NA18 Multiplication problem solving

Multiplication is the best way to solve problems where the same number is added again and again.

For my new herb garden I needed five packets of seeds which cost $3 each.

To work out the total cost we should multiply $3 by 5, which is quicker than using repeated addition.

Using repeated addition

$3
3
3
3
+ 3
$15

Using multiplication

$3
x 5
$15

Try this

1 Find the cost of these items.

a 4 watering cans

$6
x 4

b 3 bags of potting mix

c 4 pots

d 5 watering cans

e 10 bags of potting mix

f 7 pots

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2 Use the price boards to work out the cost of these herbs.

a 5 bags of parsley $2 x 5	**b** 2 bags of mint	**c** 10 bags of sage	**d** 3 bags of thyme	**e** 5 bags of rosemary
f 9 bags of thyme	**g** 5 bags of sage	**h** 8 bags of parsley	**i** 20 bags of rosemary	**j** 8 bags of thyme

3 Emma works at **Herbie's Cafe**. At lunch time she took these orders. Work out how much each order cost.

a Four hamburgers	**b** Ten salad rolls		
c Two fish and chips	**d** Six doughnuts		
e Ten custard tarts	**f** Five flavoured milks	**g** Eight soft drinks	**h** Nine orange juices

Challenge

Five of each: At the end of an hour at the markets, the herb stall owner has sold five bags of each item. How much money has the owner made?

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NA23 The distributive law

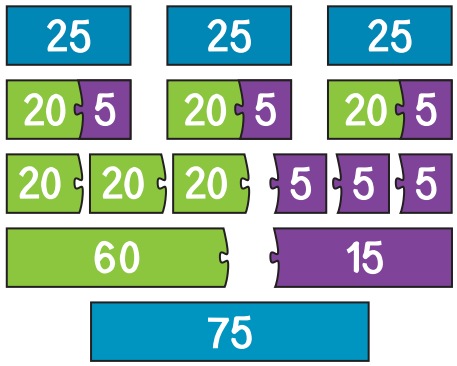
The **distributive law** says that a multiplication can be written as two multiplications and added.

For example,

$$\begin{aligned} & 25 \times 3 \\ = & (20 + 5) \times 3 \\ = & (20 \times 3) + (5 \times 3) \\ = & 60 + 15 \\ = & 75 \end{aligned}$$

The example above can be shown as a diagram.

$$\begin{aligned} & 25 \times 3 \\ = & (20 + 5) \times 3 \\ = & (20 \times 3) + (5 \times 3) \\ = & 60 + 15 \\ = & 75 \end{aligned}$$

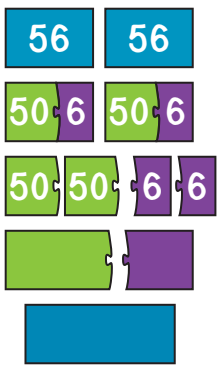


Try this

1 Use the distributive law to complete these.

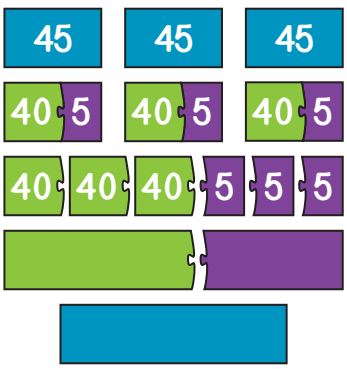
a

$$\begin{aligned} & 56 \times 2 \\ = & (\quad) \times 2 \\ = & (\quad) + (\quad) \\ = & \quad + \\ = & \end{aligned}$$



b

$$\begin{aligned} & 45 \times 3 \\ = & (\quad + \quad) \times 3 \\ = & (\quad) + (\quad) \\ = & \quad + \\ = & \end{aligned}$$



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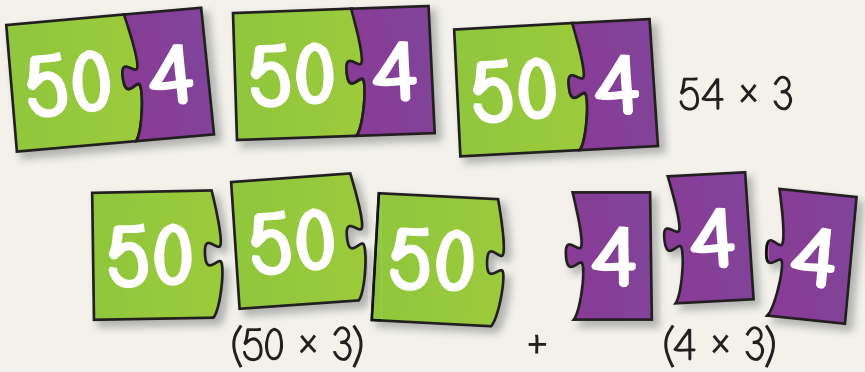

2 The distributive law can be applied as the split and multiply strategy in 2-digit x 1-digit multiplication.

Use the split and multiply strategy (distributive law) to show these 2-digit x 1-digit multiplications.

$$
\begin{aligned}
& 54 \times 3 \\
= \ & (50 + 4) \times 3 \\
= \ & (50 \times 3) + (4 \times 3) \\
= \ & 150 + 12 \\
= \ & 162
\end{aligned}
$$

a 75 x 2

= (70 + 5) × 2

= (70 × 2) + (5 × 2)

= ☐ + ☐

= ☐

b 26 x 3

c 35 x 5

d 37 × 3

e 45 × 5

f 57 × 2

Challenge

Split and divide: The distributive law also works as the 'split and divide' strategy for division.

$$
\begin{aligned}
& 96 \div 3 \\
= \ & (90 \div 3) + (6 \div 3) \\
= \ & 30 + 2 \\
= \ & 32
\end{aligned}
$$

Try these:

1 42 ÷ 2
2 63 ÷ 3
3 65 ÷ 5

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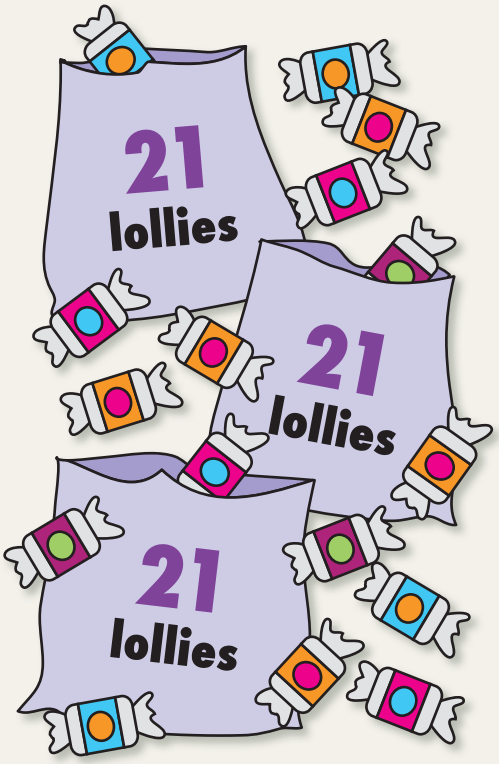
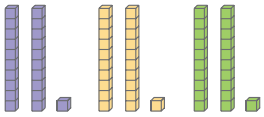
NA24 Multiplication 2-digit x 1-digit (no regrouping)

Multiplication is used when there are **groups** of things, like these bags of lollies. To find out how many lollies there are altogether, you will need to work out 21 x 3.

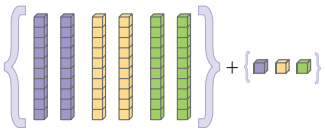


1. The split and multiply method.

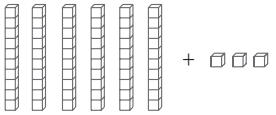
Step 1 21 x 3



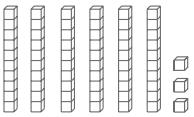
Step 2 (20 x 3) + (1 x 3)



Step 3 60 + 3



Step 4 63



2. The traditional written method.

Step 1
Set out vertically.

$$\begin{array}{r} 21 \\ \times\ 3 \\ \hline \end{array}$$

Step 2
Multiply the ones.
3 x 1 ones = 3 ones

$$\begin{array}{r} 21 \\ \times\ 3 \\ \hline 3 \end{array}$$

Step 3
Multiply the tens.
3 x 2 tens = 6 tens

$$\begin{array}{r} 21 \\ \times\ 3 \\ \hline 63 \end{array}$$

Try this

1 Use either method to find the answers.

a 24 x 2

b 12 x 3

c 21 x 5

d 51 x 3

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What's smaller than an ant's pants?

2 To answer the riddle, solve each multiplication, then write the letter that matches each answer in its box below.

42 x 2 (A)	31 x 2 (S)	41 x 2 (M)	43 x 2 (O)
22 x 4 (C)	22 x 3 (E)	20 x 3 (I)	31 x 5 (Z)

84	82	86	155	155	60	66	62
							,

88	86	155	155	60	66

3 How much will it cost to buy these palms from **Nate's Nursery**?

a Three royal palms

b Eight fan palms

c Five lipstick palms

d Four foxtail palms

e What is the total cost?

Challenge

Three-digit multiplication: Extend either method to hundreds and try these.

312 x 4	904 x 2	510 x 5	732 x 3	743 x 2

ISBN 978 1 74135 178 1

NA8 Multiplication problem solving

Multiplication is the best way to solve problems where the same number is added again and again.

Our group of seven campers need seven camping permits which cost $23 each. To work out the total cost we should multiply $23 by 7 which is quicker than using repeated addition.

Using repeated addition

Bianca's permit	$ 23
Ryan's permit	23
Zethan's permit	23
Tahlia's permit	23
Jack's permit	23
Emily's permit	23
Jessica's permit	+ 23
	$161

Using multiplication

$$\begin{array}{r} {}^{2} \\ \$\ 23 \\ \times \quad 7 \\ \hline \$161 \end{array}$$

Try this

1 Find the cost of these items.

a 5 camping permits

b 3 guidebooks

c 4 maps

d 2 guidebooks

e 6 camping permits

f 3 maps

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What did the doctor say to the camper who thought he was half-teepee, half-wigwam?

Aussie Camping Gear

Tents	$94	Billies	$18
Backpacks	$75	Cookpots	$42
Sleeping bags	$33	Plate, bowl, cup set	$25
Bedrolls	$26	Knife, fork, spoon set	$11
Hiking boots	$58	Pocket knives	$62
Torches	$14	Compasses	$26
Water bottles	$13	Kerosene lamps	$37

2 To solve the riddle, use the price list to work out the cost of each set of camping equipment. Then, write the letter that matches the answer in the correct boxes below.

3 tents (L)	7 backpacks (D)	7 sleeping bags (R)	7 pairs of hiking boots (A)	4 billies (Y)
7 torches (M)	2 cookpots (C)	3 compasses (E)	3 kerosene lamps (U)	7 water bottles (O)
7 plate, bowl, cup sets (N)	7 knife, fork, spoon sets (W)	4 pocket knives (S)	7 bedrolls (T)	

$84	$406	$282	$98

$525	$91	$77	$175

$72	$91	$111

$406	$231	$78

$182	$77	$91

$182	$78	$175	$182	$248

Challenge

First camping trip: What would be the total cost for a family of four to go camping together for the first time? You'll need to buy four of most items, but you'll only need one or two of other items.

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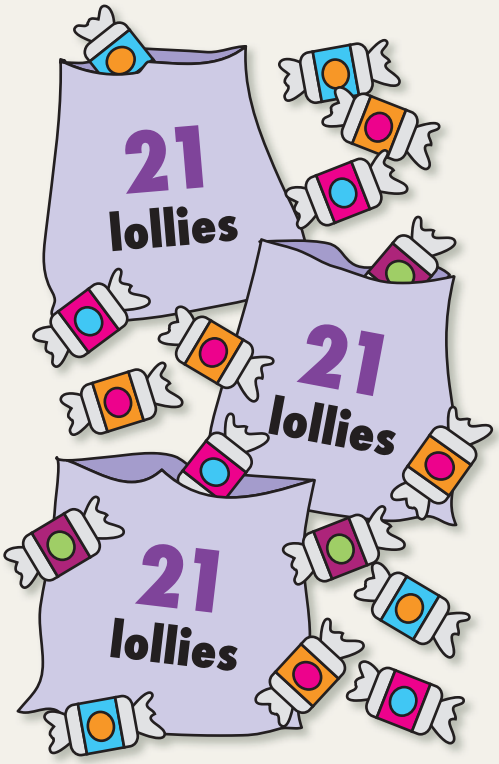

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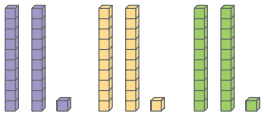

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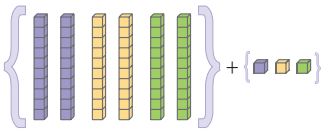

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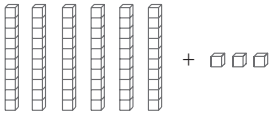

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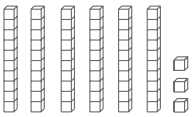

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NA16 Multiplying by tens and hundreds

When **multiplying by tens or hundreds**, first multiply by the single digit as usual, then write zeros in the ones and tens place depending on whether you are multiplying by tens or hundreds. Your answer will be in tens or hundreds.

Look at this example:

$$\begin{array}{r} 43 \\ \times\ 2 \\ \hline 86 \end{array}$$

$$\begin{array}{r} 43 \\ \times\ 20 \\ \hline 860 \end{array}$$

$$\begin{array}{r} 43 \\ \times\ 200 \\ \hline 8600 \end{array}$$

Try this

1 Multiply to find the first answer in each set, then use a strategy to complete the rest.

a

$$\begin{array}{r} 21 \\ \times\ 4 \\ \hline \end{array} \qquad \begin{array}{r} 21 \\ \times\ 40 \\ \hline \end{array} \qquad \begin{array}{r} 21 \\ \times\ 400 \\ \hline \end{array}$$

b

$$\begin{array}{r} 24 \\ \times\ 2 \\ \hline \end{array} \qquad \begin{array}{r} 24 \\ \times\ 20 \\ \hline \end{array} \qquad \begin{array}{r} 24 \\ \times\ 200 \\ \hline \end{array}$$

c

$$\begin{array}{r} 53 \\ \times\ 5 \\ \hline \end{array} \qquad \begin{array}{r} 53 \\ \times\ 50 \\ \hline \end{array} \qquad \begin{array}{r} 53 \\ \times\ 500 \\ \hline \end{array}$$

d

$$\begin{array}{r} 723 \\ \times\ 7 \\ \hline \end{array} \qquad \begin{array}{r} 723 \\ \times\ 70 \\ \hline \end{array} \qquad \begin{array}{r} 723 \\ \times\ 700 \\ \hline \end{array}$$

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What do you call two 90-year-old robbers?

2 To find the answer to this riddle, solve each multiplication, then write the letter that matches each answer in the boxes below.

72 x 30 = ☐ (I)	52 x 70 = ☐ (P)	41 x 4 = ☐ (E)	25 x 50 = ☐ (K)	57 x 60 = ☐ (F)
96 x 20 = ☐ (A)	23 x 80 = ☐ (S)	62 x 3 = ☐ (L)	45 x 90 = ☐ (C)	89 x 10 = ☐ (D)
36 x 500 = ☐ (O)	48 x 200 = ☐ (N)	53 x 40 = ☐ (R)		

1920	3640	1920	2160	2120	18 000	3420	18 000	186	890	9600	2160	4050	1250	164	2120	1840

3 Without calculating the exact answer, which of the three multiplications to the right should have the answer 70 200? Colour one bubble under the correct multiplication.

a

$$78 \times 9 = 70\,200$$

b

$$78 \times 90 = 70\,200$$

c

$$78 \times 900 = 70\,200$$

Explain how you made your choice.

Challenge

Time for times: How many minutes in 24 hours? How many seconds in 24 hours?

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