MATHLETICS

G SERIES Student Book

Multiplication and Division

Name _____

Series G – Multiplication and Division

Contents

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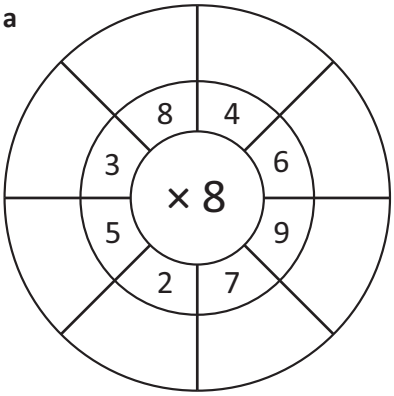
Mental multiplication strategies – multiples and multiplication facts

Multiples are the answers you get when you multiply 2 factors:
Think about your 12 times tables where 12 is always a factor.
What are the multiples of 12? 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, 144 …

12 × factor = multiple

1 **Time how quickly you can find the multiples:**

a



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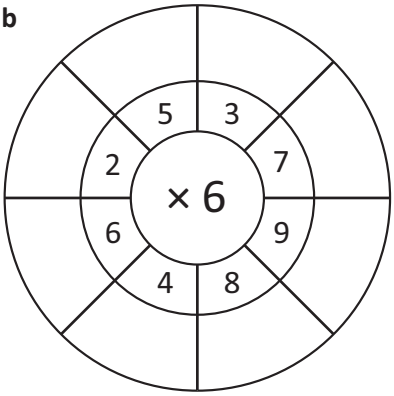

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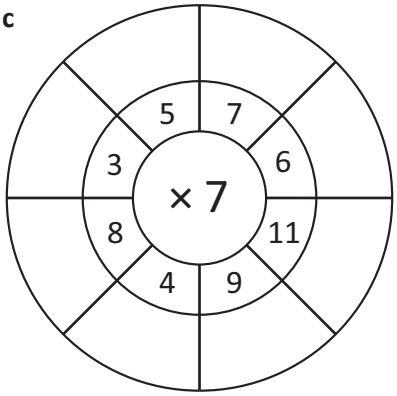

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2 **Add the missing multiples to the board:**

a	**7**		21						
b	**4**				20				
c	**99**	88							11
d	**81**	72							

3 **What number am I?**

a I am a multiple of 7.

I am also a multiple of 3.

My ones digit is half my tens digit.

I am _____

b I am a multiple of 20.

I have 3 digits.

My hundreds digit and tens digit add to make 9.

Half of me is less than 100.

I am _____

c I am an even number between 50 and 99.

I am a multiple of 9.

My tens digit is 5 more than my ones digit.

I am _____

Mental multiplication strategies – doubling and halving

To multiply a number by four, we double it twice:

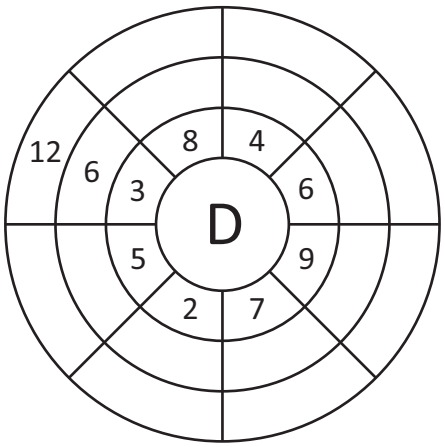
16 × 4 double once = 32 double twice = 64

To multiply a number by eight, we double it three times:

13 × 8 double once = 26 double twice = 52 double three times = 104

1 **Complete the doubling wheels:**

a



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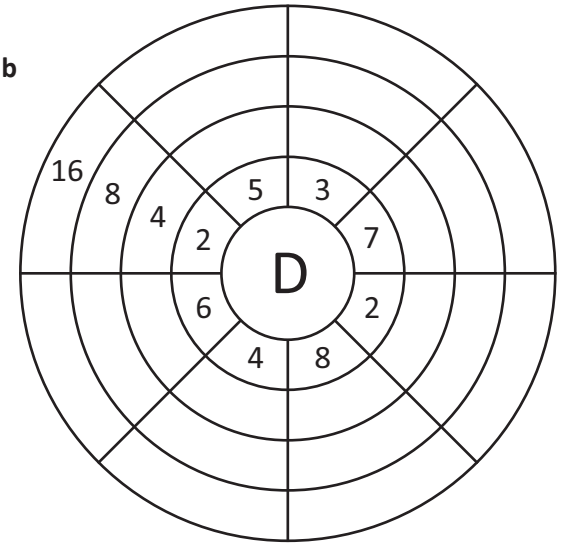


2 **Now try these. The first one has been done for you.**

a	14 × 8	*28*	*56*	*108*	**b**	310 × 8			
c	23 × 8				**d**	52 × 8			
e	105 × 8				**f**	402 × 8			

Doubling times tables facts mean you double your recall. Look at these:

6 × is double 3 × **12 ×** is double 6 × **14 ×** is double 7 × **18 ×** is double 9 ×

This is a useful trick for when the problem looks too big to work out in your head.

3 **Use doubles to solve these. The first one has been done for you.**

a	6 × 13	*39*	*78*	**b**	14 × 5			
c	21 × 6			**d**	14 × 9			
e	12 × 13			**f**	18 × 8			

Mental multiplication strategies – doubling and halving

We can use the double and halve strategy to get to an easy multiplication fact.

15 × 18 Double 15 and halve 18

30 × 9 This is an easier fact to work with.

= 270

4 **Practise your doubles and halves. You get double points for correct double answers and half points for correct half answers. What is your score?**

Double				Halve			
32		84		68		48	
48		96		150		50	
55		19		144		122	

Halves Score

Doubles Score

Total Score

5 **Look at the options below:**

a Circle the ones you could use the double and halve strategy with.

odd number × even number	even number × even number	odd number × odd number
15 × 8	**25 × 18**	**13 × 13**

b Use the examples to help explain your choice:

_____

6 **Solve these using the double and halve strategy:**

a 6 × 14 = ☐ × ☐ = ☐

b 4 × 16 = ☐ × ☐ = ☐

c 25 × 16 = ☐ × ☐ = ☐

d 25 × 12 = ☐ × ☐ = ☐

e Reuben buys 16 boxes of golf balls. Each box costs $25.00. How much does he spend?

16 × ☐ = ☐ × ☐ = ☐

f Anna has arranged her magazines onto 5 shelves. Each shelf holds 22 magazines. How many magazines does she have?

5 × ☐ = ☐ × ☐ = ☐

Mental multiplication strategies – multiplying by multiples of ten

Multiplying a whole number by 10 makes a number larger by one place value: **10 × 4 = 40**

Multiplying by 100 makes it larger by 2 place values: **100 × 4 = 400**

Multiplying by 1 000 makes it larger by three place values: **1 000 × 4 = 4 000**

1 **Multiply the numbers below as shown:**

a 10 × 42 = ☐ **b** 10 × $98 = ☐ **c** 10 × 5.5 = ☐

d 100 × 42 = ☐ **e** 100 × $98 = ☐ **f** 100 × 5.5 = ☐

g 1 000 × 42 = ☐ **h** 1 000 × $98 = ☐ **i** 1 000 × 5.5 = ☐

We multiply by a multiple of 10 such as 20 or 40 in two parts. Look at 40 × 7:

(4 × 7) × 10 = 280 OR **(10 × 7) × 4 = 280** Either method will work.

We can do the same with hundreds or thousands: **400 × 7 = 4 × 7 × 100 = 2 800**

2 **Choose a method to solve these problems:**

a It is said the average adult laughs around 20 times per day. How many laughs a day would 9 adults have?

_____ × _____ × _____ = ☐

b Children are said to laugh 400 times a day. How many laughs per day would the 9 adults have had when they were young?

_____ × _____ × _____ = ☐

c Small hummingbirds can beat their wings 60 times per second. How many times do they beat their wings in a minute? (Hint: how many seconds in a minute?)

_____ × _____ × _____ = ☐

d Great white sharks have around 3 000 teeth. How many teeth would 20 sharks have?

_____ × _____ × _____ = ☐

e The mandrill is the largest monkey in the world with male mandrills weighing up to 51 kg. What would be the weight of 300 large male mandrills?

_____ × _____ × _____ = ☐ kg

Mental multiplication strategies – split strategy

Sometimes it is easier to split a number into parts: **13 × 25 =** ☐

13 × 25

10 3

(10 × 25) + (3 × 25)

250 + 75 = 325

Split one of the numbers.

Work out the brackets.

Add the answers together.

1 **Use the split method to solve these problems. Use the frames to help organise your thoughts:**

a 52 × 8

(*50* × *8*) + (*2* × *8*)

_____ + _____

= ☐

b 73 × 9

(____ × ____) + (____ × ____)

_____ + _____

= ☐

c 82 × 6

(____ × ____) + (____ × ____)

_____ + _____

= ☐

d 25 × 9

(____ × ____) + (____ × ____)

_____ + _____

= ☐

e 75 × 5

(____ × ____) + (____ × ____)

_____ + _____

= ☐

f 16 × 12

(____ × ____) + (____ × ____)

_____ + _____

= ☐

2 **Use coloured pencils to match a problem in the left column with its parts. Work out and add the parts, then write the answer in the column on the right. The first one has been done for you.**

33 × 30	10 × 9 =	990
25 × 7	20 × 7 =	
15 × 9	1 × 6 =	
61 × 6	3 × 30 = 90	
75 × 8	70 × 8 =	
	5 × 7 =	
	5 × 8 =	
	60 × 6	
	30 × 30 = 900	
	5 × 9 =	

Mental multiplication strategies – compensation strategy

When multiplying we can round to an easier number and then adjust or compensate.
Look how we do this with **29 × 4**
29 is close to 30. We can do 30 × 4 in our heads: **30 × 4 = 120**
We have to take off 4 because we used one group of 4 too many: 120 – (1 × 4) = 116

4 × 29 = 116

1 **Use the compensation strategy to answer the questions.**
The first one has been done for you.

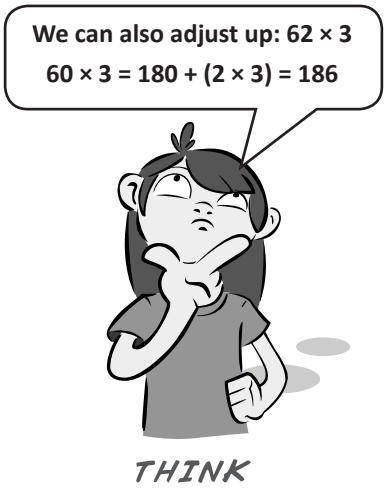
a 39 × 3 = 120 – (1 × 3) = 117

b 8 × 49 = _____ – (_____ × _____) = _____

c 78 × 5 = _____ – (_____ × _____) = _____

d 7 × 41 = _____ + (_____ + _____) = _____

e 72 × 5 = _____ + (_____ + _____) = _____



2 **We often use rounding and compensation when we are shopping, as the numbers are often very close to the next dollar. Use the strategy to find the prices for these purchases. Make sure you estimate first so you don't get your dollars and cents mixed up.**

a

$19.98

Buy 3 shirts.

e:

b

$8.98

Buy 4 books.

e:

c

$1.95

Buy 5 packs of chips.

e:

d

$2.95

Buy 8 magazines.

e:

Mental division strategies – inverse operations

As we know, multiplication and division are inverse operations. **8 × 9 = 72**
This means they do the reverse of each other: **72 ÷ 9 = 8**

We can use our knowledge of the times tables to help us answer division questions.

1 **Complete these fact families:**

a 8 × ☐ = 24
24 ÷ 8 = ☐

b 8 × ☐ = 32
32 ÷ 8 = ☐

c 7 × ☐ = 42
42 ÷ 7 = ☐

d 9 × ☐ = 27
27 ÷ 9 = ☐

e 5 × ☐ = 25
25 ÷ 5 = ☐

f 8 × ☐ = 96
96 ÷ 8 = ☐

2 **Use your knowledge of multiplication to help you mentally solve these problems. Some will have remainders.**

a 36 ÷ 3 = ☐

b 63 ÷ 7 = ☐

c 121 ÷ 11 = ☐

d 120 ÷ 10 = ☐

e 25 ÷ 6 = ☐

f 37 ÷ 8 = ☐

g 68 ÷ 11 = ☐

h 113 ÷ 12 = ☐

What do we do when there are remainders? We have to guess, check and improve.

27 ÷ 5 = ?

5 × 6 = 30 **Too high**

4 × 5 = 20 **Too low, there are 7 left over**

5 × 5 = 25 **There are 2 left over so 27 ÷ 5 = 5 r 2**

3 **Try these:**

a 42 cupcakes are shared evenly amongst you and 7 friends. How many whole cakes does each person receive?

b How do you recommend sharing the remainder?

c 102 pencils need to be put into packets of 12. How many full packs can be made? How many pencils are left over?

Mental division strategies – split strategy

Division problems become easier if you split the number to be divided into recognisable facts.

Look at the problem 68 ÷ 2

Can we divide 68 into 2 multiples of 2?

One option is 60 and 8. These are both easily divided by 2.
We do this then we add the two answers together.

68 ÷ 2

60 8

÷ 2 ÷ 2

30 + 4 = 34

Or, with two even numbers, we can keep halving until we get to known number facts:

256 ÷ 64 → 128 ÷ 32 → 64 ÷ 16 → 32 ÷ 8 = 4

1 **Use the split strategy to divide these numbers:**

a 112 ÷ 8

80 *32*

÷ 8 ÷ 8

_____ + _____ = ☐

b 115 ÷ 5

_____ _____

÷ 5 ÷ 5

_____ + _____ = ☐

c 102 ÷ 6

_____ _____

÷ 6 ÷ 6

_____ + _____ = ☐

2 **Choosing a strategy, solve these problems. Try and do them in your head.**

a 68 ÷ 16 = ☐

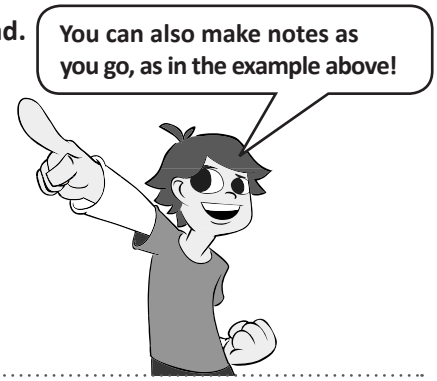
b 284 ÷ 4 = ☐

c 126 ÷ 2 = ☐

d 168 ÷ 8 = ☐

e 196 ÷ 2 = ☐

f 744 ÷ 12 = ☐



3 **Choose a strategy and solve these:**

a 848 candy bonbons are thrown into the audience at an end of year school concert. If the teachers bought enough bonbons for each child to receive 8, how many audience members are there?

b Your class of 24 ended up doing extremely well out of the toss. Not only were you positioned well, you had a 'show no mercy' approach which resulted in the class scoring 192 of the bonbons. On average, how many was this per student?

c After the concert, your class feels bad that you squashed so many kindy kids in your quest for the bonbons. You decide to give 90 of them to the 18 little ones. How many does each kindy kid get?

Mental division strategies – using factors

Factors are numbers you multiply together to get to another number:

factor × factor = whole number

Knowing the factors of numbers is helpful when solving multiplication and division problems.

1 **Complete these factor activities:**

a List all the factors of the following numbers. The first one has been done for you.

36	1, 36, 2, 18, 3, 12, 4, 9, 6
45	
72	
144	
100	
48	
64	

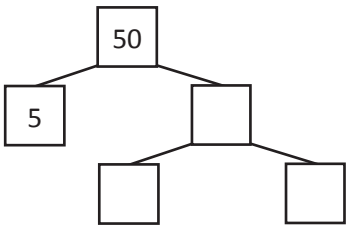
b Generate 2 sets of factors for each number. The first one has been done for you.

64	8 × 8	32 × 2
42		
24		
90		
120		
132		
240		

Factor trees help us work out the prime factors of numbers. Prime factors are the factors that can be divided no further, except by themselves and one.

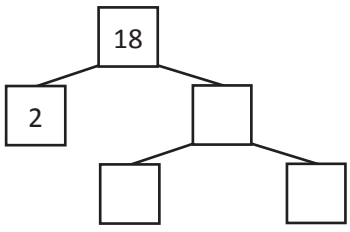
2 **Practise finding factors by completing these factor trees:**

a



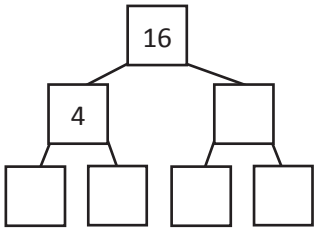
____ × ____ × ____ = 50

b



____ × ____ × ____ = 18

c



___ × ___ × ___ × ___ = 16

3 **Find the answer to these:**

a What are the common factors of 24 and 60?

b What is the highest common factor of 75 and 125?

c What is the highest common factor of 36 and 63?

Mental division strategies – using factors

When we are dividing by 2 digit numbers we can split the divisor into two factors. This makes the problem easier. Then we do the division in two steps:

216 ÷ 18	9 and 2 are factors of 18.
216 ÷ 2 = 108	We divide 216 by 2.
108 ÷ 9 = 12	We then divide 108 by 9.
	216 ÷ 18 = 12

4 **For each problem, find a pair of factors you can work with and solve these problems:**

a 564 ÷ 12 ÷ ☐ ÷ ☐

☐ ÷ ☐ = ☐

☐ ÷ ☐ = ☐

= ☐

b 126 ÷ 14 ÷ ☐ ÷ ☐

☐ ÷ ☐ = ☐

☐ ÷ ☐ = ☐

= ☐

c 330 ÷ 15 ÷ ☐ ÷ ☐

☐ ÷ ☐ = ☐

☐ ÷ ☐ = ☐

= ☐

d 918 ÷ 18 ÷ ☐ ÷ ☐

☐ ÷ ☐ = ☐

☐ ÷ ☐ = ☐

= ☐

5 **These problems have been worked out already but there are 2 wrong answers. Tick the ones that have been worked out correctly. If errors have been made, circle where it all began to go wrong:**

a 192 ÷ 12 = 16

3 and 4 are factors of 12

192 ÷ 4 = 48

48 ÷ 3 = 16

b 288 ÷ 24 = 24

2 and 6 are factors of 24

288 ÷ 6 = 48

48 ÷ 2 = 24

c 280 ÷ 40 = 56

5 and 8 are factors of 40

280 ÷ 8 = 35

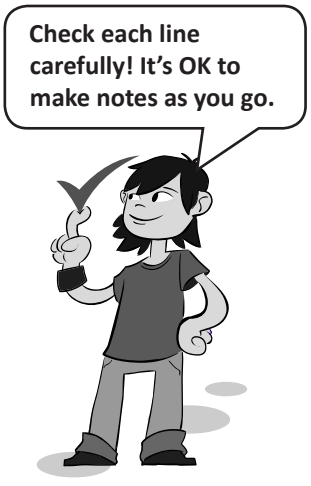
280 ÷ 5 = 57

d 510 ÷ 30 = 17

3 and 10 are factors of 30

510 ÷ 10 = 51

51 ÷ 3 = 17



Mental division strategies – rules of divisibility

Divisibility tests tell us if number can be divided evenly by another, with no remainder.
These are handy rules to know:

2 A number can be divided by 2 if the ones digit is even.

4 A number can be divided by 4 if the last 2 digits form a number that can be divided by 4.

5 A number can be divided by 5 if the ones digit is 0 or 5.

10 A number can be divided by 10 if the number ends in a zero.

100 A number can be divided by 100 if the number ends in 2 zeros.

8 A number can be divided by 8 if the last 3 digits form a number that can be divided by 8.

3 A number can be divided by 3 if you add all the digits and the sum is divisible by 3.

9 A number can be divided by 9 if you add all the digits and the sum is divisible by 9.

1 **Test these rules. Circle the numbers that match the stated rule.**

a

Divisible by 2
432
235
628
900
12 562

b

Divisible by 5
350
75
5 556
34 512
17 890

c

Divisible by 4
3 432
5 208
359
6 256
32 547

d

Divisible by 10
4 560
83 210
8 436
187 490
11 609

e

Divisible by 3
36
932
3 561
22 468
13 906

f

Divisible by 100
4
570
26 730
459 800
934 600

2 **Each of the numbers below has one or more missing digits. Add the digit needed to make the statements true. For some of the numbers, more than one choice of digit would work.**

a 54___ is divisible by 4.

b 2___ ___5 is divisible by 9.

c 2 35___ is divisible by 3.

d 3 4___8 is divisible by 8.

e 45 67___ is divisible by 10.

f 678 9___ ___ is divisible by 100.

g 156 84___ is divisible by 8.

h 5 4___ ___ is divisible by 5.

Mental division strategies – dividing by multiples of ten

Dividing a whole number by 10 makes it smaller by one place value: **80 ÷ 10 = 8**

Dividing by 100 makes a number smaller by 2 place values: **80 ÷ 100 = 0.8**

Dividing by 1 000 makes it smaller by three place values: **80 ÷ 1 000 = 0.08**

1 **Solve these problems by moving the appropriate number of place values:**

a 550 ÷ 10 = ☐ **b** 550 ÷ 100 = ☐ **c** 550 ÷ 1 000 = ☐

d 12 000 ÷ 10 = ☐ **e** 12 000 ÷ 100 = ☐ **f** 12 000 ÷ 1 000 = ☐

g 126 ÷ 10 = ☐ **h** 126 ÷ 100 = ☐ **i** 126 ÷ 1 000 = ☐

We divide by a multiple of 10 such as 20 or 40 in two parts. Look at **480 ÷ 40**:

480 ÷ 10 ÷ 4 OR **480 ÷ 4 ÷ 10**

2 **Solve these problems:**

a 270 ÷ 30
270 ÷ 10 ÷ 3 = ☐

b 550 ÷ 50
550 ÷ 10 ÷ 5 = ☐

c 840 ÷ 20
840 ÷ 10 ÷ 2 = ☐

d 8 000 ÷ 40
8 000 ÷ 10 ÷ 4 = ☐

e 9 000 ÷ 30
9 000 ÷ 10 ÷ 3 = ☐

f 12 000 ÷ 200
12 000 ÷ 100 ÷ 2 = ☐

3 **Use doubling or repeat doubling to help you get to an easier problem:**

a 625 ÷ 5 = ☐ ÷ ☐ = ☐

b 275 ÷ 5 = ☐ ÷ ☐ = ☐

c 1 250 ÷ 5 = ☐ ÷ ☐ = ☐

d 450 ÷ 25 = ☐ ÷ ☐ = ☐ ÷ ☐ = ☐

e 850 ÷ 25 = ☐ ÷ ☐ = ☐ ÷ ☐ = ☐

Doubling is a useful strategy to use to get me to multiples of ten. Look at 225 ÷ 5.

If I double both numbers I can divide 450 by 10. Much easier!

Written methods – contracted multiplication

	H	T	O
	$^{1}1$	$^{1}5$	6
×			3
	4	6	8

Contracted multiplication is one way of solving multiplication problems.

We estimate first: 150 × 3 = 450. The answer will be around 450.

We start in the ones column. 3 × 6 is 18 ones.

We rename this as 1 ten and 8 ones. We put the 8 in the ones column and carry the ten to the tens column.

3 × 5 tens is 15 plus the carried ten is 16 tens.

We rename this as 1 hundred and 6 tens. We put the 6 in the tens column and carry the hundred.

3 × 1 hundred is 3 hundreds plus the carried one is 4 hundred.

1 **Solve these problems. Round and estimate first:**

a e:

		H	T	O
		7	2	1
×				3

b e:

		H	T	O
		8	1	2
×				7

c e:

	Th	H	T	O
		4	5	2
×				5

2 **Now multiply by 2 digits:**

a

		H	T	O
		4	4	
×		1	2	
+				

		H	T	O
		$^{1}1$	$^{1}5$	6
×	$^{2}2$	^{2}	4	3
		$^{1}4$	6	8
+	6	2	4	0
	6	7	0	8

When we multiply by two digits, we multiply by the ones first. Then we multiply by the tens, placing a zero in the ones column to show there are no ones.

We add the 2 lines together.

It's important not to confuse the carried ones and the carried tens – keep them separate.

b

	Th	H	T	O
			5	5
×			3	3
+				

c

	Th	H	T	O
			9	9
×			5	2
+				

d

	Th	H	T	O
			3	6
×			4	3
+				

Written methods – extended multiplication

	H	T	O	
	1	5	6	
×			3	
		1	8	← (3 × 6)
	1	5	0	← (3 × 50)
+	3	0	0	← (3 × 100)
	4	6	8	

In extended multiplication we multiply each place value separately. Then we add all the answers together.

1 **Solve these problems using extended multiplication. Round and estimate first:**

a e: _____

	4	4	6	
×			2	
				(2 × 6)
				(2 × 40)
+				(2 × 400)

b e: _____

	7	5	3	
×			7	
				(7 × 3)
				(7 × 50)
+				(7 × 700)

c e: _____

	4	2	9	
×			8	
				(8 × _____)
				(8 × _____)
+				(8 × _____)

d e: _____

	3	1	1	9	
×				8	
					(8 × _____)
					(8 × _____)
					(8 × _____)
+					(8 × _____)

e e: _____

	5	3	4	1	
×				7	
					(7 × _____)
					(7 × _____)
					(7 × _____)
+					(7 × _____)

f e: _____

	3	3	2	2	
×				5	
					(5 × _____)
					(5 × _____)
					(5 × _____)
+					(5 × _____)

2 **Calculate your earnings in your summer job. Show all your working out:**

You can fill 145 punnets of strawberries in a morning's work. Afternoons are for swimming and washing off all that juice. You get paid 8¢ per punnet.

a How much would you earn each day?

b How much would you earn in a 5 day week?

Written methods – extended multiplication

When we multiply by 2 digits we have 2 options for setting the problem out – compact or full.

You can select the method that suits you best.

		2	6	
×		2	3	
		7	8	(3 × 26)
+	5	2	0	(20 × 26)
	5	9	8	

		2	6	
×		2	3	
		1	8	(3 × 6)
		6	0	(3 × 20)
	1	2	0	(20 × 6)
+	4	0	0	(20 × 20)
	5	9	8	

3 **Solve these problems using the method that suits you best:**

a e:

			2	4
×			4	3
+				

b e:

			7	2
×			5	8
+				

c e:

			3	5
×			3	6
+				

d e:

			7	4
×			5	1
+				

e e:

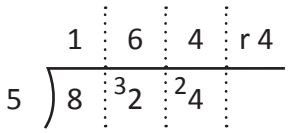
		2	3	9
×			2	3
+				

f e:

		3	2	7
×			1	4
+				

I am not 100 % confident with my mental strategies. I'll use the full model.

Written methods – contracted division



Look at 824 divided by 5. We start with the largest place value.

8 hundreds divided by 5 is 100. There is 300 left over which we rename and carry over to the tens column.

32 tens divided by 5 is 6 with 2 left over. We rename and carry these 2 tens to the ones.

24 divided by 5 is 4 remainder 4. **824 ÷ 5 = 164 r 4**

1 **Warm up with these:**

a 8) 8 5 r

b 5) 4 7 r

c 7) 5 8 r

d 5) 6 3 r

e 5) 9 9 r

f 6) 6 0 r

2 **Divide these 3 digit numbers:**

a 5) 7 1 5

b 9) 6 7 1 r

c 6) 6 1 1 r

d 8) 9 2 8

e 4) 6 3 5 r

f 4) 8 1 9 r

3 **Look at these word problems and decide if they are asking you to divide. If they are, solve the problem. If not, name the process you would use to solve them:**

a 250 kids go to the local pool on a hot summer's day. Each kid dives off the diving board 9 times. How many dives altogether?

b The water safety team come to the pool and hand out 750 free balloons. How many kids are there if they each get 3?

c The shop does a roaring trade on ice creams, selling 121 before lunch and 145 after lunch. How many ice creams do they sell in total?

d Of the 250 kids at the pool, one fifth are planning to come back the next day. How many are coming back?

Written methods – remainders in division

There are 3 ways of expressing remainders. We can express them as a fraction, as a decimal or as r __. How we do it depends on how we would deal with the problem in real life.

1 **Complete the table by expressing the remainders in 3 different ways. What patterns can you use to help you? You could use a calculator to help you find the decimal answers. The first row has been done for you.**

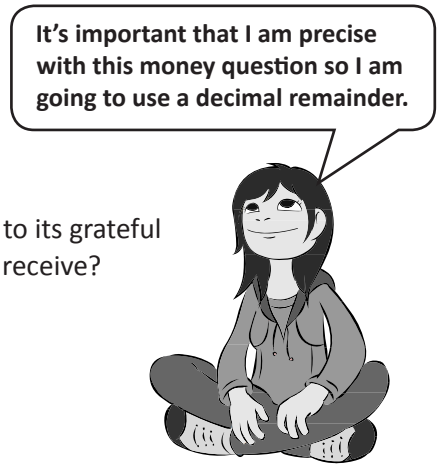
	fraction	decimal	remainder
244 ÷ 5	$48\frac{4}{5}$	48.8	$48\ r\ 4$
245 ÷ 5			
246 ÷ 5			
247 ÷ 5			

2 **Solve these problems and explain why you expressed the remainder as you did:**

a You are bagging chocolates for a birthday party. You have 299 chocolates and 10 bags. How many do you put in each bag?

b 12 pizzas are shared between 8 kids. How much pizza does each child receive?

c You and 3 friends throw 67 paper planes into the ceiling of the classroom before getting caught. Your teacher offers you 66 minutes of garbage duty in return. If you share it out evenly, how many minutes will each of you be carrying the garbage bucket around the yard?



d Tracey, Sam, Max and Huong earn a $550 reward for returning a dog to its grateful owner. If they share the reward evenly, how much does each person receive?

Written methods – solving problems

We come across multiplication and division problems regularly in our everyday lives. It doesn't matter which strategy we use to solve them, we can choose the one that suits us or the problem best.

1 **Solve these problems. Some require multiplication, some require division and some also require you to use addition as well. Underline the key words that guide you to the correct process.**

a Lachlan buys 14 tickets to the World Cup for himself and his buddies. Each ticket costs $145. How much does he spend in total?

b 4 people hired a car for 2 days. The rates were $65 per day plus a one off insurance charge of $30. What did each person pay, assuming the costs were shared evenly?

c The 3 Walsh kids are allowed to use the computer between 5 and 6 pm and between 7 and 8:30 pm. How much time in minutes is it shared evenly?

d A standard bar of chocolate weighs 45 grams. A super-super sized bar weighs 3 times that amount. How many grams in 7 super-super sized bars?

e A pack of 10 cds costs $14.90. Jack buys 4 packs. How much does he spend in total? What does the cost work out to be for each cd?

It's graduation time

apply

Getting ready

246 people will be attending your end of year graduation dinner and you are on the organising committee. You need to work out the following:

What to do

If you put people in groups of 8, how many tables will you need?

You think groups of 6 will be better as you can use the round tables. How many tables will you need?

You buy helium balloons to decorate the hall. The balloons come in packs of 25. You want to cover the entire roof and will need 1 350 balloons. How many packets do you need?

You estimate that each person will drink 3 glasses of soft drink/water over the evening. If your glasses hold 200 mL and you purchase 2 litre bottles, how many bottles will you need for the 246 attendees?

You are serving platters of finger food and have ordered:

- 20 bags of sausage rolls (24 in a bag)
- 10 bags of spring rolls (36 in a bag)
- 100 sushi rolls that you plan to cut into 4 pieces each
- 150 mini quiches

If you want every guest to have 6 items, have you ordered enough? If not, how much more do you need?

What to do next

Plan a dessert menu. Work out what you will serve and how much you will need to order to feed all 246 people.

Finish it

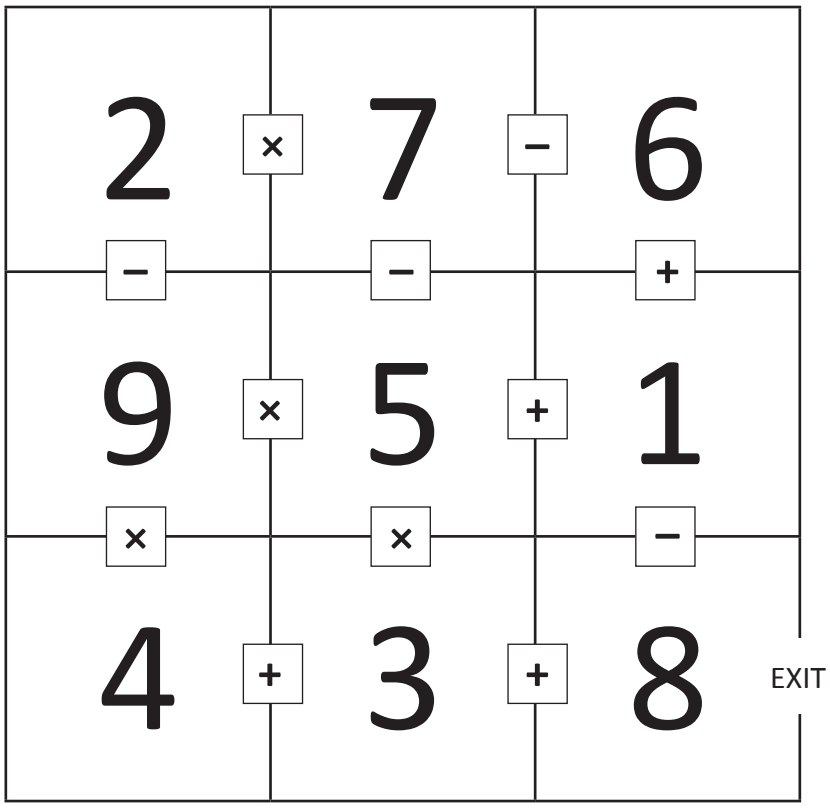
apply

Getting ready

You will work your way through every cell of a magic square of 15 using the operations as marked. You need to exit via 8 with the answer of 15.

What to do

1. You may start at any cell.
2. Find a path through the square, visiting every cell.
3. You must do the operations in order:
   Example: 2 × 7 − 6 + 1 + 5 × 9 × 4 − 3 + 8 = 509 (wrong!)
4. Your final cell must be 8 and you must have an answer of 15.



What to do next

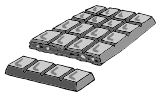
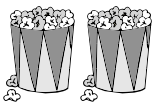
Is there only one route? Can you find another one?

Midnight market — investigate

Getting ready

Year 6 are on camp. Unfortunately, the teachers are doing the cooking and the food is less than tasty. A MasterChef intervention would help but they are fully booked.

To fill hungry stomachs, an intense trading system has evolved with dormitories trading off their midnight snacks brought from home. The following system has developed:


3 cupcakes = 
1 bag of candy = 
1 family block of chocolate = 
2 packets of popcorn = 

5 packs of chips

What to do

Answer the following questions:

Dorm 1 has 5 bags of candy that it is considering trading. Work out how many of the following they would receive in a trade:

_____ cupcakes

_____ family blocks of chocolate

_____ packs of chips

_____ packets of popcorn

How many blocks of chocolate could Dorm 2 get if it traded:

1 bag of candy? _____

12 cupcakes? _____

25 packs of chips? _____

14 packets of popcorn? _____

Dorm 3 has 2 bags of candy and 10 packets of chips. It wants 3 blocks of chocolate and 6 cupcakes. According to the rules, is this a fair swap? Explain why or why not.

Your dorm has 24 cupcakes to trade. What would you choose to trade them for?

What to do next

Design your own imaginary trading market. Choose 5 items or groups of items and assign them values. The easiest way to decide on a value is to think about what you would be prepared to swap something for in the real world. Is your ruler worth 2 erasers? Or 3? Or 1 pen? Write 5 trading problems for a friend to solve.

Too big, too small – just right! investigate

Getting ready

In this activity, you will use what you know about factors to learn about three different types of numbers; abundant, deficient and perfect.

You'll work in small groups to find the factors of composite numbers from 1 to 50. Decide how you will break up the task – will you work together or each contribute part of the solution?

You'll need pens, 2 pieces of paper and perhaps a calculator. Write the numbers 1 to 50 down the side of the first piece of paper. On the second piece of paper, rule up 3 columns.

What to do

For each of the numbers 1 to 50, work out what all its factors are. Leave the number itself off the list. Cross off the prime numbers.

For example, the factors of 24 are 1, 2, 12, 3, 8, 4, 6

Add the factors together. 1 + 2 + 12 + 3 + 8 + 4 + 6 = 36

The sum of the factors is greater than the number: 36 > 24

So 24 will go in 1 of the columns on page number 2

Add to this column any other numbers you find where the **sum of the factors is greater than the number itself.**
In the 2nd column, put any numbers where the **sum of the factors is smaller than the number itself.**
In the final column, write the numbers where the **sum of the factors equal the sum of numbers.**

Congratulations! You have just classified the numbers into 3 very important categories.

Which column of numbers do you think would be called perfect?

Which column do you think would be called abundant?

Which would be deficient? Label your column headings. Jump online or ask your teacher if you are right.

What to do next

Mathematicians have been obsessed with perfect numbers since Pythagoras was around. Find out more about them on the internet. How many are there? Can you find a list of them?

Around the world … apply

Getting ready

Your French Uncle Cecil has asked you to accompany him on a trip around the world, starting with a visit to EuroDisney in Paris. He will pay for everything if you will keep track of the finances. In particular you will need to work out the exchange rates.

You think you can just about manage that. It's just as well you are good with multiplication, division and fractions! A calculator may also come in handy.

What to do

Work out the following:

USA € 4 = $5 USD

You exchange € 400 for USD. How many USD do you receive?

You buy tickets to a Broadway show that cost $150. What is this in euros?

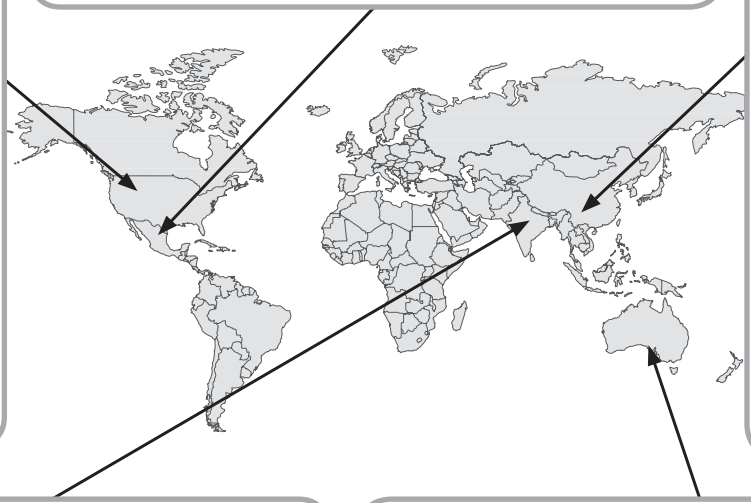
You buy a great shirt on Rodeo Drive, costing $250. What is that in euros?

(Best keep that purchase to yourself!)

MEXICO € 1 = 17 pesos

You swim with the dolphins in Mexico. This costs 510 pesos. How many euros is this?

The photo of the swim costs € 8. This is how many pesos?



CHINA € 1 = 10 yuan RMB

While in China, you plan to go on a Great Wall tour.

A 2 day tour costs 500 yuan RMB.

A 3 day tour costs 660 yuan RMB.

A 4 day tour costs 840 yuan RMB.

On a daily basis, what is the best value and why?

INDIA € 1 = 65 rupees

You splash out and stay at the beautiful Raj Palace Hotel near Jaipur.

A Heritage (fancy) Room will set Uncle Cecil back 19 500 rupees a night.

How many euros will this cost for a 7 night stay?

AUSTRALIA € 1 = $2 AUD

You withdraw AUD $1 000. How many euros is this?

While in Sydney you and Uncle Cecil climb the Harbour Bridge at dawn. This costs $295 for adults and $195 for children. How much has this cost in euros?

You and Uncle Cecil also dive the Great Barrier Reef. A 3 day trip costs $650 pp. How much is this in euros?

Analyse this — investigate

Getting ready

When solving word problems, often times the most difficult part is working out what the problem is asking you to do; the Math is the easy bit.

What to do

Look at the following problem:

Nina and her sister collect corks and donate them to the zoo to help raise funds for the March of the Elephants Program. For every 100 corks collected they earn 10 points. Once they have 50 points they get a free zoo visit. They currently have 30 points. How many more corks do they need to collect to get their free visit?

Circle the Mathletics character who has found a way to correctly solve the problem:

1 Work out how many points equal one cork:

"OK, 10 points = 100 corks. So 1 point = 10 corks"

2 Work out how many corks they have now:

"They have 30 points so that means they have 30 × 10 = 300 corks."

3 Calculate the total amount of points:

"So first we have 100 corks then we have 300 more so we have 400 corks now. That's equal to 40 points."

4 Calculate the difference

"50 points – 40 points = 10 points. 10 points = 100 corks. They need 100 more corks."

1 Work out how many corks are represented by 30 points:

"That's 3 lots of 10 points and 10 points = 100 corks so 3 × 100 = 300 corks."

2 Work out the difference between 50 points and 30 points:

"We subtract when we find the difference. 50 – 30 = 20 points"

3 Calculate what 20 points represents:

"That's 2 lots of 10 points and 10 points = 100 corks so 2 × 100 = 200 corks"

4 State the answer:

"They need 200 more corks."

1 Work out how many more points we need:

"They have 30 points already and they need 20 more 20 + 30 = 50."

2 Calculate how many corks 20 points represents:

"20 points = 100 corks divided by 2 = 50 corks"

3 State the answer:

"They need 50 more corks."