

Glossary

Dividend — The number being divided in a division calculation.

Topics by grade

Grade 2 — Proof Chapter
Grade 3 — Improvement Proof

Typesetting Improvement Proof

Worksheet grids, support bars, tall maths, diagram cells, and worked-example page breaks.

Improvement Proof

Grade 3

Ruled worksheet grid

Questions A
Short questions should read like a worksheet, with clear rows and cells.

1. 7.3	2. 8.2
3. 10.4	4. 29.1
5. 76.1	6. 13.8

Hints / Notes	*Trouble with this? Jump to:*
Watch out when removing a five. Five always rounds up.	Improvement Proof (p. 14)

Story list rows

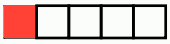
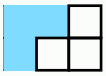
Questions B
Longer word problems need the full line and a visible boundary.

1. At an ice skating competition, the first judge awarded 8 marks and the second judge awarded −10 marks. What was the total mark?
2. Saira's class voted for an end of term treat. They voted for either a picnic lunch or a game. What was the difference between the two totals?
3. A recipe uses 200g of butter and 300g of flour. How much would be needed for 8 biscuits?

Diagram grid

Questions C

Visual questions need cells that feel like answerable spaces.

1. What fraction is shaded? 	2. What fraction is shaded? 

Tall maths grid

Questions D

Fractions, roots, and powers should not collide with row spacing.

1. $\sqrt{81}$	2. $\sqrt{144}$
3. $\frac{553}{3.47}$	4. 14^2

Worked example page break stress

Example 0.4 — This should not strand its label

$$36 \times 25 = 900$$ Split the calculation into useful parts.

$$30 \times 25 = 750$$ Multiply the tens part.

$$6 \times 25 = 150$$ Multiply the units part.

$$750 + 150 = 900$$ Add the partial products.

Context and Flow Proofs

Stress tests for widgets inside prose, lists, exercise grids, worked examples, table cells, callouts, and narrow containers.

Inline and list contexts

inline prose

Stress case: full-size bus stops in prose are visible here so the line spacing can be checked.

We write 925 divided by 4 using the bus stop method as $4\overline{)925}$ $\begin{matrix}231\ \text{r}1\\ 9^{1}25\end{matrix}$. The result is written beside the sentence without colliding with the line above or below.

inline prose, reduced size

For inline references, use a smaller bus stop: $3\overline{)12}$ $\begin{matrix}4\\ 1^{1}2\end{matrix}$. This keeps the sentence readable.

bullet list

- $\sqrt{925} = 30.4\ldots$
- $4\overline{)925}$ $\begin{matrix}231\ \text{r}1\\ 9^{1}25\end{matrix}$
- $5\overline{)7.60}$ $\begin{matrix}1.52\\ 7.^{2}6^{1}0\end{matrix}$
- $8\overline{)7.000}$

numbered list

1. $3\overline{)378}$
2. $3\overline{)378}$ $\begin{matrix}126\\ 37^{1}8\end{matrix}$
3. $5\overline{)7.60}$ $\begin{matrix}1.52\\ 7.^{2}6^{1}0\end{matrix}$

callout body

> **Key point**
> Place the quotient above the bar and carry the remainder into the next digit:
> $4\overline{)925}$ $\begin{matrix}231\ \text{r}1\\ 9^{1}25\end{matrix}$

Exercise and question contexts

Bus Stop Question Grid

These prompts are image-like question content rather than ordinary text.

1. $2\overline{)68}$	**2.** $3\overline{)7.32}$
3. $8\overline{)51.2}$	**4.** $7\overline{)935.9}$
5. $9\overline{)0.963}$	**6.** $4\overline{)64.60}$

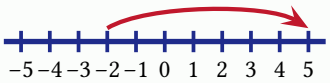
Mixed Widget Questions

Different widget heights should not collide with question numbers, answers, or each other.

1. Complete the division.

$$4\overline{)925} \quad 231\ \text{r}1$$

2. Use the number line.



3. Add these numbers.

	Hundreds	Tens	Units
	7	5	8
+	3	2	7
	10	8	5
		1	

4. Subtract these numbers.

	Hundreds	Tens	Units
	7	4 5	1 3
−	3	2	6
	4	2	7

Worked examples and side-by-side layouts

worked example body

Example 0.5

$7.6 \div 5 =$

Write as a bus stop:

$$5\overline{)7.60} \quad 1.52$$

Add a zero after the decimal when there is no next digit.

side-by-side panel

$36 \times 25 =$

×	30	6
20	600	120
5	150	30

$925 \div 4 =$

$$4\overline{)925} \quad 231\ \text{r}1$$

Table cells and narrow containers

layout table cells

Prompt	Answer
$4\overline{)925}$	$4\overline{)925}$ 231 r1
$5\overline{)7.60}$	$5\overline{)7.60}$ 1.52

narrow boxed column

Write these as bus stops:

$$13\overline{)704.6}$$

$$18\overline{)292.5}$$

$$4\overline{)925} \quad 231\ \text{r}1$$

chunking in table-like row

Calculation	Working
$633.6 \div 18$	$18\overline{)633.6}$ -360 -20×18 273.6 -180 -10×18 93.6 -90 -5×18 3.6 -3.6 -0.2×18 0

Original Source Screenshot Proofs

Reference pages from the source book, kept beside the component proof suite so layout and hierarchy decisions can be checked against the original material.

Widget coverage map

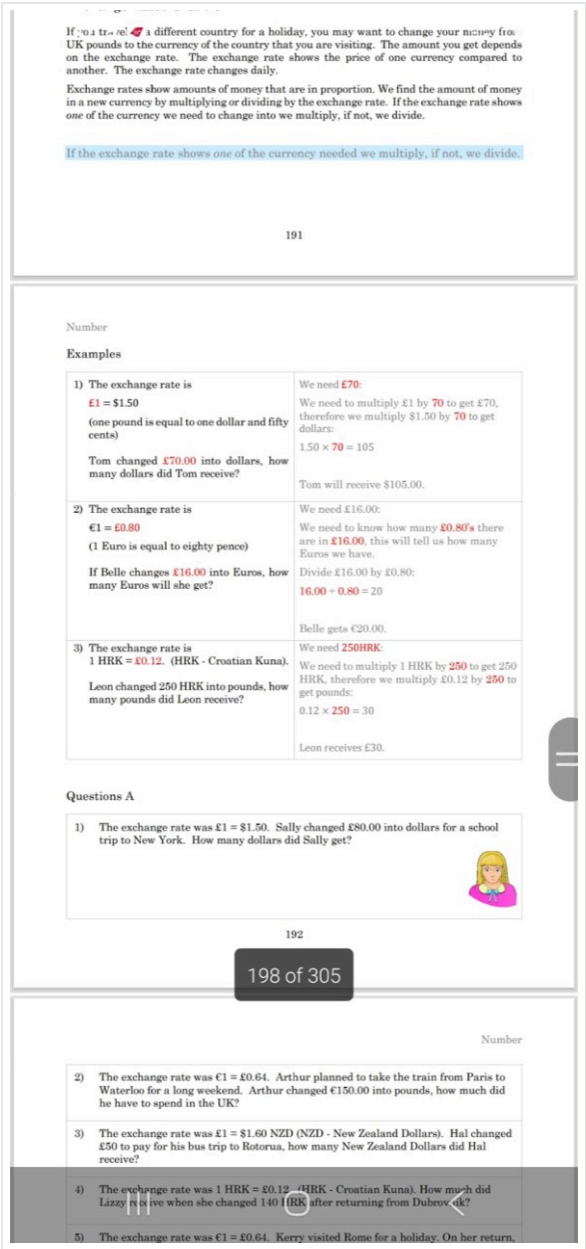
Shot	Book section	Current widget reference	Coverage / missing widget
01	Chapter 18 / Exchange Rates	key-point, worked-example, exercise, support	Covered structurally; no specialised maths widget unless we want the original three-row example table as a component.
02	Chapter 18 / Proportion Unitary Method	key-point, worked-example, exercise, support	Covered structurally; the worked proportional steps are ordinary text/math.
03	Chapter 18 / Ratio Questions with Algebra	key-point, worked-example, exercise, support	Covered structurally; algebra steps are plain math inside worked examples.
04	Chapter 16 / Fractions to Percentages, calculator method	calculator-fraction-key, worked-example, side-by-side	Covered by fraction visual proof; ordinary fractions remain native Typst math.
05	Chapter 16 / Decimal Numbers and Fractions	key-point, worked-example, exercise, support	Covered structurally; equivalent-fraction transformations should remain native Typst math unless a diagram is needed.
06	Chapter 16 / Fractions to Percentages, calculator method	calculator-fraction-key, worked-example, side-by-side	Covered by fraction visual proof.
07	Chapter 16 / Multiplying Mixed Numbers	worked-example, table-method	Partial. Table method is covered; fraction cancellation / simplification marks can remain native math for now.
08	Chapter 16 / Equivalent Fractions	fraction-strip, equivalent-fraction-grid	Covered by fraction visual proof.
09	Chapter 16 / Equivalent Fractions	fraction-pie, fraction-strip, equivalent-fraction-grid	Covered by fraction visual proof.
10	Chapter 16 / Fractions	fraction-pie, worked-example, exercise	Covered by fraction visual proof.

Shot	Book section	Current widget reference	Coverage / missing widget
11	Chapter 13 / Multiplying Decimal Numbers with Two or Three Digits	table-method	Covered by multiplication proof.
12	Chapter 13 / Dividing with Decimal Numbers	key-point, worked-example, exercise, support	Covered structurally; scaling-by-ten steps are ordinary worked text.
13	Chapter 08 / Divisibility	divisibility-rules-table, exercise	Covered by divisibility proof.
14	Chapter 05 / Square Numbers and Square Roots	square-array, times-table	Covered by squares proof.
15	Chapter 25 / Multiplying Whole Numbers by Two Digits	column-method, table-method	Covered by multiplication proof.
16	Chapter 24 / Subtracting Decimal Numbers Written Method	column-subtract	Covered by column arithmetic proof.
17	Chapter 16 / Fractions to Percentages word questions	worked-example, exercise, support	Covered structurally; calculator button note shares the missing widget from shots 04/06.
18	Chapter 24 / Adding Whole Numbers Written Method	column-add	Covered by column arithmetic proof.
19	Chapter 24 / Subtracting Whole Numbers Written Method	column-subtract	Covered by column arithmetic proof.

Source layout references

source 01: exchange rates

Blue rule strip, explanatory prose, three-row worked example table, colored values, question table, page furniture.



If you travel to a different country for a holiday, you may want to change your money from UK pounds to the currency of the country that you are visiting. The amount you get depends on the exchange rate. The exchange rate shows the price of one currency compared to another. The exchange rate changes daily.

Exchange rates show amounts of money that are in proportion. We find the amount of money in a new currency by multiplying or dividing by the exchange rate. If the exchange rate shows *one* of the currency we need to change into we multiply, if not, we divide.

If the exchange rate shows *one* of the currency needed we multiply, if not, we divide.

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Number

Examples

1) The exchange rate is £1 = $1.50 (one pound is equal to one dollar and fifty cents) Tom changed £70.00 into dollars, how many dollars did Tom receive?	We need £70: We need to multiply £1 by 70 to get £70, therefore we multiply $1.50 by 70 to get dollars: 1.50 × 70 = 105 Tom will receive $105.00.
2) The exchange rate is €1 = £0.80 (1 Euro is equal to eighty pence) If Belle changes £16.00 into Euros, how many Euros will she get?	We need £16.00: We need to know how many £0.80's there are in £16.00, this will tell us how many Euros we have. Divide £16.00 by £0.80: 16.00 ÷ 0.80 = 20 Belle gets €20.00.
3) The exchange rate is 1 HRK = £0.12. (HRK - Croatian Kuna). Leon changed 250 HRK into pounds, how many pounds did Leon receive?	We need 250HRK: We need to multiply 1 HRK by 250 to get 250 HRK, therefore we multiply £0.12 by 250 to get pounds: 0.12 × 250 = 30 Leon receives £30.

Questions A

1) The exchange rate was £1 = $1.50. Sally changed £80.00 into dollars for a school trip to New York. How many dollars did Sally get?

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Number

2) The exchange rate was €1 = £0.64. Arthur planned to take the train from Paris to Waterloo for a long weekend. Arthur changed €150.00 into pounds, how much did he have to spend in the UK?

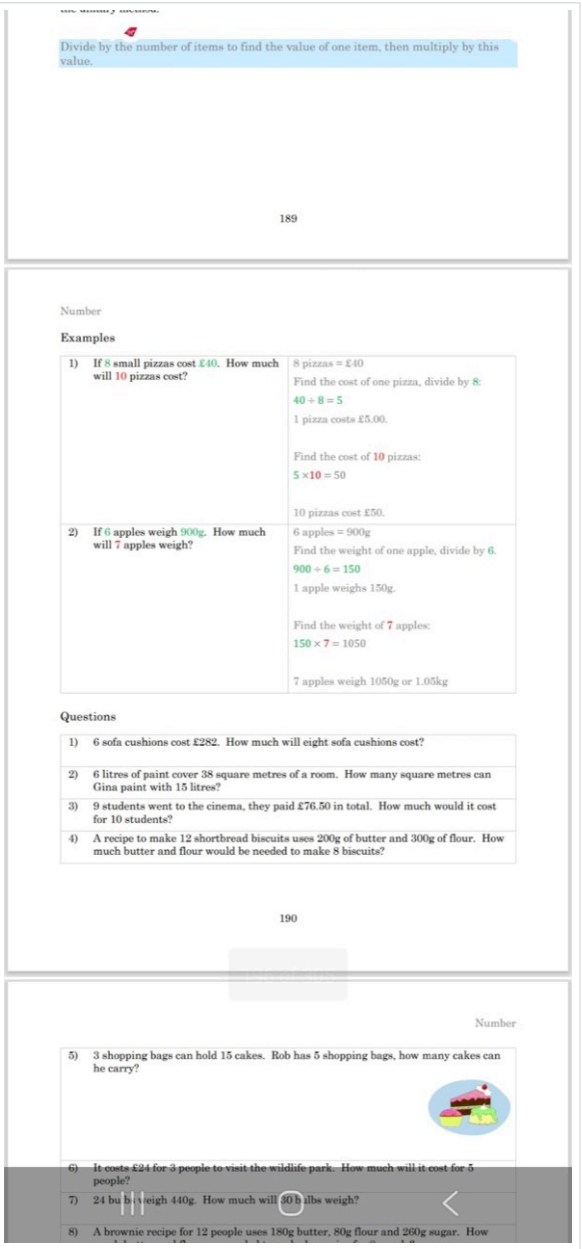
3) The exchange rate was £1 = $1.60 NZD (NZD - New Zealand Dollars). Hal changed £50 to pay for his bus trip to Rotorua, how many New Zealand Dollars did Hal receive?

4) The exchange rate was 1 HRK = £0.12 (HRK - Croatian Kuna). How much did Lizzy receive when she changed 140 HRK after returning from Dubrovnik?

5) The exchange rate was €1 = £0.64. Kerry visited Rome for a holiday. On her return,

source 02: unitary method

Two-column examples, proportional reasoning steps, question block, support row continuing across page transitions.



Divide by the number of items to find the value of one item, then multiply by this value.

189

Number

Examples

1) If 8 small pizzas cost £40. How much will 10 pizzas cost?	8 pizzas = £40 Find the cost of one pizza, divide by 8: 40 ÷ 8 = 5 1 pizza costs £5.00. Find the cost of 10 pizzas: 5 ×10 = 50 10 pizzas cost £50.
2) If 6 apples weigh 900g. How much will 7 apples weigh?	6 apples = 900g Find the weight of one apple, divide by 6. 900 ÷ 6 = 150 1 apple weighs 150g. Find the weight of 7 apples: 150 × 7 = 1050 7 apples weigh 1050g or 1.05kg

Questions

1) 6 sofa cushions cost £282. How much will eight sofa cushions cost?

2) 6 litres of paint cover 38 square metres of a room. How many square metres can Gina paint with 15 litres?

3) 9 students went to the cinema, they paid £76.50 in total. How much would it cost for 10 students?

4) A recipe to make 12 shortbread biscuits uses 200g of butter and 300g of flour. How much butter and flour would be needed to make 8 biscuits?

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Number

5) 3 shopping bags can hold 15 cakes. Rob has 5 shopping bags, how many cakes can he carry?

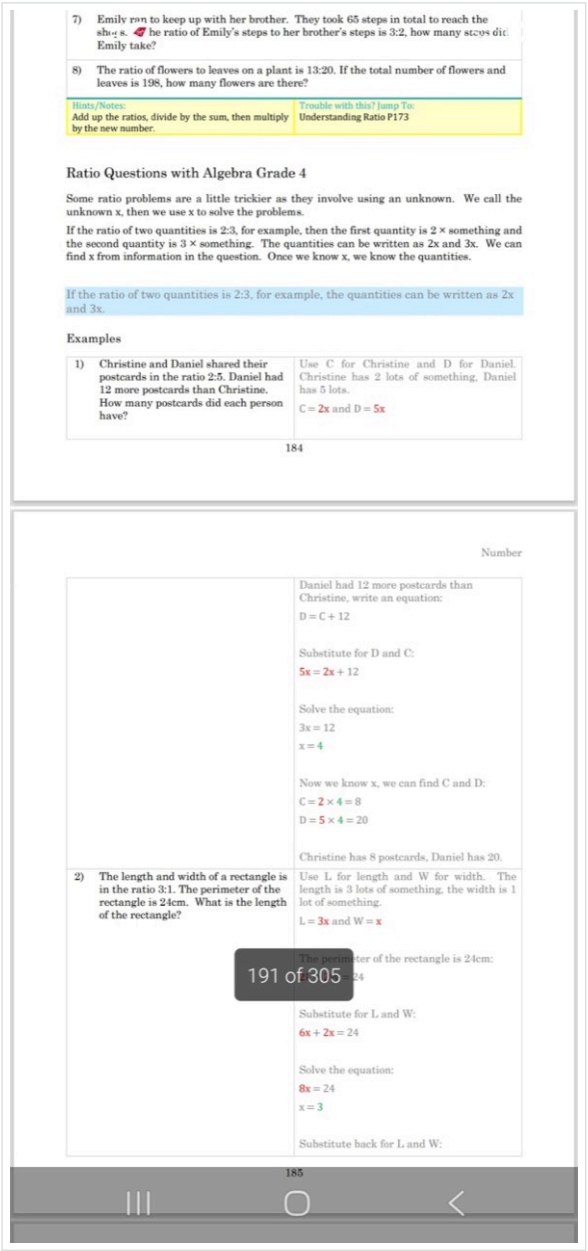
6) It costs £24 for 3 people to visit the wildlife park. How much will it cost for 5 people?

7) 24 bu[illegible] weigh 440g. How much will 30 bulbs weigh?

8) A brownie recipe for 12 people uses 180g butter, 80g flour and 260g sugar. How

source 03: ratio algebra

Hint/support strip, teaching paragraph, blue rule strip, algebraic worked solution split across large table rows.



7) Emily ran to keep up with her brother. They took 65 steps in total to reach the shops. The ratio of Emily's steps to her brother's steps is 3:2, how many steps did Emily take?

8) The ratio of flowers to leaves on a plant is 13:20. If the total number of flowers and leaves is 198, how many flowers are there?

Hints/Notes: Add up the ratios, divide by the sum, then multiply by the new number.

Trouble with this? Jump To: Understanding Ratio P173

Ratio Questions with Algebra Grade 4

Some ratio problems are a little trickier as they involve using an unknown. We call the unknown x, then we use x to solve the problems.

If the ratio of two quantities is 2:3, for example, then the first quantity is 2 × something and the second quantity is 3 × something. The quantities can be written as 2x and 3x. We can find x from information in the question. Once we know x, we know the quantities.

If the ratio of two quantities is 2:3, for example, the quantities can be written as 2x and 3x.

Examples

1) Christine and Daniel shared their postcards in the ratio 2:5. Daniel had 12 more postcards than Christine. How many postcards did each person have?

Use C for Christine and D for Daniel. Christine has 2 lots of something, Daniel has 5 lots.

C = 2x and D = 5x

184

Number

Daniel had 12 more postcards than Christine, write an equation:

D = C + 12

Substitute for D and C:

5x = 2x + 12

Solve the equation:

3x = 12

x = 4

Now we know x, we can find C and D:

C = 2 × 4 = 8

D = 5 × 4 = 20

Christine has 8 postcards, Daniel has 20.

2) The length and width of a rectangle is in the ratio 3:1. The perimeter of the rectangle is 24cm. What is the length of the rectangle?

Use L for length and W for width. The length is 3 lots of something, the width is 1 lot of something.

L = 3x and W = x

The perimeter of the rectangle is 24cm:

Substitute for L and W:

6x + 2x = 24

Solve the equation:

8x = 24

x = 3

Substitute back for L and W:

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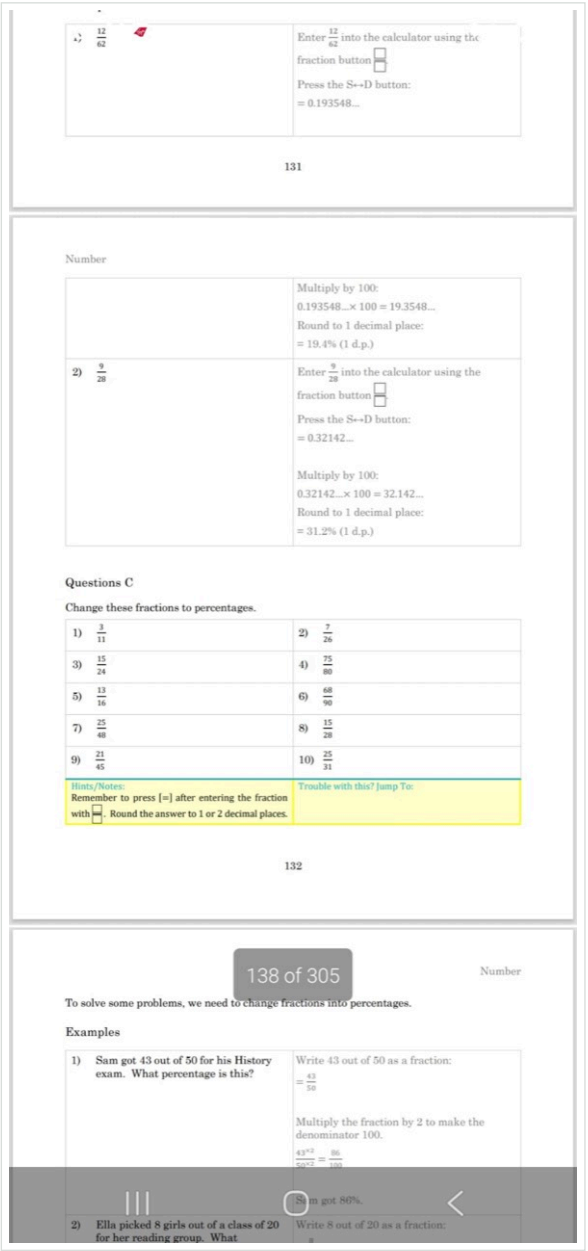
source 04: fraction to percent

Calculator method wording, fraction notation inside tables, questions grid, yellow support row and jump reference.



Enter $\frac{12}{62}$ into the calculator using the fraction button

Press the S⇔D button:

= 0.193548...

131

Number

Multiply by 100:

0.193548...× 100 = 19.3548...

Round to 1 decimal place:

= 19.4% (1 d.p.)

2) $\frac{9}{28}$

Enter $\frac{9}{28}$ into the calculator using the fraction button

Press the S⇔D button:

= 0.32142...

Multiply by 100:

0.32142...× 100 = 32.142...

Round to 1 decimal place:

= 31.2% (1 d.p.)

Questions C

Change these fractions to percentages.

1) $\frac{3}{11}$	2) $\frac{7}{26}$
3) $\frac{15}{24}$	4) $\frac{75}{80}$
5) $\frac{13}{16}$	6) $\frac{68}{90}$
7) $\frac{25}{48}$	8) $\frac{15}{28}$
9) $\frac{21}{45}$	10) $\frac{25}{31}$

Hints/Notes: Remember to press [=] after entering the fraction with ⬚. Round the answer to 1 or 2 decimal places.

Trouble with this? Jump To:

132

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Number

To solve some problems, we need to change fractions into percentages.

Examples

1) Sam got 43 out of 50 for his History exam. What percentage is this?

Write 43 out of 50 as a fraction:

$= \frac{43}{50}$

Multiply the fraction by 2 to make the denominator 100.

$\frac{43^{*2}}{50^{*2}} = \frac{86}{100}$

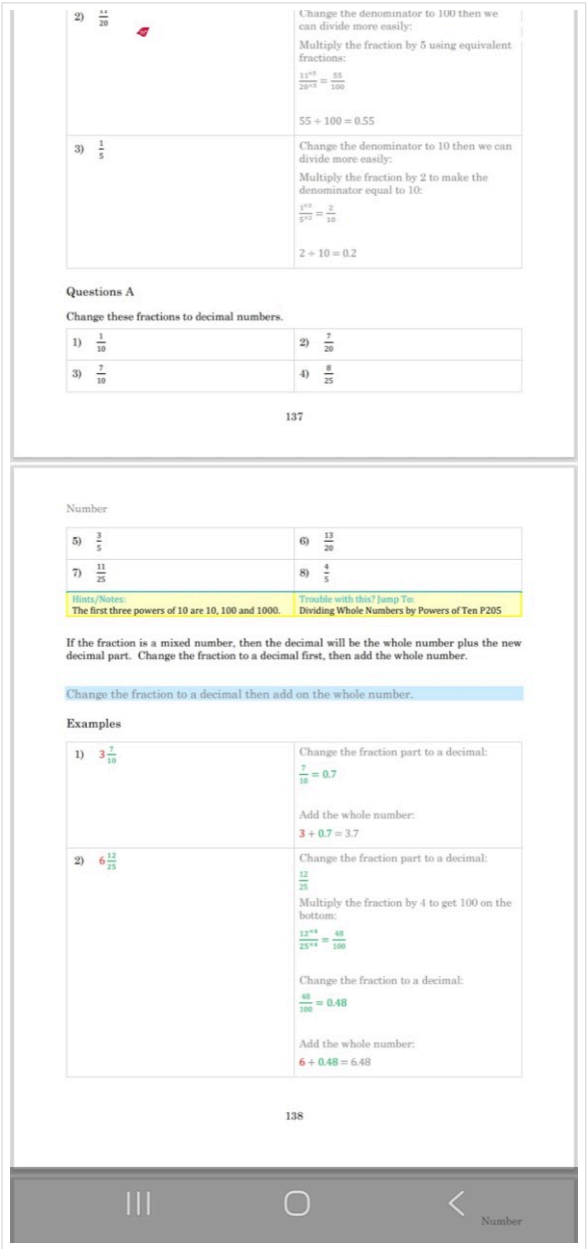
Sam got 86%.

2) Ella picked 8 girls out of a class of 20 for her reading group. What

Write 8 out of 20 as a fraction:

source 05: fractions to decimals

Equivalent-fraction steps, mixed-number examples, continued question table, support row, blue rule strip.



2) $\frac{11}{20}$	Change the denominator to 100 then we can divide more easily: Multiply the fraction by 5 using equivalent fractions: $\frac{11 \times 5}{20 \times 5} = \frac{55}{100}$ $55 \div 100 = 0.55$
3) $\frac{1}{5}$	Change the denominator to 10 then we can divide more easily: Multiply the fraction by 2 to make the denominator equal to 10: $\frac{1 \times 2}{5 \times 2} = \frac{2}{10}$ $2 \div 10 = 0.2$

Questions A

Change these fractions to decimal numbers.

1) $\frac{1}{10}$	2) $\frac{7}{20}$
3) $\frac{7}{10}$	4) $\frac{8}{25}$

137

Number

5) $\frac{3}{5}$	6) $\frac{13}{20}$
7) $\frac{11}{25}$	8) $\frac{4}{5}$

Hints/Notes:	Trouble with this? Jump To:
The first three powers of 10 are 10, 100 and 1000.	Dividing Whole Numbers by Powers of Ten P205

If the fraction is a mixed number, then the decimal will be the whole number plus the new decimal part. Change the fraction to a decimal first, then add the whole number.

Change the fraction to a decimal then add on the whole number.

Examples

1) $3\frac{7}{10}$	Change the fraction part to a decimal: $\frac{7}{10} = 0.7$ Add the whole number: $3 + 0.7 = 3.7$
2) $6\frac{12}{25}$	Change the fraction part to a decimal: $\frac{12}{25}$ Multiply the fraction by 4 to get 100 on the bottom: $\frac{12 \times 4}{25 \times 4} = \frac{48}{100}$ Change the fraction to a decimal: $\frac{48}{100} = 0.48$ Add the whole number: $6 + 0.48 = 6.48$

138

Number

source 06: calculator percent method

Fraction entry instructions, calculator button placeholders, multi-step example table, questions and support strip.

Change these fractions to percentages.

1) $\frac{3}{5}$	2) $\frac{1}{10}$
3) $\frac{1}{4}$	4) $\frac{3}{10}$
5) $\frac{2}{5}$	6) $\frac{3}{4}$
7) $\frac{7}{10}$	8) $\frac{9}{10}$
9) $\frac{4}{5}$	10) $\frac{3}{20}$

Hints/Notes:	Trouble with this? Jump To:
Remember how to do the bus stop method? If not jump to the topic!	Dividing Whole Numbers by Single Digits P238 Dividing Whole Numbers by Powers of Ten P205

We can use a calculator to change fractions into percentages. Enter the fraction into the calculator, press the S↔D button to display it as a decimal then multiply by 100. If the answer has lots of digits, we can round to 1 or 2 decimal places.

Enter the fraction into the calculator, press S↔D then multiply by 100.

Examples

1) $\frac{12}{62}$	Enter $\frac{12}{62}$ into the calculator using the fraction button Press the S↔D button: = 0.193548...

131

Number

	Multiply by 100: 0.193548...× 100 = 19.3548... Round to 1 decimal place: = 19.4% (1 d.p.)
2) $\frac{9}{28}$	Enter $\frac{9}{28}$ into the calculator using the fraction button Press the S↔D button: = 0.32142... Multiply by 100: 0.32142...× 100 = 32.142... Round to 1 decimal place: = 31.2% (1 d.p.)

Questions C

Change these fractions to percentages.

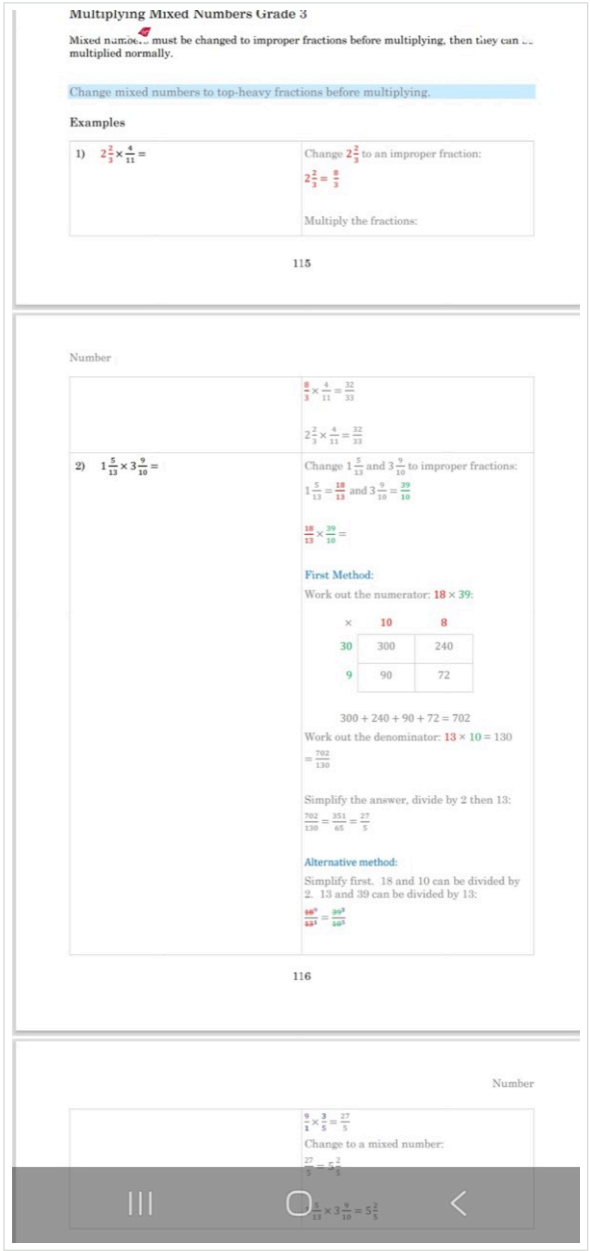
1) $\frac{3}{11}$	2) $\frac{7}{26}$
3) $\frac{15}{24}$	4) $\frac{25}{80}$
5) $\frac{13}{16}$	6) $\frac{68}{90}$
7) $\frac{25}{48}$	8) $\frac{15}{28}$
9) $\frac{21}{45}$	10) $\frac{25}{31}$

Hints/Notes:	Trouble with this? Jump To:
Remember to press [=] after entering the fraction with ▭. Round the answer to 1 or 2 decimal places.	

132

source 07: mixed number multiplication

Mixed-to-improper conversion, fraction products, table method embedded inside a worked solution, alternative method.



Multiplying Mixed Numbers Grade 3

Mixed numbers must be changed to improper fractions before multiplying, then they can be multiplied normally.

Change mixed numbers to top-heavy fractions before multiplying.

Examples

1) $2\frac{2}{3} \times \frac{4}{11} =$

Change $2\frac{2}{3}$ to an improper fraction:

$2\frac{2}{3} = \frac{8}{3}$

Multiply the fractions:

115

Number

$\frac{8}{3} \times \frac{4}{11} = \frac{32}{33}$

$2\frac{2}{3} \times \frac{4}{11} = \frac{32}{33}$

2) $1\frac{5}{13} \times 3\frac{9}{10} =$

Change $1\frac{5}{13}$ and $3\frac{9}{10}$ to improper fractions:

$1\frac{5}{13} = \frac{18}{13}$ and $3\frac{9}{10} = \frac{39}{10}$

$\frac{18}{13} \times \frac{39}{10} =$

First Method:

Work out the numerator: 18×39:

×	10	8
30	300	240
9	90	72

$300 + 240 + 90 + 72 = 702$

Work out the denominator: $13 \times 10 = 130$

$= \frac{702}{130}$

Simplify the answer, divide by 2 then 13:

$\frac{702}{130} = \frac{351}{65} = \frac{27}{5}$

Alternative method:

Simplify first. 18 and 10 can be divided by 2. 13 and 39 can be divided by 13:

$\frac{18^9}{13^1} \times \frac{39^3}{10^5}$

116

Number

$\frac{9}{1} \times \frac{3}{5} = \frac{27}{5}$

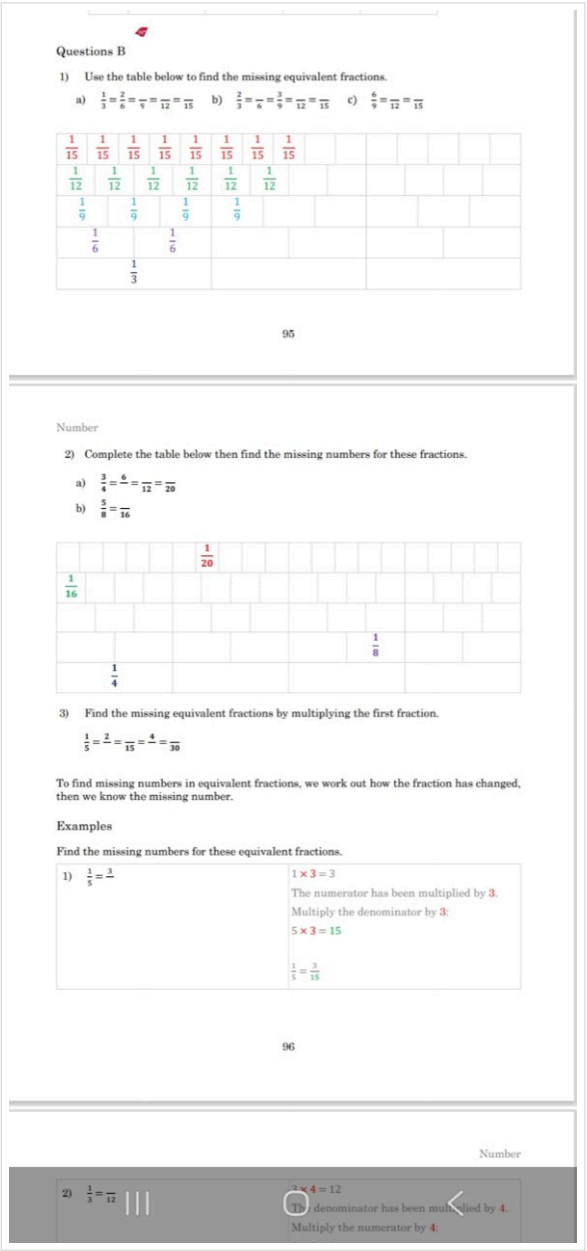
Change to a mixed number:

$\frac{27}{5} = 5\frac{2}{5}$

$1\frac{5}{13} \times 3\frac{9}{10} = 5\frac{2}{5}$

source 08: equivalent fraction strips

Wide fraction-strip grids, blank student cells, equivalent-fraction chains, worked example table.



Questions B

1) Use the table below to find the missing equivalent fractions.

a) $\frac{1}{3} = \frac{2}{6} = \frac{\_}{9} = \frac{\_}{12} = \frac{\_}{15}$ b) $\frac{2}{3} = \frac{\_}{6} = \frac{3}{9} = \frac{\_}{12} = \frac{\_}{15}$ c) $\frac{6}{9} = \frac{\_}{12} = \frac{\_}{15}$

95

Number

2) Complete the table below then find the missing numbers for these fractions.

a) $\frac{3}{4} = \frac{6}{\_} = \frac{\_}{12} = \frac{\_}{20}$

b) $\frac{5}{8} = \frac{\_}{16}$

3) Find the missing equivalent fractions by multiplying the first fraction.

$\frac{1}{5} = \frac{2}{\_} = \frac{\_}{15} = \frac{4}{\_} = \frac{\_}{30}$

To find missing numbers in equivalent fractions, we work out how the fraction has changed, then we know the missing number.

Examples

Find the missing numbers for these equivalent fractions.

1) $\frac{1}{5} = \frac{3}{\_}$

$1 \times 3 = 3$

The numerator has been multiplied by 3.

Multiply the denominator by 3:

$5 \times 3 = 15$

$\frac{1}{5} = \frac{3}{15}$

96

Number

2) $\frac{1}{3} = \frac{\_}{12}$

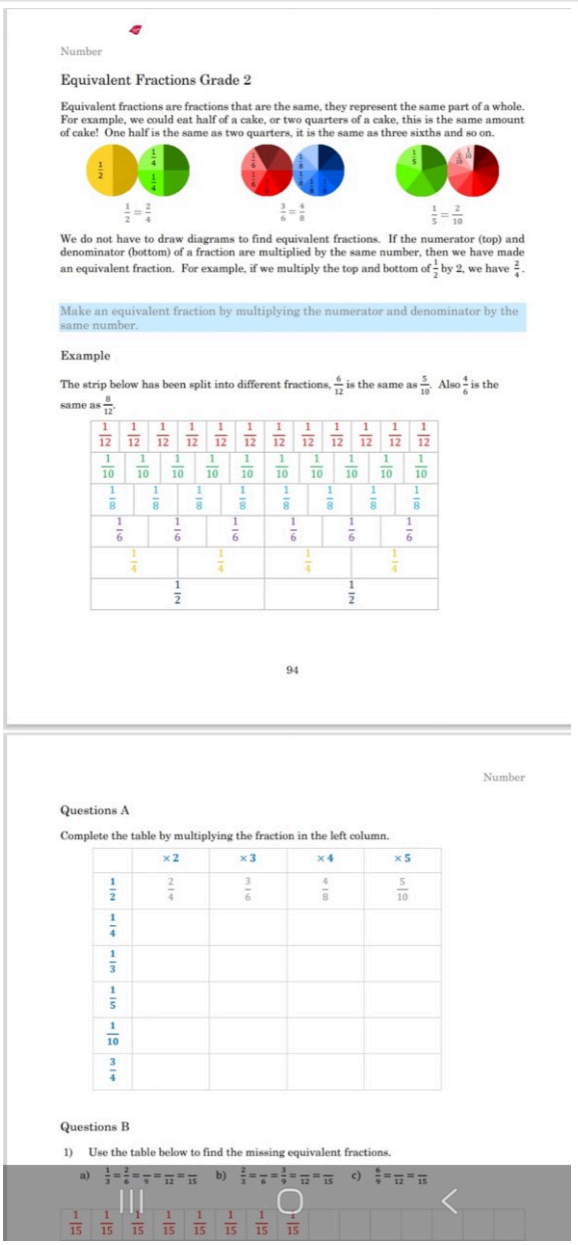
$3 \times 4 = 12$

The denominator has been multiplied by 4.

Multiply the numerator by 4:

source 09: equivalent fractions intro

Pie diagrams, introductory text, blue rule strip, fraction-strip table, multiplication-grid question table.



Number

Equivalent Fractions Grade 2

Equivalent fractions are fractions that are the same, they represent the same part of a whole. For example, we could eat half of a cake, or two quarters of a cake, this is the same amount of cake! One half is the same as two quarters, it is the same as three sixths and so on.

$\frac{1}{2} = \frac{2}{4}$ $\frac{3}{6} = \frac{4}{8}$ $\frac{1}{5} = \frac{2}{10}$

We do not have to draw diagrams to find equivalent fractions. If the numerator (top) and denominator (bottom) of a fraction are multiplied by the same number, then we have made an equivalent fraction. For example, if we multiply the top and bottom of $\frac{1}{2}$ by 2, we have $\frac{2}{4}$.

Make an equivalent fraction by multiplying the numerator and denominator by the same number.

Example

The strip below has been split into different fractions, $\frac{6}{12}$ is the same as $\frac{5}{10}$. Also $\frac{4}{6}$ is the same as $\frac{8}{12}$.

$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$
$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$		
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$				
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$						
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$								
$\frac{1}{2}$	$\frac{1}{2}$										

94

Number

Questions A

Complete the table by multiplying the fraction in the left column.

	×2	×3	×4	×5
$\frac{1}{2}$	$\frac{2}{4}$	$\frac{3}{6}$	$\frac{4}{8}$	$\frac{5}{10}$
$\frac{1}{4}$				
$\frac{1}{3}$				
$\frac{1}{5}$				
$\frac{1}{10}$				
$\frac{3}{4}$				

Questions B

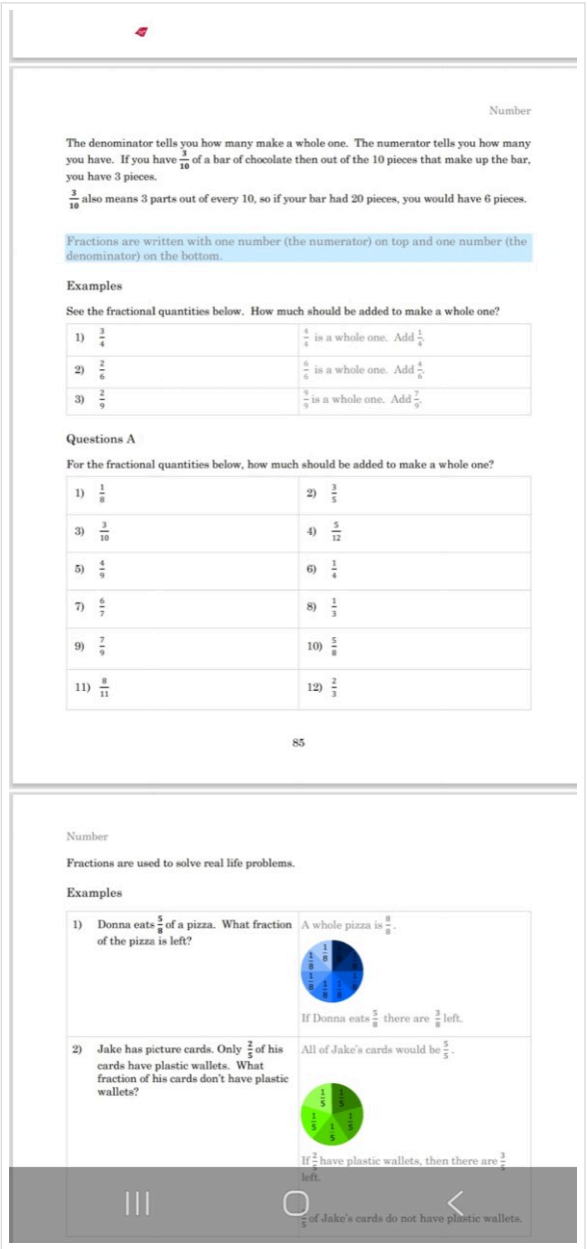
1) Use the table below to find the missing equivalent fractions.

a) $\frac{1}{3} = \frac{2}{6} = \frac{\ }{9} = \frac{\ }{12} = \frac{\ }{15}$ b) $\frac{2}{3} = \frac{\ }{6} = \frac{2}{9} = \frac{\ }{12} = \frac{\ }{15}$ c) $\frac{6}{9} = \frac{\ }{12} = \frac{\ }{15}$

$\frac{1}{15}$	$\frac{1}{15}$	$\frac{1}{15}$	$\frac{1}{15}$	$\frac{1}{15}$	$\frac{1}{15}$	$\frac{1}{15}$	$\frac{1}{15}$							

source 10: fraction complements

Fraction definition prose, complement-to-whole examples, two-column questions, word examples with circular diagrams.



Number

The denominator tells you how many make a whole one. The numerator tells you how many you have. If you have $\frac{3}{10}$ of a bar of chocolate then out of the 10 pieces that make up the bar, you have 3 pieces.

$\frac{3}{10}$ also means 3 parts out of every 10, so if your bar had 20 pieces, you would have 6 pieces.

Fractions are written with one number (the numerator) on top and one number (the denominator) on the bottom.

Examples

See the fractional quantities below. How much should be added to make a whole one?

1) $\frac{3}{4}$	$\frac{4}{4}$ is a whole one. Add $\frac{1}{4}$.
2) $\frac{2}{6}$	$\frac{6}{6}$ is a whole one. Add $\frac{4}{6}$.
3) $\frac{2}{9}$	$\frac{9}{9}$ is a whole one. Add $\frac{7}{9}$.

Questions A

For the fractional quantities below, how much should be added to make a whole one?

1) $\frac{1}{8}$	2) $\frac{3}{5}$
3) $\frac{3}{10}$	4) $\frac{5}{12}$
5) $\frac{4}{9}$	6) $\frac{1}{4}$
7) $\frac{6}{7}$	8) $\frac{1}{3}$
9) $\frac{7}{9}$	10) $\frac{5}{8}$
11) $\frac{8}{11}$	12) $\frac{2}{3}$

85

Number

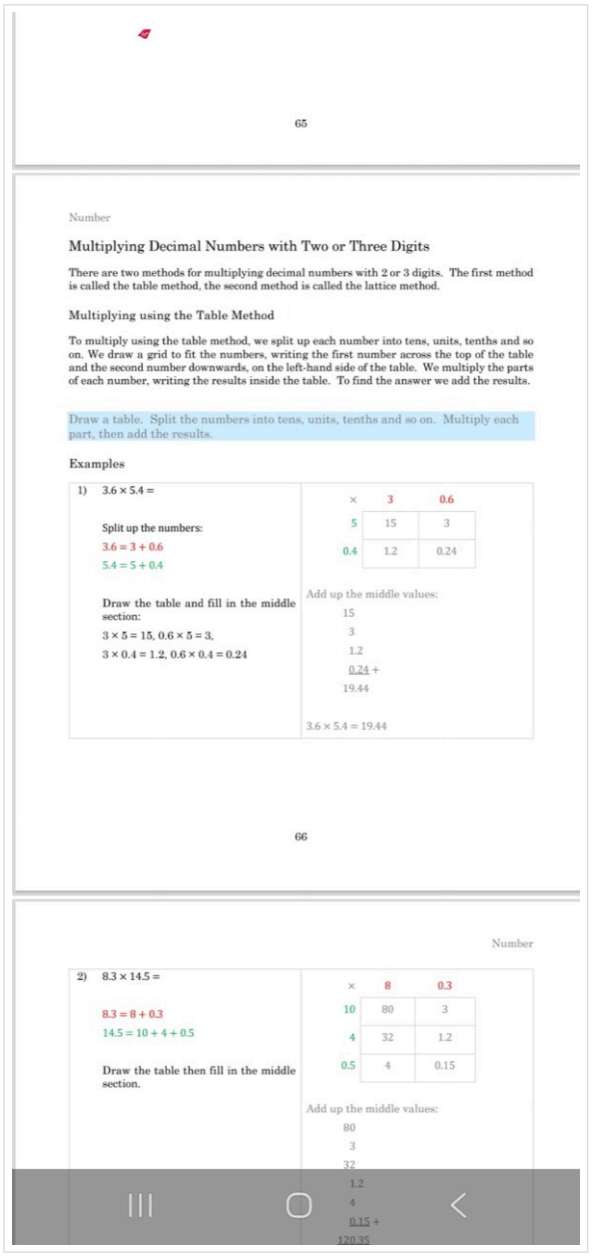
Fractions are used to solve real life problems.

Examples

1) Donna eats $\frac{5}{8}$ of a pizza. What fraction of the pizza is left?	A whole pizza is $\frac{8}{8}$. If Donna eats $\frac{5}{8}$ there are $\frac{3}{8}$ left.
2) Jake has picture cards. Only $\frac{2}{5}$ of his cards have plastic wallets. What fraction of his cards don't have plastic wallets?	All of Jake's cards would be $\frac{5}{5}$. If $\frac{2}{5}$ have plastic wallets, then there are $\frac{3}{5}$ left. $\frac{3}{5}$ of Jake's cards do not have plastic wallets.

source 11: decimal multiplication table

Decimal table-method teaching page, blue rule strip, split-number explanation, colored partition labels, vertical sum inside worked example.



65

Number

Multiplying Decimal Numbers with Two or Three Digits

There are two methods for multiplying decimal numbers with 2 or 3 digits. The first method is called the table method, the second method is called the lattice method.

Multiplying using the Table Method

To multiply using the table method, we split up each number into tens, units, tenths and so on. We draw a grid to fit the numbers, writing the first number across the top of the table and the second number downwards, on the left-hand side of the table. We multiply the parts of each number, writing the results inside the table. To find the answer we add the results.

Draw a table. Split the numbers into tens, units, tenths and so on. Multiply each part, then add the results.

Examples

1) 3.6 × 5.4 =

Split up the numbers:
3.6 = 3 + 0.6
5.4 = 5 + 0.4

Draw the table and fill in the middle section:
3 × 5 = 15, 0.6 × 5 = 3,
3 × 0.4 = 1.2, 0.6 × 0.4 = 0.24

×	3	0.6
5	15	3
0.4	1.2	0.24

Add up the middle values:
15
3
1.2
0.24 +
19.44

3.6 × 5.4 = 19.44

66

Number

2) 8.3 × 14.5 =

8.3 = 8 + 0.3
14.5 = 10 + 4 + 0.5

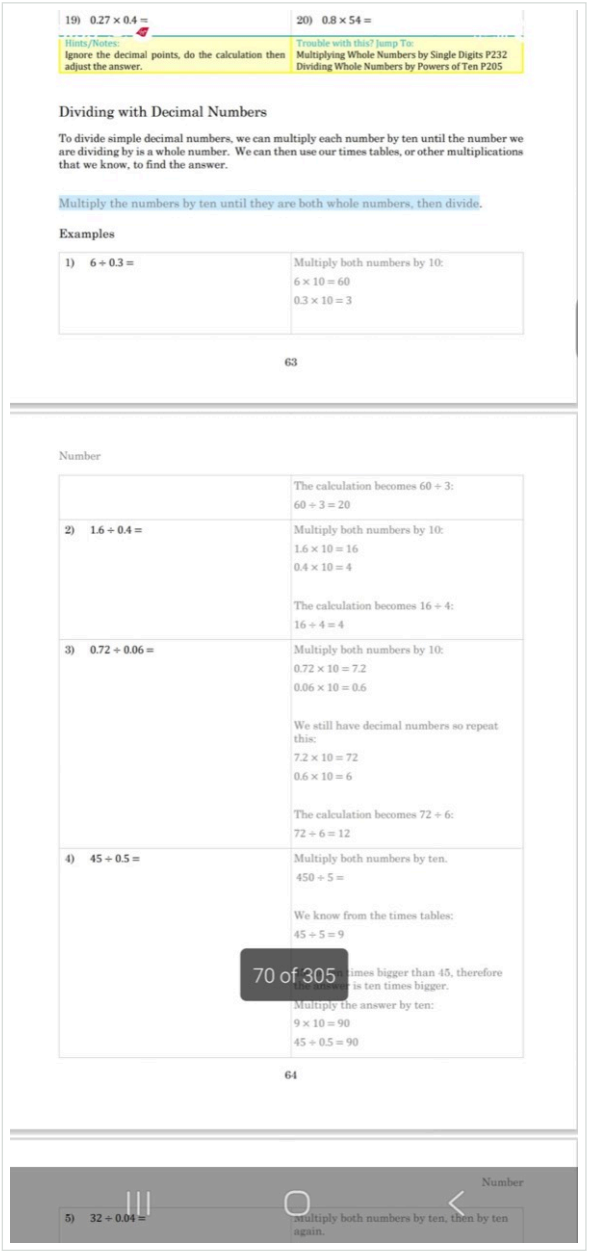
Draw the table then fill in the middle section.

×	8	0.3
10	80	3
4	32	1.2
0.5	4	0.15

Add up the middle values:
80
3
32
1.2
4
0.15 +
120.35

source 12: decimal division scaling

Decimal division by multiplying both numbers by powers of ten, repeated scaling, long worked rows, hint/support strip.



19) 0.27 × 0.4 =

20) 0.8 × 54 =

Hints/Notes:
Ignore the decimal points, do the calculation then adjust the answer.

Trouble with this? Jump To:
Multiplying Whole Numbers by Single Digits P232
Dividing Whole Numbers by Powers of Ten P205

Dividing with Decimal Numbers

To divide simple decimal numbers, we can multiply each number by ten until the number we are dividing by is a whole number. We can then use our times tables, or other multiplications that we know, to find the answer.

Multiply the numbers by ten until they are both whole numbers, then divide.

Examples

1) 6 ÷ 0.3 =

Multiply both numbers by 10:
6 × 10 = 60
0.3 × 10 = 3

63

Number

The calculation becomes 60 ÷ 3:
60 ÷ 3 = 20

2) 1.6 ÷ 0.4 =

Multiply both numbers by 10:
1.6 × 10 = 16
0.4 × 10 = 4

The calculation becomes 16 ÷ 4:
16 ÷ 4 = 4

3) 0.72 ÷ 0.06 =

Multiply both numbers by 10:
0.72 × 10 = 7.2
0.06 × 10 = 0.6

We still have decimal numbers so repeat this:
7.2 × 10 = 72
0.6 × 10 = 6

The calculation becomes 72 ÷ 6:
72 ÷ 6 = 12

4) 45 ÷ 0.5 =

Multiply both numbers by ten.
450 ÷ 5 =

We know from the times tables:
45 ÷ 5 = 9

times bigger than 45, therefore is ten times bigger.
Multiply the answer by ten:
9 × 10 = 90
45 ÷ 0.5 = 90

64

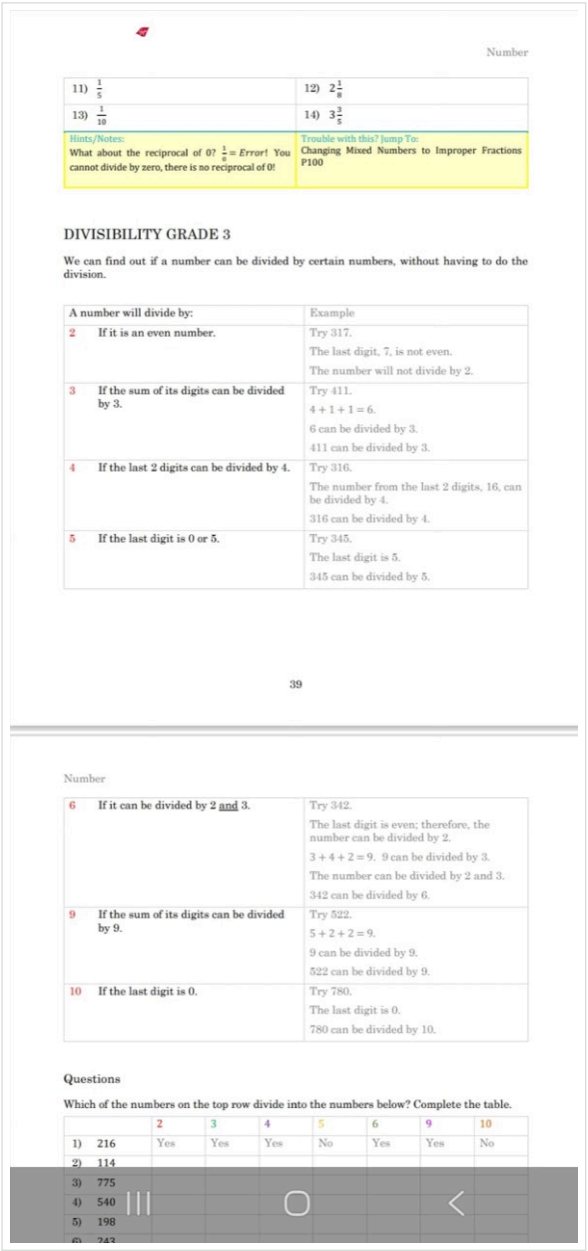
Number

5) 32 ÷ 0.04 =

Multiply both numbers by ten, then by ten again.

source 13: divisibility rules

Rule table with colored divisors, example column, continued table across pages, yes/no question grid.



Number

11) $\frac{1}{5}$	12) $2\frac{1}{8}$
13) $\frac{1}{10}$	14) $3\frac{3}{5}$

Hints/Notes:
What about the reciprocal of 0? $\frac{1}{0}$ = *Error!* You cannot divide by zero, there is no reciprocal of 0!

Trouble with this? Jump To:
Changing Mixed Numbers to Improper Fractions P100

DIVISIBILITY GRADE 3

We can find out if a number can be divided by certain numbers, without having to do the division.

A number will divide by:		Example
2	If it is an even number.	Try 317. The last digit, 7, is not even. The number will not divide by 2.
3	If the sum of its digits can be divided by 3.	Try 411. 4 + 1 + 1 = 6. 6 can be divided by 3. 411 can be divided by 3.
4	If the last 2 digits can be divided by 4.	Try 316. The number from the last 2 digits, 16, can be divided by 4. 316 can be divided by 4.
5	If the last digit is 0 or 5.	Try 345. The last digit is 5. 345 can be divided by 5.

39

Number

6	If it can be divided by 2 and 3.	Try 342. The last digit is even; therefore, the number can be divided by 2. 3 + 4 + 2 = 9. 9 can be divided by 3. The number can be divided by 2 and 3. 342 can be divided by 6.
9	If the sum of its digits can be divided by 9.	Try 522. 5 + 2 + 2 = 9. 9 can be divided by 9. 522 can be divided by 9.
10	If the last digit is 0.	Try 780. The last digit is 0. 780 can be divided by 10.

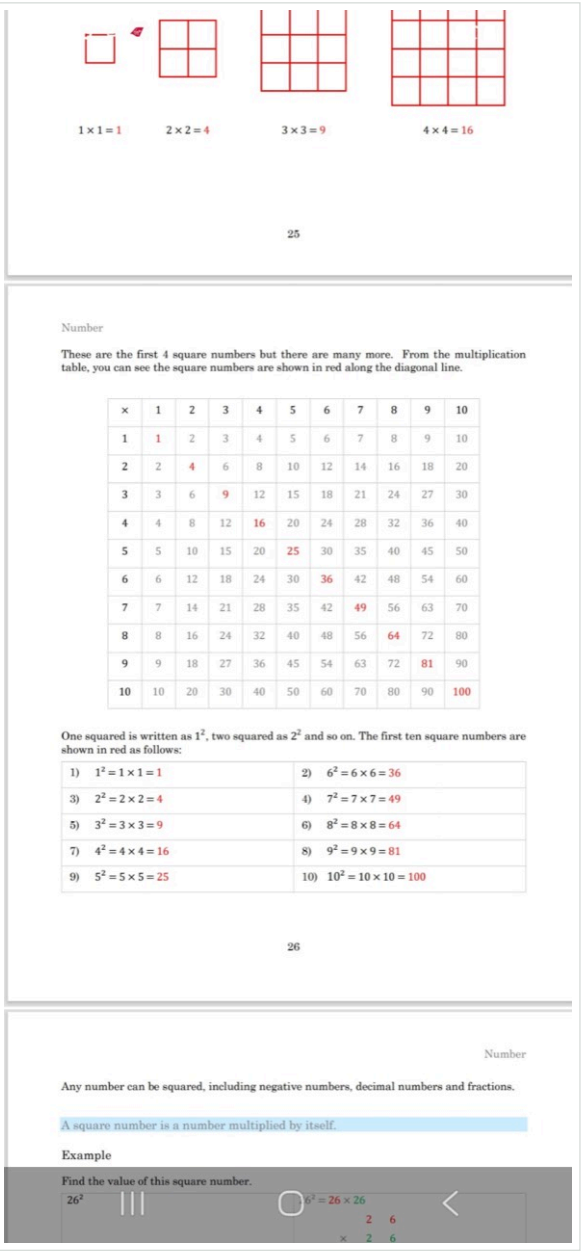
Questions

Which of the numbers on the top row divide into the numbers below? Complete the table.

		2	3	4	5	6	9	10
1)	216	Yes	Yes	Yes	No	Yes	Yes	No
2)	114							
3)	775							
4)	540							
5)	198							
6)	243							

source 14: square numbers

Square arrays, multiplication table with highlighted diagonal, square-number notation list, blue definition strip.



$1 \times 1 = 1$ $2 \times 2 = 4$ $3 \times 3 = 9$ $4 \times 4 = 16$

25

Number

These are the first 4 square numbers but there are many more. From the multiplication table, you can see the square numbers are shown in red along the diagonal line.

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

One squared is written as 1^2, two squared as 2^2 and so on. The first ten square numbers are shown in red as follows:

1)	$1^2 = 1 \times 1 = 1$	2)	$6^2 = 6 \times 6 = 36$
3)	$2^2 = 2 \times 2 = 4$	4)	$7^2 = 7 \times 7 = 49$
5)	$3^2 = 3 \times 3 = 9$	6)	$8^2 = 8 \times 8 = 64$
7)	$4^2 = 4 \times 4 = 16$	8)	$9^2 = 9 \times 9 = 81$
9)	$5^2 = 5 \times 5 = 25$	10)	$10^2 = 10 \times 10 = 100$

26

Number

Any number can be squared, including negative numbers, decimal numbers and fractions.

A square number is a number multiplied by itself.

Example

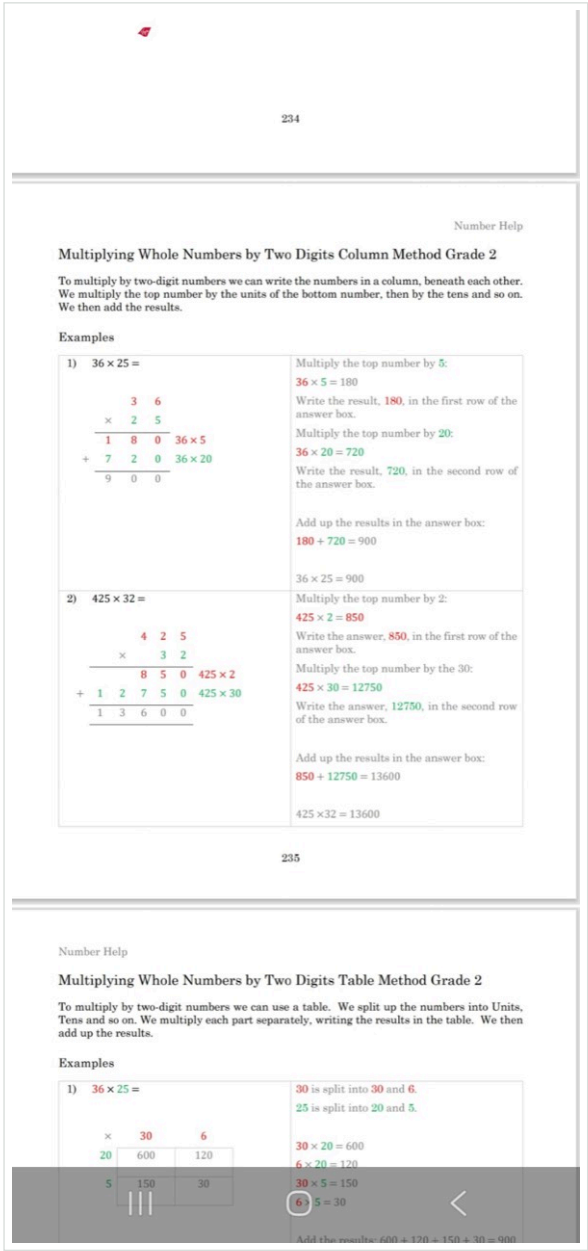
Find the value of this square number.

26^2 $26^2 = 26 \times 26$

2 6
× 2 6

source 15: written multiplication help

Number Help page furniture, column multiplication examples, colored partial products, table-method follow-on page.



234

Number Help

Multiplying Whole Numbers by Two Digits Column Method Grade 2

To multiply by two-digit numbers we can write the numbers in a column, beneath each other. We multiply the top number by the units of the bottom number, then by the tens and so on. We then add the results.

Examples

1) 36 × 25 =

```
   3 6
 × 2 5
 1 8 0   36 × 5
+7 2 0   36 × 20
 9 0 0
```

Multiply the top number by 5:
36 × 5 = 180
Write the result, 180, in the first row of the answer box.
Multiply the top number by 20:
36 × 20 = 720
Write the result, 720, in the second row of the answer box.
Add up the results in the answer box:
180 + 720 = 900
36 × 25 = 900

2) 425 × 32 =

```
     4 2 5
   × 3 2
   8 5 0   425 × 2
+1 2 7 5 0 425 × 30
 1 3 6 0 0
```

Multiply the top number by 2:
425 × 2 = 850
Write the answer, 850, in the first row of the answer box.
Multiply the top number by the 30:
425 × 30 = 12750
Write the answer, 12750, in the second row of the answer box.
Add up the results in the answer box:
850 + 12750 = 13600
425 ×32 = 13600

235

Number Help

Multiplying Whole Numbers by Two Digits Table Method Grade 2

To multiply by two-digit numbers we can use a table. We split up the numbers into Units, Tens and so on. We multiply each part separately, writing the results in the table. We then add up the results.

Examples

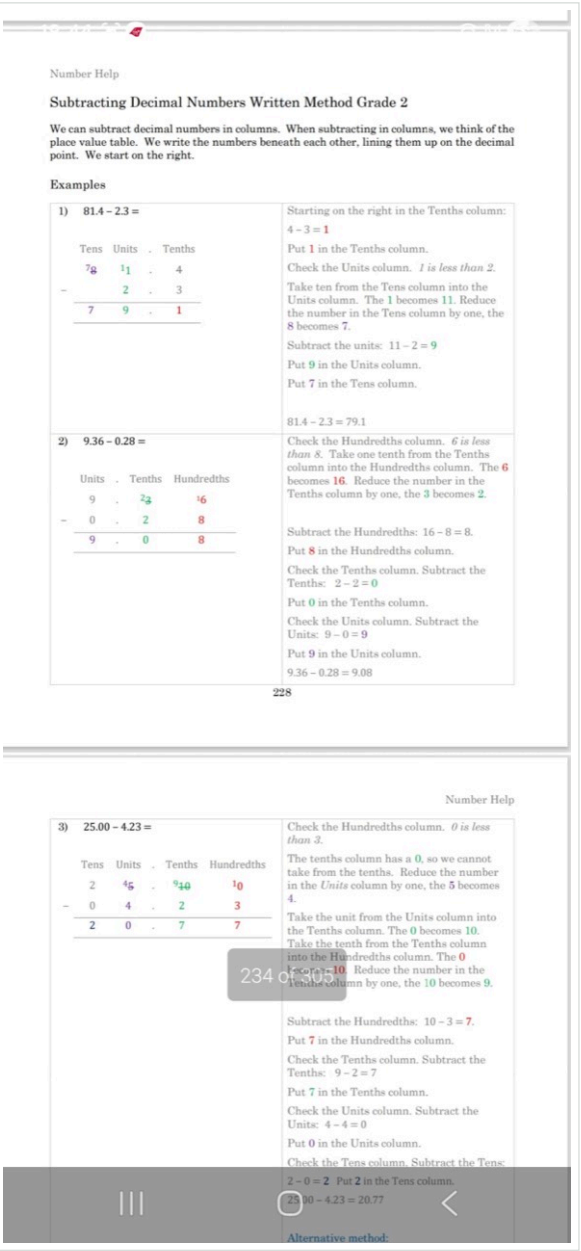
1) 36 × 25 =

×	30	6
20	600	120
5	150	30

30 is split into 30 and 6.
25 is split into 20 and 5.
30 × 20 = 600
6 × 20 = 120
30 × 5 = 150
6 × 5 = 30
Add the results: 600 + 120 + 150 + 30 = 900

source 16: decimal subtraction help

Decimal column subtraction, place-value headings, borrow superscripts, long prose solution rows, decimal alignment.



Number Help

Subtracting Decimal Numbers Written Method Grade 2

We can subtract decimal numbers in columns. When subtracting in columns, we think of the place value table. We write the numbers beneath each other, lining them up on the decimal point. We start on the right.

Examples

1) 81.4 – 2.3 =

	Tens	Units	.	Tenths
	~~8~~ 7	~~1~~ 11	.	4
–		2	.	3
	7	9	.	1

Starting on the right in the Tenths column:
4 – 3 = 1
Put 1 in the Tenths column.
Check the Units column. *1 is less than 2.*
Take ten from the Tens column into the Units column. The 1 becomes 11. Reduce the number in the Tens column by one, the 8 becomes 7.
Subtract the units: 11 – 2 = 9
Put 9 in the Units column.
Put 7 in the Tens column.
81.4 – 2.3 = 79.1

2) 9.36 – 0.28 =

	Units	.	Tenths	Hundredths
	9	.	~~2~~ 2	~~1~~ 16
–	0	.	2	8
	9	.	0	8

Check the Hundredths column. *6 is less than 8.* Take one tenth from the Tenths column into the Hundredths column. The 6 becomes 16. Reduce the number in the Tenths column by one, the 3 becomes 2.
Subtract the Hundredths: 16 – 8 = 8.
Put 8 in the Hundredths column.
Check the Tenths column. Subtract the Tenths: 2 – 2 = 0
Put 0 in the Tenths column.
Check the Units column. Subtract the Units: 9 – 0 = 9
Put 9 in the Units column.
9.36 – 0.28 = 9.08

228

Number Help

3) 25.00 – 4.23 =

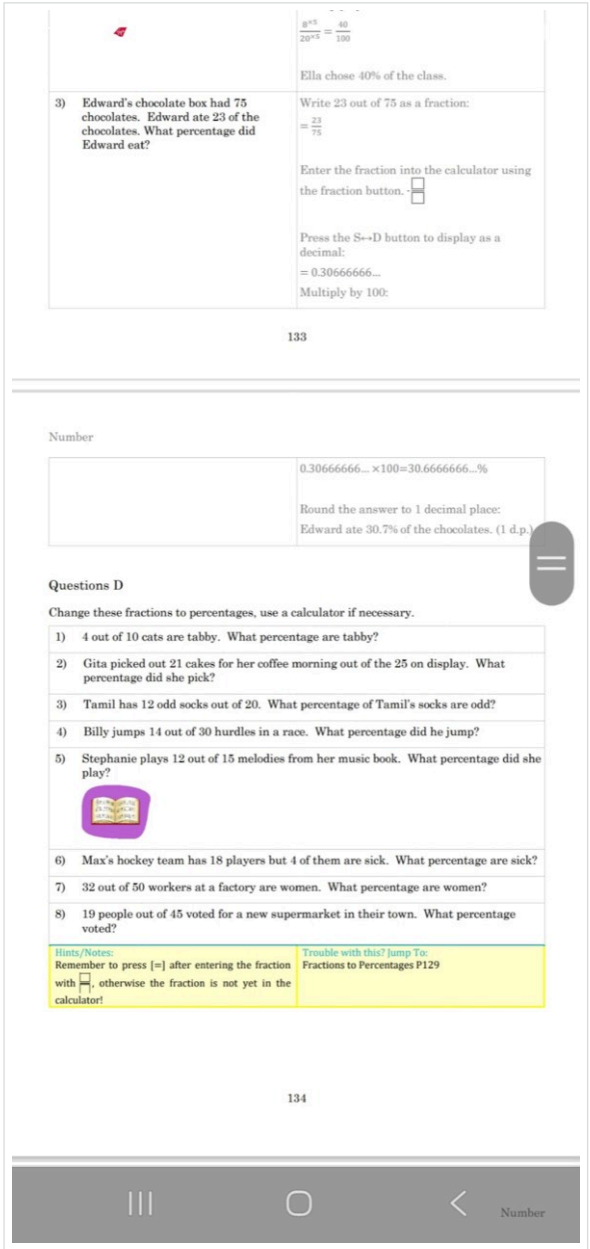
	Tens	Units	.	Tenths	Hundredths
	2	~~5~~ 4	.	~~0~~ 10	10
–	0	4	.	2	3
	2	0	.	7	7

Check the Hundredths column. *0 is less than 3.*
The tenths column has a 0, so we cannot take from the tenths. Reduce the number in the *Units* column by one, the 5 becomes 4.
Take the unit from the Units column into the Tenths column. The 0 becomes 10.
Take the tenth from the Tenths column into the Hundredths column. The 0 becomes 10. Reduce the number in the Tenths column by one, the 10 becomes 9.
Subtract the Hundredths: 10 – 3 = 7.
Put 7 in the Hundredths column.
Check the Tenths column. Subtract the Tenths: 9 – 2 = 7
Put 7 in the Tenths column.
Check the Units column. Subtract the Units: 4 – 4 = 0
Put 0 in the Units column.
Check the Tens column. Subtract the Tens: 2 – 0 = 2 Put 2 in the Tens column.
25.00 – 4.23 = 20.77

Alternative method:

source 17: percentage word questions

Calculator percentage example continuation, full-width word-question table, embedded illustration, hint/support strip.



$\frac{8\times5}{20\times5}=\frac{40}{100}$

Ella chose 40% of the class.

3)	Edward's chocolate box had 75 chocolates. Edward ate 23 of the chocolates. What percentage did Edward eat?	Write 23 out of 75 as a fraction: $=\frac{23}{75}$ Enter the fraction into the calculator using the fraction button. $\frac{\square}{\square}$ Press the S↔D button to display as a decimal: = 0.30666666... Multiply by 100:

133

Number

0.30666666... ×100=30.6666666...%

Round the answer to 1 decimal place:

Edward ate 30.7% of the chocolates. (1 d.p.)

Questions D

Change these fractions to percentages, use a calculator if necessary.

1)	4 out of 10 cats are tabby. What percentage are tabby?
2)	Gita picked out 21 cakes for her coffee morning out of the 25 on display. What percentage did she pick?
3)	Tamil has 12 odd socks out of 20. What percentage of Tamil's socks are odd?
4)	Billy jumps 14 out of 30 hurdles in a race. What percentage did he jump?
5)	Stephanie plays 12 out of 15 melodies from her music book. What percentage did she play?
6)	Max's hockey team has 18 players but 4 of them are sick. What percentage are sick?
7)	32 out of 50 workers at a factory are women. What percentage are women?
8)	19 people out of 45 voted for a new supermarket in their town. What percentage voted?

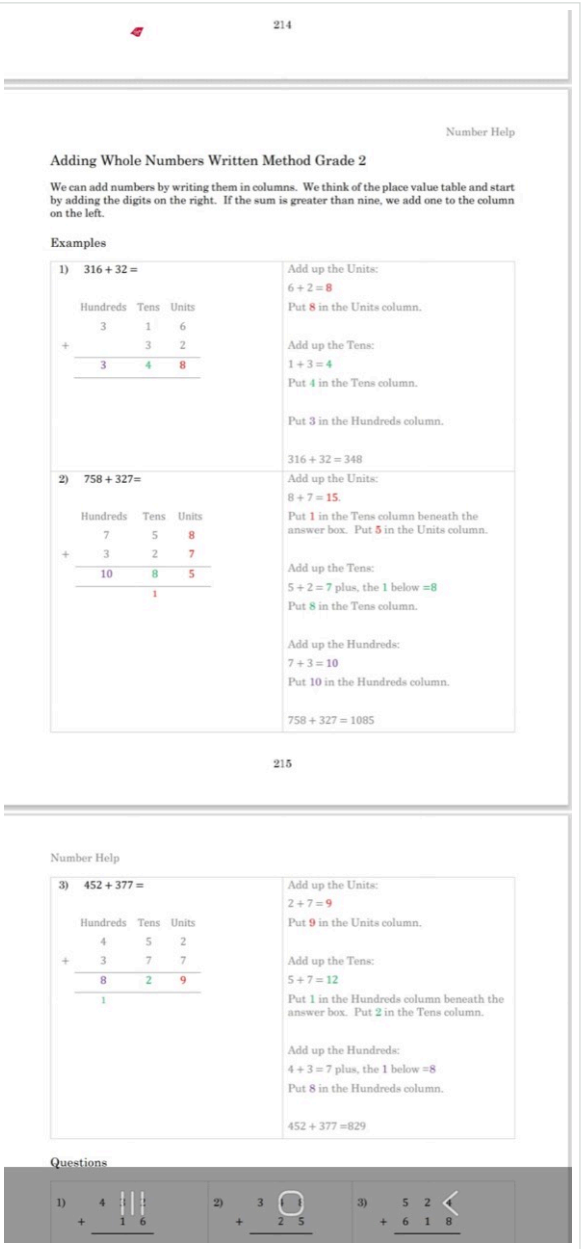
Hints/Notes:	Trouble with this? Jump To:
Remember to press [=] after entering the fraction with $\frac{\square}{\square}$, otherwise the fraction is not yet in the calculator!	Fractions to Percentages P129

134

Number

source 18: whole-number addition help

Column addition with place-value headings, carry marks below the answer row, worked prose, student practice row.



214

Number Help

Adding Whole Numbers Written Method Grade 2

We can add numbers by writing them in columns. We think of the place value table and start by adding the digits on the right. If the sum is greater than nine, we add one to the column on the left.

Examples

1) 316 + 32 =

	Hundreds	Tens	Units
	3	1	6
+		3	2
	3	4	8

Add up the Units:
6 + 2 = 8
Put 8 in the Units column.

Add up the Tens:
1 + 3 = 4
Put 4 in the Tens column.

Put 3 in the Hundreds column.

316 + 32 = 348

2) 758 + 327=

	Hundreds	Tens	Units
	7	5	8
+	3	2	7
	10	8	5
		1	

Add up the Units:
8 + 7 = 15.
Put 1 in the Tens column beneath the answer box. Put 5 in the Units column.

Add up the Tens:
5 + 2 = 7 plus, the 1 below =8
Put 8 in the Tens column.

Add up the Hundreds:
7 + 3 = 10
Put 10 in the Hundreds column.

758 + 327 = 1085

215

Number Help

3) 452 + 377 =

	Hundreds	Tens	Units
	4	5	2
+	3	7	7
	8	2	9
	1		

Add up the Units:
2 + 7 = 9
Put 9 in the Units column.

Add up the Tens:
5 + 7 = 12
Put 1 in the Hundreds column beneath the answer box. Put 2 in the Tens column.

Add up the Hundreds:
4 + 3 = 7 plus, the 1 below =8
Put 8 in the Hundreds column.

452 + 377 =829

Questions

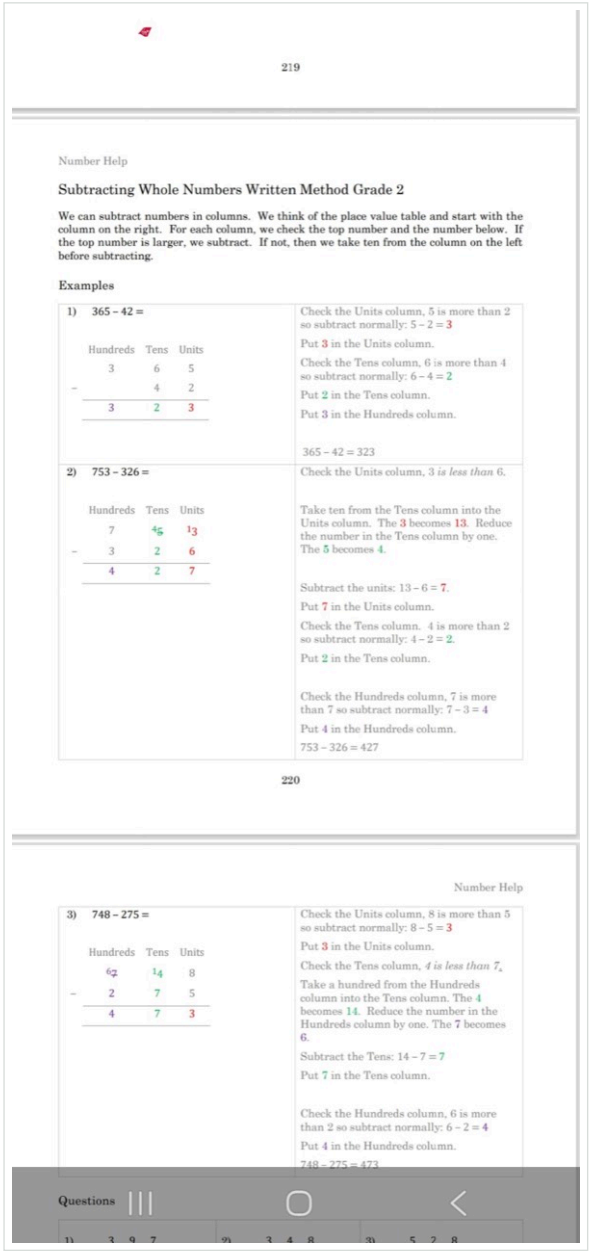
1) 4 + 1 6

2) 3 + 2 5

3) 5 2 + 6 1 8

source 19: whole-number subtraction help

Column subtraction with borrow marks, place-value headings, prose explanation, continued example and practice row.



219

Number Help

Subtracting Whole Numbers Written Method Grade 2

We can subtract numbers in columns. We think of the place value table and start with the column on the right. For each column, we check the top number and the number below. If the top number is larger, we subtract. If not, then we take ten from the column on the left before subtracting.

Examples

1) 365 – 42 =

	Hundreds	Tens	Units
	3	6	5
–		4	2
	3	2	3

Check the Units column, 5 is more than 2 so subtract normally: 5 – 2 = 3

Put 3 in the Units column.

Check the Tens column, 6 is more than 4 so subtract normally: 6 – 4 = 2

Put 2 in the Tens column.

Put 3 in the Hundreds column.

365 – 42 = 323

2) 753 – 326 =

	Hundreds	Tens	Units
	7	$^{4}5$	$^{1}3$
–	3	2	6
	4	2	7

Check the Units column, 3 *is less than* 6.

Take ten from the Tens column into the Units column. The 3 becomes 13. Reduce the number in the Tens column by one. The 5 becomes 4.

Subtract the units: 13 – 6 = 7.

Put 7 in the Units column.

Check the Tens column. 4 is more than 2 so subtract normally: 4 – 2 = 2.

Put 2 in the Tens column.

Check the Hundreds column, 7 is more than 7 so subtract normally: 7 – 3 = 4

Put 4 in the Hundreds column.

753 – 326 = 427

220

Number Help

3) 748 – 275 =

	Hundreds	Tens	Units
	$^{6}7$	$^{1}4$	8
–	2	7	5
	4	7	3

Check the Units column, 8 is more than 5 so subtract normally: 8 – 5 = 3

Put 3 in the Units column.

Check the Tens column, *4 is less than 7*,

Take a hundred from the Hundreds column into the Tens column. The 4 becomes 14. Reduce the number in the Hundreds column by one. The 7 becomes 6.

Subtract the Tens: 14 – 7 = 7

Put 7 in the Tens column.

Check the Hundreds column, 6 is more than 2 so subtract normally: 6 – 2 = 4

Put 4 in the Hundreds column.

748 – 275 = 473

Questions

1) 3 9 7 2) 3 4 8 3) 5 2 8