Unit 9
Multiplication and division

Year 4
Spring term

Five daily lessons

National
Numeracy *Strategy*

Unit Objectives
Year 4

• Extend understanding of the operations of multiplication and division, and their relationship to each other and to addition and subtraction.	Pages 52, 54
• Understand the principles (not the names) of the commutative, associative and distributive laws as they apply to multiplication.	Page 52
• **Know by heart: multiplication facts for 2, 3, 4, 5 and 10 times tables.**	Page 58
• **Derive quickly: division facts corresponding to 2, 3, 4, 5 and 10 times tables.**	Page 58
• **Find remainders after division.** Divide a whole number of pounds by 2, 4, 5 or 10 to give pounds and pence.	Page 56
• Use closely related facts, (e.g. to multiply by 9 or 11, multiply by 10 and adjust; develop the 6 times table from the 4 and 2 times tables).	Page 62
• Partition [e.g. $23 \times 4 = (20 \times 4) + (3 \times 4)$].	Page 62

This Unit Plan is designed to guide your teaching.

You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- Resource sheet 9.1 (3 pages)
- Resource sheet 9.2 (3 pages)
- Activity sheet 9.1
- Activity sheet 9.2
- OHT 9.1
- OHT 9.2
- OHT 9.3
- OHT 9.4
- Counters
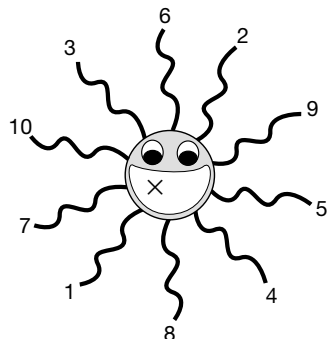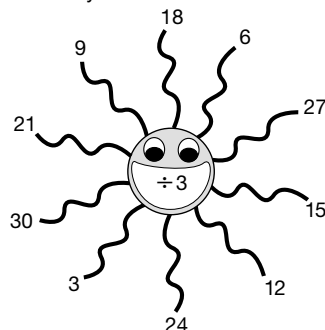- Whiteboards

Link Objectives

Year 3

- Understand multiplication as repeated addition. Read and begin to write the related vocabulary.
- **Understand division** as grouping (repeated subtraction) or sharing. Read and begin to write the related vocabulary.
- **Recognise that division is the inverse of multiplication** and that halving is the inverse of doubling.
- **Know by heart: multiplication facts for the 2, 5 and 10 times tables.**
- Begin to know the 3 and 4 times tables.
- Derive quickly: division facts corresponding to the 2, 5 and 10 times tables.
- Begin to find remainders after simple division.
- Extend understanding that multiplication can be done in any order.
- Use known number facts and place value to carry out mentally simple multiplications and divisions.

Year 5

- Understand the effect of and relationships between the four operations, and the principles (not the names) of the arithmetic laws as they apply to multiplication. Begin to use brackets.
- **Know by heart all multiplication facts up to 10×10.**
- Derive quickly or continue to derive quickly: division facts corresponding to tables up to 10×10.
- Begin to express a quotient as a fraction, or as a decimal when dividing a whole number by 2, 4, 5 or 10, or when dividing pounds and pence.
- Use closely related facts (e.g. multiply by 19 or 21 by multiplying by 20 and adjusting; develop the 12 times table from the 10 and the 2 times tables).
- Partition [e.g. $47 \times 6 = (40 \times 6) + (7 \times 6)$].

(Key objectives in bold)

department for
education and skills

Planning sheet	Day One	Unit 9 *Multiplication and division*	Term: *Spring*	Year Group: *4*

Oral and Mental

Objectives and Vocabulary	Teaching Activities
Know by heart: multiplication facts for 2, 3, 4, 5 and 10 times tables.	• Show the 'decapus' on OHT 9.1, or an enlarged display. Explain that a decapus has 10 legs. Use to reinforce 2 and 3 times tables.

• Write 2 in the decapus's mouth, and point to a leg, e.g. 6.

Q What is 6×2?

Children say response together.

Repeat using other legs. Build up children's speed and recall.

• Replace the 2 with a 3. Point to 7.

Q What is 7×3?

• Replace 3 with 4, 5 and 10 as time allows

VOCABULARY
multiplied by

RESOURCES
OHT 9.1

Main Teaching

Objectives and Vocabulary

Extend understanding of the operations of multiplication and division, and their relationship to each other and to addition and subtraction.

VOCABULARY
divided by
repeated addition
repeated subtraction

RESOURCES
OHT 9.2
Counters
Activity sheet 9.1

Teaching Activities

• Place 10 counters on an OHP, arrange as a 2 by 5 array as shown below:

• •
• •
• •
• •
• •

Q What addition number sentences can we make about these counters?

Record notation $5 + 5 = 10$, $2 + 2 + 2 + 2 + 2 = 10$. Emphasise that we can think of the counters as 2 columns of 5, or 5 rows of 2 counters. Demonstrate how multiplication is linked with repeated addition.

Record on the board: $2 \times 5 = 10, 5 \times 2 = 10$

Q How many twos are there in 10?
Q How do we write this?

Record answers and include $10 \div 2 = 5$. Demonstrate repeated subtraction with the OHP counters emphasising the link with division. Record $10 - 2 - 2 - 2 - 2 - 2 = 0$.

Q How many fives are there in 10?
Q How do we write this?

Record $10 \div 5 = 2$ and $10 - 5 - 5 = 0$. Relate the division to the repeated subtraction.

• Give out Activity sheet 9.1.

Q What $+, -, \times$ and $\div$ number sentences can you make about the first array?

Children work in pairs.

Collect and discuss children's answers and record these on the board. Use appropriate vocabulary. Make sure the answers include:
$10 + 10 + 10 = 30$
$3 \times 10 = 30$
$3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 = 30$
$10 \times 3 = 30$
$30 - 10 - 10 - 10 = 0$
$30 \div 10 = 3$ etc.

• Ask children to do the same for the array for question 2. Collect responses and discuss answers. Repeat for questions 3 and 4.

• Draw attention to the number lines in question 5. Ask children to count in 2s starting at 0. Saying 0 (point to 0), 2 (point to 1), 4 (point to 2 etc.). As they do so ask them to point to the markers on the top number line. Stop them at times, e.g. at 12.

Q How many 2s make 12?

Check that children are pointing to the marker below 6. Repeat, building up speed. Next time get children to record the numbers below the markers on the first number line. Demonstrate on the number line repeated subtraction, e.g. $8 - 2 - 2 - 2 - 2$ and show them how this means $8 \div 2 = 4$ and 4 is the number above 8.

Q What is $14 \div 2, 18 \div 2$?

Encourage children to use the number line then to turn the page over but imagine the number line to help them.

Q What is $27 \div 3$?

Ask children what number line might help them to divide by 3. Use the second number line to count in 3s and record the numbers below the markers. Repeat asking questions involving 3.

Plenary

Teaching Activities / Focus Questions

• Show the 'decapus' on OHT 9.2, or an enlarged display. As the children recite the 3 times table write the values on the legs randomly. Put $\div 3$ in the mouth.

• Children to turn over their Activity sheet 9.1 so they cannot see the number line. Point to a leg, e.g. 24.

Q What is $24 \div 3$?

• Compare with the number line and emphasise the relationship between multiplication and division.

By the end of the lesson children should be able to:

• **Complete a range of number sentences involving $+, -, \times$ or $\div$ describing a rectangular pattern of dots, e.g.**

• • • $3 + 3 + 3 + 3 = \square$
• • • $3 \times \square = 12$
• • • $12 - 3 - 3 - 3 - 3 = \square$
• • • $12 \square 4 = 3$

and provide explanations which demonstrate their understanding of the relationships between $+, -, \times$ and $\div$.
(Refer to supplement of examples, section 6, pages 52 and 54.)

Planning sheet	Day Two	Unit 9 *Multiplication and division*	Term: *Spring*	Year Group: *4*

Oral and Mental		**Main Teaching**		**Plenary**
Objectives and Vocabulary	**Teaching Activities**	**Objectives and Vocabulary**	**Teaching Activities**	**Teaching Activities / Focus Questions**

Recognise simple fractions that are several parts of a whole. Use known number facts and place value to add or subtract mentally, including any pair of two-digit whole numbers.	• Hold up fraction cards, one at a time, in any order for children to read out. • Hold 2 cards, e.g. $\frac{1}{8}$ and $\frac{3}{8}$. **Q** Point to the larger fraction. Choose some pupils, including those who were incorrect, to explain their decision. Pupils to record on whiteboards an illustration of the 2 fractions to see which is really biggest. Hold up $\frac{3}{8}$ and $\frac{3}{4}$. **Q** Which of these is bigger? Use illustrations to explain. • Revise pairs of numbers with a total of 100, by asking pupils to record on whiteboards a pair of these numbers. Expect quick recording of a number of pairs, and read out interesting pairs (i.e. not just multiples of 10). Discuss how they knew their pairs. • Take one pair, e.g. 38 + 62 and change to 638 + 62, 338 + 62, 38 + 762 etc. **Q** What is the total now? **Q** How do you know?	Derive quickly division facts corresponding to 2, 4, 5 and 10 times tables. Find remainders after division. Divide a whole number of pounds by 2, 4, 5 or 10 to give pounds and pence.	• With Resource sheet 9.1 make 2 sets of cards 1 to 10 and 2, 4, 5, 10. Shuffle the sets. Pick a card from each set and attach to the board a multiplication, e.g. $8 \times 4 =$ Collect the answer from the children. **Q** What division facts can we write using this statement? Write next to the statement $32 \div 4 = 8$ and $32 \div 8 = 4$. Children to record in their books. Return cards in pack, shuffle and repeat. • Remind children that dividing by 2 is halving and dividing by 4 is halving and halving again. Dividing by 5 is the same as dividing by 10 and doubling. • Discuss sharing £1 between 2, 4, 5 and then 10 people and record on the board: £1 ÷ 2 = 50p; £1 ÷ 4 = 25p; £1 ÷ 5 = 20p; £1 ÷ 10 = 10p. Repeat with sharing £2, then £10, between 2, 4, 5 and 10 people. • Ask children to divide £4 between 2, 4, 5 and 10 people and record answers in their books. Collect answers and discuss strategies. • Give problem: 'Five bus tickets cost £14. How much do they cost each?' **Q** What is £10 ÷ 5? **Q** How much of the £14 is left? Write £14 as £10 and £4. Remind children that they have already worked out £10 ÷ 5 and £4 ÷ 5. Record £14 ÷ 5 as; £10 ÷ 5 = £2, £4 ÷ 5 = 80p, £14 ÷ 5 = £2.80. • Provide similar division problems for children to solve in pairs and record. • Collect answers and discuss methods.	• Present problem: 'I have £27. I can buy exactly 5 boxes of chocolates as presents, how much does each cost?' Ask children to explain their method to a partner. Work through the problem as children explain their methods. Ensure they can identify the 'remainder' and write £27 as £25 and £2. **Q** What if I could buy only 4 boxes? Discuss the solution with the class. • **Q** You know you can work out the price for 4 or 5 boxes. What other numbers of boxes could you buy? Why? Establish that ÷ by 2, 3, and 10 are obvious choices, and that division by other numbers is also possible. HOMEWORK – Choose some amounts of whole £s between £10 and £30. Divide them by 2, 3, 4, 5 and 10. What patterns can you see in your results? **By the end of the lesson children should be able to:** • **Use known multiplication and division facts in 2, 3, 4, 5 and 10 times tables to solve division problems;** • **Apply these facts to money problems;** • **Divide a whole number of pounds by 2, 4, 5 or 10.** (Refer to supplement of examples, section 6, pages 56 and 58.)
RESOURCES Resource sheet 9.2 Whiteboards		VOCABULARY halving remainder RESOURCES Resource sheet 9.1		

NNS Unit Plans

Planning sheet	Day Three	Unit 9 *Multiplication and division*	Term: *Spring*	Year Group: *4*

Oral and Mental

Objectives and Vocabulary	Teaching Activities
Recognise and extend number sequences formed by counting from any number in steps of constant size.	• Use counting stick to count in steps of $\frac{1}{2}$ hour, e.g. from 9.30; half past 4; 7.05, both forwards and back. • Count in steps of $\frac{1}{4}$ hour, just using o'clock, $\frac{1}{4}$ past, $\frac{1}{2}$ past and $\frac{1}{4}$ to, starting from different times, both forwards and back. • Count in steps of 5 minutes, e.g. from 1 o'clock in digital or analogue fashion. • Count in steps of 10 minutes, as above.

RESOURCES
Counting stick

Main Teaching

Objectives and Vocabulary

Understand the principles (not the names) of the commutative and associative laws as they apply to multiplication.

VOCABULARY
factors

RESOURCES
Counters

Teaching Activities

• Review homework activity. Quickly make a table of a few results and discuss the patterns.

• On the board write:

4×3 and 3×4

> **Q** Do these have the same answer?

On the OHP use 12 counters to show the array:

· · · ·
· · · ·
· · · ·

> **Q** How many counters are there?

Emphasise that it does not matter if we count the 4 lots of 3 or the 3 lots of 4, we still get 12. This can help us when we multiply numbers, as we can change the order of the numbers. Give other examples to reinforce the rule.

> **Q** Can we extend this rule to multiplying 3 numbers together?

• On the board write: $2 \times 4 \times 5$

> **Q** Can we rearrange the 3 numbers to help us find the answer?

• Cover the 2× and ask:

> **Q** Can we reorder the 4 and 5?

Agree we can and write as $2 \times 5 \times 4$.

> **Q** What is 2×5?

Using the answer 10 write 10×4.

> **Q** What is 10×4?

Establish the answer to $2 \times 4 \times 5$ is 40. Using $2 \times 7 \times 5$ demonstrate this is $2 \times 5 \times 7 = 10 \times 7 = 70$.

Set children similar questions involving 2, 5 and a third number. Collect answers and correct any misunderstandings.

•
> **Q** What is $4 \times 6 \times 5$?

Reorder as $4 \times 5 \times 6$ and rewrite as 20×6.

Demonstrate that as 20 is 2×10 we can use
$2 \times 10 \times 6 = 2 \times 60$
and double 60 is 120.

Repeat using $4 \times 4 \times 5$. Set children similar questions. Collect answers and discuss methods.

• Write 4 x 15 on the board.

> **Q** Which two numbers can be multiplied to give 15?

Establish that 5 and 3 are a pair of factors of 15. Show how $4 \times 15 = 4 \times 3 \times 5$, and that these numbers can also be re-arranged as $4 \times 5 \times 3$.

> **Q** What is $4 \times 5 \times 3$?

Rewrite as 20×3 and ensure that children can demonstrate that this gives an answer of 60.

• Write the numbers 2, 3, 4, 5 in one circle on the board and 15, 25, 35, 45 in another circle.

Children choose one number from each circle and multiply them together in the way that has been modelled.

Repeat several times.

Plenary

Teaching Activities / Focus Questions

• Discuss children's work, asking for examples. Identify and correct any errors and misunderstandings.

• Write on the board:

'Pencils come in boxes of 24. How many pencils will be in 5 boxes?'

> **Q** What calculation is needed?

Establish that children recognise the calculation is the multiplication 24×5 or 5×24.

Use the method taught to rewrite as $5 \times 4 \times 6$ etc.

> **By the end of the lesson children should be able to:**
> - **Know that multiplication can be done in any order;**
> - **Know that multiplication calculations can be made easier by using factors.**
>
> (Refer to supplement of examples, section 6, page 52.)

Planning sheet	Day Four	Unit 9 *Multiplication and division*	Term: *Spring*	Year Group: *4*

Oral and Mental

Objectives and Vocabulary	Teaching Activities
Partition numbers into thousands, hundreds, tens and ones.	• Use place value cards to make three and four-digit numbers, e.g. `7 4 6 2` Remove a card `7 0 6 2` **Q** What is missing? **Q** How do you know? Model subtraction as 7462 − 62; 7462 − 7000 etc; and addition as 7000 + 462; 7002 + 460 etc. **Q** What other additions or subtractions can you create with these cards?
OR	
Use the eight compass directions N, S, E, W, NE, NW, SE, SW. Make and measure clockwise and anticlockwise turns.	• Pupils record 8 points of compass on white boards. Draw an arrow pointing S. Make a clockwise turn of 90° and draw another arrow. Show your board. • Start from different compass points and make turns of 45°, 90°, 180° or 360°.
VOCABULARY multiply multiplied by **RESOURCES** Whiteboards Place value cards	

Main Teaching

Objectives and Vocabulary	Teaching Activities	
Use closely related facts. Use the distributive law to develop the 6 times table from the 2 and 4 times tables. Multiply by 9 or 11, multiply by 10 and adjust.	• Show OHT 9.3. **Q** How can the 2 and 4 times tables help us with the 6 times table? Children discuss in pairs. Take suggestions from the children. Write the facts 5 × 4 = 20 and 5 × 2 = 10 on the board, and show how the sum of these two facts will give 5 × 6 = 30. Use 2 sets of counters to display two arrays: 5×4 5×2 Move the arrays together to demonstrate they represent 5 × 6. Write on the board: (5 × 4) + (5 × 2) = 5 × 6. **Q** How could you work out the answer to 7 × 6 using the 2 and 4 times tables? Take responses and record: 7 × 6 = (7 × 4) + (7 × 2). Emphasise that this partitions the 6 into 4 and 2 as we know the 4 and 2 times table. Complete the 6 times table this way. • Write 7 × 11 on the board. **Q** What multiplication facts can we use to work this out? Establish that children know 7 × 10 = 70 and 7 × 1 = 7.	Write on the board: (7 × 11) = (7 × 10) + (7 × 1) **Q** How could we work out 8 × 11 in a similar way? Collect responses and establish that: 8 × 11 = (8 × 10) + (8 × 1) = 80 + 8 = 88 Children to record this. Give similar questions involving multiplying by 11. • Write (7 × 10) − (7 × 1) **Q** What does this calculate? Establish 10 − 1 = 9 so it is the same as 7 × 9. Work through this and another example. Give similar questions involving multiplying by 9. **Q** How could we work out 12 × 11 and 12 × 9? Give children time to work them out. Collect responses and show children how to set out their methods to arrive at 120 + 12 and 120 − 12. Show OHT 9.4. Explain that they are to complete the multiplications. The answers are mixed up in the table but one number is wrong. **Q** Which number is incorrect?
RESOURCES Counters OHT 9.3 OHT 9.4		

Plenary

Teaching Activities / Focus Questions
• Collect answers. Identify that 196 is the incorrect number as 18 × 11 = 198.   **Q** How could we extend this idea to the 12 times table?   Collect answers from children and demonstrate on board.   Encourage children to explain their methods.   **By the end of the lesson children should be able to:**   • **Use their knowledge of ×4 and ×2 facts to derive ×6 facts;**   • **Be able to work out ×11 and ×9 facts by using ×10 facts and adjusting.**   (Refer to supplement of examples, section 6, page 62.)

Planning sheet	Day Five	Unit 9 *Multiplication and division*	Term: *Spring*	Year Group: *4*

Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	**Teaching Activities**	**Objectives and Vocabulary**	**Teaching Activities**	**Teaching Activities / Focus Questions**

Derive multiplication facts for the 7 and 8 times tables.	• Children recite the 2 times table. Repeat and as they do record the table on the board.
	
	• Do the same for the 3 times table and the 4 times table.
	
	  Q What other tables can we derive from these three tables?
	
	• Establish that the 4 times table is double the 2 times table, that adding the 2 and 4 times tables gives the 6 times table. Record on the board:
	
	  Q What table will we get by adding the 2 and 3 time tables?
	
	Agree that this is the 5 times table and check particular cases.
	
	  Q What other tables can we add and what tables will this give?
	
	Use the 3 and 4 times tables to derive the 7 times table and record on the board.
	
	  Q How can we get the 8 times table?
	
	• Establish that adding the 2 and 6 times table will work or doubling the 4 times table will give the 8 times table. Derive the 8 times table. Record on the board.
	
	• Children to recite the 7 then 8 times table from those on the board. Get them to cover their eyes and to try to recite these tables.
	
	• Emphasise that by knowing the 2 and 3 times table we can derive the 4, 5, 6, 7 and 8 times tables.
		Use the distributive law and partitioning to multiply TU by U.
		
		VOCABULARY
		partition
		grid method
		
		RESOURCES
		Activity sheet 9.2
			• Remind children how they multiplied by 11 and 9 by partitioning 11 into 10 + 1 and 9 into 10 − 1. Explain that other calculations can be done in a similar way. Draw attention to multiplying by 12 by partitioning. Work through:
			
			$8 \times 12 = (8 \times 10) + (8 \times 2)$
			$= 80 + 16$
			$= 96$
			
			  Q How could we work out 6×15?
			
			Discuss suggestions and establish the use of partitioning 15 into 10 and 5. Work through 6 x 15
			
			$6 \times 15 = (6 \times 10) + (6 \times 5)$
			$= 60 + 30$
			$= 90$
			
			Demonstrate how this can be recorded on a grid as well as with jottings.
			
			| ×
				10	5	

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6	60	30	= 90 |
			
			Repeat with a calculation such as 17×3.
			
			• Give children similar examples to do in pairs. Emphasise the partitioning of the two-digit number and encourage the use of the grid to record their working. Collect answers and discuss methods. Correct any errors or misunderstandings.
			
			• Look at Activity sheet 9.2 together. Discuss suggestions for how to work out each answer.
			
			  Q What sort of calculation do we need to do? How?
			
			Ask children to solve the problems and record their answers.
				• Pose the problem:
				
				  'Asha says he can buy 9 spiders with his £2, is he right?'
				
				Discuss the question and use children's responses to assess children's understanding, and correct any misunderstandings related to partitioning.
				
				  Q What have we learned about multiplication this week?
				
				• Take feedback from children.
				
				Summarise the different strategies for multiplication that have been covered during the week. Make sure the following are included:
				
				– multiplying in any order,
				– links with other operations,
				– using factors to make calculations easier,
				– using known table facts to derive new ones, by doubling and adding related facts,
				– partitioning.
				
				By the end of the lesson children should be able to:
				
				• **Use partitioning to multiply a two-digit number by a single-digit number mentally;**
				• **Be familiar with partitioning with 2, 3, 4, 5, 6 and 10 times tables.**
				
				(Refer to supplement of examples, section 6, pages 52 and 62.)

1	2
3	4
5	6
7	8

9	10
×	=
2	4
5	10

3	✕
2	3
✕	6
=	=

$$\frac{1}{2}$$

$$\frac{1}{4}$$

$$\frac{1}{10}$$

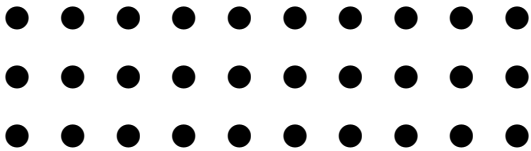$$\frac{1}{8}$$

$$\frac{3}{8}$$
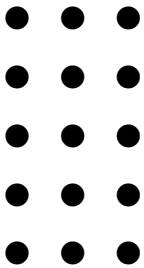
$$\frac{4}{10}$$

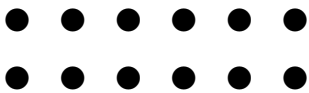$$\frac{5}{10}$$
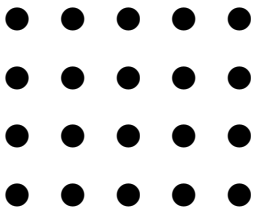
$$\frac{3}{4}$$
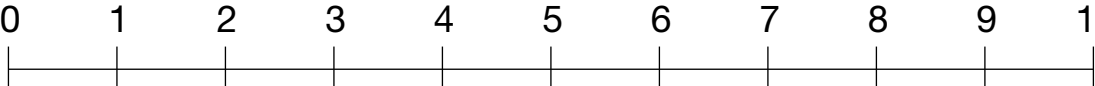
$$\frac{5}{8}$$

$$\frac{3}{10}$$

$$\frac{2}{10}$$

$$\frac{9}{10}$$

1. ● ● ● ● ● ● ● ● ● ●   _____
   ● ● ● ● ● ● ● ● ● ●   _____
   ● ● ● ● ● ● ● ● ● ●   _____
     _____
     _____

2. ● ● ●   _____
   ● ● ●
   ● ● ●   _____
   ● ● ●   _____
   ● ● ●   _____

3. ● ● ● ● ● ●   _____
   ● ● ● ● ● ●   _____
     _____
     _____

4. ● ● ● ● ●   _____
   ● ● ● ● ●   _____
   ● ● ● ● ●   _____
   ● ● ● ● ●   _____

5. 0　1　2　3　4　5　6　7　8　9　10

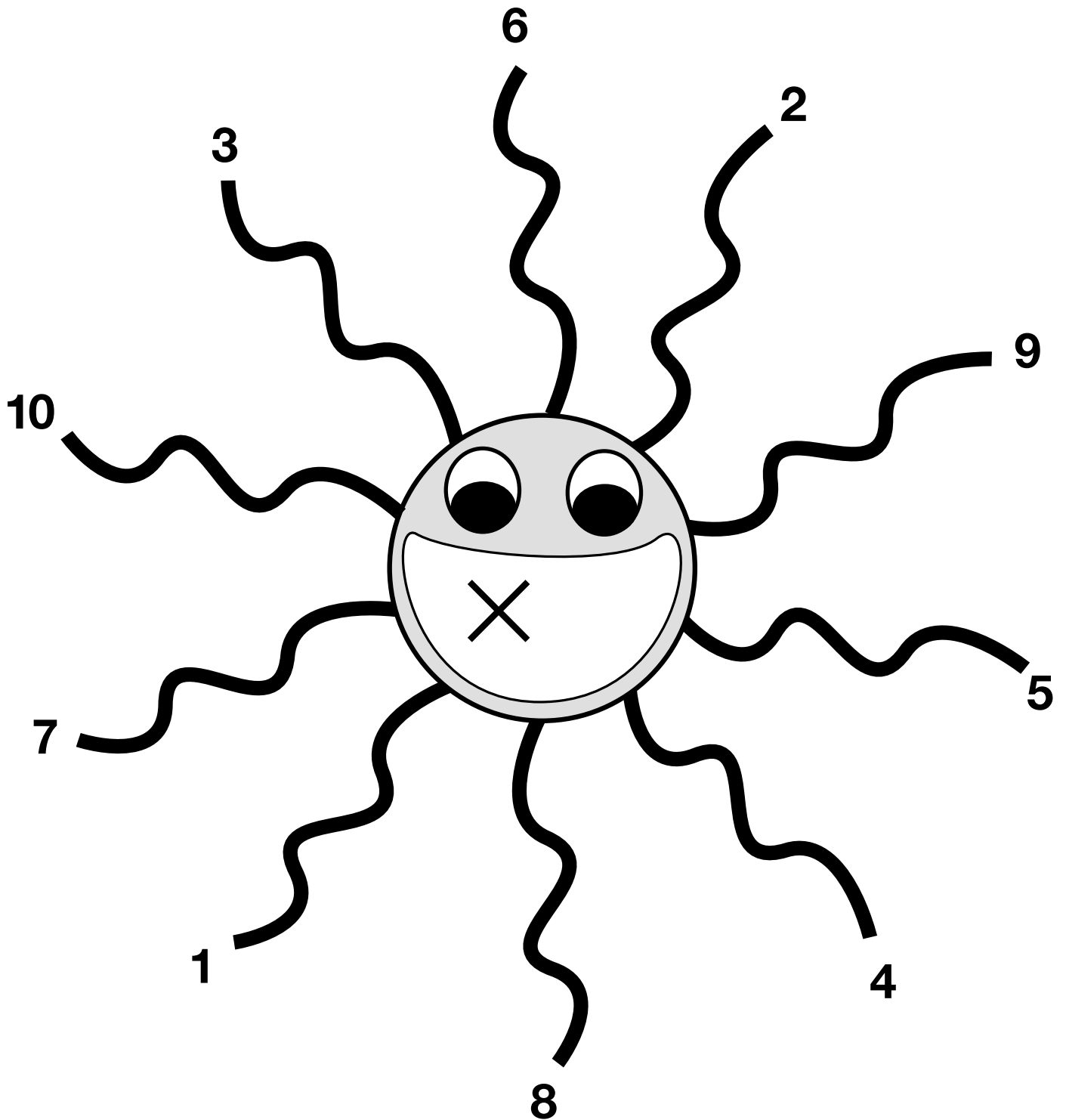   0　1　2　3　4　5　6　7　8　9　10

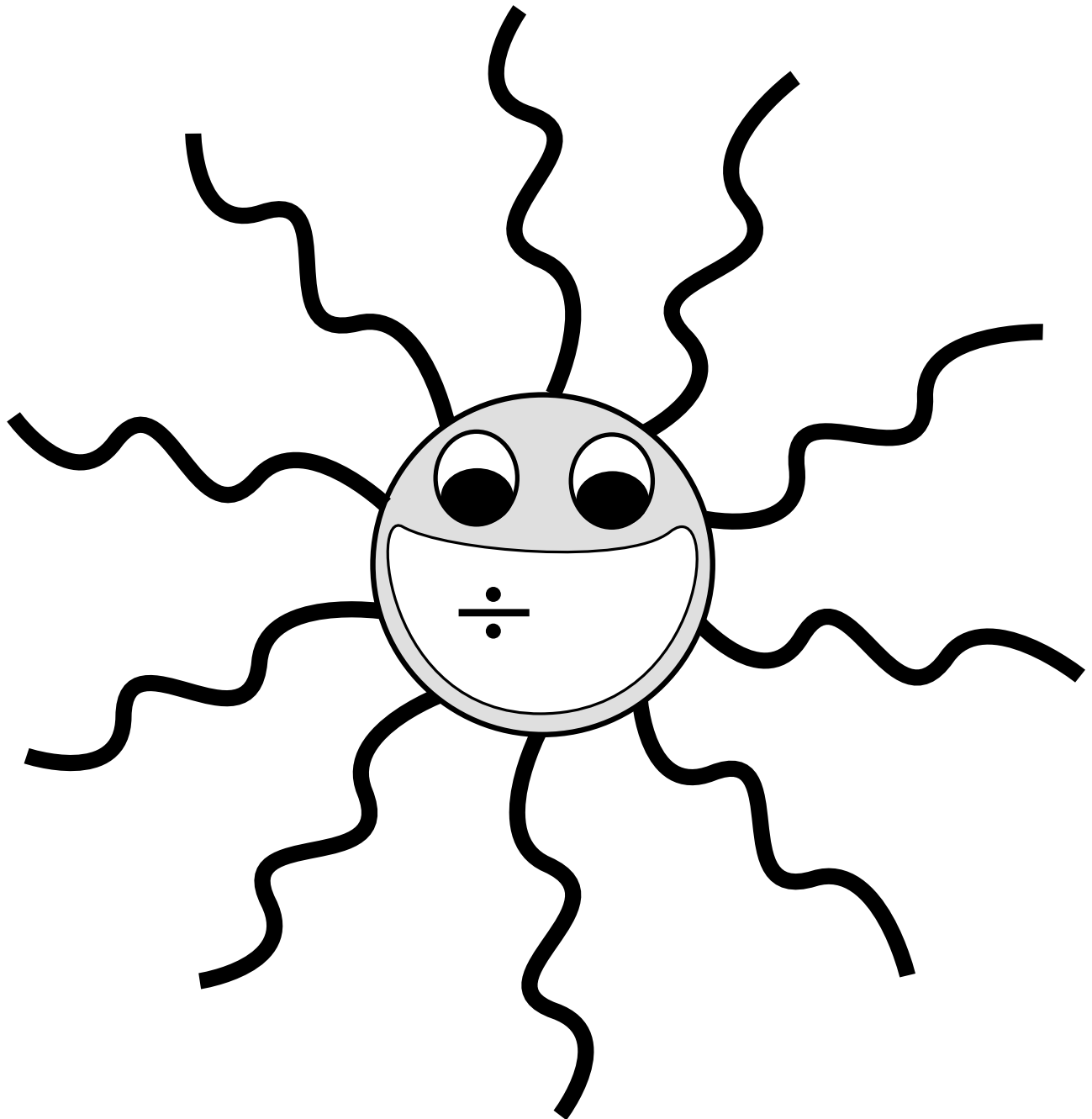# Mrs Jolly's Joke Shop

KIDDIE ♥ KORNER

Ghost Mask 32p each

False noses 34p each

Pretend Slug 26p each

Slime 62p per bottle

Scary spiders 23p each

OPEN

1. 4 children spend their pocket money on a scary spider each. How much money did they spend altogether?

2. Joe bought a ghost mask for himself and two of his friends. How much money did he spend?

3. If three children buy a false nose each, how much money do they spend?

4. Mrs Jolly sold 5 bottles of slime one day. How much money did she collect from selling slime?

5. How much do four slugs cost? How much change would there be from £2.00?

6. Julie buys 11 ghost-masks as presents for her friends? How much did this cost her?

Decapus

Decapus

$\times 2$

$1 \times 2 = 2$

$2 \times 2 = 4$

$3 \times 2 = 6$

$4 \times 2 = 8$

$5 \times 2 = 10$

$6 \times 2 = 12$

$7 \times 2 = 14$

$8 \times 2 = 16$

$9 \times 2 = 18$

$10 \times 2 = 20$

$\times 4$

$1 \times 4 = 4$

$2 \times 4 = 8$

$3 \times 4 = 12$

$4 \times 4 = 16$

$5 \times 4 = 20$

$6 \times 4 = 24$

$7 \times 4 = 28$

$8 \times 4 = 32$

$9 \times 4 = 36$

$10 \times 4 = 40$

Questions

13×9	17×11	15×11	14×9
14×11	18×9	15×9	18×11
16×9	13×11	16×11	17×9

Answers

187	135	154	196
143	176	153	117
126	162	165	144