Unit 5: Multiplication and division (I)

Lesson I: Multiples

➜ pages 108–110

1. 3 × 3 = 9
5 × 3 = 15
8 × 3 = 24
These all show the multiples of the number 3.
9, 15 and 24 are all multiples of 3.

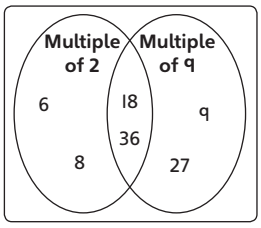
2. a) 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 should be shaded in.
b) 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96 and 99 should be shaded in.

3. a) 80, 30, 102 and 300 should be circled.
b) 70, 95, 530, 35 and 300 should be circled.

4. Circled: is not
Explanations will vary; for example:
64 is not a multiple of 6 because 64 ÷ 10 has a remainder so 64 is not a multiple of 6.

5. a) Answers may vary, but the top right box in the two-way table cannot be filled in as all multiples of 6 are also multiples of 2:

	Multiple of 2	Not a multiple of 2
Multiple of 6	6 12	
Not a multiple of 6	8 4	5 9



b) The section 'multiple of 6 and not a multiple of 2' has no numbers in it as all multiples of 6 are also multiples of 2.

6. It is sometimes true.
Explanations will vary; for example:
If you add the same number of multiples of 4 and 5 together, then the answer will also be a multiple of 9; for example: (3 × 4) + (3 × 5) = 12 + 15 = 27. 27 is a multiple of 9.
It is not always true, though, because 12 is a multiple of 4 and 20 is a multiple of 5 but 4 + 20 = 24, which is not a multiple of 9.

7. No, 777 will not be in the sequence even though it is a multiple of 7 because the start number is not zero but 2. That means all the numbers in the sequence will be 2 more than a multiple of 7.

Reflect

Richard is confused about multiples. A multiple of 7 is any number in the 7 times-table. As 10 is not in the 7 times-table it is not a multiple of 7. However, the calculation does show that 70 is in the 7 times-table so 70 is a multiple of 7.

Lesson 2: Factors

➜ pages 111–113

1. 1 × 18 = 18
2 × 9 = 18
6 × 3 = 18
4 × 5 = 20
2 × 10 = 20
1 × 20 = 20
The factors of 18 are: 1, 2, 3, 6, 9, 18
The factors of 20 are: 1, 2, 4, 5, 10, 20

2. Arrays should be drawn for 1 × 32, 2 × 16 and 4 × 8.
The factors of 32 are 1, 2, 4, 8, 16 and 32.

3. a) Circled: is not
Explanations may vary; for example:
6 is not a factor of 28 because 6 does not divide into 28 exactly.
b) Circled: is
Explanations may vary; for example:
7 is a factor of 84 because 7 goes into 84 exactly 12 times.

4. a) 1 × 36 = 36
2 × 18 = 36
3 × 12 = 36
4 × 9 = 36
6 × 6 = 36
b) 36 ÷ 1 = 36
36 ÷ 2 = 18
36 ÷ 3 = 12
36 ÷ 4 = 9
36 ÷ 6 = 6
36 has 9 factors. They are 1, 2, 3, 4, 6, 9, 12, 18 and 36.

5. 1, 2, 5, 10, 25 and 50.

6. a) Numbers shaded: 20, 1, 10, 50, 4, 5, 100
b) The missing factors are 2 and 25.

7. It is always true. If X is a factor of Y, then Y is a multiple of X.

Reflect

Andy is wrong. Explanations will vary; for example:
Some even numbers (4, 8, 12, …) are multiples of 4 but others are not (2, 6, 10, …).
70 is even, which means it is a multiple of 2. Therefore 70 does have a factor of 2.

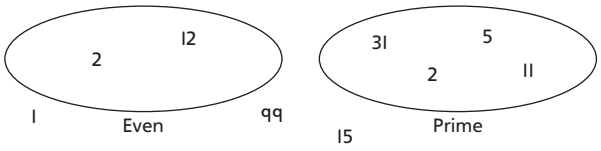
Lesson 3: Prime numbers

➜ pages 114–116

1. 11 cannot be made into an array (other than a 1 by 11 array) as there is always a remainder. Children should show this pictorially.
11 has 2 factors. It is a prime number.

2. Arrays should be drawn for:
15: 1 × 15 or 3 × 5
17: 1 × 17
19: 1 × 19
21: 1 × 21 or 3 × 7
17 and 19 are prime numbers.
15 and 15 are composite numbers.

3.



2 is in both groups.
1, 15 and 99 are not in either group.
No other number can join both groups. All even numbers have 2 as a factor, therefore even numbers which are not 2 will have more than 2 factors (1, 2, the number itself …) so they are not prime.

4. 99 is not a prime number as it is divisible by 1, 3, 9, 11, 33 and 99 so it has more than 2 factors. It is sufficient to show that it has at least 1 factor in addition to 1 and itself; for example: recognising that 3 is a factor of 99 is sufficient to show that it is not prime.

5. a) Circled: true
This is true because some odd numbers (3, 5, 7, 11, …) are prime, but others (9, 15, 21, 25, …) are not.
b) Circled: true
This is true because all numbers that end in 5 have 5 as a factor. So every number that ends in 5 (apart from 5 itself) will have more than 2 factors (1, 5, the number itself …) so they are not prime.

6. a) Circled: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41
b) Answers may vary; for example:
Most prime numbers appear in the 1st and 5th columns.
c) Some columns have no prime numbers because they only contain even numbers greater than 2.
d) Chart filled in up to 100 and circled: 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97
The 5th column has the most prime numbers.

Reflect

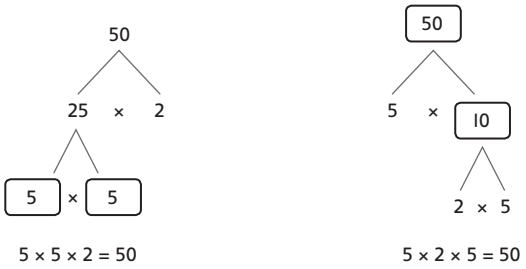
Answers will vary; for example:
Children could draw 33 dots in groups of 3 or 11 to show that 33 has factors of 3 and 11, making it a composite number.

Lesson 4: Using factors

➜ pages 117–119

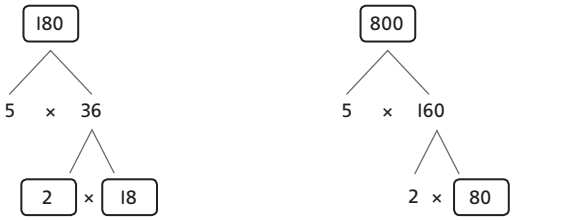
1. a) 3 × 2 × 2 = 12
b) 2 × 3 × 2 = 12 or 2 × 2 × 3 = 12
c) The two calculations give the same product. This is because the 3 factors are the same.

2.



3. 4 × 20 × 5 = 400
a) 4 × 20 = 80
80 × 5 = 400
b) 20 × 5 = 100
100 × 4 = 400
There are 400 hinges in total.

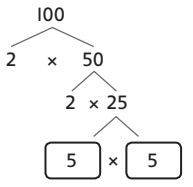
4.



5 × 36 = 5 × 2 × 18 = 180 5 × 160 = 5 × 2 × 80 = 10 × 80

Answers may vary, but look out for the most efficient calculations.

5. Order of factors may vary.
a)



100 = 2 × 2 × 5 × 5

b) Children should draw a factor tree showing:
75 = 3 × 5 × 5
c) Children should draw a factor tree showing:
200 = 2 × 2 × 2 × 5 × 5
d) Answers will vary; ensure all factors are prime numbers.

Reflect

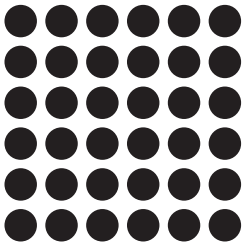
Answers will vary; for example:
Children could draw a factor tree to show the different factors of 28 and then use the factors in a number sentence to equal 140. Encourage the use of the factor 2, as 2 × 5 = 10 and will be easier to multiply; for example: 28 × 5 = 14 × 2 × 5 = 14 × 10 = 140.

Lesson 5: Squares

➜ pages 120–122

1. a) $3^2 = 3 \times 3 = 9$
9 is a square number.
b) 6 squared = 6^2
$6 \times 6 = 36$
36 is a square number.

2. Children must show 6 × 6 = 36 as a square number.



$6^2 = 36$

3. 10 is not a square number. Drawings should show that 10 cannot be arranged as a square array.

4. a) Circled: does
This does show a square number because it represents 3 × 3 = 9.
b) Circled: does not
This does not show a square number because 18 cannot be arranged as a square array.
c) Circled: does
This does show a square number because there are 5 parts of 5. 25 is a square number.

5. Diagrams may vary. Ensure children represent 16 as 4 × 4.

6. Shaded: 4, 1, 81, 144

7. a)

Number	9	25	49
All factors	1, 3, 9	1, 5, 25	1, 7, 49
How many factors?	3	3	3

b) Answers will vary; for example:
16 has factors 1, 2, 4, 8 and 16 so has 5 factors.
c) Yes, Isla is correct. Non-square numbers have pairs of factors, so will always have an even number of factors. As one of the factor pairs in a square number uses the same factor twice, this will mean the square number will always have an odd number of factors.

Reflect

There are 5 square numbers between 50 and 150. They are: 64, 81, 100, 121 and 144.

Lesson 6: Cubes

➜ pages 123–125

1. Diagrams matched:
1st diagram ➜ 3 × 3 × 3
2nd diagram ➜ 2^3
3rd diagram ➜ 2 squared
4th diagram ➜ 2 × 3

2. a) $5^3 = 5 \times 5 \times 5$
b) 6 cubed = 6 × 6 × 6
c) $1^3 = 1 \times 1 \times 1$

3. a) 4 × 4 = 16
4 × 16 = 64
$4^3 = 4 \times 4 \times 4 = 64$
b) 2 × 4 = 8
4 × 8 = 32
32 × 2 = 64
c) 2 × 8 = 16
2 × 16 = 32
32 × 2 = 64

4. a) 3 is not a cube number as $1^3 = 1 \times 1 \times 1 = 1$
b) To work out 3^3, multiply
3 × 3 × 3. So, 3 × 3 = 9; 9 × 3 = 27

5. a) 7 cubed = 343
b) $10^3 = 1{,}000$
c) $1^3 = 1$
d) $0^3 = 0$

6. a) Eight 2 × 2 × 2 cubes will make a 4 × 4 × 4 cube.
Explanations may vary; for example:
$4^3 = 64$ and $2^3 = 8$ and eight lots of 8 go into 64.
b) Eight 5 × 5 × 5 cubes would make a 10 × 10 × 10 cube.
Explanations may vary; for example:
$10^3 = 1{,}000$ and $5^3 = 125$ and eight lots of 125 go into 1,000.
c) $20^3 = 20 \times 20 \times 20 = 8{,}000$

Reflect

You could work systematically to calculate the first 5 cube numbers. These are:
$1^3 = 1 \times 1 \times 1 = 1$
$2^3 = 2 \times 2 \times 2 = 8$
$3^3 = 3 \times 3 \times 3 = 27$
$4^3 = 4 \times 4 \times 4 = 64$
$5^3 = 5 \times 5 \times 5 = 125$

Lesson 7: Inverse operations

➜ pages 126–128

1. a) 8 × 4 = 32
32 ÷ 8 = 4
32 ÷ 4 = 8
b) 6 × 3 = 18
18 ÷ 6 = 3
18 ÷ 3 = 6
c) 4 × 25 = 100
100 ÷ 4 = 25
100 ÷ 25 = 4

2. a) 48 ÷ 6 = 8
b) 8 × 6 = 48

3. a) There are 6 vases and 12 white roses.
b) She needs 33 red roses.

4. a) 2 × 16 = 32
32 ÷ 16 = 2
64 ÷ 2 = 32
32 × 2 = 64
b) 4 × 5 = 20
20 ÷ 5 = 4
100 ÷ 5 = 20
100 = 20 × 5
c) 15 = 45 ÷ 3
30 = 90 ÷ 3
150 ÷ 5 = 30
15 = 75 ÷ 5

5. Bella has written the numbers 5, 13 and 65 in the wrong order in the second division. It should say 65 ÷ 5 = 13. When you use the numbers in a multiplication calculation to write a related division calculation, the product (answer from the multiplication) will be the first number in the related division.

6. a) Reena started with 23.
b) Andy divided by 7.
c) Possible starting numbers: 61, 67, 73, 79 or 97.

Reflect

18 ÷ 6 = 3 54 ÷ 3 = 18
Encourage children to use the inverse to solve the missing number equations; for example:
3 × ? = 18 and 3 × 18 =?

Lesson 8: Multiplying whole numbers by 10, 100 and 1,000

➜ pages 129–131

1. a) 4 × 100 = 400
b) 10 × 6 = 60 (6 ten counters drawn)
c) 1,000 × 5 = 5,000 (5 thousand counters drawn)

2. Diagrams matched:
1st diagram ➜ 1 × 3
2nd diagram ➜ 100 × 3
3rd diagram ➜ 3 × 1,000
4th diagram ➜ 10 × 10

3. a) 11 × 1 = 11
b) 11 × 100 = 1,100
c) 11 × 10 = 110
d) 11 × 1,000 = 11,000

4. Errors corrected: 40 × 100 = 4,000 (not 400)
1,000 × 20 = 20,000 (not 2,000)

5.

	TTh	Th	H	T	O
Number				3	7
× 10			3	7	0
× 100		3	7	0	0
× 1,000	3	7	0	0	0

	TTh	Th	H	T	O
Number				7	0
× 10			7	0	0
× 100		7	0	0	0
× 1,000	7	0	0	0	0

6. a) 5 × 10 = 50
50 × 10 = 500
50 × 100 = 5,000
5 × 1,000 = 5,000
b) 3 × 1,000 = 3,000
300 × 10 = 3,000
300 × 100 = 30,000
300 × 1 = 300
c) 15 × 1,000 = 15,000
100 × 15 = 1,500
1,500 = 150 × 10
15,000 = 150 × 100
Children may explain what they notice in different ways; for example:
Each set of calculations are related.

7. a) Answers will vary; for example:
8 × 100 < 90 × 10
5 × 10 × 10 < 20 × 100
100 × 50 > 10 × 10 × 10 × 4
7 × 10 < 10 × 10 × 6 < 10 × 100
b) Possible answers (the order of operations may vary):
2 × 1,000 × 10 = 2,000 × 10
2 × 100 × 100 = 2,000 × 10
2 × 1,000 × 100 = 2,000 × 100
2 × 1,000 × 1,000 = 2,000 × 1,000
20 × 100 = 200 × 10
20 × 1,000 = 200 × 100
2,000 × 10 = 200 × 100
2,000 × 100 = 200 × 1,000

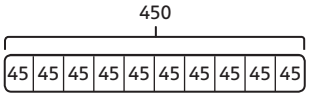
Reflect

Answers will vary. Children should show calculations which involve powers of 10 and have the answer 1,300; for example:
13 × 100 = 1,300
130 × 10 = 1,300
1,300 × 1 = 1,300

Lesson 9: Dividing whole numbers by 10, 100 and 1,000

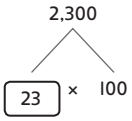
➜ pages 132–134

1. a)



450 is 45 tens.
450 ÷ 10 = 45

b)



2,300 is 23 hundreds.
2,300 ÷ 100 = 23

c) 7,000 is 7 thousands.
7,000 ÷ 1,000 = 7

d) Answers may vary but most likely answer is:
500 is 5 hundreds.
500 ÷ 100 = 5

2. 1,100 ÷ 11 = 100
1,100 ÷ 100 = 11

3. a) 8,000 ÷ 1,000 = 8
8 1,000 kg weights would balance the scales.

b) 8,000 ÷ 100 = 80
80 100 kg weights would balance the scales.

c) 8,000 ÷ 10 = 800
800 10 kg weights would balance the scales.

4. a) 500 ÷ 10 = 50
500 ÷ 100 = 5
50 ÷ 10 = 5

b) 1,500 ÷ 100 = 15
150 ÷ 10 = 15
15,000 ÷ 1,000 = 15

c) 5,000 ÷ 50 = 100
5,000 ÷ 500 = 10
500 ÷ 50 = 10

5. a) There are 20 marbles in each jar.

b) In total, there are 100 jars.

6. a)

★	▲
5	500
70	7,000
7	700
500	50,000

▲ is 100 times greater than ★.

b) Calculations will vary but ♥ should be 1,000 × ☁; for example:
4,000 ÷ 10 = 10 × 10 × 4; 13,000 ÷ 10 = 10 × 10 × 13

Reflect

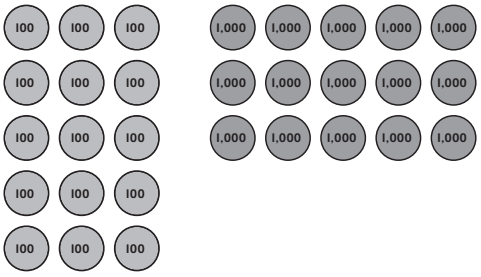
3,300 ÷ 100 = 33 is correct. When you divide by 100, all the digits move 2 places to the right. You can use a place value grid to check.

Lesson 10: Multiplying and dividing by multiples of 10, 100 and 1,000

➜ pages 135–137

1. Diagrams matched:
Top diagram ➜ 4 × 3 tens ➜ 12 tens = 120
2nd diagram ➜ 3 × 2 hundreds ➜ 6 hundreds = 600
3rd diagram ➜ 2 × 3 thousands ➜ 6 thousands = 6,000
4th diagram ➜ 3 × 4 hundreds ➜ 12 hundreds = 1,200

2. Children should draw 5 lots of 3 hundred counters and 3 lots of 5 thousand counters.



a) 5 × 300 = 15 hundreds = 1,500

b) 3 × 5,000 = 15 thousands = 15,000

3. a) 300 × 6 = 1,800
6 × 300 = 1,800
1,800 ÷ 300 = 6
1,800 ÷ 6 = 300

b) 30 × 60 = 1,800
60 × 30 = 1,800
1,800 ÷ 30 = 60
1,800 ÷ 60 = 30

4. a) 3 × 700 = 2,100
b) 5,000 × 9 = 45,000
c) 5 × 80 = 400
d) 1,200 ÷ 300 = 4
e) 150 ÷ 5 = 30
f) 72,000 ÷ 9,000 = 8

5. I agree with Reena.
Explanations will vary; for example:
because 4 × 5 = 20 so 40 × 5 = 200 and 40 × 50 = 2,000.

6. a) 600 × 6 = 400 × 9
There are nine 400 g boxes.
b) 80 × 70 = 800 × 7
2,100 ÷ 30 = 21,000 ÷ 300
40,000 ÷ 500 = 400 ÷ 5

Reflect

Answers may vary but should include multiplying and/or dividing by powers of ten or multiples of powers of ten; for example: 4 × 10 = 40; 80 ÷ 2 = 40; 800 ÷ 20 = 40

End of unit check

➜ pages 138–139

My journal

Children may write answers such as:

I know 250 isn't a square number because 15 squared is 225 and 16 squared is 256; 2,500 is a square number because 50 × 50 is 2,500; I know 2,500 is going to be square because 5 × 5 is 25. If I multiply both 5s by 10 then the answer must be multiplied by 100.
25 × 100 = 2,500.

Power puzzle

Prime factors of 90 = 2 × 3 × 3 × 5

Prime factors of 210 = 2 × 3 × 5 × 7