1:01 Numbers Above One Million

Content strand: Number and Algebra

Substrand: Whole Numbers 1

Content statements:

- Recognise, represent and order numbers to at least tens of millions.

Outcomes: MA3-1WM, MA3-2WM, MA3-3WM, MA3-4NA

Teaching Suggestions

- Demonstrate numbers above one hundred million.
- Provide students with frequent opportunities to read and write any number presented verbally.
- Revise place value, e.g. the value of the 6 in 216 439 251 is 6 millions (6 000 000).
- Revise rounding, i.e. digits 5 and above are rounded up while digits below 5 are rounded down.
- Revise powers of ten, e.g. 1 643 786 is $(1 \times 10^6) + (6 \times 10^5) + (4 \times 10^4) + (3 \times 10^3) + (7 \times 10^2) + (8 \times 10^1) + 6$.
- Use the example questions on the IWB DVD.

Investigation

- The best strategy to use for this exercise is Guess and Check.
- Have students work in pencil and erase any guesses that do not satisfy the requirements of the exercise.
- Encourage students to check a final time when all of the digits have been used.

Extension Work

- Use powers of ten to write each numeral in Question 3.

Language

numeral, expanded notation, powers of ten, place value, hundred millions, ten millions, millions, hundred thousands, ten thousands, thousands, hundreds, tens, units, numeral expander

Resources

- pencil, eraser
- spare paper
- IWB DVD 6

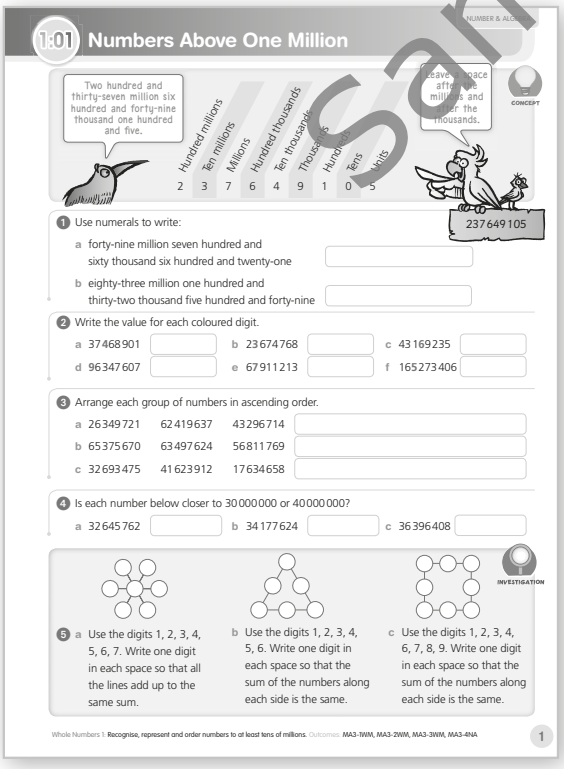
Cross-reference

Year 5 p. 2

Evaluation

Is the student able to do the following?

- apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems


1:01 Numbers Above One Million

Two hundred and thirty-seven million six hundred and forty-nine thousand one hundred and five.

Hundred millions, Ten millions, Millions, Hundred thousands, Ten thousands, Thousands, Hundreds, Tens, Units

2 3 7 6 4 9 1 0 5

Leave a space after the millions and after the thousands.

237 649 105

1 Use numerals to write:
a forty-nine million seven hundred and sixty thousand six hundred and twenty-one
b eighty-three million one hundred and thirty-two thousand five hundred and forty-nine

2 Write the value for each coloured digit.
a 37 468 901 b 23 674 768 c 43 169 235
d 96 347 607 e 67 911 213 f 165 273 406

3 Arrange each group of numbers in ascending order.
a 26 349 721 62 419 637 43 296 714
b 65 375 670 63 497 624 56 811 769
c 32 693 475 41 623 912 17 634 658

4 Is each number below closer to 30 000 000 or 40 000 000?
a 32 645 762 b 34 177 624 c 36 396 408

INVESTIGATION

5 a Use the digits 1, 2, 3, 4, 5, 6, 7. Write one digit in each space so that all the lines add up to the same sum.
b Use the digits 1, 2, 3, 4, 5, 6. Write one digit in each space so that the sum of the numbers along each side is the same.
c Use the digits 1, 2, 3, 4, 6, 7, 8, 9. Write one digit in each space so that the sum of the numbers along each side is the same.

Whole Numbers 1 Recognise, represent and order numbers to at least tens of millions. Outcomes MA3-1WM, MA3-2WM, MA3-3WM, MA3-4NA 1

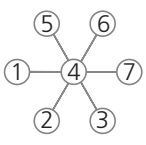
Answers

1 a 49 760 621
b 83 132 549

2 a 4 hundreds of thousands
b 3 millions
c 6 tens of thousands
d 9 tens of millions
e 7 millions
f 5 millions

3 a 26 349 721; 43 296 714; 62 419 637
b 56 811 769; 63 497 624; 65 375 670
c 17 634 658; 32 693 475; 41 623 912

4 a 30 000 000
b 30 000 000
c 40 000 000

5 a


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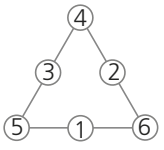

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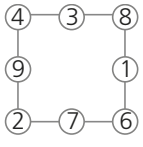


1:02 Square Numbers

Content strand: Number and Algebra

Substrand: Whole Numbers 2

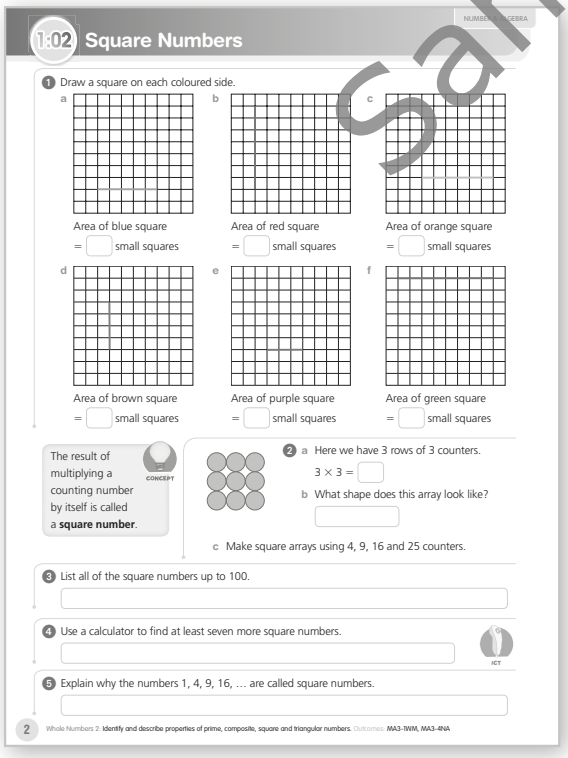
Content statements:

- Identify and describe properties of prime, composite, square and triangular numbers.

Outcomes: MA3-IWM, MA3-4NA

Teaching Suggestions

- We are using this worksheet to explain the link between square numbers and the area of squares. Square numbers are the result of multiplying a counting number by itself. The area of a square with a side length that is a counting number is found by multiplying the counting number by itself.
- Question 2: Here we link the concept of a square number to the number of counters in a square array. The number of counters can be found by multiplying the number of counters on one side by itself.
- Emphasise that the square number is the result of multiplying a counting number by itself, so 49 is a square number.
- Show students a list of whole numbers and ask them to identify the square numbers.
- Ask students to find the square numbers created by multiplying 11, 12 and 13 by themselves. You may need to review multiplication by a two-digit number. Even though a calculator will do this more quickly, there is value in asking students to do these calculations.


1:02 Square Numbers

1 Draw a square on each coloured side.

a Area of blue square = ☐ small squares

b Area of red square = ☐ small squares

c Area of orange square = ☐ small squares

d Area of brown square = ☐ small squares

e Area of purple square = ☐ small squares

f Area of green square = ☐ small squares

The result of multiplying a counting number by itself is called a **square number**.

2 a Here we have 3 rows of 3 counters. 3 × 3 = ☐

b What shape does this array look like? ☐

c Make square arrays using 4, 9, 16 and 25 counters.

3 List all of the square numbers up to 100.

4 Use a calculator to find at least seven more square numbers.

5 Explain why the numbers 1, 4, 9, 16, … are called square numbers.

2 Whole Numbers 2: Identify and describe properties of prime, composite, square and triangular numbers. Outcomes: MA3-IWM, MA3-4NA

ICT

- Discuss the use of a calculator in finding larger square numbers, e.g. 37 × 37 = 1 369. Ask students if 1 369 is a square number.

Extension Work

- Ask students to use a calculator to discover whether 2 116 is a square number. It would be better if the calculator being used does not have a square root sign. The method of solution expected from students would be trial and error, using a calculator. They might begin multiplying 25 by 25 and finding the answer is far too small. They might then try 45 by 45 and find that the answer 2 025 is close to the answer 2 116. If they then chose to multiply 46 by 46 they would get the required answer 2 116. If 46 × 46 gave an answer larger than 2 116 then 2 116 would not be a square number.

Language

square number, area, multiply, array, whole numbers, two-digit number, calculation

Resources

- calculators
- IWB DVD 6

Cross-reference

See also page: 3, 7
Year 5 p: 93

Evaluation

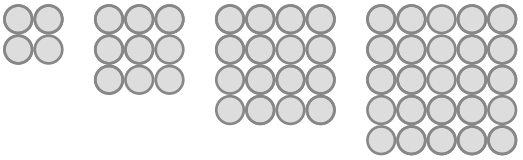
Is the student able to do the following?

- produce a square number
- identify a square number

Answers

1 a 25 b 49 c 36
d 16 e 9 f 64

2 a 9 b a square
c



3 1, 4, 9, 16, 25, 36, 49, 64, 81, 100

4 Answers can vary. (Some are 121, 144, 169, 196, 225, 256 and 289.)

5 Counters representing square numbers can be arranged in the shape of a square.

1:03 Square Numbers

Content strand: Number and Algebra

Substrand: Whole Numbers 2

Content statements:

- Identify and describe properties of prime, composite, square and triangular numbers.

Outcomes: MA3-1WM, MA3-2WM, MA3-3WM, MA3-4NA

Teaching Suggestions

- Provide each student with a hundred square. Have students cut off a square of their choice, e.g. 6 cm × 6 cm. Ask them to place a place-value one on each part of this square and count the ones. List the numbers discovered by the students. Call these *square numbers*.
- Find all factors of each square number by rearranging the place-value ones of each square into other rectangles. Students could colour squares of different sizes (e.g. 1 cm × 1 cm, 2 cm × 2 cm, 3 cm × 3 cm) on 1 cm grid paper (**BLM 12**, p. 211).
- Explain that a square number has other factors of which it is a multiple.
- Ask students to write square numbers as numbers squared, e.g. 25 can be written as 5 × 5 or five squared.
- Be aware that in Mathematics 'square' has more than one meaning.

Extension Work

- Investigate larger square numbers with grid paper and calculators.
- Have students colour the square numbers on a multiplication grid and comment on the pattern.
- **BLW 5** Square Numbers, p. 220, could be given.

Language

square number, five squared, factor, multiple, product, odd numbers, even numbers

Resources

- hundred squares
- place-value ones
- multiplication grids
- calculators
- 1 cm grid paper (**BLM 12**, p. 211)
- **BLW 5** Square Numbers, p. 220
- IWB DVD 6

Cross-reference

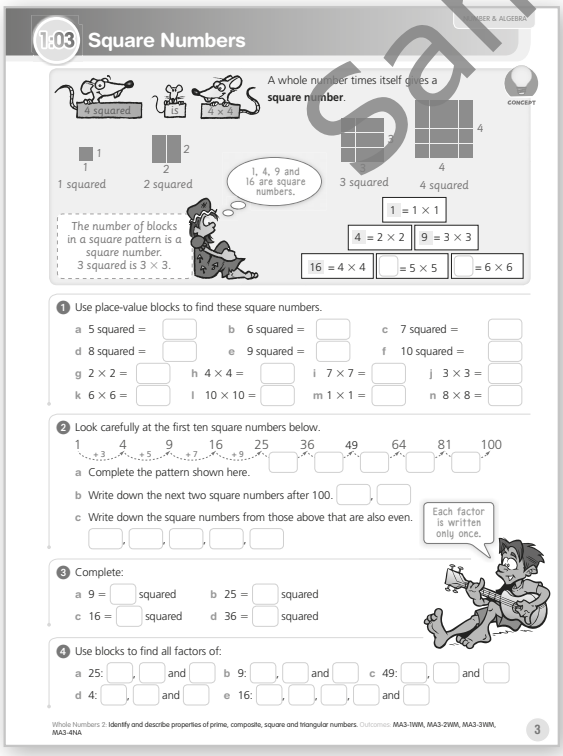
See also: p. 2, 7

Year 5 p. 93

Evaluation

Is the student able to do the following?

- find multiples and squares of numbers


1:03 Square Numbers

A whole number times itself gives a square number.

CONCEPT

4 squared 15 4 × 4

1 squared 2 squared 3 squared 4 squared

1, 4, 9 and 16 are square numbers.

The number of blocks in a square pattern is a square number. 3 squared is 3 × 3.

1 = 1 × 1

4 = 2 × 2 9 = 3 × 3

16 = 4 × 4 = 5 × 5 = 6 × 6

1 Use place-value blocks to find these square numbers.

a 5 squared = b 6 squared = c 7 squared =

d 8 squared = e 9 squared = f 10 squared =

g 2 × 2 = h 4 × 4 = i 7 × 7 = j 3 × 3 =

k 6 × 6 = l 10 × 10 = m 1 × 1 = n 8 × 8 =

2 Look carefully at the first ten square numbers below.

1 4 9 16 25 36 49 64 81 100

+3 +5 +7 +9

a Complete the pattern shown here.

b Write down the next two square numbers after 100.

c Write down the square numbers from those above that are also even.

Each factor is written only once.

3 Complete:

a 9 = squared b 25 = squared

c 16 = squared d 36 = squared

4 Use blocks to find all factors of:

a 25: and b 9: and c 49: and

d 4: and e 16: and

Whole Numbers 2: Identify and describe properties of prime, composite, square and triangular numbers. Outcomes: MA3-1WM, MA3-2WM, MA3-3WM, MA3-4NA

3

Answers

Concept

25 = 5 × 5, 36 = 6 × 6

1 **a** 25 **b** 36 **c** 49
d 64 **e** 81 **f** 100
g 4 **h** 16 **i** 49 **j** 9
k 36 **l** 100 **m** 1 **n** 64

2 **a** + 11, + 13, + 15, + 17, + 19
b 121, 144
c 4, 16, 36, 64, 100

3 **a** 3 squared **b** 5 squared
c 4 squared **d** 6 squared

4 **a** 1, 25, 5 **b** 1, 9, 3 **c** 1, 49, 7
d 1, 4, 2 **e** 1, 16, 2, 8, 4

1:04 Percentages

Content strand: Number and Algebra

Substrand: Fractions and Decimals 2

Content statements:

- Make connections between equivalent fractions, decimals and percentages.

Outcomes: MA3-1WM, MA3-7NA

Teaching Suggestions

- 1:04 (p. 4) and 1:05 (p. 5) could be treated in the same lesson, as they both deal with the same concept.
- Read percentages as a number out of 100, e.g. '25% is 25 out of 100'.
- Emphasise the relationship between percentages, decimals and common fractions. Use hundred squares and place-value blocks to demonstrate this equivalence.
- Use numeral cards to label fractions, decimals and percentages in many different ways.
- Use the example questions and/or play the drag-and-drop game on the IWB DVD.

Activity

- Students could categorise examples of percentages collected from the environment, e.g. interest rates, discounts, nutrition information on food packaging etc.

Extension Work

- Have students take turns to roll two dice, multiply the numbers rolled and colour the appropriate percentage on a hundred square. The first player to completely colour the hundred square is the winner.

Language

fraction, decimal, percentage, hundredth, tenth, decimal point, per cent sign, whole, denominator, numerator, 50 out of 100, sixty-five per cent, eighty per cent etc.

Resources

- hundred squares
- place-value blocks
- numeral cards
- dice
- IWB DVD 6

Cross-reference

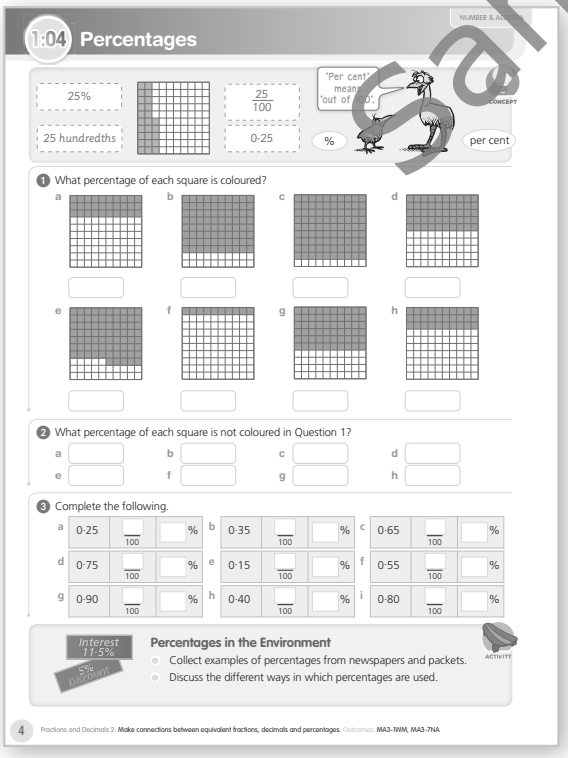
See also: pp. 5, 6, 28, 29

Year 5 p. 23

Evaluation

Is the student able to do the following?

- recognise percentages in everyday situations
- relate a common percentage to a fraction or decimal



Answers

❶ **a** 30% **b** 80% **c** 90% **d** 50%
e 75% **f** 10% **g** 60% **h** 30%

❷ **a** 70% **b** 20% **c** 10% **d** 50%
e 25% **f** 90% **g** 40% **h** 70%

❸

a	0·25	$\frac{25}{100}$	25%
b	0·35	$\frac{35}{100}$	35%
c	0·65	$\frac{65}{100}$	65%
d	0·75	$\frac{75}{100}$	75%
e	0·15	$\frac{15}{100}$	15%
f	0·55	$\frac{55}{100}$	55%
g	0·90	$\frac{90}{100}$	90%
h	0·40	$\frac{40}{100}$	40%
i	0·80	$\frac{80}{100}$	80%

1:05 Percentages

Content strand: Number and Algebra

Substrand: Fractions and Decimals 2

Content statements:

- Make connections between equivalent fractions, decimals and percentages.

Outcomes: MA3-1WM, MA3-7NA

Teaching Suggestions

- Read percentages as a number out of 100, e.g. '75% is 75 out of 100'.
- Emphasise the relationship between percentages, decimals and common fractions.
- Use calculators to convert fractions to decimals, e.g. $\frac{9}{10}$ is 9 divided by 10 to give 0·9.
- Use numeral cards to label fractions, decimals and percentages in many different ways.
- Reinforce the concept of significant and non-significant zeros.

Extension Work

- Have students work in groups with sets of cards representing hundredths, using different names, e.g. $\frac{25}{100}$, 25 out of 100, 0·25 and 25%. Have them use the cards to play familiar games such as *Fish* and *Old Maid*.

Language

whole, fraction, decimal, percentage, hundredth, tenth, decimal point, per cent sign, denominator, numerator, 75 out of 100, seventy-five per cent, sixty per cent etc.

Resources

- hundred squares
- place-value blocks
- calculators
- numeral cards
- cards with various matching expressions representing hundredths
- IWB DVD 6

Cross-reference

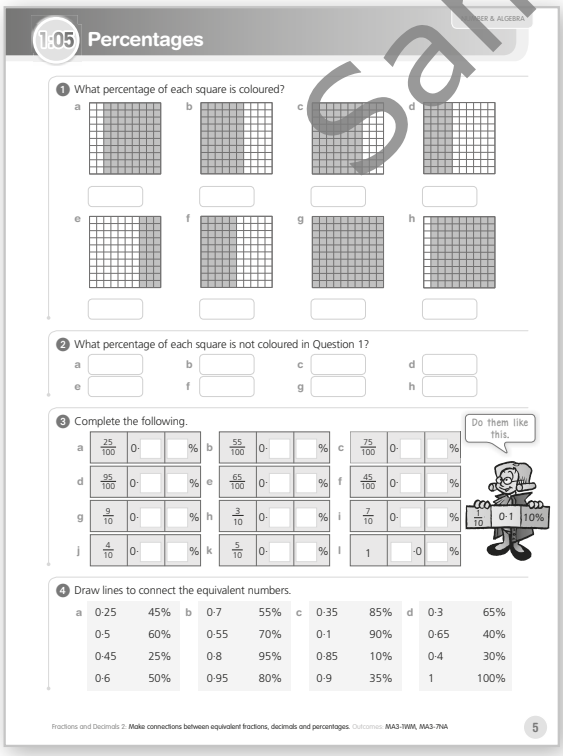
See also: pp. 4, 6, 28, 29

Year 5 p. 23

Evaluation

Is the student able to do the following?

- recognise percentages in everyday situations
- make connections between equivalent fractions, decimals and percentages


1:05 Percentages

1 What percentage of each square is coloured?

a b c d

e f g h

2 What percentage of each square is not coloured in Question 1?

3 Complete the following.

Do them like this.

4 Draw lines to connect the equivalent numbers.

a	0·25	45%	b	0·7	55%	c	0·35	85%	d	0·3	65%
	0·5	60%		0·55	70%		0·1	90%		0·65	40%
	0·45	25%		0·8	95%		0·85	10%		0·4	30%
	0·6	50%		0·95	80%		0·9	35%		1	100%

Fractions and Decimals 2: Make connections between equivalent fractions, decimals and percentages. Outcomes: MA3-1WM, MA3-7NA 5

Answers

1 a 80% b 60% c 70% d 40%
e 30% f 50% g 100% h 90%

2 a 20% b 40% c 30% d 60%
e 70% f 50% g 0% h 10%

3

a	$\frac{25}{100}$	0·25	25%
b	$\frac{55}{100}$	0·55	55%
c	$\frac{75}{100}$	0·75	75%
d	$\frac{95}{100}$	0·95	95%
e	$\frac{65}{100}$	0·65	65%
f	$\frac{45}{100}$	0·45	45%
g	$\frac{9}{10}$	0·9	90%
h	$\frac{3}{10}$	0·3	30%
i	$\frac{7}{10}$	0·7	70%
j	$\frac{4}{10}$	0·4	40%
k	$\frac{5}{10}$	0·5	50%
l	1	1·0	100%

4 a 0·25–45%, 0·5–60%, 0·45–25%, 0·6–50%

b 0·7–55%, 0·55–70%, 0·8–95%, 0·95–80%

c 0·35–85%, 0·1–90%, 0·85–10%, 0·9–35%

d 0·3–65%, 0·65–40%, 0·4–30%, 1–100%

1:06 Percentages

Content strand: Number and Algebra

Substrand: Fractions and Decimals 2

Content statements:

- Make connections between equivalent fractions, decimals and percentages.

Outcomes: MA3-1WM, MA3-7NA

Teaching Suggestions

- Answer Questions 9 to 13 on **ID Card 1**, p. 193.
- Revise the concept of the percentage (%) as a fraction with a denominator of 100.
- Use place-value blocks and hundred squares to demonstrate tenths and hundredths in decimals and corresponding percentages. You could use the tools on the IWB DVD to demonstrate.
- Discuss the equivalence between decimal fractions and common percentages, e.g. 10%, 20%, 25%, 50%, 75%, 100%.
- Use fraction labels (**BLM 2**, p. 201) to name fractions.
- Use the Arithmetic Card (**BLM 9**, p. 208) to practice converting fractions and decimals into percentages.
- Provide students with frequent opportunities to read and write percentages in everyday situations, e.g. '30% of the land is irrigated'.

Extension Work

- Use **BLW 20** Finding Percentage, p. 235, for further work.

Language

fraction, decimal, percentage, per cent (%), tenths, hundredths, zero point four, zero point three five

Resources

- place-value blocks and hundred squares
- **ID Card 1**, p. 193
- fraction labels (**BLM 2**, p. 201)
- arithmetic card (**BLM 9**, p. 208)
- **BLW 20** Finding Percentage, p. 235
- IWB DVD 6

Cross-reference

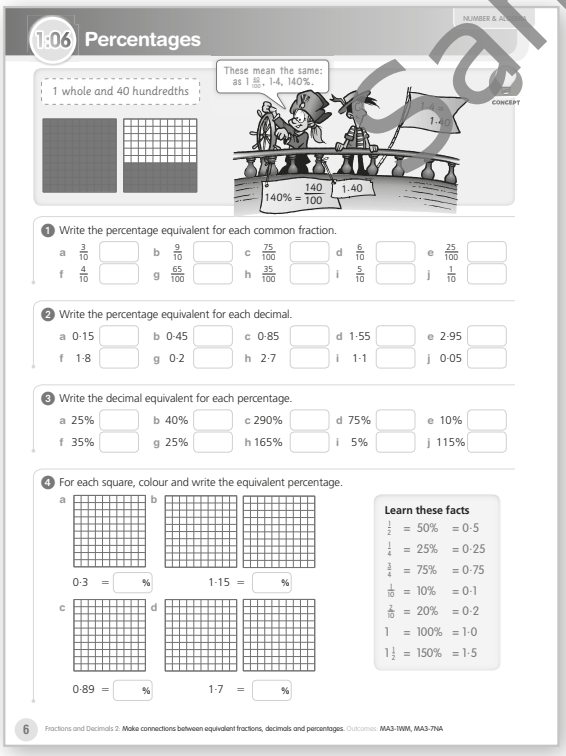
See also: pp. 4, 5, 28 29

Year 5 p. 23

Evaluation

Is the student able to do the following?

- model, compare and represent commonly used fractions, decimals and percentages


1:06 Percentages

1 whole and 40 hundredths

These mean the same: as 1 40/100, 1·40, 140%.

CONCEPT

140% = 140/100 1·40

1 Write the percentage equivalent for each common fraction.

a 3/10 b 9/10 c 75/100 d 6/10 e 25/100

f 4/10 g 65/100 h 35/100 i 5/10 j 1/10

2 Write the percentage equivalent for each decimal.

a 0·15 b 0·45 c 0·85 d 1·55 e 2·95

f 1·8 g 0·2 h 2·7 i 1·1 j 0·05

3 Write the decimal equivalent for each percentage.

a 25% b 40% c 290% d 75% e 10%

f 35% g 25% h 165% i 5% j 115%

4 For each square, colour and write the equivalent percentage.

a b

0·3 = % 1·15 = %

c d

0·89 = % 1·7 = %

Learn these facts

1/2 = 50% = 0·5

1/4 = 25% = 0·25

3/4 = 75% = 0·75

1/10 = 10% = 0·1

2/10 = 20% = 0·2

1 = 100% = 1·0

1 1/2 = 150% = 1·5

6 Fractions and Decimals 2: Make connections between equivalent fractions, decimals and percentages. Outcomes: MA3-1WM, MA3-7NA

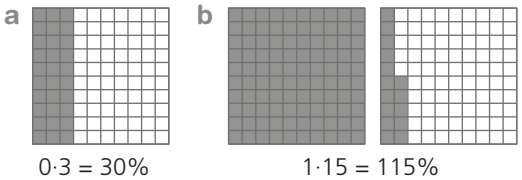
Answers

1 a 30% b 90% c 75% d 60% e 25%
f 40% g 65% h 35% i 50% j 10%

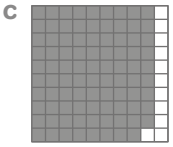
2 a 15% b 45% c 85% d 155% e 295%
f 180% g 20% h 270% i 110% j 5%

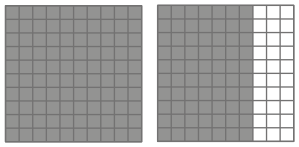
3 a 0·25 b 0·4 c 2·9 d 0·75 e 0·1
f 0·35 g 0·25 h 1·65 i 0·05 j 1·15

4


a 0·3 = 30%

b 1·15 = 115%


c 0·89 = 89%


d 1·7 = 170%

1:07 Triangular Numbers

Content strand: Number and Algebra

Substrand: Whole Numbers 2

Content statements:

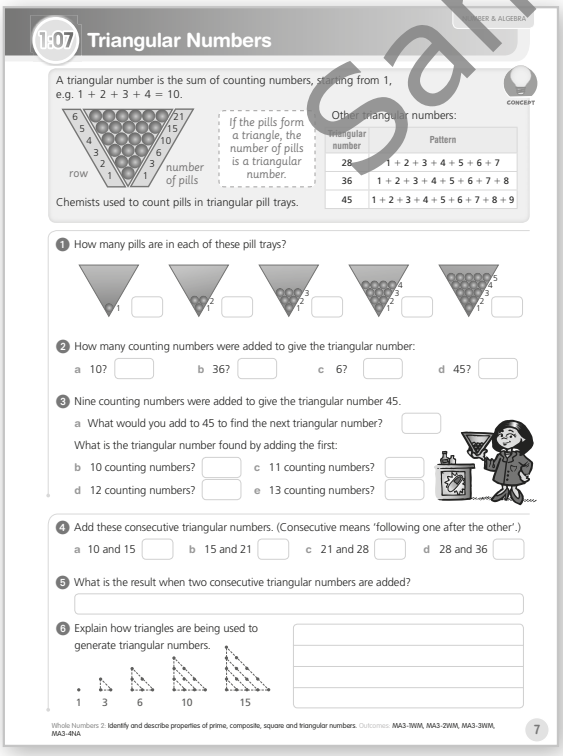
- Identify and describe properties of prime, composite, square and triangular numbers.

Outcomes: MA3-1WM, MA3-2WM, MA3-3WM, MA3-4NA

Teaching Suggestions

- Ask students to model a square number using 16 counters. Ask if 14 counters can be used to make a square. Conclude that, if the number of counters is a square number we can always make a square and, if we can make a square with a group of counters the number of counters must be a square number.
- Ask students what kind of shape they would expect to be made if the number of counters is a triangular number. Allow students to discover some simple triangular numbers using counters. Ask students to write their triangular numbers as the sum of the counters that make up the rows within their triangle. Conclude that every triangular number is made by adding consecutive counting numbers starting at 1.

  1 is a triangular number, 3 is equal to 1 + 2, 6 = 1 + 2 + 3, 10 = 1 + 2 + 3 + 4, 15 = 1 + 2 + 3 + 4 + 5.
- Explain that before the use of digital measuring scales chemists used pill trays to count the number of tablets being given to customers. Discuss the pill tray shown in the concept box.



1:07 Triangular Numbers

A triangular number is the sum of counting numbers, starting from 1, e.g. 1 + 2 + 3 + 4 = 10.

CONCEPT

row

number of pills

If the pills form a triangle, the number of pills is a triangular number.

Other triangular numbers:

Triangular number	Pattern
28	1 + 2 + 3 + 4 + 5 + 6 + 7
36	1 + 2 + 3 + 4 + 5 + 6 + 7 + 8
45	1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9

Chemists used to count pills in triangular pill trays.

1 How many pills are in each of these pill trays?

2 How many counting numbers were added to give the triangular number:
a 10? b 36? c 6? d 45?

3 Nine counting numbers were added to give the triangular number 45.
a What would you add to 45 to find the next triangular number?
What is the triangular number found by adding the first:
b 10 counting numbers? c 11 counting numbers?
d 12 counting numbers? e 13 counting numbers?

4 Add these consecutive triangular numbers. (Consecutive means 'following one after the other'.)
a 10 and 15 b 15 and 21 c 21 and 28 d 28 and 36

5 What is the result when two consecutive triangular numbers are added?

6 Explain how triangles are being used to generate triangular numbers.

1 3 6 10 15

Whole Numbers 2: Identify and describe properties of prime, composite, square and triangular numbers. Outcomes: MA3-1WM, MA3-2WM, MA3-3WM, MA3-4NA

7

- Give students the task of listing the triangular numbers in order as they are discovered, using the calculator to add consecutive numbers. (Adding the next counting number to the last triangular number gives the next triangular number.)
- Ask students to add pairs of small consecutive triangular numbers, e.g. 1 + 3, 3 + 6, 6 + 10. Discuss the answers. What kind of numbers are these?

Extension Work

- Ask students to investigate other special types of numbers such as 'perfect numbers' and 'Fibonacci numbers'. Students could investigate numbers generated by the pattern $3^2 + 3 + 4$, $4^2 + 4 + 5$, $5^2 + 5 + 6$. In each case the next highest square number is generated.

Language

triangular number, square number, counting number, consecutive, generate, patterns

Resources

- counters
- calculator
- IWB DVD 6

Cross-reference

See also page: 2, 3, 30, 31

Evaluation

Is the student able to do the following?

- produce a triangular number
- identify a triangular number

Answers

1. 1, 3, 6, 10, 15
2. **a** 4 **b** 8 **c** 3 **d** 9
3. **a** 10 **b** 55 **c** 66 **d** 78 **e** 91
4. **a** 25 **b** 36 **c** 49 **d** 64
5. The result is the next square number.
6. Answers will vary. In each case, another row of dots is added to the previous diagram to generate the next triangular number (the total number of dots used).

1:08 Negative Numbers

Content strand: Number and Algebra

Substrand: Whole Numbers 2

Content statements:

- Investigate everyday situations that use integers; locate and represent these numbers on a number line.

Outcomes: MA3-1WM, MA3-2WM, MA3-4NA

Teaching Suggestions

- Discuss the concept of a negative number, i.e. a number less than zero.
- Use a thermometer scale as a number line to order numbers including some negative numbers.
- Discuss the use of negative numbers in everyday contexts, e.g. bank balances, scientific experiments.
- Relate the use of negative numbers to the operation of subtraction.
- Ask students to place negative numbers on a number line (**BLM 11**, p. 210). This stencil may require some modification.
- Play the drag-and-drop game on the IWB DVD.

ICT

- Ask students to use the internet to research the use of negative numbers in real-life situations.

Extension Work

- Have students roll two dice three times and record the totals.
- Repeat and record the totals as negative numbers.
- Order the six numbers along a number line drawn on 5 mm grid paper (**BLM 13**, p. 212).

Language

numeral, digits, zero, negative number, less than zero, positive number, more than zero

Resources

- dice
- number lines (**BLM 11**, p. 210)
- 5 mm grid paper (**BLM 13**, p. 212)
- IWB DVD 6

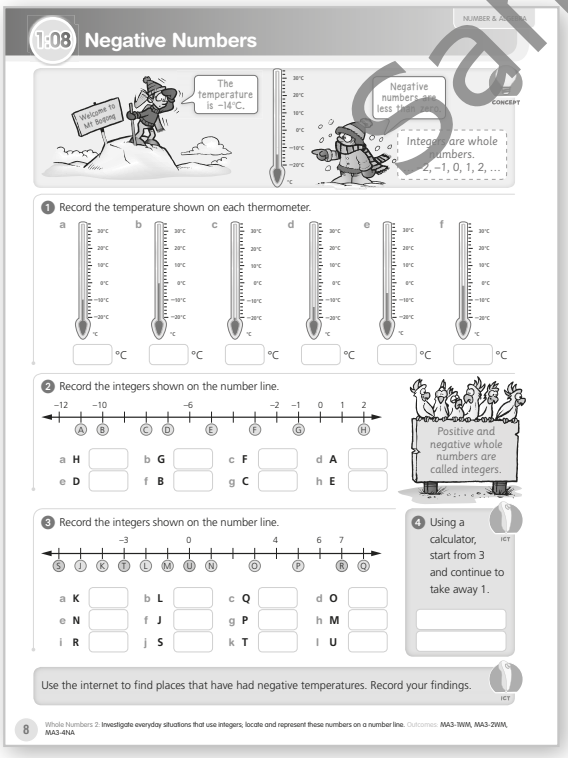
Cross-reference

See also: pp. 9, 12, 13, 14

Evaluation

Is the student able to do the following?

- read, write and order numbers using place value
- locate and represent negative numbers on a number line



Answers

❶ **a** −10°C **b** 0°C **c** −20°C
d −14°C **e** −6°C **f** −2°C

❷ **a** 2 **b** −1 **c** −3 **d** −11
e −7 **f** −10 **g** −8 **h** −5

❸ **a** −4 **b** −2 **c** 8 **d** 3
e 1 **f** −5 **g** 5 **h** −1
i 7 **j** −6 **k** −3 **l** 0

ICT

3, 2, 1, 0, –1, –2, –3 …

1:09 Positive and Negative Numbers

Content strand: Number and Algebra

Substrand: Whole Numbers 2

Content statements:

- Investigate everyday situations that use integers; locate and represent these numbers on a number line.

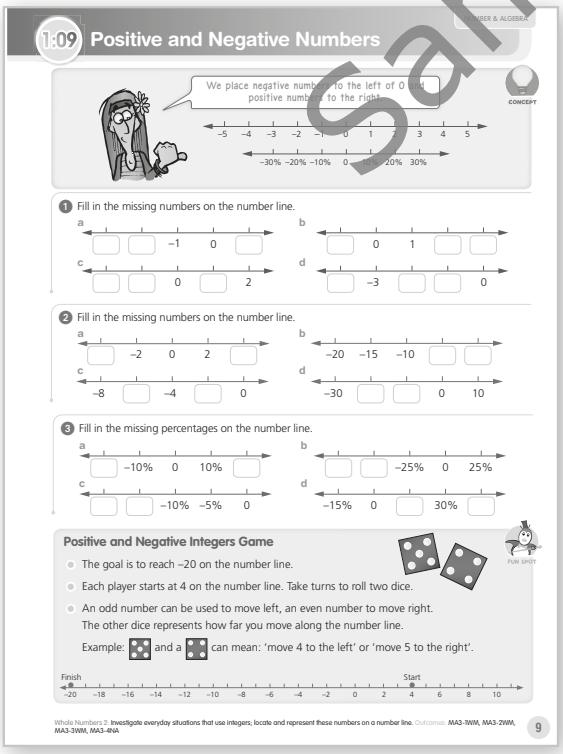
Outcomes: MA3-1WM, MA3-2WM, MA3-3WM, MA3-4NA

Teaching Suggestions

- Revise the definition of the term *negative number*, i.e. a number less than zero.
- Discuss the fact that whole numbers, fractions, decimals and percentages can be extended to include negative numbers.
- Ask students to look carefully at the number lines and compare the use of fractions, decimals and percentages.
- Relate the use of negative numbers to the operation of subtraction.
- Discuss rocket countdowns: 3, 2, 1, 0, 1 after lift-off, 2 after lift-off etc. Discuss the use of negative numbers to say this: 3, 2, 1, 0, –1, –2 etc.
- Use the example questions and/or play the drag-and-drop game on the IWB DVD.

Fun Spot

- Students can work in groups of two or more. Ensure they understand the rules of the game by demonstrating how it works. Choose one dice to represent the direction of movement and the other dice to represent the size of the move.


1:09 Positive and Negative Numbers

We place negative numbers to the left of 0 and positive numbers to the right.

CONCEPT

1 Fill in the missing numbers on the number line.

a –1 0

b 0 1

c 0 2

d –3 0

2 Fill in the missing numbers on the number line.

a –2 0 2

b –20 –15 –10

c –8 –4 0

d –30 0 10

3 Fill in the missing percentages on the number line.

a –10% 0 10%

b –25% 0 25%

c –10% –5% 0

d –15% 0 30%

Positive and Negative Integers Game

FUN SPOT

- The goal is to reach –20 on the number line.
- Each player starts at 4 on the number line. Take turns to roll two dice.
- An odd number can be used to move left, an even number to move right. The other dice represents how far you move along the number line.

Example: and a can mean: 'move 4 to the left' or 'move 5 to the right'.

Finish –20 –18 –16 –14 –12 –10 –8 –6 –4 –2 0 2 4 6 8 10 Start

Whole Numbers 2: Investigate everyday situations that use integers; locate and represent these numbers on a number line. Outcomes: MA3-1WM, MA3-2WM, MA3-3WM, MA3-4NA 9

Extension Work

- Ask students to use number lines (**BLM 11**, p. 210) to devise their own number patterns using fractions, decimals and percentages.

Language

numeral, digits, zero, negative and positive numbers, positive 2, negative 2, minus 2, integer, whole numbers, fractions, decimals, percentages, number line

Resources

- dice
- number lines (**BLM 11**, p. 210)
- IWB DVD 6

Cross-reference

See also: pp. 8, 12, 13, 14

Evaluation

Is the student able to do the following?

- use a number line to complete fraction, decimal and percentage patterns

Answers

1 a –3 –2 –1 0 1

b –1 0 1 2 3

c –2 –1 0 1 2

d –4 –3 –2 –1 0

2 a –4 –2 0 2 4

b –20 –15 –10 –5 0

c –8 –6 –4 –2 0

d –30 –20 –10 0 10

3 a –20% –10% 0 10% 20%

b –75% –50% –25% 0 25%

c –20% –15% –10% –5% 0

d –15% 0 15% 30% 45%

1:10 Improper Fractions and Mixed Numerals

Content strand: Number and Algebra

Substrand: Fractions and Decimals 2

Content statements:

- Compare fractions with related denominators and locate and represent them on a number line.

Outcomes: MA3-1WM, MA3-7NA

Teaching Suggestions

- Answer Questions 9 to 24 on **ID Card 1**, p. 193.
- Revise these terms:
  - *mixed numeral* – a whole number and a fraction part;
  - *improper fraction* – the numerator is bigger than the denominator
  - *proper fraction* – a fraction with a denominator that is smaller than the numerator.
- Use concrete materials, diagrams and number lines to demonstrate mixed numbers and improper fractions.
- Provide frequent opportunities for students to rename mixed numbers as improper fractions.
- Discuss the use of division to find the mixed number for an improper fraction.
- Compare and order fractions with the same denominator using a diagram or number line.
- Play the drag-and-drop game on the IWB DVD.

Extension Work

- Complete **BLW 8** Mixed Numbers, p. 223.
- On 5 mm grid paper (**BLM 13**, p. 212) draw a number line to show quarters from zero to four. Record the fractions as both mixed numbers and improper fractions.

Language

fraction, numerator, denominator, improper fraction, proper fraction, mixed number

Resources

- place-value blocks
- fraction charts
- **ID Card 1**, p. 193
- 5 mm grid paper (**BLM 13**, p. 212)
- **BLW 8** Mixed Numbers, p. 223
- IWB DVD 6

Cross-reference

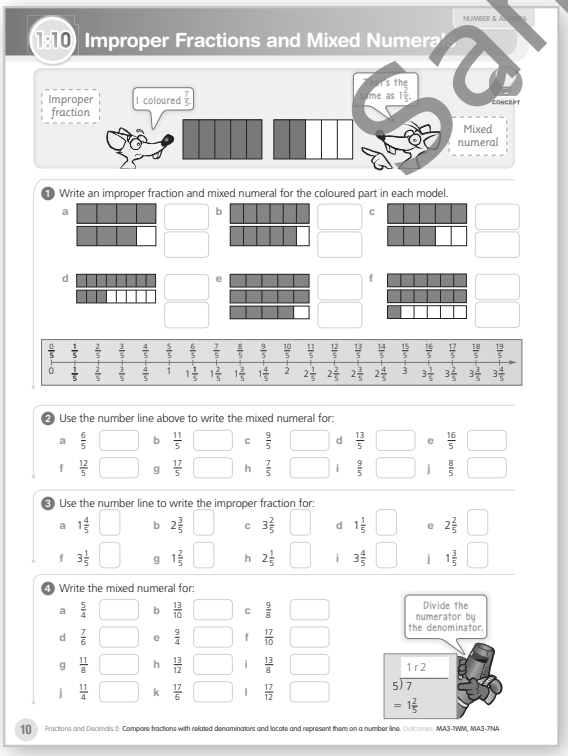
See also: pp. 11, 26

Year 5 p. 17

Evaluation

Is the student able to do the following?

- model, compare and represent commonly used fractions
- express a mixed number as an improper fraction and vice versa



Answers

1 a $\frac{7}{4}, 1\frac{3}{4}$ b $\frac{11}{6}, 1\frac{5}{6}$ c $\frac{8}{5}, 1\frac{3}{5}$
d $\frac{11}{8}, 1\frac{3}{8}$ e $\frac{14}{5}, 2\frac{4}{5}$ f $\frac{13}{6}, 2\frac{1}{6}$

2 a $1\frac{1}{5}$ b $2\frac{1}{5}$ c $1\frac{4}{5}$ d $2\frac{3}{5}$ e $3\frac{1}{5}$
f $2\frac{2}{5}$ g $3\frac{2}{5}$ h $1\frac{2}{5}$ i $1\frac{4}{5}$ j $1\frac{3}{5}$

3 a $\frac{9}{5}$ b $\frac{13}{5}$ c $\frac{17}{5}$ d $\frac{6}{5}$ e $\frac{12}{5}$
f $\frac{16}{5}$ g $\frac{7}{5}$ h $\frac{11}{5}$ i $\frac{19}{5}$ j $\frac{8}{5}$

4 a $1\frac{1}{4}$ b $1\frac{3}{10}$ c $1\frac{1}{8}$
d $1\frac{1}{6}$ e $2\frac{1}{4}$ f $1\frac{7}{10}$
g $1\frac{3}{8}$ h $1\frac{1}{12}$ i $1\frac{5}{8}$
j $2\frac{3}{4}$ k $2\frac{5}{6}$ l $1\frac{5}{12}$