



# UNIT 6

## NUMBER: CALCULATIONS

SUGGESTED TIME

**6 hours**

### TEACHING OBJECTIVES

- Understand the effect of, and the relationship between, the four operations and the principles of the arithmetic laws.
- Use repeated doubling and halving; double any two-digit number.
- Partition to multiply mentally, for example,  $46 \times 7$ .
- Extend written methods to addition and subtraction of a pair of whole numbers and decimals both with 1 or 2 decimal places.
- Extend written methods to  $\text{HTU} \times \text{U}$  and  $\text{U.t} \times \text{U}$ .
- Use all four operations to solve money or 'real life' word problems. 

**SECTION 1** Doubles and halves

**SECTION 2** Mental calculations

**SECTION 3** Addition

**SECTION 4** Subtraction

**SECTION 5** Multiplication

**SECTION 6** Division

### HOMEWORK

- Use Sections 1 and 2 to practise mental calculations. Star Challenge 3 in Section 2 consolidates a variety of mental calculation methods.
- Some pupils will need to practise written methods of calculation in Sections 3, 4 and 5.
- Apply all four operations to word problems.

Unit **6****Checklist for pupils**UNIT  
**6****Doubles and halves**

You will:

- double and halve numbers

**Mental calculations**

You will:

- use doubling and halving
- work out multiples of 10, 100, 25 and 50 in your head
- multiply in your head, for example  $67 \times 8$
- multiply simple decimals in your head

**Addition**

You will:

- add simple decimals in your head
- practise written addition of whole numbers and decimals

**Subtraction**

You will:

- subtract simple decimals in your head
- practise written subtraction of whole numbers and decimals

**Multiplication**

You will:

- multiply mentally
- solve problems that involve multiplication

**Division**

You will:

- use division to solve simple problems
- use links between multiplication and division

# UNIT 6

## SECTION 1: DOUBLES AND HALVES

### DIRECT TEACHING POINTS

- Much of this work can be done orally. The exercises can act as prompts for the teacher or practice for pupils. You will need to revisit this during the term.
- Consolidate the recall of doubles and halves of numbers up to 20 and then multiples of 10. The usual progression will include working out doubles of numbers like 24, then 28 which crosses 10s boundary and 64 which crosses hundreds boundary. The final example like 76, spans both tens and hundreds boundaries.

- You need to demonstrate these calculations.  
For example, 'double 36 = double 30 + double 6'  
$$= 60 + 12$$
$$= 72$$

This will be a mental calculation with perhaps some jottings.

- Extend doubling to calculations such as  $280 \times 2$ .
- Explain halving as inverse process to doubling.
- Model halving of odd numbers. 'Half of 6 = 3, half of 7 =  $3\frac{1}{2}$ , half of 8 = 4.'  
Half of 97 = half of 90 + half of 7  
$$= 45 + 3\frac{1}{2}$$
$$= 48\frac{1}{2}$$
- Teach the range of vocabulary and notation associated with doubling and halving. Use Star Challenge 2 as practice.
- Star Challenge 1 includes near doubles in a simple context.



*double twice halve*  
*half of multiple*

## Doubles and halves

1

### Doubles and halves



- |                     |                       |                                    |
|---------------------|-----------------------|------------------------------------|
| 1 Double 14 = ..... | 9 Half of 10 = .....  | 17 Half of ..... = 3               |
| 2 Double 11 = ..... | 10 Half of 20 = ..... | 18 Half of ..... = 15              |
| 3 Double 6 = .....  | 11 Half of 16 = ..... | 19 Half of 11 = .....              |
| 4 Double 15 = ..... | 12 Half of 30 = ..... | 20 Half of 15 = .....              |
| 5 Double 18 = ..... | 13 Half of 24 = ..... | 21 Double $5\frac{1}{2}$ = .....   |
| 6 Double 9 = .....  | 14 Double ..... = 14  | 22 Double $10\frac{1}{2}$ = .....  |
| 7 Double 19 = ..... | 15 Double ..... = 32  | 23 Half of 20 + half of 14 = ..... |
| 8 Half of 6 = ..... | 16 Double ..... = 28  | 24 Double 8 + double 5 = .....     |
|                     |                       | 25 Double 16 + half of 16 = .....  |

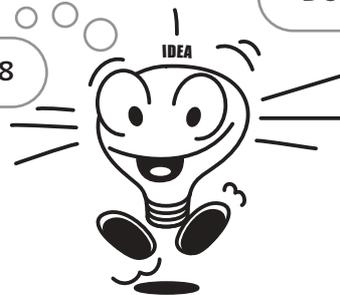
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### Doubles and halves of multiples of 10 and 100



**Example**

Double 14 = 28



Double 140 = 280

- |                      |                        |                        |
|----------------------|------------------------|------------------------|
| 1 Double 20 = .....  | 8 Double 80 = .....    | 15 Half of 300 = ..... |
| 2 Double 40 = .....  | 9 Double 250 = .....   | 16 Half of 240 = ..... |
| 3 Double 200 = ..... | 10 Double 330 = .....  | 17 Half of 90 = .....  |
| 4 Double 70 = .....  | 11 Half of 60 = .....  | 18 Half of 360 = ..... |
| 5 Double 150 = ..... | 12 Half of 100 = ..... | 19 Half of 70 = .....  |
| 6 Double 500 = ..... | 13 Half of 200 = ..... | 20 Half of 870 = ..... |
| 7 Double 120 = ..... | 14 Half of 140 = ..... |                        |

## Doubles and halves

3

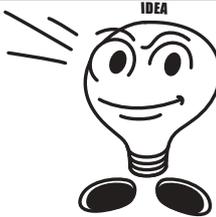
Doubles and halves of  
2-digit numbers

Example

Work out: double 36

$$\text{Double } 36 = \text{double } 30 + \text{double } 6 = 60 + 12 = 72$$

IDEA



$$\text{Double } 36 = 60 + 12 = 72$$

- A**
- |                                     |                                     |
|-------------------------------------|-------------------------------------|
| 1 Double 23 = 40 + ..... = .....    | 6 Double 66 = ..... + ..... = ..... |
| 2 Double 42 = 80 + ..... = .....    | 7 Double 92 = .....                 |
| 3 Double 38 = 60 + ..... = .....    | 8 Double 37 = .....                 |
| 4 Double 64 = 120 + ..... = .....   | 9 Double 75 = .....                 |
| 5 Double 24 = ..... + ..... = ..... | 10 Double 79 = .....                |
- B**
- |   |                      |
|---|----------------------|
| 1 Half of 46 = 20 + ..... = .....             | 5 Half of 92 = ..... |
| 2 Half of 78 = 35 + ..... = .....             | 6 Half of 35 = ..... |
| 3 Half of 27 = ..... + $3\frac{1}{2}$ = ..... | 7 Half of 72 = ..... |
| 4 Half of 66 = ..... + ..... = .....          | 8 Half of 98 = ..... |

# Doubles and halves



**1**

## Double yummy

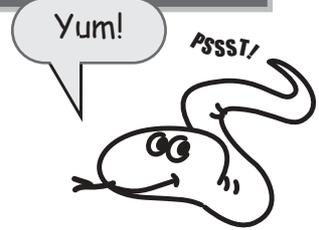


7-8 correct 1 star

**Ice cream prices (per scoop)**

Vanilla 26p  
 Strawberry 27p  
 Lemon 28p  
 Chocolate 29p  
 Toffee 31p

- 1 A double vanilla cone costs twice the price of a single scoop of vanilla. Work out the following prices:
  - (a) a double vanilla cone .....
  - (b) a double toffee cone .....
  - (c) a double chocolate cone .....
  - (d) a double lemon cone .....
  
- 2 A vanilla and toffee cone costs 26p + 31p. Work out the following prices:
  - (a) a vanilla and toffee cone .....
  - (b) a strawberry and lemon cone .....
  - (c) a chocolate and lemon cone .....
  - (d) two chocolate and lemon cones .....



**2**

## Doubles and halves in disguise



21 correct 3 stars  
 18-20 correct 2 stars  
 15-17 correct 1 star

double 7 = 14  
 twice 7 = 14  
 $2 \times 7 = 14$   
 $7 \times 2 = 14$   
 7 multiplied by 2 = 14  
 7 times 2 = 14

These all mean 'double it'.

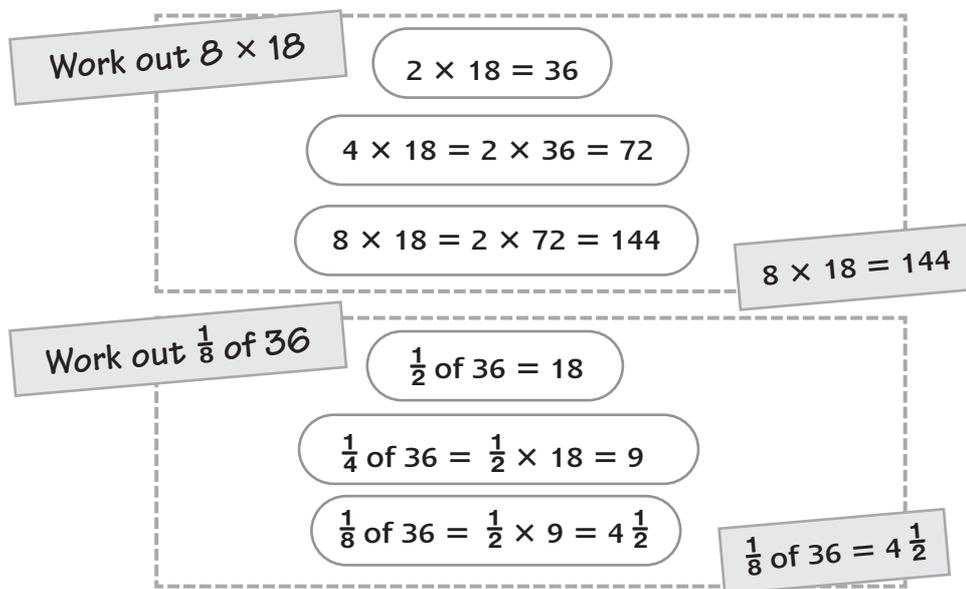
half of 20 = 10  
 20 divided by 2 = 10  
 $\frac{1}{2}$  of 20 = 10  
 $\frac{1}{2} \times 20 = 10$   
 $\frac{20}{2} = 10$   
 $20 \div 2 = 10$

These all mean 'halve it'.

- |                             |                                   |                            |
|-----------------------------|-----------------------------------|----------------------------|
| 1 Double 13 .....           | 8 Twice 61 .....                  | 15 ..... $\times 2 = 86$   |
| 2 Half of 26 .....          | 9 $84 \div 2$ .....               | 16 ..... of 24 = 12        |
| 3 Twice 25 .....            | 10 14 multiplied by 2 .....       | 17 $\frac{18}{2} =$ .....  |
| 4 $2 \times 68$ .....       | 11 $\frac{1}{2}$ of 48 .....      | 18 ..... $\div 2 = 15$     |
| 5 $\frac{1}{2}$ of 60 ..... | 12 $\frac{1}{2} \times 100$ ..... | 19 $75 \times$ ..... = 150 |
| 6 $\frac{44}{2}$ .....      | 13 $150 \times 2 =$ .....         | 20 $82 \div$ ..... = 41    |
| 7 27 times 2 .....          | 14 $120 \div 2 =$ .....           | 21 $\frac{\quad}{2} = 5$   |

DIRECT TEACHING POINTS

- Model how doubling can assist the recall of multiplication facts. Show how to deduce 8 times table from 4 times table.
- Demonstrate how to extend calculations, for example, deduce 16 times from 8 times.



- A key target for pupils is to multiply mentally a two-digit number by a single-digit number. Prerequisites of this are the recall of multiplication bonds to  $10 \times 10$  and the extension of them to include, for example,  $60 \times 4$ ,  $80 \times 7$ ,  $60 \times 50$ . 'I know that  $8 \times 7 = 56$ , so  $80 \times 7 = 560$  and so on. Exercise 2 provides examples.
- Show pupils how to record their jottings to support mental calculations, for example,  $23 \times 7$ :

$$\begin{array}{l} 20 \times 7 = 140 \\ 3 \times 7 = 21 \\ \hline 23 \times 7 = 161 \end{array}$$

See exercise 4 for examples.

- Extend doubles to include calculations such as  $3.8 \times 2$ ,  $0.76 \times 2$ , as in exercise 5. This builds on work in Unit 2 on multiplication and division by 10.
- Teach multiplication by 50 as combining pairs of 50 to make 100. Teach multiplication by 25 by combining four 25s to make 100.
- Pupils need to decide which calculations can be done mentally and which need the application of a written method. Discuss with pupils the different methods that they use in Star Challenge 4.

## Mental calculations

1

### Repeated doubling and halving



1  $\frac{1}{2}$  of 44 = .....

5  $4 \times 26 = \dots\dots$

9  $\frac{1}{4}$  of 56 = .....

2  $\frac{1}{4}$  of 44 = .....

6  $8 \times 26 = \dots\dots$

10  $\frac{1}{8}$  of 56 = .....

3  $\frac{1}{8}$  of 44 = .....

7  $\frac{1}{2}$  of 42 = .....

11  $4 \times 33 = \dots\dots$

4 Double 26 = .....

8  $\frac{1}{4}$  of 42 = .....

12  $4 \times 10\frac{1}{2} = \dots\dots$

2

### Multiples of 10 and 100



1  $7 \times 30 = \dots\dots$

4  $2 \times 120 = \dots\dots$

7  $5 \times 50 = \dots\dots$

2  $40 \times 5 = \dots\dots$

5  $80 \times 4 = \dots\dots$

8  $60 \times 3 = \dots\dots$

3  $6 \times 20 = \dots\dots$

6  $7 \times 70 = \dots\dots$

9  $90 \times 4 = \dots\dots$

10  $5 \times 300 = \dots\dots$

13  $6 \times 400 = \dots\dots$

16  $500 \times 8 = \dots\dots$

11  $400 \times 7 = \dots\dots$

14  $800 \times 4 = \dots\dots$

17  $9 \times 900 = \dots\dots$

12  $9 \times 200 = \dots\dots$

15  $5 \times 700 = \dots\dots$

18  $600 \times 3 = \dots\dots$

19  $50 \times 50 = \dots\dots$

22  $30 \times 40 = \dots\dots$

25  $80 \times 80 = \dots\dots$

20  $40 \times 60 = \dots\dots$

23  $60 \times 70 = \dots\dots$

26  $90 \times 20 = \dots\dots$

21  $70 \times 20 = \dots\dots$

24  $50 \times 70 = \dots\dots$

27  $60 \times 50 = \dots\dots$

## Mental calculations

3

### Multiplying in your head using partitioning



Example

$6 \times 13 = ?$

$6 \times 13 = 6 \times 10 \text{ plus } 6 \times 3$



$6 \times 10 = 60$

$6 \times 3 = 18$

$60 + 18 = 78$

$6 \times 13 = 78$

1  $6 \times 15 = \dots\dots$

4  $5 \times 16 = \dots\dots$

7  $8 \times 84 = \dots\dots$

2  $7 \times 36 = \dots\dots$

5  $23 \times 6 = \dots\dots$

8  $33 \times 7 = \dots\dots$

3  $47 \times 8 = \dots\dots$

6  $9 \times 14 = \dots\dots$

9  $92 \times 4 = \dots\dots$

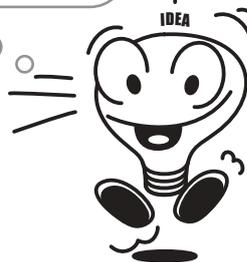
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### Multiplying simple decimals in your head



Example

$4 \times 0.2 = ?$



$4 \times 2 = 8$

$4 \times 0.2 = 0.8$

1  $2 \times 0.3 = \dots\dots$

4  $7 \times 0.4 = \dots\dots$

7  $4 \times 2.5 = \dots\dots$

2  $2 \times 1.4 = \dots\dots$

5  $4 \times 0.6 = \dots\dots$

8  $0.8 \times 6 = \dots\dots$

3  $4 \times 2.1 = \dots\dots$

6  $2 \times 3.2 = \dots\dots$

9  $7 \times 0.7 = \dots\dots$

## Mental calculations

STAR CHALLENGE  
3

### Multiplication mix



19–20 correct 2 stars  
16–18 correct 1 star

- |   |                                     |    |                             |    |                                      |
|---|-------------------------------------|----|-----------------------------|----|--------------------------------------|
| 1 | $2 \times 14 = \dots\dots$          | 7  | $4 \times 70 = \dots\dots$  | 13 | $14 \times 3 = \dots\dots$           |
| 2 | $\frac{1}{2}$ of 46 = $\dots\dots$  | 8  | $50 \times 70 = \dots\dots$ | 14 | $80 \times 30 = \dots\dots$          |
| 3 | $12 \times 7 = \dots\dots$          | 9  | $4 \times 600 = \dots\dots$ | 15 | $6 \times 0.7 = \dots\dots$          |
| 4 | $4 \times 35 = \dots\dots$          | 10 | $11 \times 25 = \dots\dots$ | 16 | $5 \times 2.5 = \dots\dots$          |
| 5 | $\frac{1}{4}$ of 200 = $\dots\dots$ | 11 | $18 \times 50 = \dots\dots$ | 17 | $4 \times 2\frac{1}{2} = \dots\dots$ |
| 6 | $30 \times 60 = \dots\dots$         | 12 | twice 45 = $\dots\dots$     | 18 | $7 \times 300 = \dots\dots$          |

19 Femi's pencil is exactly 4 times as long as his rubber.  
His rubber is 3.1 cm long. How long is his pencil?  $\dots\dots$

20 The length of Sue's little finger is exactly 4 times its width.  
Her finger is 1.6 cm wide. How long is her finger?  $\dots\dots$

STAR CHALLENGE  
4

### You decide how to do it



5 correct 2 stars  
4 correct 1 star

1  $14 \times 70$

3  $6 \times 75$

2  $25 \times 25$

4  $4 \times 1.35$

5  $14 \times 125$

# UNIT 6

## SECTIONS 3 AND 4: ADDITION SUBTRACTION

### DIRECT TEACHING POINTS

- This work follows on from Unit 2. Addition and subtraction may need a quick revisit or substantial teaching depending on your assessment of pupils' progress.
- Support pupils in applying expanded or standard written methods of addition and subtraction to decimals.
- Make sure that pupils have accurate and efficient written methods for addition and subtraction. (Refer to teacher notes on pages 89 and 90).
- Exercise 1 in Sections 3 and 4 develops mental work on addition and subtraction of two-digit numbers.
- Pupils need to make sensible choices as to which questions can be done mentally and which calculations require a written (or calculator) method. Illustrate this with examples within your teaching – exercise 3 in Section 4.
- Problems in addition and subtraction are at the end of Section 4 – see Star Challenges 6,7,8 which are typical of test questions. **All** pupils will need practice at solving word problems.

Teach the process

- read question
- extract relevant information
- decide on calculation
- decide method of calculation and complete calculation
- interpret answer in the context of the question



*decimal decimal point*  
*cost altogether change*

## Addition

1

### Mental addition of simple decimals



**Example**

Work out  $2.3 + 1.4$



$$23 + 14 = 37$$

$$2.3 + 1.4 = 3.7$$

$$2.3 + 1.4 = 3.7$$

1  $0.2 + 0.3 = \dots\dots$

4  $1.2 + 1.4 = \dots\dots$

7  $1.6 + 0.4 = \dots\dots$

2  $1.2 + 0.3 = \dots\dots$

5  $0.8 + 1.1 = \dots\dots$

8  $2.3 + 3.5 = \dots\dots$

3  $0.5 + 0.5 = \dots\dots$

6  $2.5 + 0.5 = \dots\dots$

9  $4.2 + 5.7 = \dots\dots$

2

### Addition



**Example**

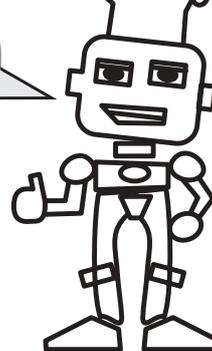
Work out  
 $137 + 13 + 173$

$$\begin{array}{r} 137 \\ 13 \\ + 173 \\ \hline 323 \\ \hline 11 \end{array}$$

Stack carefully.

Show your 'carry' figures clearly.

HELPFUL



You don't have to use the HTU headings.

1  $2492 + 1341$

2  $2058 + 612 + 39$

3  $4731 + 19 + 3120$

# Addition

## 3 Adding decimals

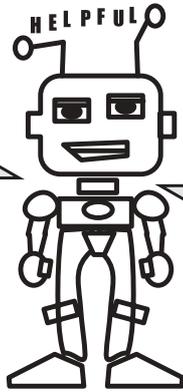


**Example**  
Work out  
 $72.3 + 23.8$

$72.3 + 23.8 = 96.1$

U. t	7 2 . 3
+	2 3 . 8
	9 6 . 1
	1

Put units under units.  
Put decimal points in line.  
Put tenths under tenths...



Then, add as for whole numbers.

Show your 'carry' figures clearly.

1      $31.6 + 43.5$

3 1 . 6
+ 4 3 . 5

2      $2.48 + 1.31$

2 . 4 8
+ 1 . 3 1

3      $62.5 + 23.7$

6 2 . 5
+

4      $13.7 + 54.2$


5      $7.64 + 2.32$


6      $63.6 + 24.8$


7      $24.35 + 32.67$


8      $54.62 + 37.53$


9      $42.61 + 74.38$


## Addition

STAR CHALLENGE  
5

Decimal arithmetic in your head



18–21 correct 2 stars  
14–17 correct 1 star

1  $0.3 + 0.5 = \dots\dots$

8  $3.25 + 1.75 = \dots\dots$

15 Double 3.24 = .....

2  $2.8 + 0.5 = \dots\dots$

9 Double 0.4 = .....

16 Double 1.33 = .....

3  $1.3 + 1.5 = \dots\dots$

10 Double 1.3 = .....

17  $2.5 + 2.7 = \dots\dots$

4  $4.2 + 2.8 = \dots\dots$

11 Double 2.5 = .....

18  $3.5 + 3.6 = \dots\dots$

5  $2.31 + 3.15 = \dots\dots$

12 Double 1.6 = .....

19  $2.7 + 2.9 = \dots\dots$

6  $4.25 + 5.42 = \dots\dots$

13 Double 0.45 = .....

20 Double 1.25 = .....

7  $6.84 + 1.27 = \dots\dots$

14 Double 1.41 = .....

21  $5.4 + 4.5 = \dots\dots$

# Subtraction

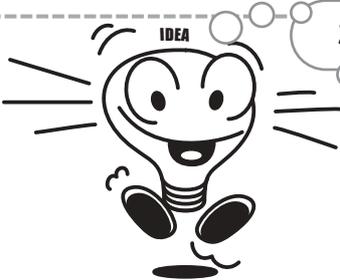
1

## Mental subtraction of simple decimals



**Example**

Work out  $2.6 - 1.4$



$26 - 14 = 12$

$2.6 - 1.4 = 1.2$

$2.6 - 1.4 = 1.2$

1  $0.5 - 0.3 = \dots\dots$

4  $1.9 - 1.4 = \dots\dots$

7  $1.6 - 0.4 = \dots\dots$

2  $1.7 - 0.3 = \dots\dots$

5  $1.1 - 0.9 = \dots\dots$

8  $3.7 - 2.5 = \dots\dots$

3  $3.5 - 0.5 = \dots\dots$

6  $2.5 - 1.5 = \dots\dots$

9  $9.7 - 5.3 = \dots\dots$

2

## Subtraction

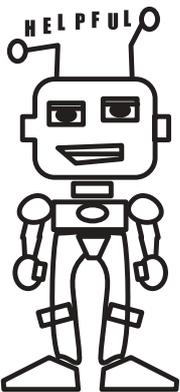


**Example**

$$\begin{array}{r} 31 \\ 543 \\ - 327 \\ \hline 216 \end{array}$$

3 - 7 is a problem.

You have to take a 10 from the tens column.



1  $635 - 118$

2  $556 - 264$

3  $482 - 176$

## Subtraction

3

## Subtracting decimals

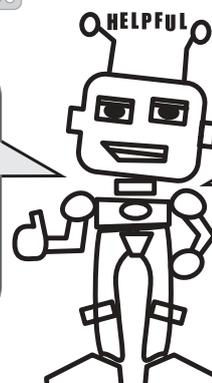


## Example

Work out  
 $7.3 - 3.8$ 

U. t
6 1
<del>7</del> . 3
- 3. 8
3. 5

Put units under units.  
Put decimal points in line.  
Put tenths under tenths...



Then, subtract as for whole numbers.

Complete these subtractions.

You should be able to do some in your head.

1  $5.3 - 3.2$

2  $5.68 - 1.41$

3  $4.5 - 2.7$

4  $5.62 - 2.53$

Work out the answers:

5  $5.7 - 3.9$

6  $7.64 - 2.12$

7  $5.6 - 2.8$

8  $5.35 - 2.67$

9  $8.41 - 4.59$

10  $6.04 - 3.13$

# Subtraction

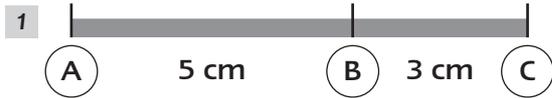


## Lengths of lines

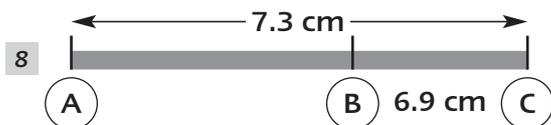
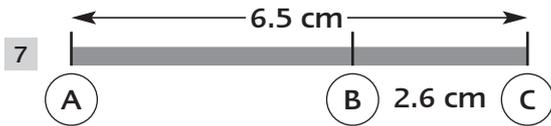
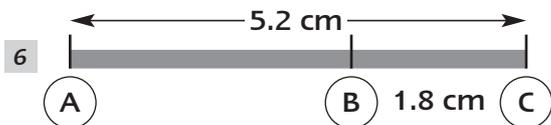
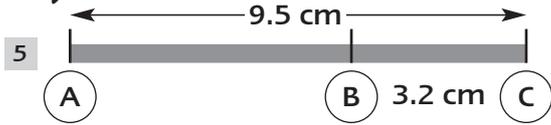


All correct 1 star

Calculate the length of the line AC in questions 1 to 4.



Calculate the length of the line AB in questions 5 to 8.



## How much?



4-5 correct 1 star

- Carol goes to the cinema. She pays £1.80 in bus fares. She pays £4.25 to see the film.
  - How much does she pay altogether? .....
  - How much change does she have from £8? .....
- Sue has £9.50. She goes to the disco on Saturday. How much does she have left to spend? .....
- Conor goes to the disco on Thursday. How much more would it cost him to go on Saturday? .....
- Ali spends £3.24 on Friday. He spends £1.36 on Saturday. How much does he spend altogether? .....
- Erroll has saved £8.60. He spends £3.45. How much does Erroll have left? .....

**Disco Prices**

Sat £7.25

Mon-Fri £5.40

# Subtraction



8

## Money problems



7 correct 2 stars  
5-6 correct 1 star

- 1 Peter goes to the cinema with his mother.  
Peter is 6 years old.  
How much does it cost for both of them? .....
- 2 Katy buys presents for her brother.  
She buys a colouring book. The price is £1.85  
She buys a box of crayons. The price is £0.64  
How much do the presents cost? .....
- 3 Parva goes to the zoo with her father.  
Parva is 12 years old.  
How much does it cost for both of them? .....
- 4 Ann goes to the zoo with her 14-year-old  
twin brother.  
How much does it cost for both of them? .....
- 5 Stella buys a large toy dog and a medium-sized  
toy dog in the sale.  
How much does she pay altogether? .....
- 6 Tom buys two medium-sized toy dogs in the sale.  
How much does he pay altogether? .....
- 7 Jenny buys a large toy dog and a small toy  
dog in the sale.  
How much does she pay altogether? .....

### Rex Cinema Prices

Adults £4.60  
Children £2.25

### Zoo Entrance Prices

Adults £8.25  
Children £3.45  
Children must be  
15 or under

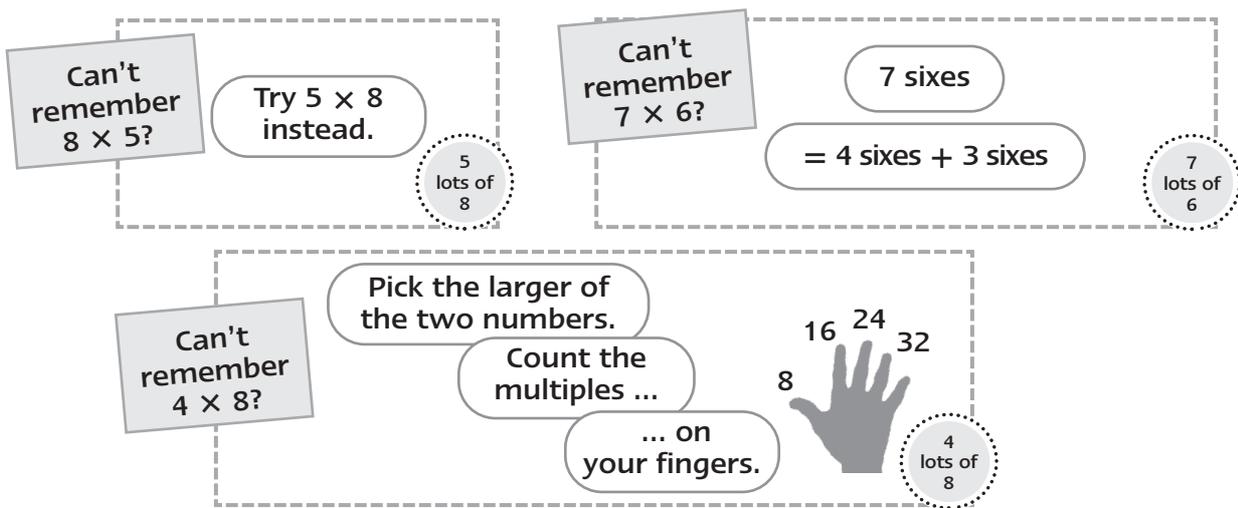
**!! TOY DOG SALE !!**

**! Prices slashed !**

Large dog £4.82  
Medium-sized dog  
£2.75  
Small dog £1.99

DIRECT TEACHING POINTS

- Reinforce learning of multiplication facts. Help pupils to remember key facts, for example, squares. Ask pupils how they remember table facts.



- Use exercises 1, 2 and 3 to reinforce mental work.
- Make sure that pupils' recall of multiplication bonds is secure before moving on to the grid method of multiplication. Consolidate, for example,  $60 \times 4$  and  $6 \times 0.4$ .
- Pupils must have an efficient, accurate written method for multiplication. You need to decide which pupils should consolidate the grid method and who might move on to a more compact method (Unit 10). It is better that pupils are secure in the grid method rather than rushed into using a compact method that they do not fully understand.
- Model multiplication using the grid method.

Work out:  $24 \times 3$

$24 \times 3 = (20 \times 3) + (4 \times 3)$

×	20	4	
3	60	12	$24 \times 3 = 72$

Work out:  $735 \times 6$

×	700	30	5	
6	4200	180	30	$735 \times 6 = 4410$

Work out:  $7 \times 2.6$

×	2	0.6	
7	14	4.2	$7 \times 2.6 = 18.2$

- Demonstrate how to use approximations to check calculations.
  - 1)  $8.9 \times 7.3$  is approximately  $9 \times 7$
  - 2)  $27.8 \times 3.9$  is approximately  $30 \times 4$



multiplication multiply  
multiple product

# Multiplication

1

## Multiples of 6, 7, 8, 9

Do you have problems remembering multiplication tables?  
Here are some ideas that might help.

**Can't remember  $7 \times 6$ ?**

7 sixes  
= 4 sixes + 3 sixes

**Can't remember  $8 \times 5$ ?**

Try  $5 \times 8$  instead.

5 lots of 8

**Can't remember  $4 \times 8$ ?**

Pick the larger of the two numbers.

Count the multiples ...  
... on your fingers.

16 24 32  
8

4 lots of 8

1  $9 \times 8 = \dots\dots$

4  $9 \times 7 = \dots\dots$

7  $9 \times 4 = \dots\dots$

2  $5 \times 9 = \dots\dots$

5  $7 \times 5 = \dots\dots$

8  $6 \times 9 = \dots\dots$

3  $8 \times 6 = \dots\dots$

6  $8 \times 7 = \dots\dots$

2

## Multiples of 10 and 100



**IDEA**

$30 \times 7$

$= 7 \times 3 \times 10$

$= 7 \times 30$

$= 21 \times 10$

$= 210$

1  $6 \times 40 = \dots\dots$

4  $5 \times 70 = \dots\dots$

7  $4 \times 50 = \dots\dots$

2  $50 \times 5 = \dots\dots$

5  $80 \times 6 = \dots\dots$

8  $900 \times 2 = \dots\dots$

3  $7 \times 200 = \dots\dots$

6  $9 \times 700 = \dots\dots$

9  $30 \times 9 = \dots\dots$

# Multiplication

3

## Multiplication for TU × U



1

$$35 \times 4$$

2

$$27 \times 3$$

3

$$48 \times 5$$

4

$$73 \times 6$$

4

## Multiplication for HTU × U



1

$$253 \times 4$$

2

$$532 \times 8$$

3

$$428 \times 5$$

4

$$663 \times 7$$

# Multiplication

5

## Multiplication for U.t × U



1

$$2.4 \times 4$$

2

$$7.5 \times 7$$

3

$$3.8 \times 5$$



9

## Little problems



5 correct 2 stars  
4 correct 1 star

- 1 There are 8 forms in Year 7 at a school. Each form has 29 pupils in it.

How many pupils are there in Year 7?

.....

- 2 Egg boxes hold 6 eggs. There are 16 egg boxes on a shelf.

How many eggs are there?

.....



- 3 185 pupils are going on a school visit. Each pupil pays £3.

How much money is collected to go on the visit?

.....

- 4 Jeremy is working on a building site. He has to travel a total of 145 km every day.

How far does he travel in 5 days?

.....

- 5 23 flower posies are needed for a wedding. Each posy has 6 flowers in it.

How many flowers are needed to make all the posies?

.....



**DIRECT TEACHING POINTS**

- Pupils need to have an understanding of division beyond sharing. Exercises 1 and 2 can form basis of oral work.
- The relationship between multiplication and division underpins much of this work.  $45 \div \square = 9$  is equivalent to  $9 \times \square = 45$ , or  $45 \div 9 = \square$ . These are mental calculations, while  $657 \div \square = 23$  is best done using a calculator. You need to highlight these links and choices.
- Make sure pupils can use the language of division.

**Share 20 among 4**

**Divide 20 by 4**

$20 \div 4$

20 divided by 4

$\frac{1}{4}$  of 20

These all mean 'How many 4s are, there in 20?'

$35 \div a = 7$   
What is the value of  $a$ ?

this means

$a \times 7 = 35$

$a = 5$

- Star Challenge 12 does not require formal methods to solve the equations.
- Star Challenges 11 and 12 focus on the use of inverse operations and link to early work on algebra.



division inverse

# Division

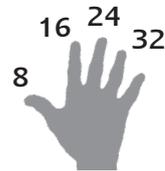
1

## Division



How many 8s  
are there in 32? .....

There are four 8s in 32.



- |                                      |                                       |
|--------------------------------------|---------------------------------------|
| 1 How many 5s are there in 25? ..... | 6 How many 5s are there in 35? .....  |
| 2 How many 2s are there in 16? ..... | 7 How many 3s are there in 18? .....  |
| 3 How many 4s are there in 20? ..... | 8 How many 7s are there in 49? .....  |
| 4 How many 7s are there in 21? ..... | 9 How many 9s are there in 27? .....  |
| 5 How many 6s are there in 30? ..... | 10 How many 8s are there in 40? ..... |

2

## Ways of asking the same thing



- |  |                                  |
|--|----------------------------------|
| 1 How many 5s are there in 20? .....           | 16 (a) How many 6s in 24? .....  |
| 2 Divide 15 by 3 .....                         | (b) $24 \div 4 =$ .....          |
| 3 $16 \div 8 =$ .....                          | 17 (a) How many 10s in 80? ..... |
| 4 $10 \div 2 =$ .....                          | (b) $80 \div 8 =$ .....          |
| 5 How many 10s are there in 30? .....          | 18 (a) $70 \div 10 =$ .....      |
| 6 Divide 20 by 5 .....                         | (b) $70 \div 7 =$ .....          |
| 7 $40 \div 10 =$ .....                         | 19 (a) $500 \div 100 =$ .....    |
| 8 How many 5s are there in 35? .....           | (b) $500 \div 5 =$ .....         |
| 9 $18 \div 3 =$ .....                          | 20 (a) $56 \div 7 =$ .....       |
| 10 $14$ divided by $2 =$ .....                 | (b) $56 \div 8 =$ .....          |
| 11 How many 6s are there in 36? .....          | 21 (a) $54 \div 6 =$ .....       |
| 12 Divide 18 by 2 .....                        | (b) $54 \div 9 =$ .....          |
| 13 $30 \div 6 =$ .....                         | 22 (a) $110 \div 10 =$ .....     |
| 14 $21 \div 7 =$ .....                         | (b) $110 \div 11 =$ .....        |
| 15 Share equally £24 between<br>4 people ..... | 23 (a) $12 \times 8 =$ .....     |
|  | (b) $96 \div 8 =$ .....          |

## Division

STAR CHALLENGE  
10

## Multiplication and division puzzles

14 marks    3 stars  
12-13 marks    2 stars  
10-11 marks    1 star

- 1 This calculation has the same number in each box.  
Find the missing number. (3 marks)

$$\square \times \square - \square = 42$$

Find the missing numbers: (2 marks)

2  $\square \times 4 = 340$

3  $\square \times 6 = 1644$

- 4 Complete this statement. (9 marks)

There are three possible sets of digits. Find as many sets as you can.  
(3 marks for each set)

$$\square \square \times 3 = \square 8 \square$$

$$\square \square \times 3 = \square 8 \square$$

$$\square \square \times 3 = \square 8 \square$$

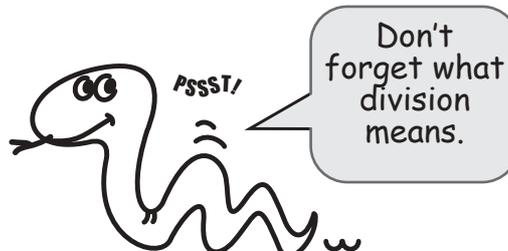
# Division

STAR CHALLENGE  
11

## Division in disguise



15-16 correct 2 stars  
12-14 correct 1 star



Complete each statement.

You decide whether you need to use a calculator.

1  $125 \div 5 = \dots\dots$

2  $640 \div \dots\dots = 32$

3  $\frac{48}{\dots\dots} = 16$

4  $820 \div 4 = \dots\dots$

5  $129 \div 3 = \dots\dots$

6  $682 \div \dots\dots = 341$

7  $\frac{375}{\dots\dots} = 15$

8 £420 shared between 4  
= £  $\dots\dots$

9 There are  $\dots\dots$  25s in 125

10  $\frac{1}{3}$  of £360 =  $\dots\dots$

11 645 divided by 5 =  $\dots\dots$

12  $\dots\dots \div 19 = 3$

13  $185 \div \dots\dots = 37$

14  $\frac{\dots\dots}{15} = 4$

15 £667 shared between 23  
=  $\dots\dots$

16  $450 \div \dots\dots = 30$

## Division



12

Can you crack the code?



14 correct    2 stars  
12-13 correct 1 star

Work out the value of each letter:

$14 \times 3 = a$

$a = \dots\dots$

$6 + 15 = b$

$b = \dots\dots$

$13 \times 3 = c$

$c = \dots\dots$

$75 \div 5 = d$

$d = \dots\dots$

$20 \times 4 = e$

$e = \dots\dots$

$45 \times 3 = f$

$f = \dots\dots$

$129 - 17 = g$

$g = \dots\dots$

**Example**

$35 \div a = 7$   
What is the value of  $a$ ?

this means

$a \times 7 = 35$

$a = 5$



$5 + h = 10$

$h = \dots\dots$

$8 + i = 15$

$i = \dots\dots$

$15 \times j = 60$

$j = \dots\dots$

$30 \div k = 6$

$k = \dots\dots$

$12 \times m = 36$

$m = \dots\dots$

$50 \times n = 200$

$n = \dots\dots$

$24 - p = 21$

$p = \dots\dots$

# Unit 6 Answers

## Section 1

### Doubles and halves

#### 1 Doubles and halves

1	28	8	3	15	16	22	21
2	22	9	5	16	14	23	17
3	12	10	10	17	6	24	26
4	30	11	8	18	30	25	40
5	36	12	15	19	$5\frac{1}{2}$		
6	18	13	12	20	$7\frac{1}{2}$		
7	38	14	7	21	11		

#### 2 Doubles and halves of multiples of 10 and 100

1	40	8	160	15	150
2	80	9	500	16	120
3	400	10	660	17	45
4	140	11	30	18	180
5	300	12	50	19	35
6	1000	13	100	20	435
7	240	14	70		

#### 3 Doubles and halves of 2-digit numbers

A	1	$40 + 6 = 46$	6	$120 + 12 = 132$
	2	$80 + 4 = 84$	7	184
	3	$60 + 16 = 76$	8	74
	4	$120 + 8 = 128$	9	150
	5	$40 + 8 = 48$	10	158
B	1	$20 + 3 = 23$	5	46
	2	$35 + 4 = 39$	6	$17\frac{1}{2}$
	3	$10 + 3\frac{1}{2} = 13\frac{1}{2}$	7	36
	4	$30 + 3 = 33$	8	49

## Unit 6 Answers

## Section 2

## Mental calculations

## 1 Repeated doubling and halving

1	22	5	104	9	14
2	11	6	208	10	7
3	$5\frac{1}{2}$	7	21	11	132
4	52	8	$10\frac{1}{2}$	12	42

## 2 Multiples of 10 and 100

1	210	4	240	7	250
2	200	5	320	8	180
3	120	6	490	9	360
10	1500	13	2400	16	4000
11	2800	14	3200	17	8100
12	1800	15	3500	18	1800
19	2500	22	1200	25	6400
20	2400	23	4200	26	1800
21	1400	24	3500	27	3000

## 3 Multiplying in your head using partitioning

1	90	4	80	7	672
2	252	5	138	8	231
3	376	6	126	9	368

## 4 Multiplying simple decimals in your head

1	0.6	4	2.8	7	10
2	2.8	5	2.4	8	4.8
3	8.4	6	6.4	9	4.9

## Unit 6 Answers

## Section 3

## Addition

## 1 Mental addition of simple decimals

1	0.5	4	2.6	7	2 or 2.0
2	1.5	5	1.9	8	5.8
3	1 or 1.0	6	3 or 3.0	9	9.9

## 2 Addition

1	3833	2	2709	3	7870
---	------	---	------	---	------

## 3 Adding decimals

1	75.1	4	67.9	7	57.02
2	3.79	5	9.96	8	92.15
3	86.2	6	88.4	9	116.99

## Section 4

## Subtraction

## 1 Mental subtraction of simple decimals

1	0.2	4	0.5	7	1.2
2	1.4	5	0.2	8	1.2
3	3 or 3.0	6	1 or 1.0	9	4.4

## 2 Subtraction

1	517	2	292	3	306
---	-----	---	-----	---	-----

## 3 Subtracting decimals

1	2.1	2	4.27	3	1.8	4	3.09
5	1.8	6	5.52	7	2.8		
8	2.68	9	3.82	10	2.91		

## Unit 6 Answers

## Section 5

## Multiplication

## 1 Multiples of 6, 7, 8, 9

1	72	4	63	7	36
---	----	---	----	---	----

2	45	5	35	8	54
---	----	---	----	---	----

3	48	6	56		
---	----	---	----	--	--

## 2 Multiples of 10 and 100

1	240	4	350	7	200
---	-----	---	-----	---	-----

2	250	5	480	8	1800
---	-----	---	-----	---	------

3	1400	6	6300	9	270
---	------	---	------	---	-----

## 3 Multiplication for TU × U

1	×	30	5		35 × 4
		4	120	20	= 140

2	×	20	7		27 × 3
		3	60	21	= 81

3	×	40	8		48 × 5
		5	200	40	= 240

4	×	70	3		73 × 6
		6	420	18	= 438

## 4 Multiplication for HTU × U

1	×	200	50	3		253 × 4
		4	800	200	12	= 1012

2	×	500	30	2		532 × 8
		8	4000	240	16	= 4256

3	×	400	20	8		428 × 5
		5	2000	100	40	= 2140

4	×	600	60	3		663 × 7
		7	4200	420	21	= 4641

# Unit 6 Answers

## Multiplication

*continued*

### 5 Multiplication for U.t × U

$$\begin{array}{r} 1 \quad \times \quad | \quad 2 \quad 0.4 \\ \hline 4 \quad | \quad 8 \quad 1.6 \end{array} \quad 2.4 \times 4 = 9.6$$

$$\begin{array}{r} 2 \quad \times \quad | \quad 7 \quad 0.5 \\ \hline 7 \quad | \quad 49 \quad 3.5 \end{array} \quad 7.5 \times 7 = 52.5$$

$$\begin{array}{r} 3 \quad \times \quad | \quad 3 \quad 0.8 \\ \hline 5 \quad | \quad 15 \quad 4.0 \end{array} \quad 3.8 \times 5 = 19$$

## Section 6

## Division

### 1 Division

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

### 2 Ways of asking the same thing

1	4	9	6	16	(a) 4	(b) 6
2	5	10	7	17	(a) 8	(b) 10
3	2	11	6	18	(a) 7	(b) 10
4	5	12	9	19	(a) 5	(b) 100
5	3	13	5	20	(a) 8	(b) 7
6	4	14	3	21	(a) 9	(b) 6
7	4	15	£6 each	22	(a) 11	(b) 10
8	7			23	(a) 96	(b) 12

## Unit 6 Answers

## Star Challenge answers



1

Double yummy

7-8 correct 1 star

1 (a) 52p

(c) 58p

2 (a) 57p

(c) 57p

(b) 62p

(d) 56p

(b) 55p

(d) 114p

or £1.14



2

Doubles and halves in disguise

21 correct 3 stars  
18-20 correct 2 stars  
15-17 correct 1 star

1 26

5 30

9 42

2 13

6 22

10 28

3 50

7 54

11 24

4 136

8 122

12 50

13  $150 \times 2 = 300$

16 half of 24 = 12

19  $75 \times 2 = 150$

14  $120 \div 2 = 60$

17  $\frac{18}{2} = 9$

20  $82 \div 2 = 41$

15  $43 \times 2 = 86$

18  $30 \div 2 = 15$

21  $\frac{10}{2} = 5$



3

Multiplication mix

19-20 correct 2 stars  
16-18 correct 1 star

1 28

6 1800

11 900

16 12.5

2 23

7 280

12 90

17 10

3 84

8 3500

13 42

18 2100

4 140

9 2400

14 2400

19 12.4 cm

5 50

10 275

15 4.2

20 6.4 cm



4

You decide how to do it

5 correct 2 stars  
4 correct 1 star

1 980

2 625

3 450

4 5.4

5 1750

## Unit 6 Answers

## Star Challenge answers

continued



## Decimal arithmetic in your head

18-21 correct	2 stars
14-17 correct	1 star

1	0.8	8	5 or 5.0	15	6.48
2	3.3	9	0.8	16	2.66
3	2.8	10	2.6	17	5.2
4	7 or 7.0	11	5 or 5.0	18	7.1
5	5.46	12	3.2	19	5.6
6	9.67	13	0.9	20	2.5
7	8.11	14	2.82	21	9.9



## Lengths of lines

All correct	1 star
-------------	--------

1	8 cm	3	10.1 cm	5	6.3 cm	7	3.9 cm
2	7 cm	4	18.2 cm	6	3.4 cm	8	0.4 cm



## How much?

4-5 correct	1 star
-------------	--------

1	(a) £6.05	(b) £1.95	2	£2.25	
3	£1.85	4	£4.60	5	£5.15



## Money problems

7 correct	2 stars
5-6 correct	1 star

1	£6.85	4	£6.90	7	£6.81
2	£2.49	5	£7.57		
3	£11.70	6	£5.50		



## Little problems

5 correct	2 stars
4 correct	1 star

1	232 pupils	2	96 eggs	3	£555
4	725 km	5	138 flowers		

## Unit 6 Answers

## Star Challenge answers

*continued*

## Multiplication and division puzzles

14 marks	3 stars
12-13 marks	2 stars
10-11 marks	1 star

- |   |                                  |         |
|---|----------------------------------|---------|
| 1 | <b>7</b>                         | 3 marks |
| 2 | <b>85</b> $\times$ 4 = 340       | 1 mark  |
| 3 | <b>274</b> $\times$ 6 = 1644     | 1 mark  |
| 4 | <b>27</b> $\times$ 3 = <b>81</b> | 3 marks |
|   | <b>28</b> $\times$ 3 = <b>84</b> | 3 marks |
|   | <b>29</b> $\times$ 3 = <b>87</b> | 3 marks |



## Division in disguise

15-16 correct	2 stars
12-14 correct	1 star

- |   |  |    |  |
|---|--|----|--|
| 1 | 125 $\div$ 5 = <b>25</b>               | 9  | There are <b>5</b> 25s in 125          |
| 2 | 640 $\div$ <b>20</b> = 32              | 10 | $\frac{1}{3}$ of £360 = <b>£120</b>    |
| 3 | $\frac{48}{\mathbf{3}}$ = 16           | 11 | 645 divided by 5 = <b>129</b>          |
| 4 | 820 $\div$ 4 = <b>205</b>              | 12 | <b>57</b> $\div$ 19 = 3                |
| 5 | 129 $\div$ 3 = <b>43</b>               | 13 | 185 $\div$ <b>5</b> = 37               |
| 6 | 682 $\div$ <b>2</b> = 341              | 14 | $\frac{\mathbf{60}}{15}$ = 4           |
| 7 | $\frac{375}{\mathbf{25}}$ = 15         | 15 | £667 shared between 23<br>= <b>£29</b> |
| 8 | £420 shared between 4<br>= <b>£105</b> | 16 | 450 $\div$ <b>15</b> = 30              |



## Can you crack the code?

14 correct	2 stars
12-13 correct	1 star

- |               |                |              |              |
|---------------|----------------|--------------|--------------|
| a = <b>42</b> | e = <b>80</b>  | i = <b>7</b> | n = <b>4</b> |
| b = <b>21</b> | f = <b>135</b> | j = <b>4</b> | p = <b>3</b> |
| c = <b>39</b> | g = <b>112</b> | k = <b>5</b> |              |
| d = <b>15</b> | h = <b>5</b>   | m = <b>3</b> |              |