CALCULATION POLICY FOR MULTIPLICATION AND DIVISION

YEAR 2

Year 2			
	Block 1	Block 2	Block 3
Calculation content	MULTIPLICATION AND DIVISION (UNIT 1) • Groups and equal groups • 5 × table • 10 × table • 2 × table • Division: sharing by 2 • Division: making groups of 2 • Odd and even numbers • Dividing by 5 • Dividing by 10 FRACTIONS (UNIT 1) • Finding half	MONEY AND DECIMALS (UNIT 1) n/a MULTIPLICATION AND DIVISION (UNIT 2) • 10 × table (r) • Dividing by 10 (r) • 5 × table (r) • Dividing by 5 (r) • 2 × table (r) • Dividing by 2 (r) FRACTIONS (UNIT 2) • Finding half (r) • Finding one quarter • Finding quarters • Finding thirds	CALCULATION UNIT • Doubling and halving MONEY AND DECIMALS (UNIT 2) • Multiplying amounts of money • Dividing amounts of money

Year 2			
	Block 1	**Block 2**	**Block 3**
Strategies/ methods	<u>Groups and equal groups</u> In Y1 children learnt about equal and unequal groups. They began to understand the equivalence between a repeated addition expression and a multiplication expression exists due to equal groups, eg: 10 + 10 + 10 = 3 × 10 Teaching shows how the numbers in '3 × 10' relate to the numbers in '10 + 10 + 10'. <u>5 × table</u> Children's knowledge about multiplication is developed by learning about the 5 × table. The array is introduced as a key tool for conceptual understanding. Pictures are used as prompts for writing multiplication equations, eg: 4 × 5 = 20. Teaching encourages children to explain how each term links to the context.	<u>10 × table (r) and dividing by 10 (r)</u> Block 2 begins with revision of the 10 × table and the related division facts. There are no new representations. Children continue to work with arrays, including arrays that support early understanding of the distributive property of multiplication. There is an emphasis on strengthening connections between multiplication and division and this is echoed in fluency sessions.	<u>Doubling and halving</u> Understanding of doubling and halving is extended to finding double/half of two-digit numbers beyond 20. The strategy modelled is to partition the two-digit number into tens and ones, find half of each part, and then combine. Children need to know half of multiples of 10 to 90 and half of the even numbers 2, 4, 6 and 8. <u>Multiplying amounts of money</u> Children's knowledge of multiplication facts is applied to the context of money. Visual representations emphasise the repeated addition structure of multiplication. Children find missing amounts on a money multiplication grid and develop the ability to represent problems with bar models.

Year 2			
	Block 1	**Block 2**	**Block 3**
Strategies/ methods	<u>10 × table</u> Learning about the 10 × table continues to make use of arrays and the interpretation of pictorial representations. Links between the 5 × table and 10 × table are also explored. <u>2 × table</u> Learning about the 2 × table also continues to make use of arrays. An early introduction to the distributive property of multiplication (not referred to as such) deepens understanding about multiplication. For example: 3 × 2 = 6 2 × 2 = 4 5 × 2 = 10	<u>5 × table (r) and dividing by 5 (r)</u> As with the 10 × table, there are no new representations. Again, there is an emphasis on strengthening connections between multiplication and division and this is echoed in fluency sessions. Throughout Block 2 there is a focus on applying knowledge of multiplication and division to solve problems.	<u>Dividing amounts of money</u> The money multiplication grid is used for division. Teaching makes explicit links with multiplication. 3 × __ = 6p 6p ÷ 3 = 2p Children continue to develop the ability to represent problems with bar models.

Year 2			
	Block 1	**Block 2**	**Block 3**
Strategies/ methods	<u>Division: sharing by 2</u> Learning about division begins by understanding that the term divide can be used when something is separated into equal parts. Learning to divide by 2 begins with the partitive (sharing) division structure. Children are introduced to the division symbol: ÷. Connections are made between division and multiplication, supported by the relationship triangle, eg: 10 ÷ 2 = 5 5 × 2 = 10 <u>Division: making groups of 2</u> The quotitive division structure is introduced next and children learn to make equal groups. Links between multiplication and division continue to be supported by the relationship triangle.	<u>2 × table (r)</u> Learning about the 2 × table does introduce a new representation: the multiplication grid. The core purpose of the lesson is to familiarise children with how the grid works as it is likely something they will encounter. Teaching introduces the commutative property and shows how we obtain the same product regardless of the order of the factors. The multiplication grid may look a bit like a 100 square, but it works in a very different way. The multiplication grid is actually arrays. The first grid shows 7 rows of 2. The second shows 2 columns of 7.	

Year 2			
	Block 1	**Block 2**	**Block 3**
Strategies/ methods	<u>Odd and even numbers</u> Learning explores dividing by 2 using the context of odd and even numbers and children learn that even numbers can be divided exactly by 2. <u>Dividing by 5</u> Learning to divide by 5 involves both sharing and grouping structures. Teaching seeks to help children to see where the quotient is in each structure: for sharing - the number in each group; for grouping – the number of groups. The relationship triangle is used to help make links between multiplication and division. <u>Dividing by 10</u> Block 1 concludes with learning to divide by 10, using both sharing and grouping structures.	<u>Dividing by 2</u> Solving problems involving dividing by 2 introduces the concept of inverse. Children will need to learn the term, but understanding of it is best achieved by talking about *working forwards* or *working backwards*. In the case of 7 × 2 = __ we are working forwards. In the case of 14 = __ × 2 we are working backwards or using the inverse. In the examples shown in the representations section, we can solve row 1 and row 2 by working forwards. To solve row 3 we need to work backwards.	

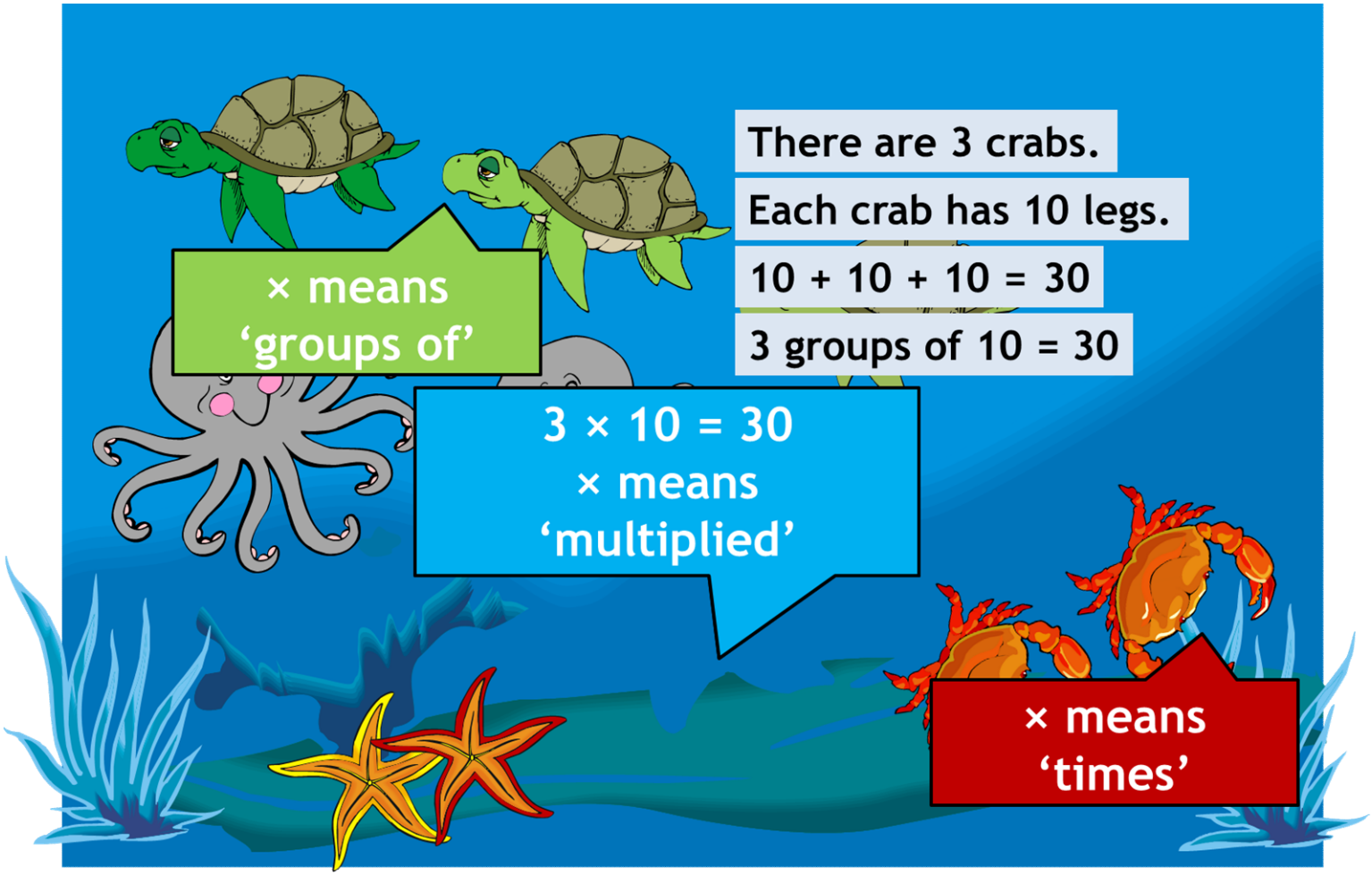
Year 2			
	Block 1	**Block 2**	**Block 3**
Strategies/ methods	Finding half Learning to find half of a number, a group of objects or a shape begins by revisiting the connections between the 2 × table and its related division facts. The focus is on finding half of numbers to 20. Children engage in a range of contexts that involve finding half of even numbers to 20.	Finding half (r) Revision of finding half of numbers to 20 continues to make connections between the 2 × table and its related division facts. Activities include shading shapes to show one-half and also drawing lines on grids to divide shapes into halves. Finding one quarter Children learn that one quarter of a set of objects occurs when the whole is split into 4 equal parts. Note that the 4 × table has not been taught in Year 2 – it is taught in Year 3 – so children cannot use their knowledge of division facts to obtain one quarter. A range of approaches are used, including using concrete resources, encouraging the use of drawing and linking to knowledge of finding half.	

Year 2			
	Block 1	Block 2	Block 3
Strategies/ methods		<u>Finding three-quarters</u> Finding three-quarters of a set is initially done through using concrete resources. Connections are also made to finding one quarter: if one quarter is 5, then two-quarters is 10 and three-quarters is 15. <u>Finding thirds</u> Children learn that one third of a set of objects occurs when the whole is split into 3 equal parts. Note that the 3 × table has not been taught in Year 2 – it is taught in Year 3 – so children cannot use their knowledge of division facts to obtain one third. Nor can they make links to other maths facts they know. They have had experience of counting in threes and the use of concrete resources, visual representations and drawing are the prime strategies for finding thirds. As for learning to find three-quarters, children apply their knowledge of finding one-third to finding two-thirds.	

Year 2 - Block 1

$3 \times 10 = 10 + 10 + 10$

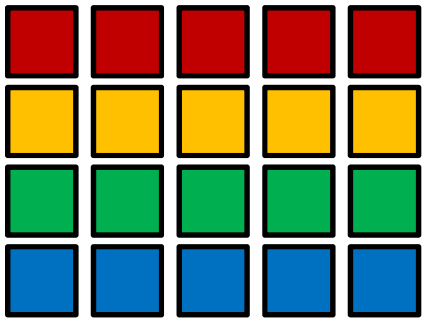
Groups and equal groups



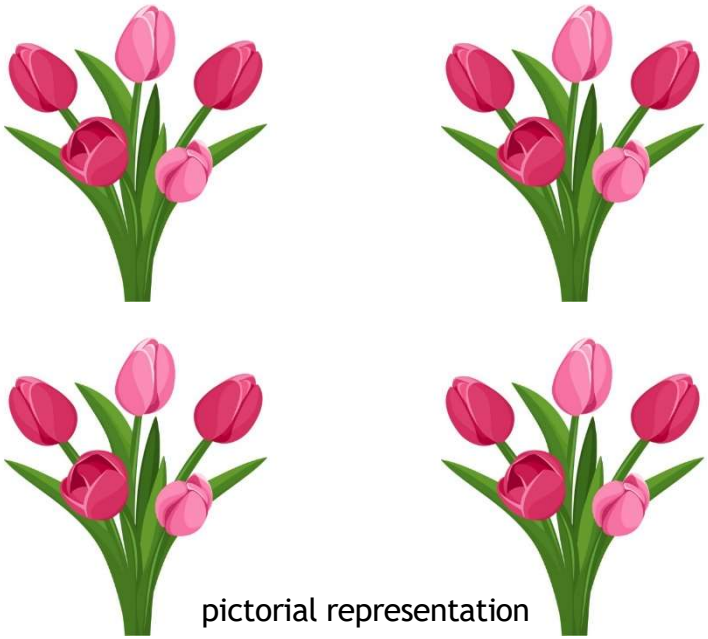
Year 2 - Block 1

$4 \times 5 = 20$

5 × table



array



pictorial representation

$5 + 5 + 5 + 5 = 20$

repeated addition

4 groups of 5 = 20

$4 \times 5 = 20$

multiplication equation

Year 2 - Block 1

4 × 5 = 20 • 4 × 10 = 40

10 × table

4 × 5 = 20

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120

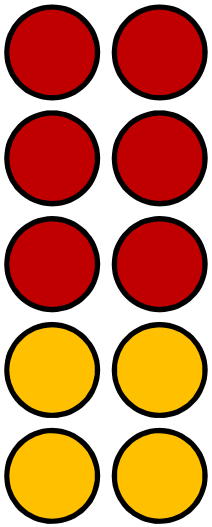
4 × 10 = 40

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120

Year 2 - Block 1

3 × 2 = 6 • 2 × 2 = 4 • 5 × 2 = 10

2 × table



3 groups of ☐

and

☐ groups of ☐

makes

☐ groups of ☐

which equals

☐

Division: sharing by 2

At the start of the lesson we learnt that the word divide can be used when something is separated into equal parts.

In maths, divide means to find how many times a number contains another.

partitive (sharing) division structure

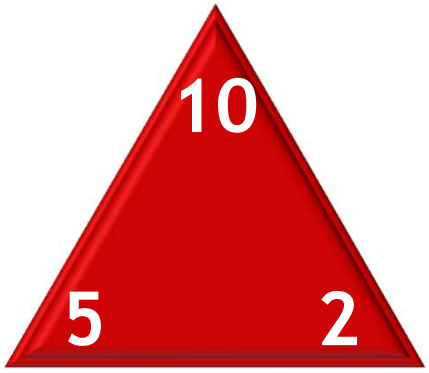
10 sweets were shared equally between 2 children.

Each child received 5 sweets.

10 divided by 2 is 5.

10 ÷ 2 = 5

relationship triangle

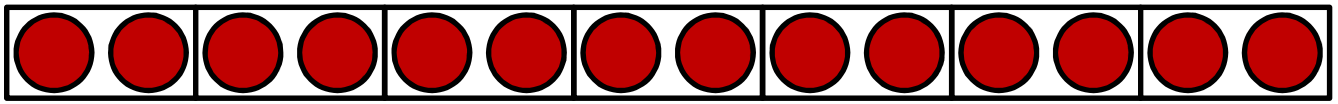


Year 2 - Block 1

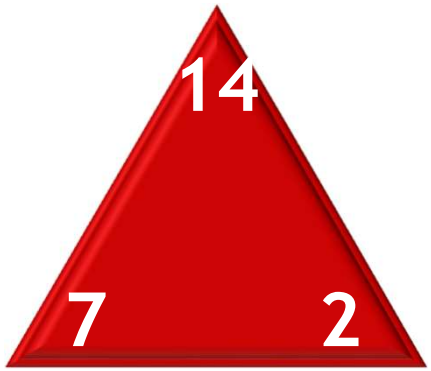
14 ÷ 2 = 7

Division: making groups of 2

14 ÷ 2 = 7



quotitive (grouping) division structure



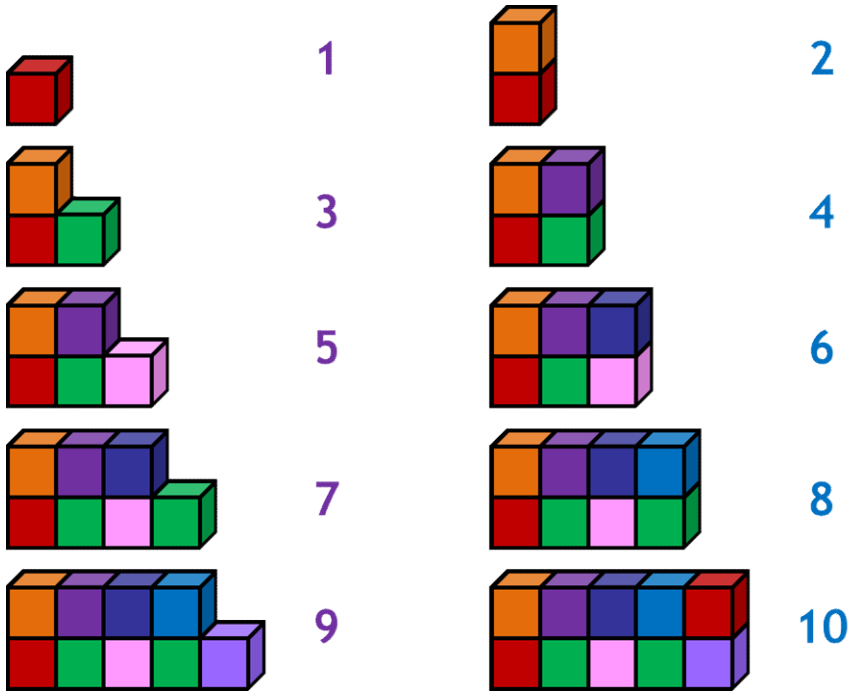
relationship triangle

Year 2 - Block 1

even number ÷ 2 = even number

Odd and even numbers

The numbers on the left are called odd numbers. The numbers on the right are called even numbers.

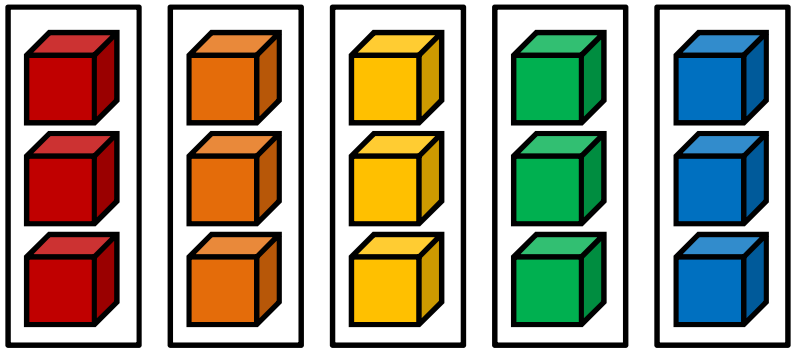


Even numbers can be divided exactly by 2.

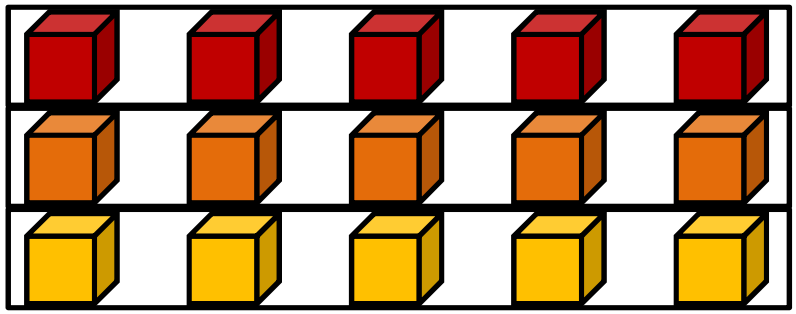
Year 2 - Block 1

$15 \div 5 = 3$

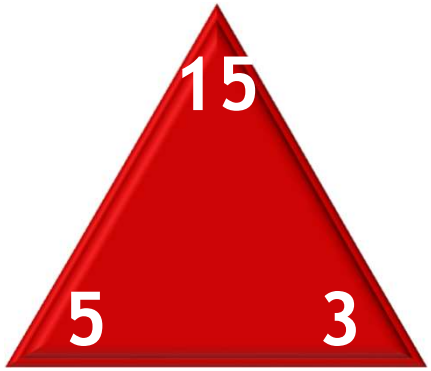
Dividing by 5



partitive (sharing) division structure



quotitive (grouping) division structure

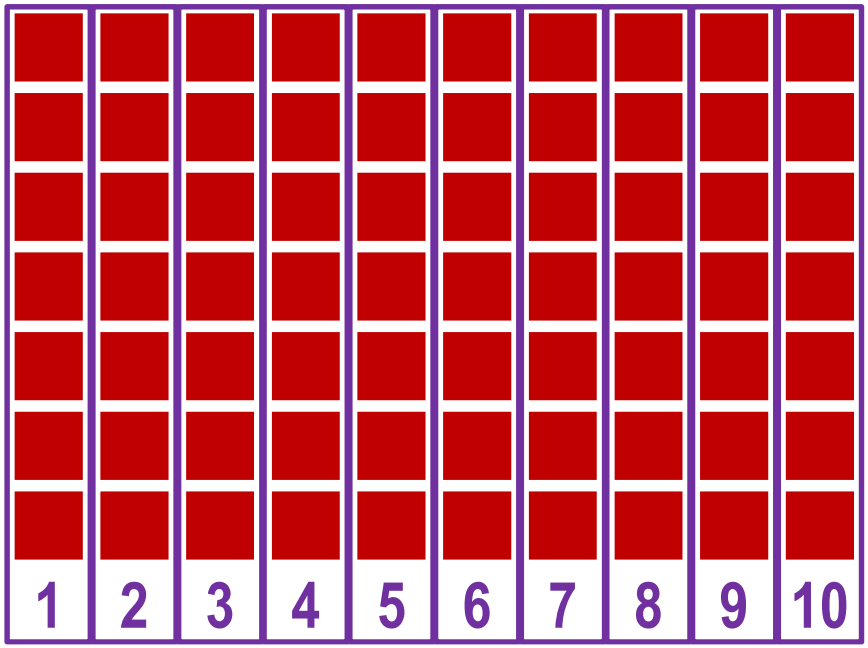


relationship triangle

Year 2 - Block 1

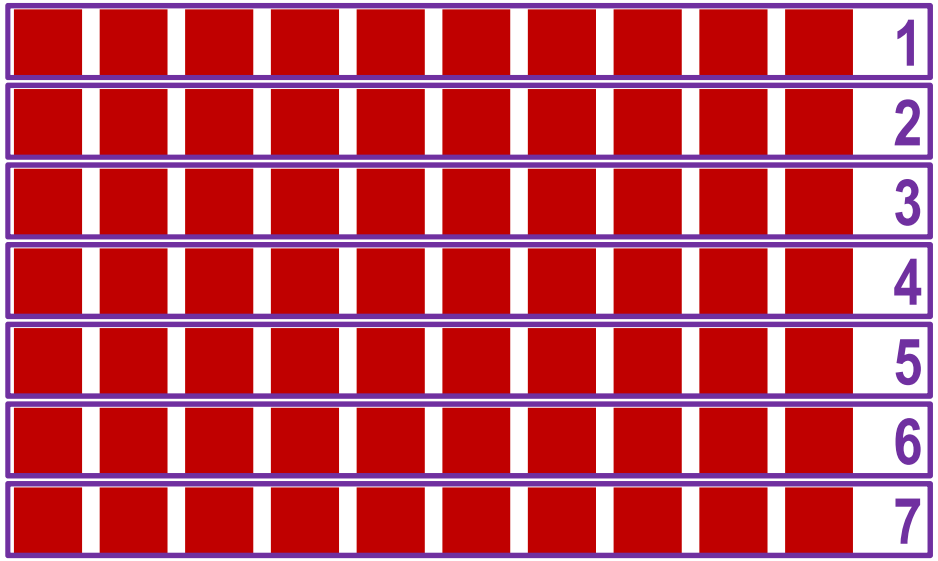
70 ÷ 10 = 7

Dividing by 10



70 squares are shared between 10 people.
Each person receives 7 squares.
70 ÷ 10 = 7

partitive (sharing) division structure



70 squares are put in groups of 10.
There are 7 groups.
70 ÷ 10 = 7

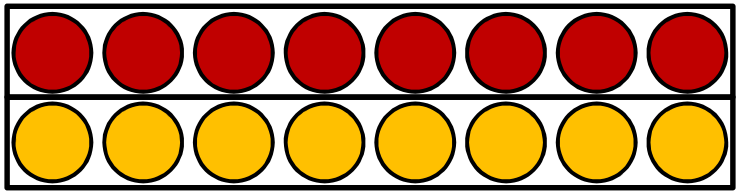
quotitive (grouping) division structure

Year 2 - Block 1

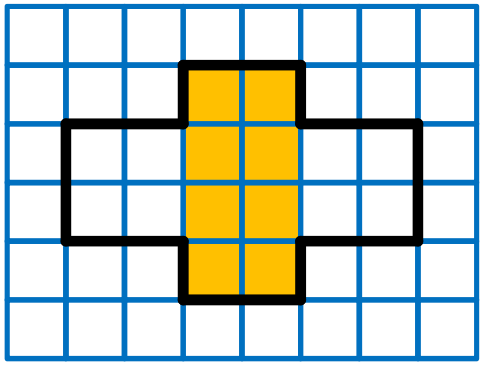
$^1/_2$ *of* 16 = 8

Finding half

8 × 2 = 16	16 ÷ 2 = 8



$\frac{1}{2}$ of 16 = 8



16 squares altogether

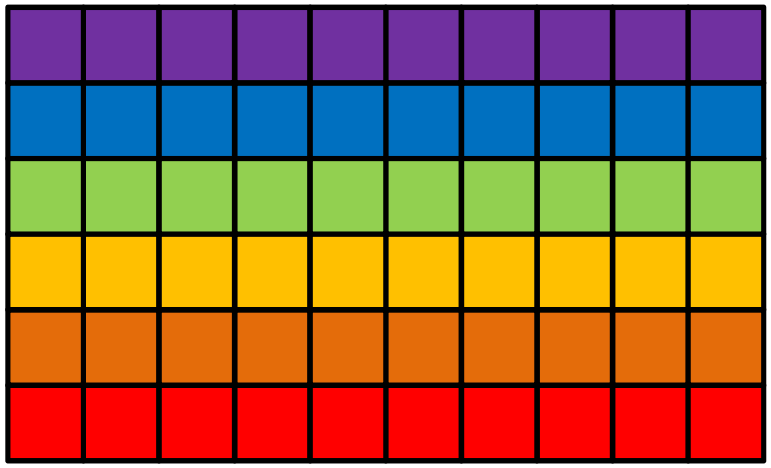
$\frac{1}{2}$ of 16 = 8

Mia bought a bag of cherries.
She ate half the number of cherries in the bag.
Mia had 8 cherries left.
How many cherries did Mia buy?

Year 2 - Block 2

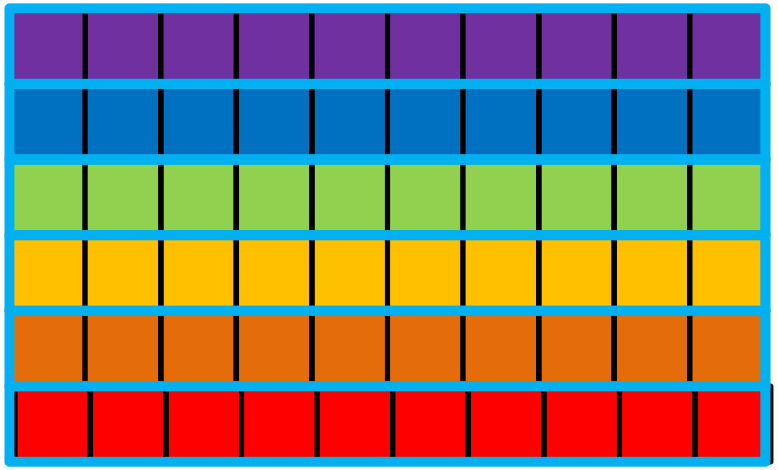
$6 \times 10 = 60 \bullet 60 \div 10 = 6$

10 × table (r) and dividing by 10 (r)



$6 \times 10 = 60$

array showing 6 groups of 10 making 60



$60 \div 10 = 6$

array of 60 squares divided into 6 groups of 10

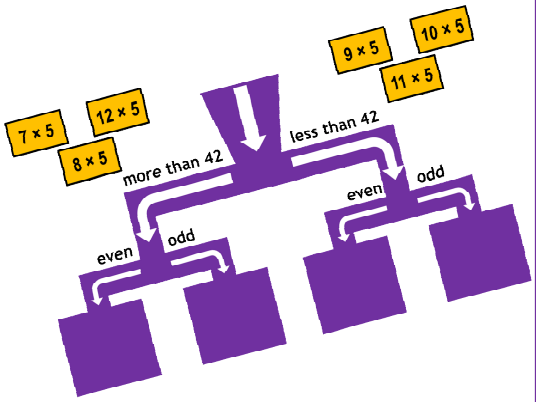
emphasise connections between multiplication and division

Year 2 - Block 2

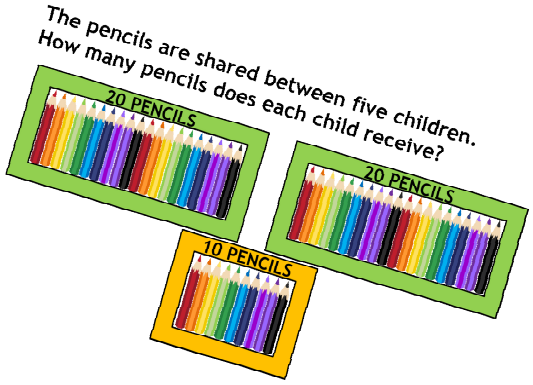
5 × table (r) and dividing by 5 (r)

7	×	5	=		→	35	÷	5	=		
8	×	5	=		→	40	÷	5	=		
9	×	5	=		→	45	÷	5	=		
10	×	5	=		→	50	÷	5	=		

emphasise connections between multiplication and division



Twenty pencils are shared between five children. How many pencils does each child receive?	20 ÷ 2
Twenty pencils are shared between ten children. How many pencils does each child receive?	2 × 5
Twenty pencils are shared between two children. How many pencils does each child receive?	20 ÷ 5
Two children are each given five pencils. How many pencils are given out altogether?	20 ÷ 10



applying knowledge of multiplication and division to solve problems

Year 2 - Block 2

$2 \times 7 = 14 \bullet 7 \times 2 = 14$

2 × table (r)

START

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

7 × 2 = 14

START

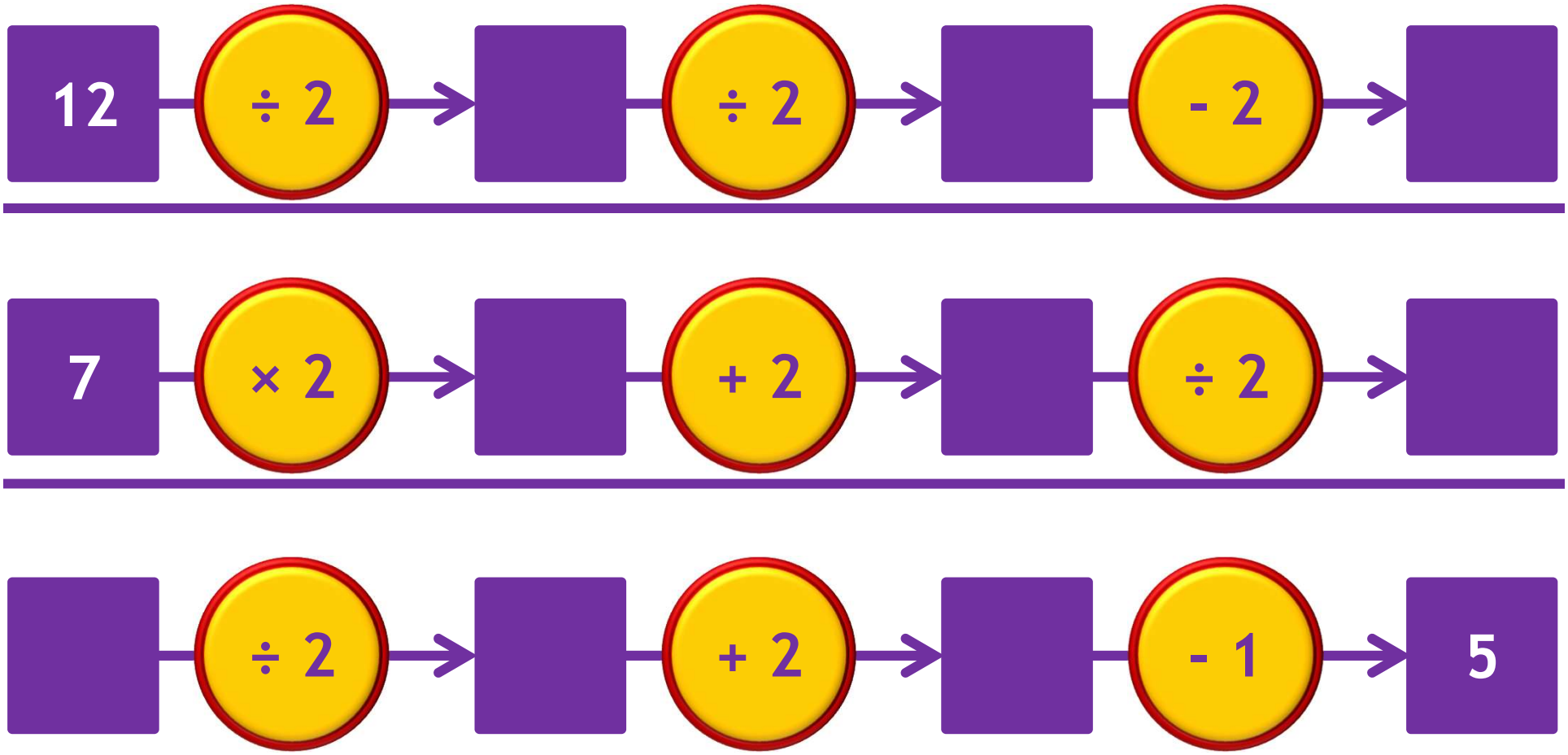
×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

2 × 7 = 14

commutative property of multiplication on the multiplication grid

Year 2 - Block 2

Dividing by 2 (r)



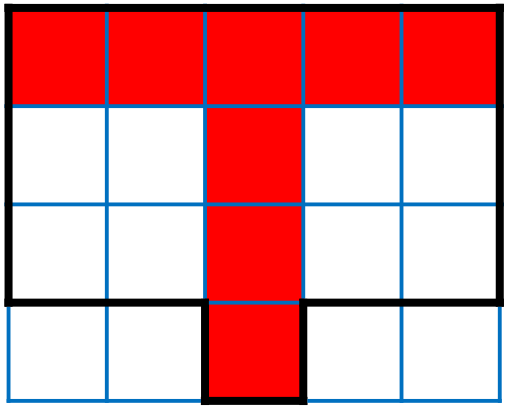
applying knowledge of the inverse – working backwards

Year 2 - Block 2

$\frac{1}{2}$ *of* 16 = 8

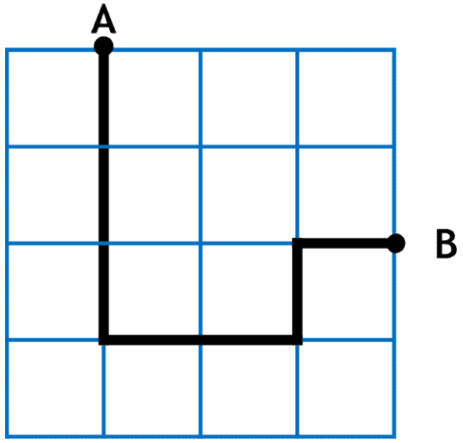
Finding half (r)

8 × 2 = 16	16 ÷ 2 = 8



16 squares altogether.

½ of 16 = 8



There are 8 squares on each side of the line.

8 is half of 16.

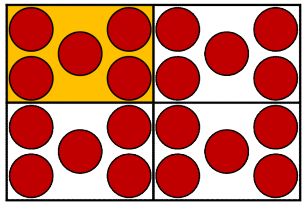
Year 2 - Block 2

$^1/_4$ *of* 20 = 5

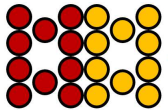
Finding one quarter

Use counters to make one quarter of the following numbers.

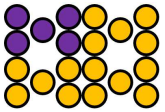
4 8 12 16 20 24



$\frac{1}{2}$ *of* 20 = ☐



$\frac{1}{4}$ *of* 20 = ☐

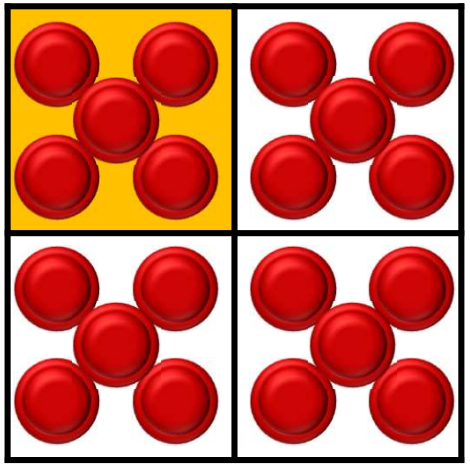


Finding $\frac{1}{4}$ *is the same as*
dividing by 2
and then dividing by 2 again.

20 ÷ 2 = 10

10 ÷ 2 = 5

5 is ¼ of 20.



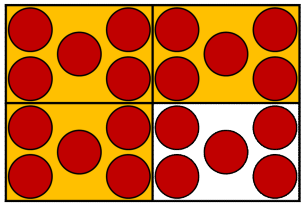
Year 2 - Block 2

$^{3}/_{4}$ *of* 20 = 15

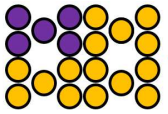
Finding three-quarters

Use counters to make three-quarters of the following numbers.

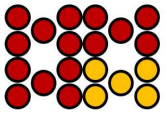
4 8 12 16 20 24

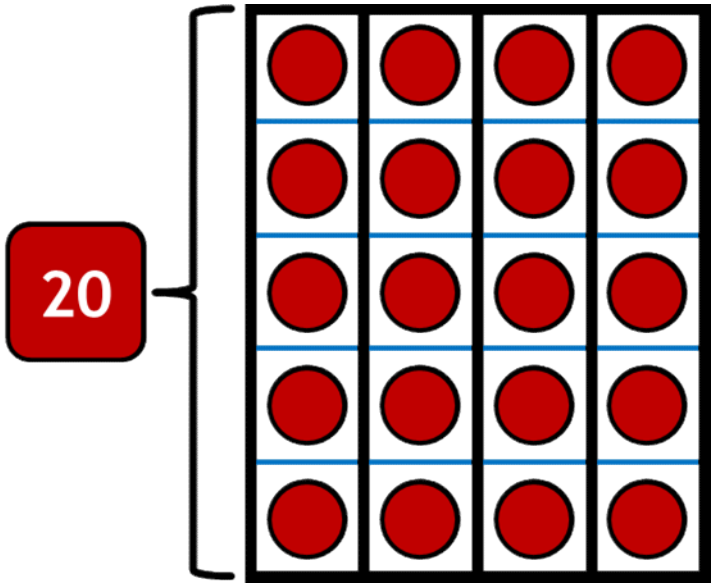


$\frac{1}{4}$ *of* 20 = 5



$\frac{3}{4}$ *of* 20 =





$^{1}/_{4}$ *of* 20 =

$^{2}/_{4}$ *of* 20 =

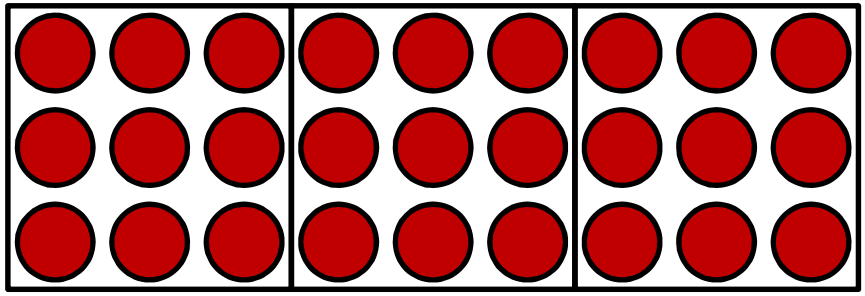
$^{3}/_{4}$ *of* 20 =

Year 2 - Block 2

$^{2}/_{3}$ *of* 27 = 18

Finding thirds

☐ counters were shared into ☐ equal groups.



Each group is ☐.

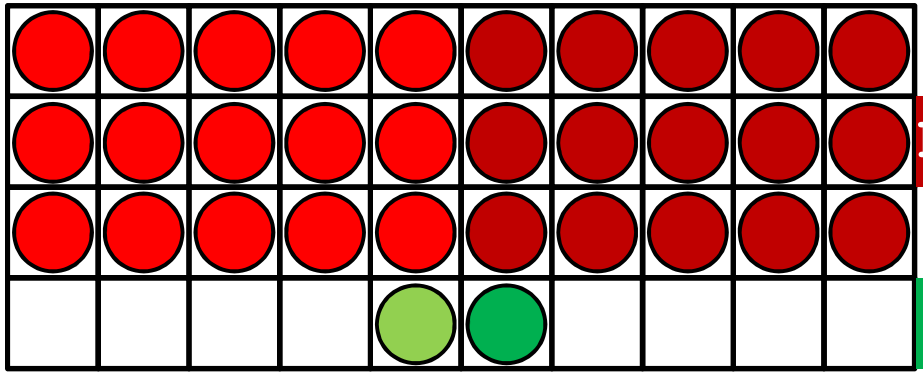
$\frac{1}{3}$ of 27 is ☐

$\frac{2}{3}$ of 27 is ☐

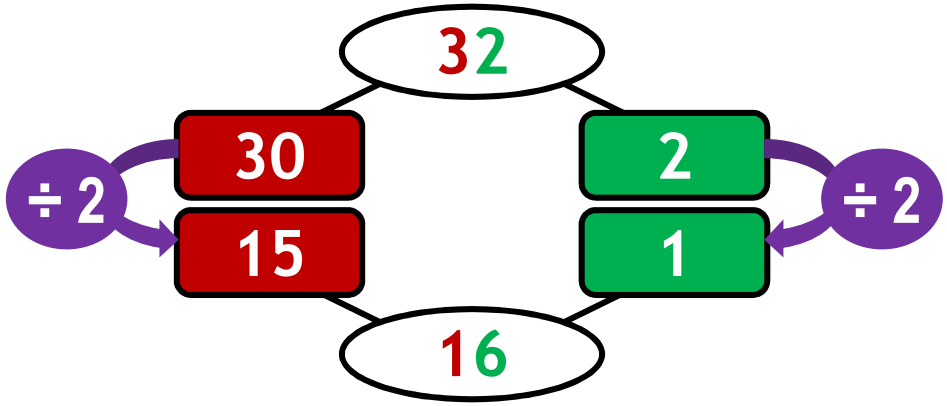
Year 2 - Block 3

½ of 32 = 16

Doubling and halving



representation showing half of 32



numeric representation showing half of 32

Year 2 - Block 3

5p × 4 = 20p

Multiplying amounts of money

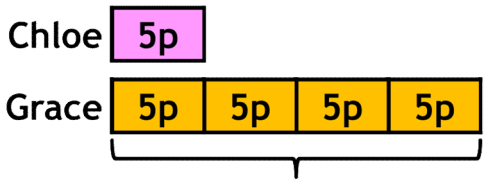
5p + 5p + 5p = 5p = 4 × 5p

×	1	2	3	4	5	6
	2p	4p	6p	8p	10p	12p
	5p	10p	15p	20p	25p	30p
	10p	20p	30p	40p	50p	60p

money multiplication grid

Chloe has 5p.
Grace has four times as much money as Chloe.
How much money does Grace have?

Chloe



5p × 4 = 20p

Grace has 20p.

Grace

representing problems with the bar model

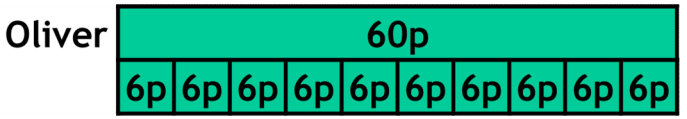
Year 2 - Block 3

Dividing amounts of money

×	3	9	6	5	7	2
	6p	18p	12p	10p	14p	4p
	30p	90p	60p	50p	70p	20p
	15p	45p	30p	25p	35p	10p

money multiplication grid used for division

Oliver has 60p.
He spends the same amount every day for 10 days.
How much does he spend each day?



60p ÷ 10 = 6p

Oliver spends 6p every day for 10 days.

representing problems with the bar model