



EQUA Mead
Learning Trust
Every Child, Every Chance

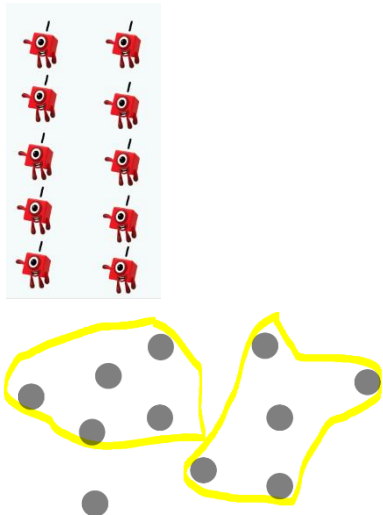
SOUTHWICK CE PRIMARY SCHOOL

Love, Learn, Grow

"Do everything in love." 1 Corinthians 16:14

Progression Through Calculation: Multiplication

Reception	Reception Progression of Skills	Reception - Have a deep understanding of number to 10, including the composition of each number. - Subitise (recognise quantities without counting) up to 5 - Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 and some number bonds to 10, including double facts. - Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally		
	Doubles – explore how some numbers can be made with 2 equal parts	Key Representations		
		Concrete	Pictorial	Abstract
	Counting larger sets	Key Representations		

	and things that cannot be seen	Concrete	Pictorial 	Abstract
	Year 1 Progression of Skills	Year 1 - Count in multiples of twos, fives and tens. - Solve one-step problems involving multiplication, using concrete objects, pictorial representations and arrays with the support of the teacher.		
		Key Representations		

Count in 2s, 5s and 10s

Begin by counting objects that naturally come in 2s, 5s and 10s, for example pairs of socks or fingers.

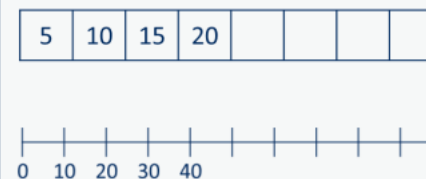
There are ... equal groups of ...
There are ... altogether.



Continue to colour in ...s
What do you notice?

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

Complete the number track/number line by counting in ...s.

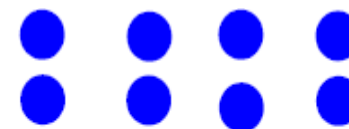
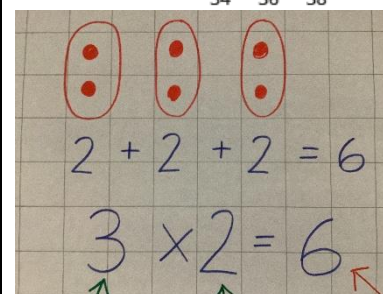
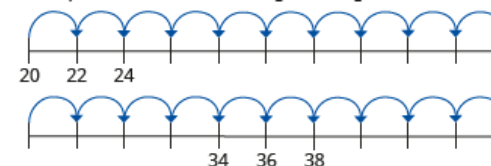


Concrete

Count the groups as children are skip counting, children may use their fingers as they are skip counting.



Pictorial



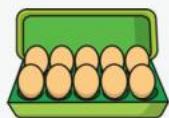
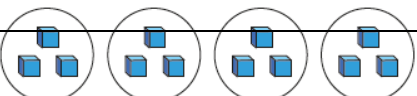
Children make representations to show counting in multiples.

Abstract

Count in multiples of a number aloud.

Write sequences with multiples of numbers.

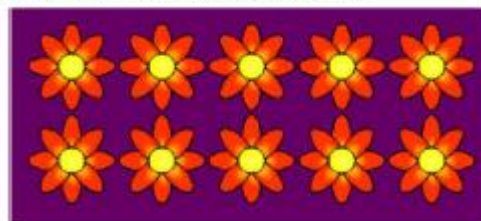
2, 4, 6, 8, 10
5, 10, 15, 20, 25, 30

Add equal groups (repeated addition)	Key Representations There are ... groups of ... There are ... altogether.		What is the same? What is different?	
	 $10 + 10 + 10 = 30$  $5 + 5 + 5 + 5 = 20$		$2 + 2 + 2 =$ $5 + 5 + 5 =$ $10 + 10 + 10 =$ Use objects or a drawing to represent the equal groups and find how many in total.	
Children should be able to write a repeated addition to represent equal groups and to draw pictures or use objects to represent a repeated addition.	Concrete   Use manipulatives to create equal groups.		Pictorial Draw  to show $2 \times 3 = 6$ Draw and make representations	Abstract $2 \times 4 = 8$
	Make arrays	Key Representations There are ... rows of ... There are ... altogether. There are ... columns of ... There are ... altogether.		
   				
Children use their knowledge of adding equal groups to arrange objects in	Concrete 		Pictorial	Abstract

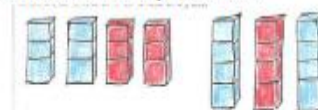
columns
and rows.



Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc.



Draw representations of arrays to show



understanding



$$3 \times 2 = 6$$

$$2 \times 5 = 10$$

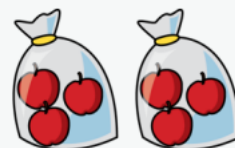
Make doubles

Children understand that doubles are two equal groups. Children may begin to explore doubles beyond 20

Key Representations

Double ... is ...

... + ... = ...



Concrete

Pictorial

Abstract

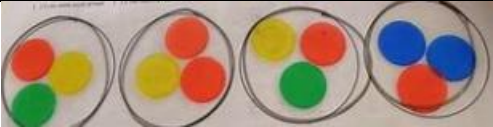
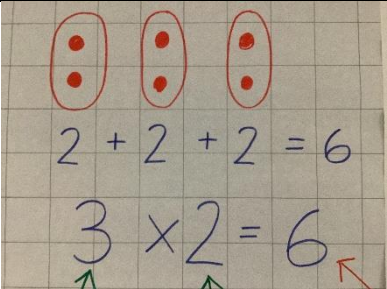
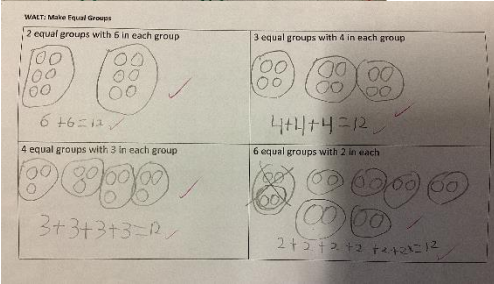
	using base 10	<
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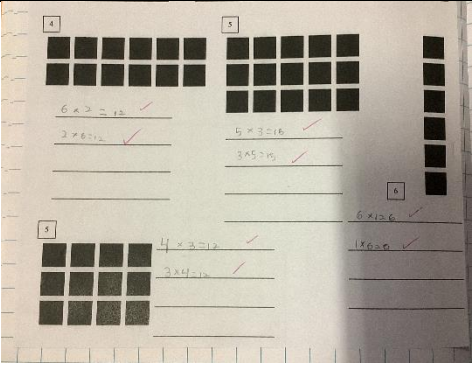
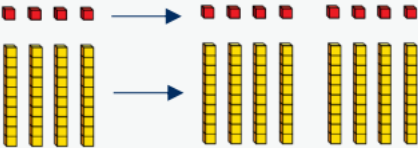
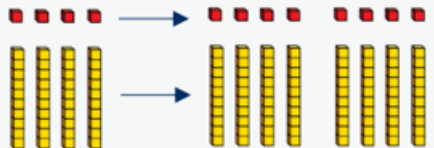
Concrete

Pictorial

Abstract

$5 + 5 + 5 + 5 = 20$
 $4 \times 5 = 20$

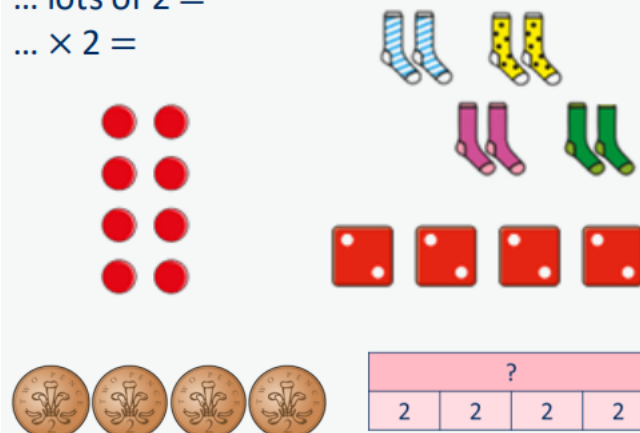
	and multiplication.			
				
	Use arrays	Key Representations There are ... rows with ... in each row. There are ... columns with ... in each column.  3 lots of 5 = 15 5 + 5 + 5 = 15 5 lots of 3 = 15 3 + 3 + 3 + 3 + 3 = 15 I can see ... × ... and ... ×... 3 × 5 = 15 5 × 3 = 15 3 × 5 = 5 × 3		
		Concrete	Pictorial	Abstract

			I can see ... $\times$... and $3 \times 5 = 15$ $5 \times 3 = 15$ $3 \times 5 = 5 \times 3$
Double Encourage children to make links with related facts.	Key Representations Double ... is ...  Double 4 = 4 + 4 Double 4 is 8 Concrete 	Double ... is ... so double ... is ...  Double 4 is 8 Double 40 is 80 Pictorial 	Abstract I know that $4 + 4 = 8$ so I also know $40 + 40 = 80$
	Key Representations		

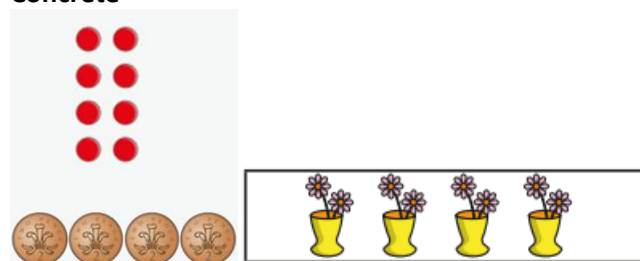
The 2 times-table

Encourage daily counting in multiples both forwards and back. Notice that all multiples of 2 are even numbers.

... lots of 2 =
... $\times 2 =$



Concrete



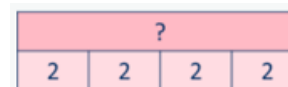
... times 2 is equal to ...

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

$$\begin{aligned} 1 \times 2 &= 2 & 2 &= 1 \times 2 \\ 2 \times 2 &= 4 & 4 &= 2 \times 2 \\ 3 \times 2 &= 6 & 6 &= 3 \times 2 \end{aligned}$$

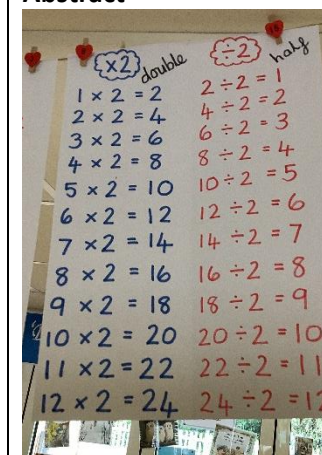


Pictorial



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

Abstract

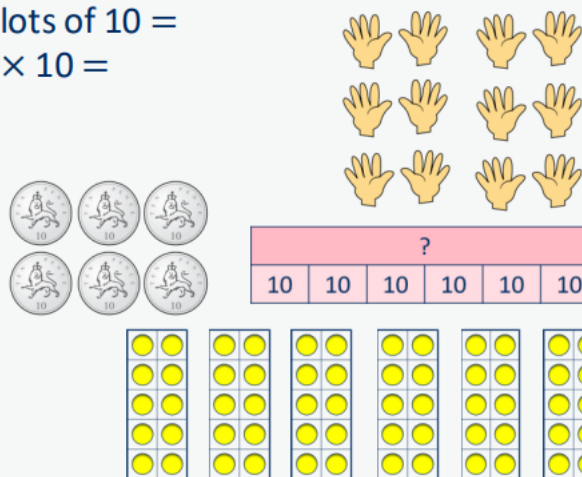


Key Representations

The 10 times-table

Encourage daily counting in multiples both forwards and back. Notice the pattern in the numbers.

... lots of 10 =
... $\times 10 =$



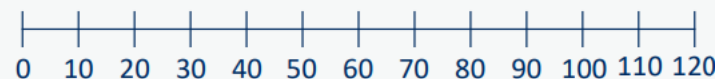
... times 10 is equal to ...

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

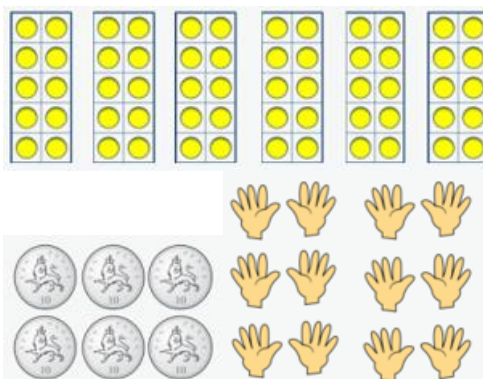
$$1 \times 10 = 10 \quad 10 = 1 \times 10$$

$$2 \times 10 = 20 \quad 20 = 2 \times 10$$

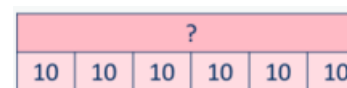
$$3 \times 10 = 30 \quad 30 = 3 \times 10$$



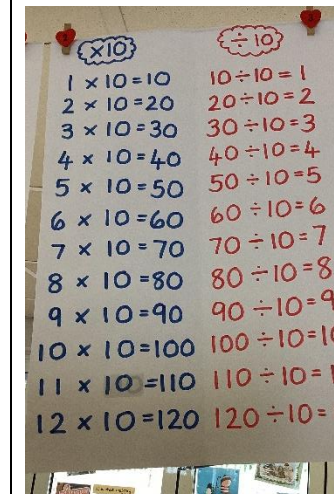
Concrete



Pictorial



Abstract



Key Representations

The 5 times-table

Encourage daily counting in multiples both forwards and back. Notice the pattern in the numbers.

... lots of 5 =

... $\times 5 =$



?				
5	5	5	5	5

Concrete



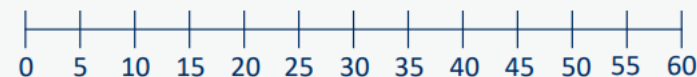
... times 5 is equal to ...

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

$$1 \times 5 = 5 \quad 5 = 1 \times 5$$

$$2 \times 5 = 10 \quad 10 = 2 \times 5$$

$$3 \times 5 = 15 \quad 15 = 3 \times 5$$



Pictorial

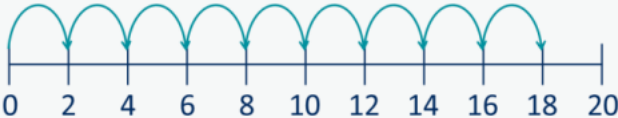
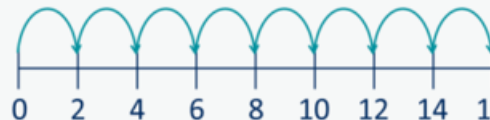
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

?				
5	5	5	5	5

Abstract

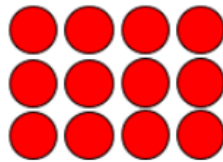
$\times 5$	$\div 5$
$1 \times 5 = 5$	$5 \div 5 = 1$
$2 \times 5 = 10$	$10 \div 5 = 2$
$3 \times 5 = 15$	$15 \div 5 = 3$
$4 \times 5 = 20$	$20 \div 5 = 4$
$5 \times 5 = 25$	$25 \div 5 = 5$
$6 \times 5 = 30$	$30 \div 5 = 6$
$7 \times 5 = 35$	$35 \div 5 = 7$
$8 \times 5 = 40$	$40 \div 5 = 8$
$9 \times 5 = 45$	$45 \div 5 = 9$
$10 \times 5 = 50$	$50 \div 5 = 10$
$11 \times 5 = 55$	$55 \div 5 = 11$
$12 \times 5 = 60$	$60 \div 5 = 12$

Key Representations

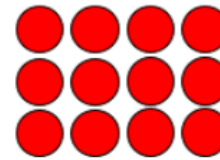
Missing numbers Make links to known facts.	... is equal to ... groups of ... 18 socks, how many pairs?  	... times ... is equal to ... $\square \times 2 = 18$ $18 = 2 \times \square$																															
	Concrete 12 counters, how many groups of 3 can you make? 	Pictorial 	Abstract $\square \times 2 = 18$ $18 = 2 \times \square$																														
Year 3 Progression of Skills	Year 3 - Recall and use multiplication facts for the 3, 4 and 8 multiplication tables. - Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. - Solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.																																
The 3 times-table Encourage daily counting in multiples both	Key Representations ... groups of 3 = ... $\times 3 =$ 3, ... times = $3 \times \dots =$     ... times 3 is equal to ... <table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr><tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr></table> $4 \times 3 = 12$ $12 = 4 \times 3$ 			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
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																								

forwards
and back.

Concrete



Pictorial



$$1 \times 3 = 3$$

$$2 \times 3 = 6$$

$$3 \times 3 = 9$$

$$4 \times 3 = 12$$

$$5 \times 3 = 15$$

$$6 \times 3 = 18$$

$$7 \times 3 = 21$$

$$8 \times 3 = 24$$

$$9 \times 3 = 27$$

$$10 \times 3 = 30$$

$$11 \times 3 = 33$$

$$12 \times 3 = 36$$

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Abstract

$$6 \times 3 =$$

The 4 times- table

Encourage
daily
counting in
multiples
both
forwards
and back.
Encourage
children to

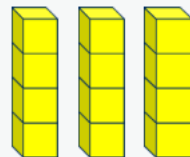
Key Representations

... groups of 4 =

... $\times 4 =$

4, ... times =

$4 \times \dots =$

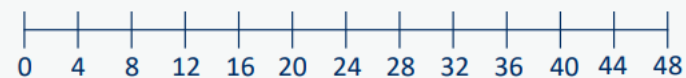


Concrete

... times 4 is equal to ...

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

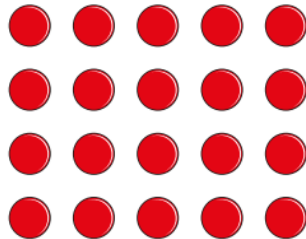
$$3 \times 4 = 12 \quad 12 = 3 \times 4$$



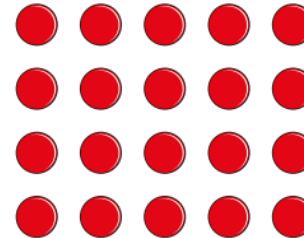
Pictorial

Abstract

notice links
between
the 2 and 4
times-
tables.



x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144



- 1 x 4 = 4
- 2 x 4 = 8
- 3 x 4 = 12
- 4 x 4 = 16
- 5 x 4 = 20
- 6 x 4 = 24
- 7 x 4 = 28
- 8 x 4 = 32
- 9 x 4 = 36
- 10 x 4 = 40

$$4 \times 4 = \underline{\hspace{2cm}}$$

$$3 \times 4 = \underline{\hspace{2cm}}$$

$$5 \times 4 = \underline{\hspace{2cm}}$$

$$2 \times 4 = \underline{\hspace{2cm}}$$

$$9 \times 4 = \underline{\hspace{2cm}}$$

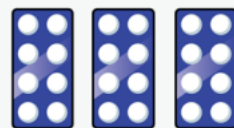
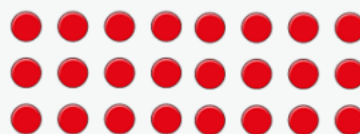
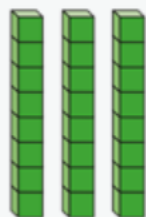
$$6 \times 4 = \underline{\hspace{2cm}}$$

Key Representations

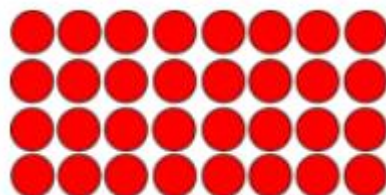
The 8 times-table

Encourage daily counting in multiples both forwards and back. Encourage children to notice links between the 2, 4 and 8 times-tables.

... lots of 8 =
 $\times 8 =$
 8, ... times =
 $8 \times \dots =$



Concrete



... times 8 is equal to ...

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

$$3 \times 8 = 24 \quad 24 = 3 \times 8$$



Pictorial

*	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Abstract

$$8 \times 4 = \square \quad 8 \times 9 = \square \quad 11 \times 8 = \square$$

$1 \times 8 = 8$

$2 \times 8 = 16$

$3 \times 8 = 24$

$4 \times 8 = 32$

$5 \times 8 = 40$

$6 \times 8 = 48$

$7 \times 8 = 56$

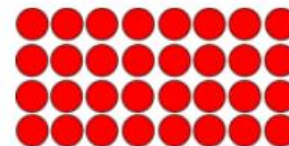
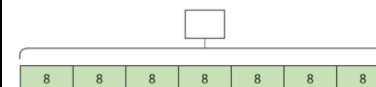
$8 \times 8 = 64$

$9 \times 8 = 72$

$10 \times 8 = 80$

$11 \times 8 = 88$

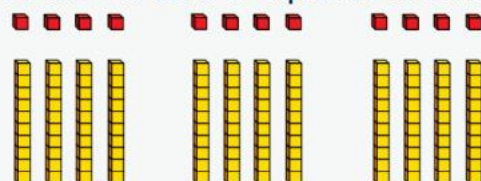
$12 \times 8 = 96$



Key Representations

Related facts
Use knowledge of multiplying by 10 to scale times-table facts.

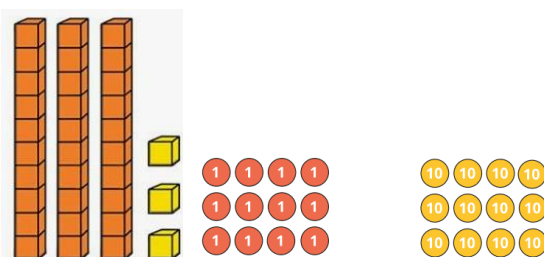
... × ... ones is equal to ... ones
so ... × ... tens is equal to ... tens.



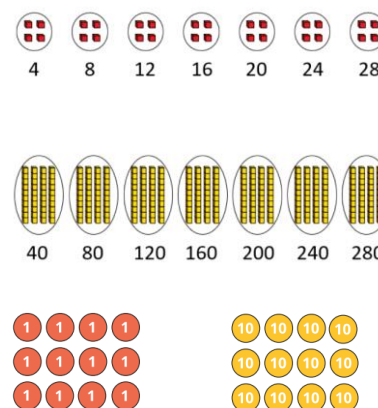
$$3 \times 4 = 12$$

$$3 \times 40 = 120$$

Concrete



Pictorial



Abstract

a) $5 \times 70 =$

b) $7 \times 5 =$

c) $50 \times 7 =$

Multiply a 2-digit number by a 1-digit number - no exchange

Children apply their understanding of partitioning

Key Representations

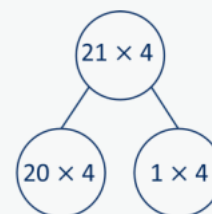
... tens multiplied by ... is equal to ... tens.
...ones multiplied by ... is equal to ... ones.

Tens	Ones

$$30 \times 2 = 60$$

$$2 \times 2 = 4$$

$$32 \times 2 = 64$$



Tens	Ones

Concrete

Pictorial

Abstract

g to represent and solve calculation s using the expanded method.	<table><tr><th>Tens</th><th>Ones</th></tr><tr><td> 10 10 10 10 </td><td> 1 1 1 </td></tr><tr><td> 10 10 10 10 </td><td> 1 1 1 </td></tr></table> <table><tr><th>T</th><th>O</th></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 31 × 3 =	Tens	Ones	10 10 10 10	1 1 1	10 10 10 10	1 1 1	T	O							10 10 10 10 10 10 <table><tr><th>Tens</th><th>Ones</th></tr><tr><td> 10 10 10 10 </td><td> 1 1 1 </td></tr><tr><td> 10 10 10 10 </td><td> 1 1 1 </td></tr></table>	Tens	Ones	10 10 10 10	1 1 1	10 10 10 10	1 1 1	a) 24 × 2 b) 44 × 2 c) 31 × 3 d) 42 × 2
	Tens	Ones																					
10 10 10 10	1 1 1																						
10 10 10 10	1 1 1																						
T	O																						
Tens	Ones																						
10 10 10 10	1 1 1																						
10 10 10 10	1 1 1																						
Multiply a 2-digit number by a 1-digit number - with exchange Children apply their understand ing of partitionin g to represent and solve calculation s using the	Key Representations ... tens multiplied by ... is equal to ... tens. ... ones multiplied by ... is equal to ... ones. <table><tr><th>Tens</th><th>Ones</th></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 20 × 4 = 80 4 × 4 = 16 24 × 4 = 96 45 × 3 40 × 3 5 × 3 <table><tr><th>Tens</th><th>Ones</th></tr><tr><td> 10 10 10 10 </td><td> 1 1 1 1 1 </td></tr><tr><td> 10 10 10 10 </td><td> 1 1 1 1 1 </td></tr><tr><td> 10 10 10 10 </td><td> 1 1 1 1 1 </td></tr></table>			Tens	Ones											Tens	Ones	10 10 10 10	1 1 1 1 1	10 10 10 10	1 1 1 1 1	10 10 10 10	1 1 1 1 1
Tens	Ones																						
Tens	Ones																						
10 10 10 10	1 1 1 1 1																						
10 10 10 10	1 1 1 1 1																						
10 10 10 10	1 1 1 1 1																						
	Concrete	Pictorial	Abstract																				
			4 × 24																				

expanded method.

Tens	Ones
	
	
	
	
	

Work out 4×15

Tens	Ones
	
	
	
	

$4 \times 5 = \square$
 $4 \times 10 = \square$
 $\square + \square = \square$
 $4 \times 15 = \square$

Work out 4×15

Tens	Ones
	
	
	
	

$4 \times 5 = \square$
 $4 \times 10 = \square$
 $\square + \square = \square$
 $4 \times 15 = \square$

Scaling

Children focus on multiplication as scaling (... times the size) as opposed to repeated addition.

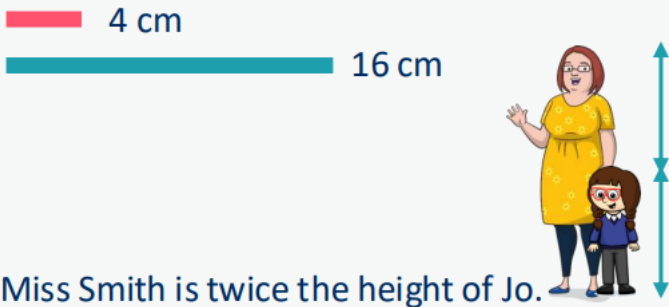
Key Representations

There are ... times as many ... as ...



There are 3 times as many triangles as circles.

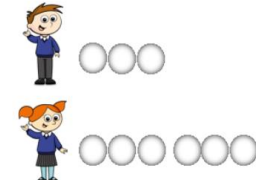
... is ... times the size of ...
... is ... times the length/height of ...



Concrete



Pictorial



Abstract

Ron has 5 bananas.
Esther has 6 times as many bananas as Ron.
Draw a bar model to work out how many bananas Esther has got.

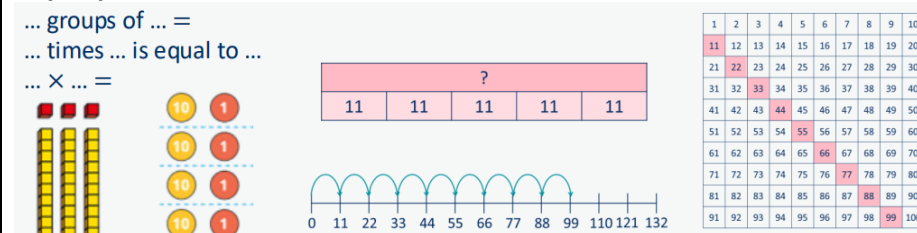
		Ron has three times as many snowballs as Annie.  10  101010																											
Correspondence problems (How many ways?) Encourage children to work systematically to find all the different possible combinations.	Key Representations For every ... , there are ... possible ... There are ... × ... possibilities altogether.  <table><thead><tr><th></th><th>hats</th><th>scarves</th></tr></thead><tbody><tr><td>blue</td><td></td><td> </td></tr><tr><td>orange</td><td></td><td> </td></tr><tr><td>purple</td><td></td><td> </td></tr></tbody></table> For every hat, there are two possible scarves. 3 × 2 = 6 There are 6 possibilities altogether.		hats	scarves	blue		 	orange		 	purple		 	Pictorial The children are dressing the snowman. They have 3 hats and 2 scarves to choose from.  <table><thead><tr><th>Hat</th><th>Scarf</th></tr></thead><tbody><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></tbody></table> 	Hat	Scarf													Abstract Rosie is making a birthday card. She uses a sheet of coloured card and sticks a shape on it. She has 5 different shapes she can choose from. She can make 40 different birthday cards in total. How many different sheets of card does Rosie have?
	hats	scarves																											
blue		 																											
orange		 																											
purple		 																											
Hat	Scarf																												
Year 4 Progression of Skills	Year 4 - Recall multiplication facts for multiplication tables up to 12 × 12 - Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers. - Recognise and use factor pairs and commutativity in mental calculations. - Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.																												

- Solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

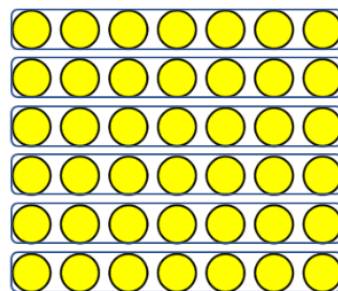
Times-table facts to 12×12

Encourage daily counting in multiples both forwards and back. Encourage children to notice links between related times-tables.

Key Representations



Concrete



There are 6 rows of 7

$$6 \times 7 = \underline{42}$$

Pictorial



There are 6 equal groups of 3

$$\boxed{3} + \boxed{3} + \boxed{3} + \boxed{3} + \boxed{3} + \boxed{3} = \boxed{18}$$

$$\boxed{3} \times \boxed{6} = \boxed{18} \quad \boxed{6} \times \boxed{3} = \boxed{18}$$

Abstract

6 times-table

$$0 \times 6 = \boxed{}$$

$$1 \times 6 = \boxed{}$$

$$2 \times 6 = 12$$

$$3 \times 6 = \boxed{}$$

$$4 \times 6 = 24$$

$$5 \times 6 = \boxed{}$$

$$6 \times 6 = \boxed{}$$

Multiply by 1 and 0

Key Representations

Any number multiplied by 1 is equal to ...

Any number multiplied by 0 is equal to ...



... $\times$... = ...

$$1 \times 1 = 1$$

$$2 \times 1 = 2$$

$$3 \times 1 = 3$$

$$4 \times 1 = 4$$

$$1 \times 0 = 0$$

$$2 \times 0 = 0$$

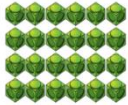
$$3 \times 0 = 0$$

$$4 \times 0 = 0$$

Concrete

Pictorial

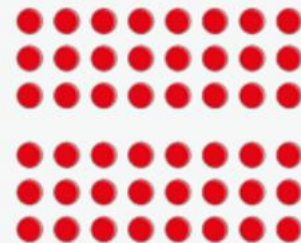
Abstract

	$5 \times 1 = 5$ 	 a) How many flowers are in each vase? b) How many flowers are there in total? Complete the multiplication. $\square \times \square = \square$	39×1 8×0 $95 \times$ 4×1 $0 \times$
Multiply 3 numbers Children use their understanding of commutativity to multiply more efficiently.	Key Representations To work out $\dots \times \dots \times \dots$, I can first calculate $\dots \times \dots$ and then multiply the answer by ...  $4 \times 2 \times 3 = 8 \times 3 = 24$ $2 \times 3 \times 4 = 6 \times 4 = 24$ $3 \times 4 \times 2 = 12 \times 2 = 24$		
	Concrete What multiplications are shown by these arrays?  $\square \times \square = \square$  $\square \times \square = \square$	Pictorial How many ways can you use all three digit cards to fill in the multiplication sentence? $\square \times \square \times \square$ $2 \times 5 \times 3$ $3 \times 2 \times 5$ $5 \times 2 \times 3$ $2 \times 3 \times 5$ $3 \times 5 \times 2$ $5 \times 3 \times 2$	Abstract $3 \times 4 \times 5 = \square$ $2 \times 3 \times 8 = \square$ $2 \times 4 \times 7 = \square$
	Key Representations		

Factor pairs

Children explore equivalent calculations using different factors pairs

$$12 = \dots \times \dots, \text{ so } \dots \times 12 = \dots \times \dots \times \dots$$



$$8 \times 6 = 8 \times 3 \times 2$$

$$8 \times 6 = 24 \times 2$$



$$6 \times 8 = 6 \times 4 \times 2$$

$$6 \times 8 = 24 \times 2$$

Concrete

What calculation is represented in each array?



$$\square \times \square = 18$$



$$\square \times \square = 18$$

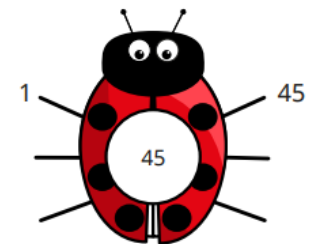


$$\square \times \square = 18$$

Pictorial

Complete the factor bugs.

a)



Abstract

Find all the factor pairs for each number.

a) 28

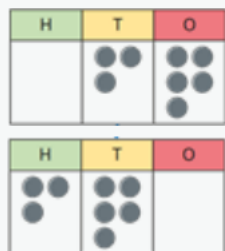
b) 50

Key Representations

Multiply by 10 and 100

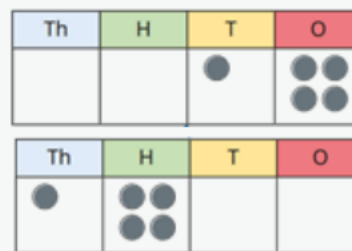
Some children may overgeneralise that multiplying by 10 or 100 always results in adding zeros. This will cause issues later when multiplying decimals.

When I multiply by 10, the digits move ...
place value column to the left.
... is 10 times the size of ...



$$35 \times 10 = 350$$

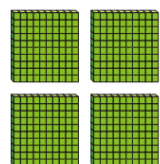
When I multiply by 100, the digits move ...
place value columns to the left.
... is 100 times the size of ...



$$14 \times 100 = 1,400$$

Concrete

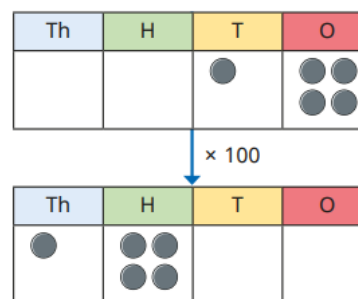
Use the base 10 to complete the calculations.



$$4 \times 1 \text{ hundred} = \boxed{} \text{ hundreds}$$

$$4 \times 100 = \boxed{}$$

Pictorial



Abstract

Work out the multiplications.

a) $5 \times 1 = \boxed{}$

$$5 \times 10 = \boxed{}$$

$$50 \times 10 = \boxed{}$$

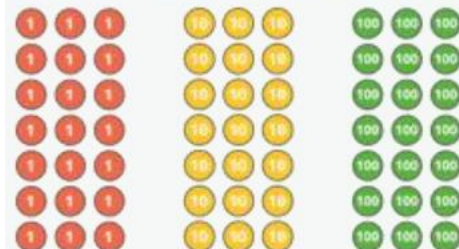
$$5 \times 100 = \boxed{}$$

Related facts

Use knowledge of multiplying by 10 and 100 to scale times-table facts.

Key Representations

... $\times$... ones is equal to ... ones
so ... $\times$... tens is equal to ... tens
and ... $\times$... hundreds is equal to ... hundreds.



$$3 \times 7 = 21$$

$$3 \times 70 = 210$$

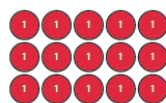
$$3 \times 700 = 2,100$$

$$7 \times 3 = 21$$

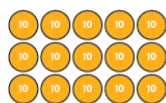
$$7 \times 30 = 210$$

$$7 \times 300 = 2,100$$

Concrete



$$\begin{aligned} 3 \times 5 &= 15 \\ 5 \times 3 &= 15 \\ 15 \div 5 &= 3 \\ 15 \div 3 &= 5 \end{aligned}$$



$$\begin{aligned} 30 \times 5 &= 150 \\ 50 \times 3 &= 150 \\ 150 \div 5 &= 30 \\ 150 \div 3 &= 50 \end{aligned}$$

Pictorial

1000	2000	3000	4000	5000
100	200	300	400	500
10	20	30	40	50
1	2	3	4	5

Abstract

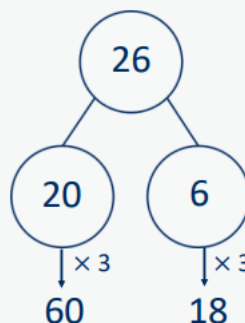
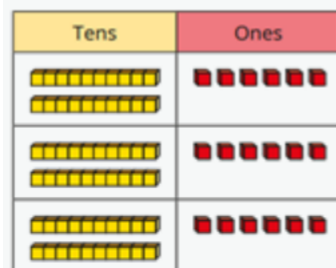
$$\begin{aligned} 5 \times 7 &= \square & 5 \times 70 &= \square \\ 6 \times 3 &= \square & 6 \times 30 &= \square \\ 8 \times 7 &= \square & 80 \times 7 &= \square \end{aligned}$$

Mental strategies

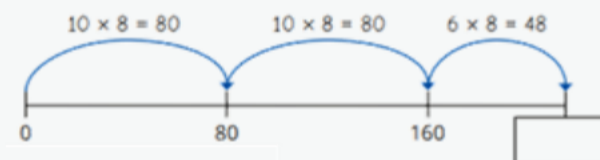
Partition 2 or 3-digit numbers to multiply using informal methods.

Key Representations

... tens multiplied by ... is equal to ... tens.
...ones multiplied by ... is equal to ... ones.

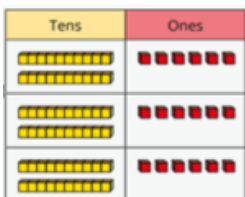


$$3 \times 26 = 60 + 18 = 78$$

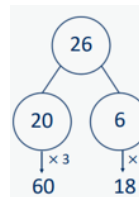


$$26 \times 8 = 80 + 80 + 48 = 208$$

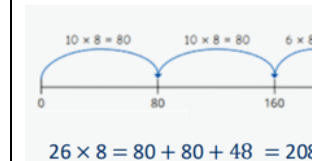
Concrete



Pictorial



Abstract

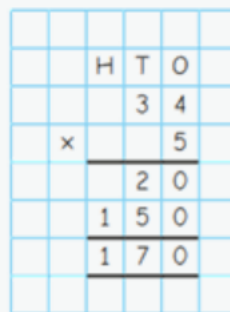
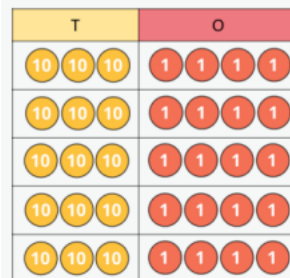


Key Representations

Multiply a 2 or 3-digit number by a 1-digit number

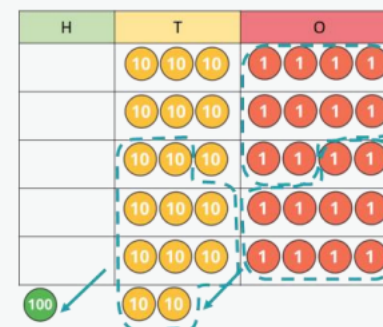
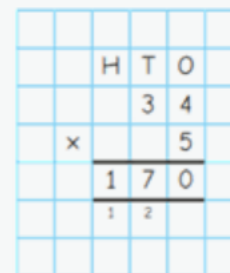
The short multiplication method is introduced for the first time, initially in an expanded form.

To multiply a 2-digit number by ... , I multiply the ones by ... and the tens by ...
To multiply a 3-digit number by ... , I multiply the ones by ... , the tens by ... and the hundreds by ...

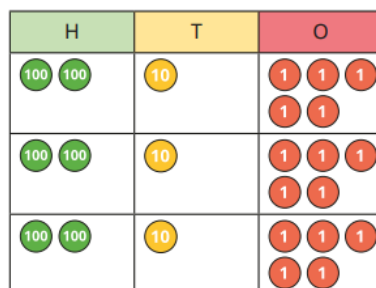


$$(4 \times 5)$$

$$(30 \times 5)$$

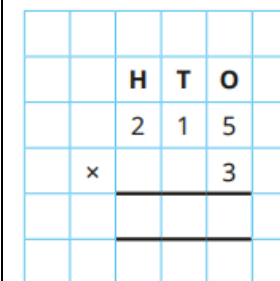


Concrete
215 x 3



Pictorial

Abstract



Scaling

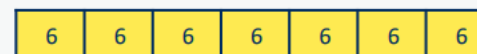
Children focus on multiplication as scaling (...

Key Representations

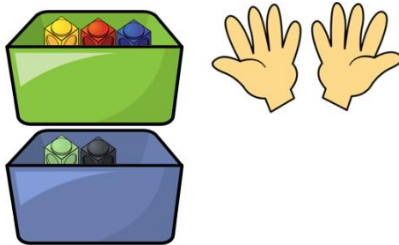
... is ... times the size of ...



A computer mouse costs £7
A keyboard costs 6 times as much.



A red ribbon is 6 cm.
A yellow ribbon is 7 times as long.

	times the size).	Concrete 	Pictorial 156 x 3 <table><tr><td colspan="3">?</td></tr><tr><td>156km</td><td>156km</td><td>156km</td></tr></table>	?			156km	156km	156km	Abstract A lorry driver travels 156 km per day. How many kilometres will the lorry driver have after 3 days?								
	?																	
156km	156km	156km																
Correspondence problems Encourage children to use tables to show all the different possible combinations.	Key Representations For every ... , there are ... possibilities. There are ... × ... possibilities altogether. A pizza company offers a choice of 5 toppings and 3 bases. 5 × 3 = 15 Cheese Mushroom Vegetable Chicken Tuna																	
	Concrete 	Pictorial <table><tr><th>Ice cream</th><th>Sauce</th><th>Topping</th></tr><tr><td>Vanilla</td><td>Blueberry</td><td>Flake</td></tr><tr><td>Chocolate</td><td>Raspberry</td><td>Sprinkles</td></tr><tr><td>Strawberry</td><td></td><td></td></tr><tr><td>Mint</td><td></td><td></td></tr></table> 4 × 2 × 2 = 16 possibilities	Ice cream	Sauce	Topping	Vanilla	Blueberry	Flake	Chocolate	Raspberry	Sprinkles	Strawberry			Mint			Abstract Tom and Esther are building a snowman. They have a choice of five hats, four scarves and gloves to dress their snowman. How many different combinations are possible?
Ice cream	Sauce	Topping																
Vanilla	Blueberry	Flake																
Chocolate	Raspberry	Sprinkles																
Strawberry																		
Mint																		
Year 5 Progression of Skills	Year 5 - Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers - Recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³) - Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers.																	

- Multiply numbers mentally drawing upon known facts.
- Multiply whole numbers and those involving decimals by 10, 100 and 1000
- Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.

Multiples and factors

Encourage children to notice patterns and make links with known facts.

Key Representations

... is a multiple of ... because

$$\dots \times \dots = \dots$$



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

... is a factor of ... because

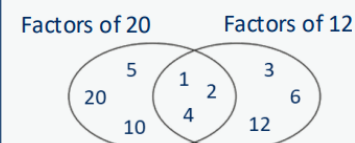
$$\dots \times \dots = \dots$$

$$1 \times 8$$

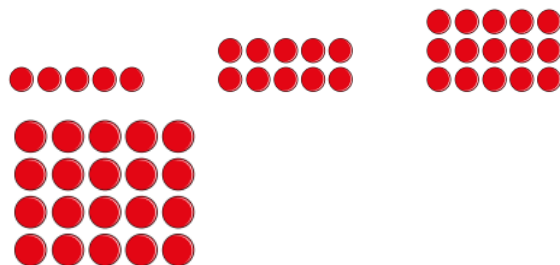
$$2 \times 4$$

1, 2, 4 and 8 are factors of 8

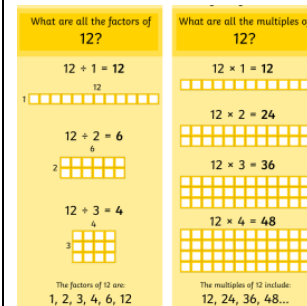
The common factors of ... and ... are ...



Concrete



Pictorial



Abstract

List the first six multiples of 4
List the first six multiples of 8

Complete the calculations.

- ▶ $2 \times \dots = 14$ so $6 \times 14 = 6 \times 2 \times \dots$
- ▶ $3 \times \dots = 9$ so $9 \times 12 = 3 \times \dots \times 12$

Square and cube numbers

Key Representations

... squared means $\dots \times \dots$

$$1 \times 1 = 1^2 = 1$$

$$2 \times 2 = 2^2 = 4$$

$$3 \times 3 = 3^2 = 9$$

$$4 \times 4 = 4^2 = 16$$

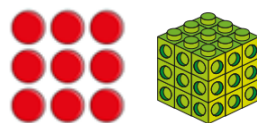
... cubed means $\dots \times \dots \times \dots$

$$1 \times 1 \times 1 = 1^3 = 1$$

$$2 \times 2 \times 2 = 2^3 = 8$$

$$3 \times 3 \times 3 = 3^3 = 27$$

Concrete



Pictorial



$$3 \times 3 = 9$$



Abstract

Work out the values of the square numbers.

4 ²	9 ²	10 ²	8 ²	7 ²
----------------	----------------	-----------------	----------------	----------------

Size of cube	Calculation	Number of cubes
1 ³		1
2 ³		8
3 ³	3 × 3 × 3	
4 ³		
5 ³		
6 ³	6 × 6 × 6	

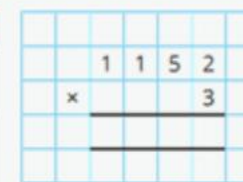
Multiply numbers up to 4 digits by a 1-digit number

This builds on the short multiplication method introduced in Y4

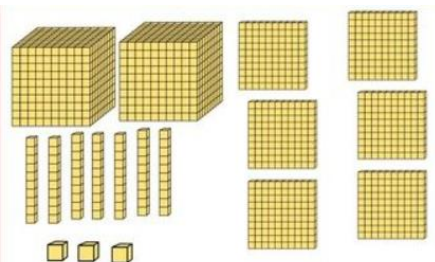
Key Representations

To multiply a 4-digit number by ... , I multiply the ones by ... , the tens by ... , the hundreds by ... and the thousands by ...

Th	H	T	O
1,000	100	10 10 10 10 10	1 1
1,000	100	10 10 10 10 10	1 1
1,000	100	10 10 10 10 10	1 1



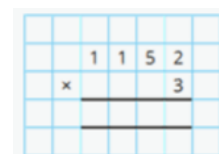
Concrete



Pictorial

Th	H	T	O
1,000	100	10 10 10 10 10	1 1
1,000	100	10 10 10 10 10	1 1
1,000	100	10 10 10 10 10	1 1

Abstract

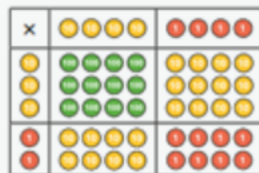


Multiply numbers up to 4 digits by a 2-digit number

Numbers are first partitioned using an area model then long multiplication is introduced for the first time.

Key Representations

I can partition ... into ... and ...



×	40	4
30	1,200	120
2	80	8

$$32 \times 44 = 1,200 + 80 + 120 + 8$$

$$32 \times 44 = 1,408$$

First, I multiply by the ... Then I multiply by the ...

×	10	3
30	300	90
2	20	6

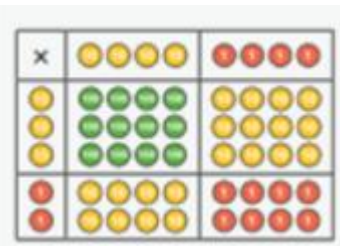
$$300 + 90 + 20 + 6 = 416$$



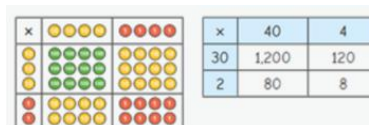
$$(32 \times 3)$$

$$(32 \times 10)$$

Concrete



Pictorial



Abstract

	2	4			
x	1	5			
	1	2	0		
	2	4	0		
	3	6	0		

$$24 \times 15 = \underline{360}$$

Multiply by 10, 100 and 1,000

Some children may overgeneralise that multiplying by a power

Key Representations

To multiply by 10/100/1,000, I move all the digits ... places to the left.
... is 10/100/1,000 times the size of ...

M	HTh	TTh	Th	H	T	O
				●	●	●

$$234 \times 10 = 2,340$$

$$234 \times 100 = 23,400$$

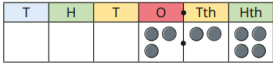
$$234 \times 1,000 = 234,000$$

Th	H	T	O	●	Tth	Hth
			●	●	●	●

$$2.34 \times 10 = 23.4$$

$$2.34 \times 100 = 234$$

$$2.34 \times 1,000 = 2,340$$

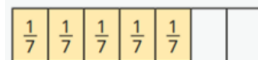
	of 10 always results in adding zeros. This will cause issues later when multiplying decimals.	Concrete The place value counters show 3.2 multiplied by 10 	Pictorial Use the place value chart to multiply 3.24 by 10, 100 and 1,000 	Abstract 0.6×10 $\rightarrow 2.4 \times 10$ $\rightarrow 1.35 \times 10$ 0.6×100 2.4×100 1.35×100 $0.6 \times 1,000$ $2.4 \times 1,000$ $1.35 \times 1,000$
	Mental strategies Children continue to use efficient mental strategies such as partitioning and knowledge of factor pairs and related facts to multiply.	Key Representations The most efficient strategy to calculate ... $\times$... is ... To calculate ... $\times$ 12, I can do ... $\times$... $\times$... For example: 121×12 I could calculate 100×12 plus 20×12 plus 1×12 I could calculate 121×10 plus 121×2 I could calculate $121 \times 6 \times 2$ I could calculate $121 \times 4 \times 3$		
		Concrete	Pictorial	Abstract
		Key Representations		

Multiply fractions by a whole number

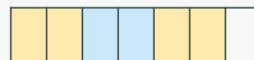
Make links with repeated addition.

E.g. $\frac{1}{5} \times 4 = \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{4}{5}$

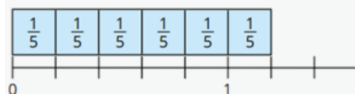
To multiply a fraction by an integer, I multiply the numerator by the integer and the denominator remains the same.



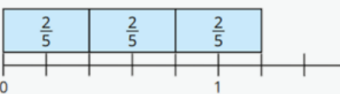
$$\frac{1}{7} \times 5 = \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} = \frac{5}{7}$$



$$\frac{2}{7} \times 3 = \frac{2}{7} + \frac{2}{7} + \frac{2}{7} = \frac{6}{7}$$

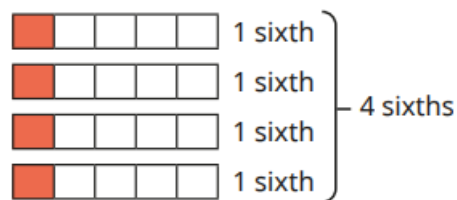


$$\frac{1}{5} \times 6 = \frac{6}{5} = 1\frac{1}{5}$$

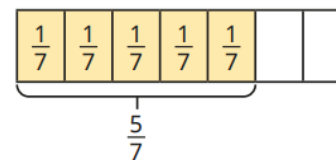


$$\frac{2}{5} \times 3 = \frac{6}{5} = 1\frac{1}{5}$$

Concrete



Pictorial



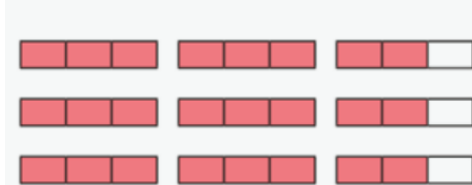
Abstract

$$6 \times \frac{1}{4} \rightarrow \frac{1}{3} \times 4$$

Multiply mixed numbers by a whole number

Key Representations

I can partition $2\frac{2}{3}$ into 2 and $\frac{2}{3}$

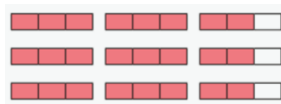


$$2\frac{2}{3} \times 3$$

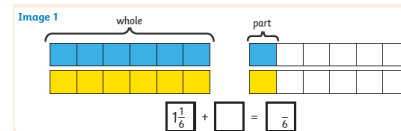
$$2 \times 3 = 6 \quad \frac{2}{3} \times 3 = \frac{6}{3} = 2$$

$$2\frac{2}{3} \times 3 = 6 + 2 = 8$$

Concrete

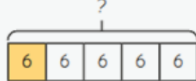
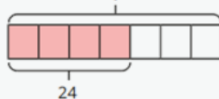
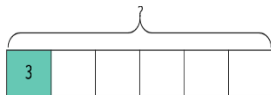
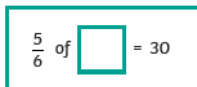


Pictorial



Abstract

I know that $1\frac{1}{5} \times 3 = 1\frac{1}{5} + 1\frac{1}{5} + 1\frac{1}{5} = 3\frac{3}{5}$

	Find the whole Children multiply to find the whole from a given part.	Key Representations If $\frac{1}{\square}$ is ... , then the whole is ... $\times$... $\frac{1}{5}$ of $\square = 6$  $5 \times 6 = 30$ $\frac{1}{5}$ of $30 = 6$ If $\frac{\square}{\square}$ is ... , then $\frac{1}{\square}$ is ... and the whole is ... $\times$... $\frac{4}{7}$ of $\square = 24$ $\frac{1}{7} = 24 \div 4 = 6$ $7 \times 6 = 42$ $\frac{4}{7}$ of $42 = 24$  Concrete  Pictorial $\frac{1}{6}$ of $\square = 3$  Abstract  $\frac{5}{6}$ of $\square = 30$		
	Year 6 Progression of Skills	Year 6 • Identify common factors and common multiples. • Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. • Multiply numbers by 10, 100 and 1,000 • Multiply one-digit numbers with up to two decimal places by whole numbers. • Use their knowledge of the order of operations to carry out calculations involving the 4 operations. • Multiply simple pairs of proper fractions, writing the answer in its simplest form. • Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. • Solve problems involving the calculation of percentages.		
	Key Representations			

Multiply numbers up to 4 digits by a 2-digit number

To multiply by a 2-digit number, first multiply by the ones, then multiply by the tens and then find the total.

		1	2	0	7
×			3	6	
+	7	2	4	2	
	3	6	2	1	0
	4	3	4	5	2
	1				

(1,207 × 6)
(1,207 × 30)

Concrete



Pictorial

Abstract

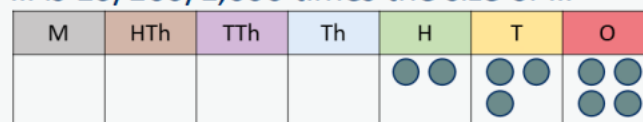
		1	2	3	5
×				5	3

Multiply by 10, 100 and 1,000

Some children may overgeneralise that multiplying by a power of 10 always results in adding zeros.

Key Representations

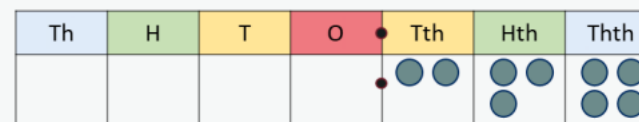
To multiply by 10/100/1,000, I move all the digits ... places to the left.
... is 10/100/1,000 times the size of ...



$$234 \times 10 = 2,340$$

$$234 \times 100 = 23,400$$

$$234 \times 1,000 = 234,000$$



$$0.234 \times 10 = 2.34$$

$$0.234 \times 100 = 23.4$$

$$0.234 \times 1,000 = 234$$

Concrete



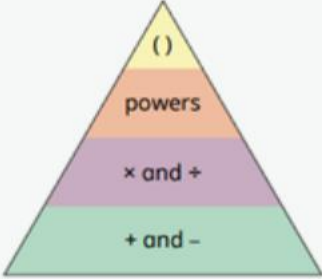
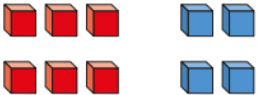
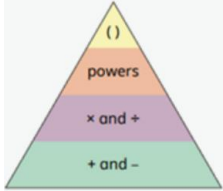
Pictorial



Abstract

$$473 \times 100 =$$

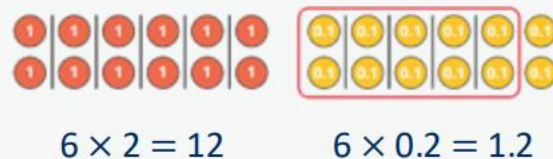
$$92.4 \times \underline{\quad} = 924$$

Order of operations Calculations in brackets should be done first. Multiplication and division should be performed before addition and subtraction.	Key Representations ... has greater priority than ..., so the first part of the calculation I need to do is ...   $(3 + 4) \times 2 = 14$  $3 + 4^2 = 19$  $3 + 4 \times 2 = 11$		
	Concrete 	Pictorial 	Abstract $(3 + 2) \times 3$
	Key Representations		

Multiply decimals by integers

This is the first time children multiply decimals by numbers other than 10, 100 or 1,000. Encourage them to make links with known facts and whole number multiplication.

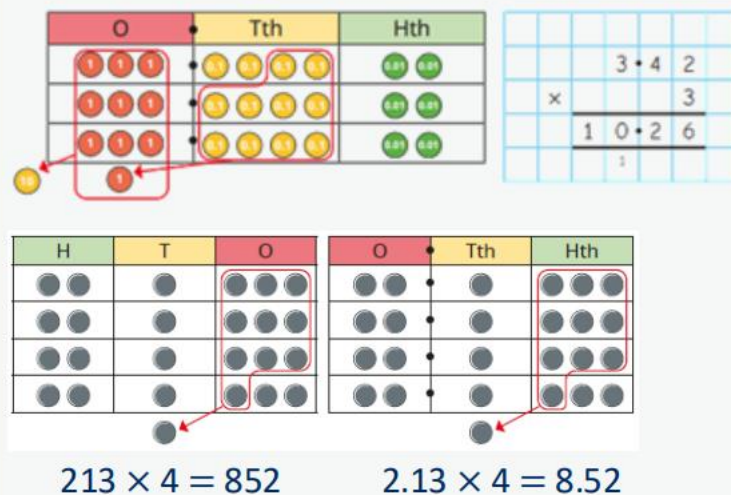
I know that $\dots \times \dots = \dots$,
so I also know that $\dots \times \dots = \dots$



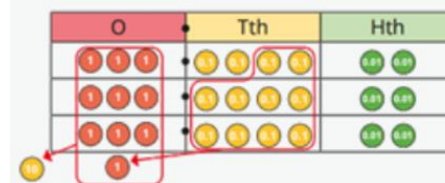
Concrete



I need to exchange 10 ... for 1 ...



Pictorial



Abstract

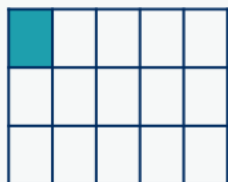
$37.5 \times 9 =$
___ = 23×52.84

Key Representations

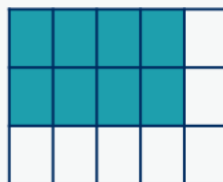
Multiply fractions by fractions

Encourage children to give answers in their simplest form.

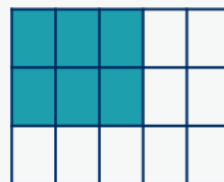
When multiplying a pair of fractions, I need to multiply the numerator and multiply the denominator.



$$\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$$



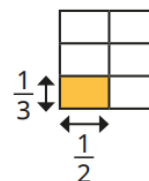
$$\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$$



$$\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$$

Concrete

Pictorial



Abstract

$$\frac{1}{5} \times \frac{1}{4} =$$

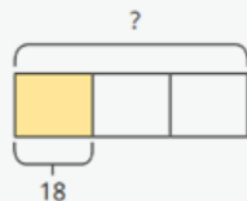
Find the whole

Children multiply to find the whole from a given part.

Key Representations

If $\frac{1}{\square}$ is ... , then the whole is ... $\times$...

$$\frac{1}{3} \text{ of } \underline{\quad} = 18$$

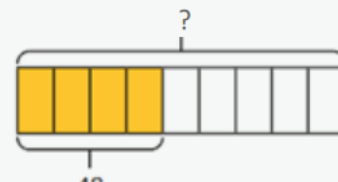


$$18 \times 3 = 54$$

$$\frac{1}{3} \text{ of } \mathbf{54} = 18$$

If $\frac{\square}{\square}$ is ... , then $\frac{1}{\square}$ is ... and the whole is ... $\times$...

$$\frac{4}{9} \text{ of } \underline{\quad} = 48$$



$$\frac{1}{9} = 48 \div 4 = 12$$

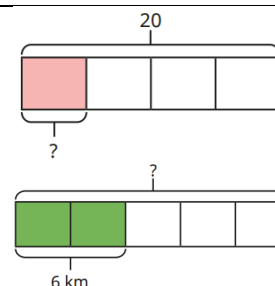
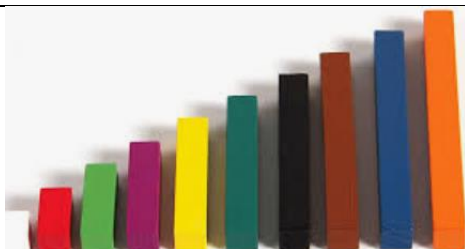
$$9 \times 12 = 108$$

$$\frac{4}{9} \text{ of } \mathbf{108} = 48$$

Concrete

Pictorial

Abstract



$$\frac{3}{5} \text{ of } \underline{\hspace{2cm}} = 21$$

$$\frac{\square}{3} \text{ of } 60 = 40$$

Calculate percentages

Children first learn how to find 1%, 10%, 20%, 25% and 50% before using multiples of these amounts to find any percentage.

Key Representations

There are ... lots of ... % in 100%
To find ... %, I need to divide by ...

100%			
50%		50%	
25%	25%	25%	25%

$$50\% \text{ of } \dots = \dots \div 2$$

$$25\% \text{ of } \dots = \dots \div 4$$

... % is made up of ... %, and ... %

100%									
10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

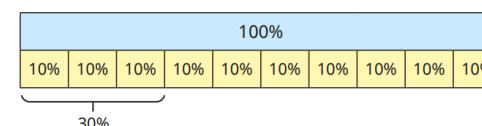
To find 30%, I can find 10% and then multiply it by 3

To find 23%, I can use $10\% \times 2$ and $1\% \times 3$

To find 99%, I can find 1%, then subtract from 100%

Concrete

Pictorial



Abstract

10% of 250
25% of 40

Key Representations

Calculation s involving ratio

Encourage children to see the multiplicative relationship between ratios. They will need to multiply or divide each value by the same number to keep the ratio equivalent. Double number lines and ratio tables help children to see both horizontal and vertical multiplicative

For every ... , there are ...

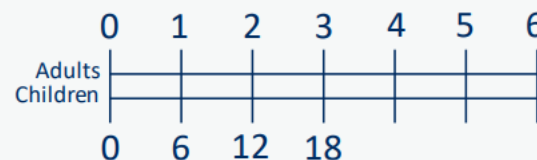
For every 1 adult on a school trip, there are 6 children.



Adults	Children
1	6
2	12
3	18

Diagram showing multiplication factors: $\times 3$ (vertical arrows) and $\times 6$ (horizontal arrows).

The ratio of adults to children is 1 : 6



Concrete



Pictorial



Abstract

Write the ratio of:

- bananas to strawberries
- cherries to strawberries
- strawberries to bananas to cherries
- cherries to strawberries to bananas

Draw a bar model to represent each ratio.



	ve relationshi ps.			
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