Multiplication is repeated addition.

6×4

how many times to add   number to be added

$6 \times 4 = 4 + 4 + 4 + 4 + 4 + 4 = 24$

six 4s

4×6

how many times to add   number to be added

$4 \times 6 = 6 + 6 + 6 + 6 = 24$

four 6s
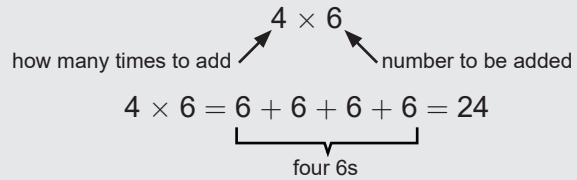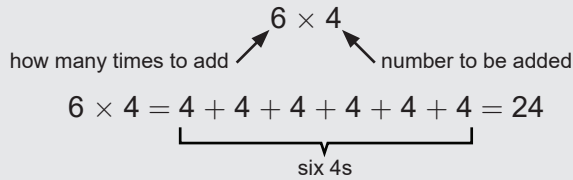
So $6 \times 4 = 4 \times 6$. The answer will be the same no matter which number is first.

1. Write the multiplication statement as repeated addition.

a) $5 \times 3 =$ _____

b) $6 \times 7 =$ _____

c) $4 \times 9 =$ _____

BONUS ▶ $4 \times 748 =$ _____

2. Write the multiplication statement as repeated addition. Calculate the product.

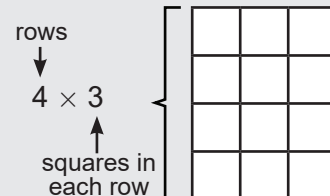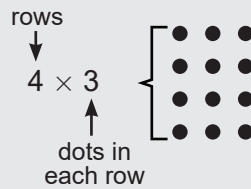a) $5 \times 4 =$ _____ $=$ _____ and $4 \times 5 =$ _____ $=$ _____

b) $6 \times 2 =$ _____ $=$ _____ and $2 \times 6 =$ _____ $=$ _____

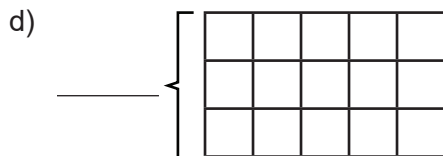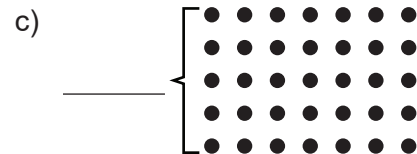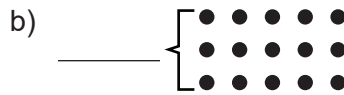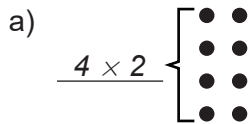3. Fill in the blanks to complete the equation.

a) $9 \times 8 = 72$ so $\underline{\ \ 8\ \ } \times \underline{\ \ 9\ \ } = \underline{\ \ 72\ \ }$

b) $5 \times 3 = 15$ so ____ × ____ = _____

c) $4 \times 8 = 32$ so ____ × ____ = _____

d) $6 \times 7 = 42$ so ____ × ____ = _____

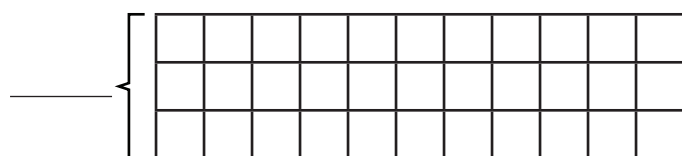An **array** is a picture that shows multiplication:

rows

4×3

dots in each row

rows

4×3

squares in each row

4. Write a product for the array.

a) $\underline{4 \times 2}$

b) _____

c) _____

d) _____

BONUS ▶ _____
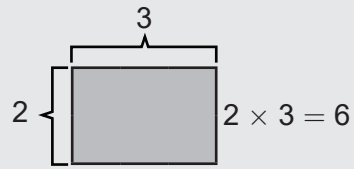
The arrays are the same size but in different orientations.

They show that $3 \times 2 = 2 \times 3$.

$3 \times 2 = 6$ $2 \times 3 = 6$
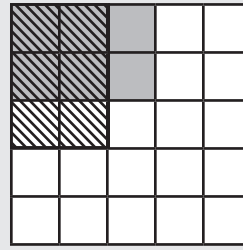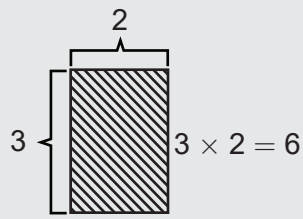
5. Draw the two arrays. Find the product. Complete the equation.

a) 3×5 and 5×3
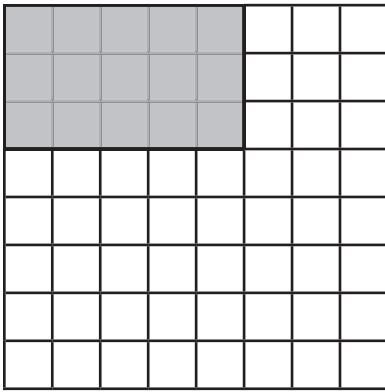
_**3**_ × _**5**_ = _____ × _____ = _____

b) 6×7 and 7×6

_____ × _____ = _____ × _____ = _____
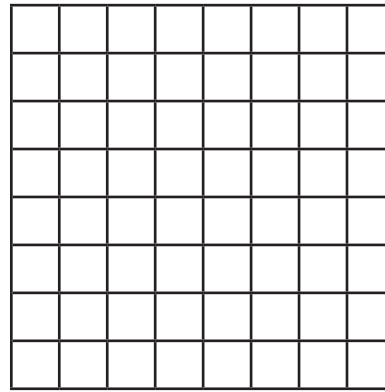
c) 9×4 and 4×9

_____ × _____ = _____ × _____ = _____
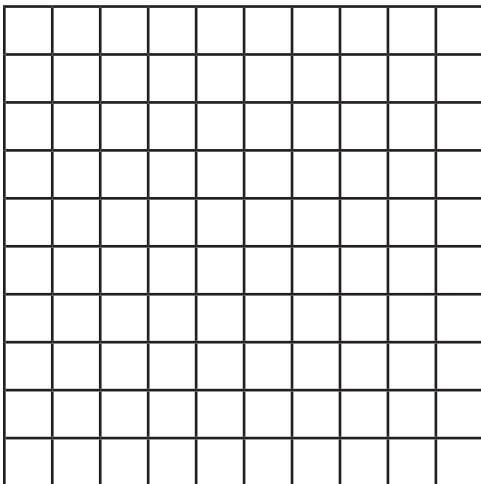
d) 8×5 and 5×8

_____ × _____ = _____ × _____ = _____
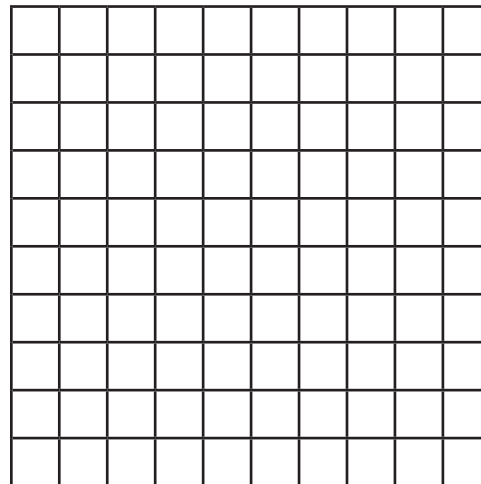
Marla knows that 3×6 is 18. Her teacher asks her how she can find 4×6 *quickly* (without adding four 6s).

Marla knows that 4×6 is one more 6 than 3×6. She shows this in two ways:

With a picture:

four 6s ⎰ ⎱ three 6s

plus one more 6

three 6s   plus one more 6
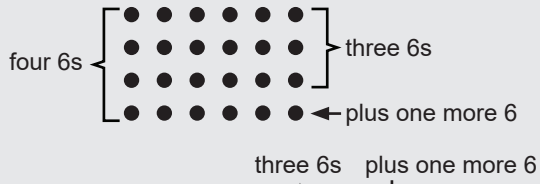
By adding:

$4 \times 6 = 6 + 6 + 6 + 6$

three 6s

Marla knows that $\mathbf{4 \times 6 = (3 \times 6) + 6}$.

She knows $3 \times 6 = 18$, so $4 \times 6 = 18 + 6 = 24$.

6. Fill in the missing products and number.

a)
4×7
rows
dots in
each row

$\underline{3 \times 7}$
$+ \underline{7}$

b)
$\underline{}$
$+ \underline{}$

c)
$\underline{}$
$+ \underline{}$

d)
$\underline{}$
$+ \underline{}$

e)
$\underline{}$
$+ \underline{}$

f)
$\underline{}$
$+ \underline{}$

BONUS ▶

$\underline{}$
$+ \underline{}$

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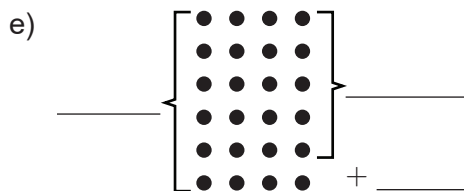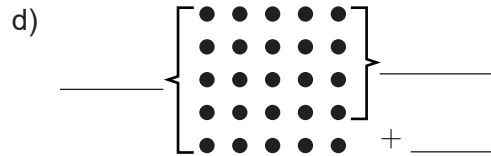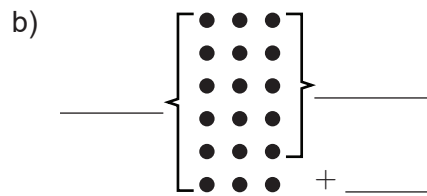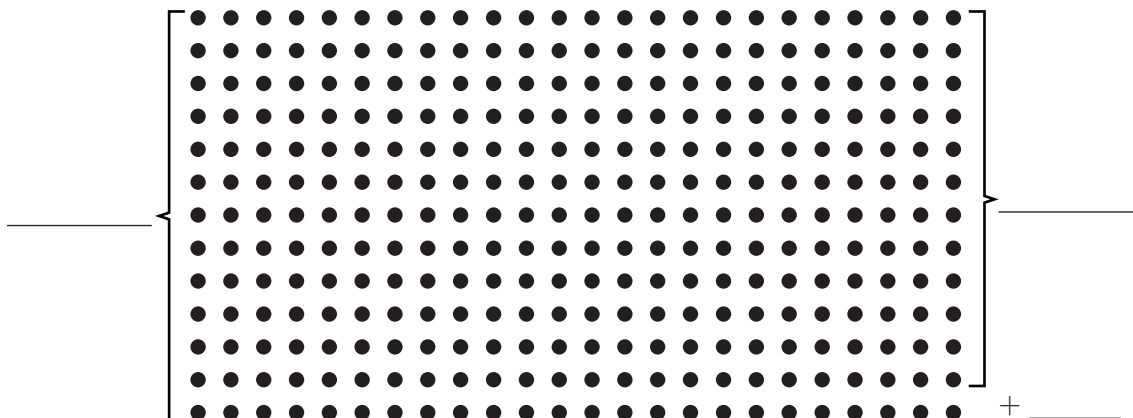
7. Fill in the missing products and number. Then write an equation.

a)

$\underline{4 \times 6}$ $\underline{3 \times 6}$
$+ \underline{6}$

$\underline{4 \times 6 = (3 \times 6) + 6 }$

b)

$\underline{}$ $\underline{}$
$+ \underline{}$

$\underline{}$

c)

$\underline{}$ $\underline{}$
$+ \underline{}$

$\underline{}$

d)

$\underline{}$ $\underline{}$
$+ \underline{}$

$\underline{}$

You can always turn a product into a smaller product and a sum.

$$7 \times 3 = (\mathbf{6} \times 3) + \mathbf{3} \qquad\qquad\qquad 6 \times 3 = (\mathbf{5} \times 3) + \mathbf{3}$$

take 1 away from 7   add an extra 3

---

8. Turn the product into a smaller product and a sum.

a) $14 \times 2 = (\ \underline{13}\ \times\ \underline{2}\ ) + \underline{2}$ b) $15 \times 7 = (\ \underline{14}\ \times\ \underline{}\ ) + \underline{}$

c) $28 \times 3 = (\underline{} \times \underline{}) + \underline{}$ d) $43 \times 6 = (\underline{} \times \underline{}) + \underline{}$

e) $17 \times 4 = (\underline{} \times \underline{}) + \underline{}$ f) $19 \times 6 = (\underline{} \times \underline{}) + \underline{}$

g) $35 \times 5 = \underline{}$ h) $58 \times 7 = \underline{}$

i) $47 \times 6 = \underline{}$ **BONUS ▶** $16 \times 14 = \underline{}$

9. Find the answer by turning the product into a smaller product and a sum.

a) $6 \times 5 = \underline{(5 \times 5) + 5}$ b) $7 \times 6 = \underline{}$

$ = \underline{25 + 5}$ $= \underline{}$

$ = \underline{30}$ $= \underline{}$

c) $4 \times 8 = \underline{}$ d) $3 \times 7 = \underline{}$

$= \underline{}$ $= \underline{}$

$= \underline{}$ $= \underline{}$

e) 6×6 f) 4×7 g) 7×5 h) 6×8
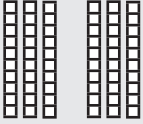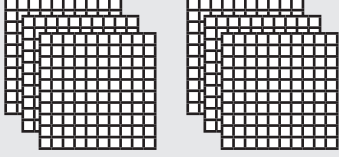
NS5-15 Multiplying by Multiples of 10, 100, and 1000

To multiply 2 × 3, make 2 groups of 3 ones blocks (3 ones = 3).

$2 \times 3 = 2 \times 3$ ones
$= 6$ ones $= 6$

Notice the pattern:
$2 \times 3 = 6$

To multiply 2 × 30, make 2 groups of 3 tens blocks (3 tens = 30).

$2 \times 30 = 2 \times 3$ tens
$= 6$ tens $= 60$

$2 \times 30 = 60$

To multiply 2 × 300, make 2 groups of 3 hundreds blocks (3 hundreds = 300).

$2 \times 300 = 2 \times 3$ hundreds
$= 6$ hundreds $= 600$

$2 \times 300 = 600$

1. Draw a model for the multiplication. Then calculate the answer.

a) 3×40

b) 3×50

$3 \times 40 = 3 \times \underline{\ 4\ }$ tens $= \underline{\ 12\ }$ tens $= \underline{\ 120\ }$

$3 \times 50 = 3 \times \underline{\ \ \ }$ tens $= \underline{\ \ \ \ }$ tens $= \underline{\ \ \ \ }$

2. Regroup to find the answer.

a) $2 \times 70 = 2 \times \underline{\ 7\ }$ tens $= \underline{\ 14\ }$ tens $= \underline{\ 140\ }$

b) $4 \times 50 = 4 \times \underline{\ \ \ }$ tens $= \underline{\ \ \ \ }$ tens $= \underline{\ \ \ \ }$

c) $6 \times 40 = 6 \times \underline{\ \ \ }$ tens $= \underline{\ \ \ \ }$ tens $= \underline{\ \ \ \ }$

d) $8 \times 30 = 8 \times \underline{\ \ \ }$ tens $= \underline{\ \ \ \ }$ tens $= \underline{\ \ \ \ }$

3. Complete the pattern.

a) $2 \times 4 = \underline{\ \ \ \ \ \ }$

$2 \times 40 = \underline{\ \ \ \ \ \ }$

$2 \times 400 = \underline{\ \ \ \ \ \ }$

b) $9 \times 1 = \underline{\ \ \ \ \ \ }$

$9 \times 10 = \underline{\ \ \ \ \ \ }$

$9 \times 100 = \underline{\ \ \ \ \ \ }$

c) $8 \times 2 = \underline{\ \ \ \ \ \ }$

$8 \times 20 = \underline{\ \ \ \ \ \ }$

$8 \times 200 = \underline{\ \ \ \ \ \ }$

d) $3 \times 3 = \underline{\ \ \ \ \ \ }$

$3 \times 30 = \underline{\ \ \ \ \ \ }$

$3 \times 300 = \underline{\ \ \ \ \ \ }$

4. Multiply.

a) $2 \times 40 = \underline{\ \ \ \ \ \ }$

b) $3 \times 50 = \underline{\ \ \ \ \ \ }$

c) $6 \times 30 = \underline{\ \ \ \ \ \ }$

d) $4 \times 50 = \underline{\ \ \ \ \ \ }$

e) $8 \times 100 = \underline{\ \ \ \ \ \ }$

f) $5 \times 300 = \underline{\ \ \ \ \ \ }$

g) $4 \times 300 = \underline{\ \ \ \ \ \ }$

h) $2 \times 600 = \underline{\ \ \ \ \ \ }$

i) $7 \times 50 = \underline{\ \ \ \ \ \ }$

j) $5 \times 60 = \underline{\ \ \ \ \ \ }$

k) $9 \times 20 = \underline{\ \ \ \ \ \ }$

l) $2 \times 800 = \underline{\ \ \ \ \ \ }$

5. Draw a base ten model to show 2×300.

6. You know that $6 \times 3 = 18$. How can you use this fact to multiply 6×300?

7. Draw a model for the multiplication. Then calculate the answer.

a) $10 \times 20 = 10 \times$ $=$ $= \underline{\quad 200 \quad}$

b) $10 \times 300 = 10 \times$ $=$ $= \underline{\qquad}$

c) $10 \times 6 = 10 \times \square\,\square\,\square\,\square\,\square\,\square =$ $= \underline{\qquad}$

d) 10×5

e) 10×50

f) 10×500

g) 10×5000

8. Multiply.

a) $10 \times 4 = \underline{\qquad}$

b) $10 \times 70 = \underline{\qquad}$

c) $10 \times 80 = \underline{\qquad}$

d) $10 \times 600 = \underline{\qquad}$

e) $10 \times 8 = \underline{\qquad}$

f) $10 \times 900 = \underline{\qquad}$

BONUS ▶

g) $10 \times 20\,000 = \underline{\qquad}$

h) $60\,000 \times 10 = \underline{\qquad}$

$10 \times 3 = 130$ $\qquad$ $100 \times 13 = 1300$ $\qquad$ $1000 \times 13 = 13\,000$

9. Use the pattern in the grey box to multiply.

a) $10 \times 14 = \underline{\qquad}$

b) $100 \times 17 = \underline{\qquad}$

c) $10 \times 21 = \underline{\qquad}$

d) $100 \times 42 = \underline{\qquad}$

e) $100 \times 87 = \underline{\qquad}$

f) $100 \times 28 = \underline{\qquad}$

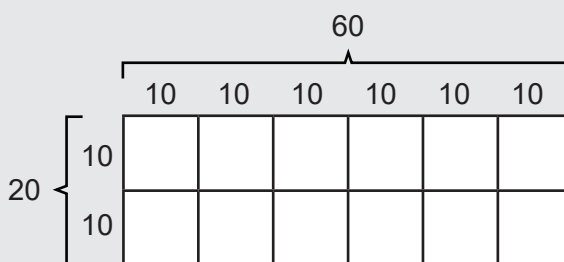**BONUS ▶**

g) $43 \times 1000 = \underline{\qquad}$

h) $1000 \times 135 = \underline{\qquad}$

$20 = 2 \times 10 \qquad 60 = 6 \times 10$

2×6

So, $20 \times 60 = (2 \times 10) \times (6 \times 10)$

10×10

$= (2 \times 6) \times (10 \times 10)$

$= 12 \times 100$

$= 1200$

10. Multiply.

a) $30 \times 40 = (3 \times 10) \times (4 \times 10)$

$= (3 \times 4) \times (10 \times 10)$

$= 12 \times \underline{\quad 100 \quad}$

$= \underline{\quad 1200 \quad}$

b) $20 \times 70 = (2 \times 10) \times (7 \times 10)$

$= (2 \times 7) \times (10 \times 10)$

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

$= \underline{\quad\quad}$

c) $20 \times 400 = (2 \times 10) \times (4 \times 100)$

$= (2 \times 4) \times (10 \times 100)$

$= 8 \times \underline{\quad 1000 \quad}$

$= \underline{\quad 8000 \quad}$

d) $40 \times 400 = (4 \times 10) \times (4 \times 100)$

$= (4 \times 4) \times (10 \times 100)$

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

$= \underline{\quad\quad}$

Follow the steps to multiply 40×60:

Step 1: Multiply $4 \times 6 = 24$.

Step 2: Write all the zeros from 4**0** and 6**0**. $\longrightarrow$ $40 \times 60 = 24$**00**

11. Multiply the one-digit numbers to find the product of the tens and hundreds.

a) $8 \times 3 = \underline{\quad 24 \quad}$

$800 \times 30 = \underline{\quad 24\ 000 \quad}$

b) $4 \times 3 = \underline{\quad\quad}$

$40 \times 300 = \underline{\quad\quad}$

c) $5 \times 7 = \underline{\quad\quad}$

$500 \times 70 = \underline{\quad\quad}$

d) $2 \times 6 = \underline{\quad\quad}$

$20 \times 600 = \underline{\quad\quad}$

e) $4 \times 9 = \underline{\quad\quad}$

$400 \times 90 = \underline{\quad\quad}$

f) $8 \times 5 = \underline{\quad\quad}$

$80 \times 500 = \underline{\quad\quad}$

BONUS ▶ Estimate 5821×3926 by rounding each number first. $6000 \times 4000 = \underline{\quad\quad\quad\quad}$

12. At the provincial school track meet there will be 30 schools competing with 20 students from each school. How many students will be competing?

NS5-16 Easier Ways to Multiply

To double 42, write $42 = 40 + 2$.   So, the double of $42 =$ double $40 +$ double $2 = 80 + 4 = 84$.

1. To double the number mentally, double the ones digit and the tens digit separately.

a) double 42 is ___*84*___

b) double 41 is _____

c) double 21 is _____

d) double 23 is _____

e) double 51 is _____

f) double 34 is _____

2. To double the number, double the ones and tens separately and add the result.

a) double 17 is _*20 + 14 = 34*_

b) double 27 is _____

c) double 38 is _____

d) double 25 is _____

e) double 35 is _____

f) double 55 is _____

To find 4×23, Anton doubles 23 twice:

Double 23 is 46, and double 46 is $80 + 12 = 92$. So 23×4 is 92.

3. Double twice to find the answer.

a) 4×13

Double 13 is ___*26*___,

and double _*26*_ is _*40 + 12 = 52*___.

So 4×13 is ___*52*__.

b) 4×16

Double 16 is ___*20 + 12 =*_____,

and double ____ is _____.

So 4×16 is _____.

c) 4×36

Double 36 is _____,

and double ____ is _____.

So 4×36 is _____.

d) 4×48

Double 48 is _____,

and double ____ is _____.

So 4×48 is _____.

e) 4×57

Double 57 is _____,

and double _____ is _____.

So 4×57 is _____.

f) 4×76

Double 76 is _____,

and double _____ is _____.

So 4×76 is _____.

If you already know 3 times a number, you can double it to find 6 times the number.
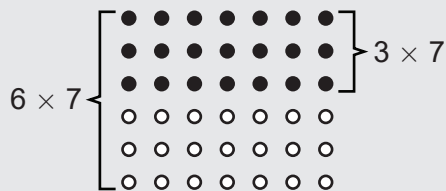
$$3 \times 7 = 21$$
$$\text{so } 6 \times 7 = 42 \longleftarrow \text{double } 21 = 42$$

4. Double 3 times the number to find 6 times the number.

a) $3 \times 4 = \underline{\hspace{1cm}}$

so $6 \times 4 = \underline{\hspace{1cm}}$

b) $3 \times 7 = \underline{\hspace{1cm}}$

so $6 \times 7 = \underline{\hspace{1cm}}$

c) $3 \times 8 = \underline{\hspace{1cm}}$

so $6 \times 8 = \underline{\hspace{1cm}}$

d) $3 \times 6 = \underline{\hspace{1cm}}$

so $6 \times 6 = \underline{\hspace{1cm}}$

e) $3 \times 5 = \underline{\hspace{1cm}}$

so $6 \times 5 = \underline{\hspace{1cm}}$

f) $3 \times 9 = \underline{\hspace{1cm}}$

so $6 \times 9 = \underline{\hspace{1cm}}$

BONUS ▶

g) $3 \times 111 = \underline{\hspace{1cm}}$

so $6 \times 111 = \underline{\hspace{1cm}}$

h) $3 \times 1111 = \underline{\hspace{1cm}}$

so $6 \times 1111 = \underline{\hspace{1cm}}$

i) $3 \times 111\ 111 = \underline{\hspace{1cm}}$

so $6 \times 111\ 111 = \underline{\hspace{1cm}}$

5. Double 2 times the number to find 4 times the number. Then find 8 times the number by doubling again.

a) $2 \times 6 = \underline{\hspace{1cm}}$

so $4 \times 6 = \underline{\hspace{1cm}}$

and $8 \times 6 = \underline{\hspace{1cm}}$

b) $2 \times 8 = \underline{\hspace{1cm}}$

so $4 \times 8 = \underline{\hspace{1cm}}$

and $8 \times 8 = \underline{\hspace{1cm}}$

c) $2 \times 7 = \underline{\hspace{1cm}}$

so $4 \times 7 = \underline{\hspace{1cm}}$

and $8 \times 7 = \underline{\hspace{1cm}}$

d) $2 \times 9 = \underline{\hspace{1cm}}$

so $4 \times 9 = \underline{\hspace{1cm}}$

and $8 \times 9 = \underline{\hspace{1cm}}$

e) $2 \times 12 = \underline{\hspace{1cm}}$

so $4 \times 12 = \underline{\hspace{1cm}}$

and $8 \times 12 = \underline{\hspace{1cm}}$

BONUS ▶ $2 \times 120 = \underline{\hspace{1cm}}$

so $4 \times 120 = \underline{\hspace{1cm}}$

and $8 \times 120 = \underline{\hspace{1cm}}$

6. Double 3 times the number to find 6 times the number. Then find 12 times the number.

a) $3 \times 7 = \underline{\hspace{1cm}}$

so $6 \times 7 = \underline{\hspace{1cm}}$

and $12 \times 7 = \underline{\hspace{1cm}}$

b) $3 \times 5 = \underline{\hspace{1cm}}$

so $6 \times 5 = \underline{\hspace{1cm}}$

and $12 \times 5 = \underline{\hspace{1cm}}$

BONUS ▶ $3 \times 50 = \underline{\hspace{1cm}}$

so $6 \times 50 = \underline{\hspace{1cm}}$

and $12 \times 50 = \underline{\hspace{1cm}}$

7. Use doubling to find 16 times the number.

a) 3

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

$\underline{\quad 4 \times 3 = 12 \quad}$

$\underline{\quad 8 \times 3 = 24 \quad}$

$\underline{\quad 16 \times 3 = 48 \quad}$

b) 9

$\underline{\hspace{4cm}}$

$\underline{\hspace{4cm}}$

$\underline{\hspace{4cm}}$

$\underline{\hspace{4cm}}$

c) 17

$\underline{\hspace{4cm}}$

$\underline{\hspace{4cm}}$

$\underline{\hspace{4cm}}$

$\underline{\hspace{4cm}}$

BONUS ▶ Use your answer to Question 7.a) to find 32×3. $\underline{\hspace{4cm}}$

8. Use doubling to calculate the total cost mentally.

a) 4 hair clips for 42¢ each _____

b) 4 pencils for 37¢ each _____

c) 8 stickers for 7¢ each _____

d) 8 bookmarks for 9¢ each _____

e) 16 marbles for 11¢ each _____

f) 16 tickets for $14 each _____

BONUS ▶ Use doubling to find 128×13. Hint: Write the steps as you did in Question 7.

9. Use doubling and halving to find the product.

a) $5 \times 46 = \underline{\quad 10 \quad} \times \underline{\quad 23 \quad} = \underline{\quad 230 \quad}$

b) $5 \times 68 = \underline{\qquad} \times \underline{\qquad} = \underline{\qquad}$

c) $5 \times 482 = \underline{\qquad} \times \underline{\qquad} = \underline{\qquad}$

d) $5 \times 866 = \underline{\qquad} \times \underline{\qquad} = \underline{\qquad}$

BONUS ▶

e) $50 \times 48 = \underline{\qquad} \times \underline{\qquad} = \underline{\qquad}$

f) $500 \times 86 = \underline{\qquad} \times \underline{\qquad} = \underline{\qquad}$

Mandy puts pairs that make a multiple of 10 together to find the product mentally:

$5 \times 13 \times 2 = 5 \times 2 \times 13 = 10 \times 13 = 130$

$4 \times 16 \times 5 = 4 \times 5 \times 16 = 20 \times 16 = 320$

---

10. Multiply by finding a multiple of 10.

a) $5 \times 31 \times 4 = \underline{\quad 5 \times 4 \times 31 \quad}$

$= \underline{\quad 20 \times 31 \quad}$

$= \underline{\quad 620 \quad}$

b) $6 \times 22 \times 5 = \underline{\qquad}$

$= \underline{\qquad}$

$= \underline{\qquad}$

c) $2 \times 39 \times 5 = \underline{\qquad}$

$= \underline{\qquad}$

$= \underline{\qquad}$

d) $8 \times 12 \times 5 = \underline{\qquad}$

$= \underline{\qquad}$

$= \underline{\qquad}$

BONUS ▶

e) $20 \times 39 \times 5 = \underline{\qquad}$

$= \underline{\qquad}$

$= \underline{\qquad}$

f) $2 \times 39 \times 50 = \underline{\qquad}$

$= \underline{\qquad}$

$= \underline{\qquad}$

NS5-17 Arrays and Multiplication

This is how Alexa multiplies 5×23:

She writes 23 as a sum: $23 = 20 + 3$

She multiplies 5 by 20: $5 \times 20 = 100$

She multiplies 5 by 3: $5 \times 3 = 15$

She adds the two results: $100 + 15 = 115$

Alexa concludes that $5 \times 23 = 115$.

This picture shows why Alexa's method works:

5×23

5×20 5×3

$5 \times 23 = (5 \times 20) + (5 \times 3) = 100 + 15 = 115$
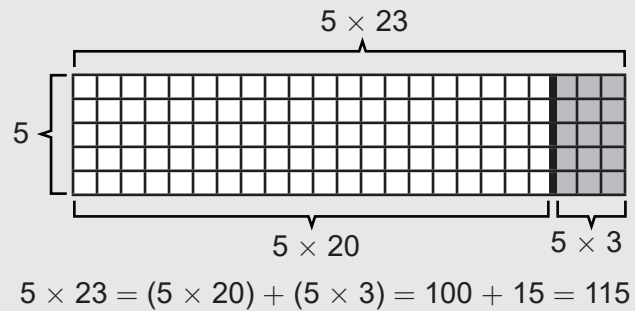
1. Write a product for the whole array and for each part of the array.

a) 3×23

3×20 3×3

b) _____

_____ _____

c) _____

_____ _____

d) _____

_____ _____
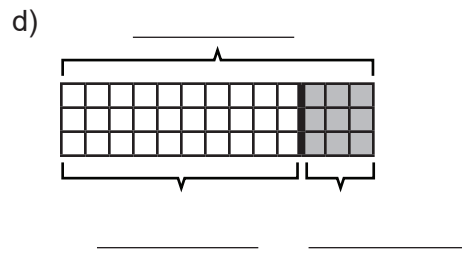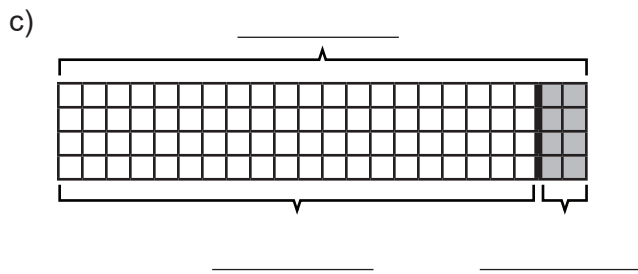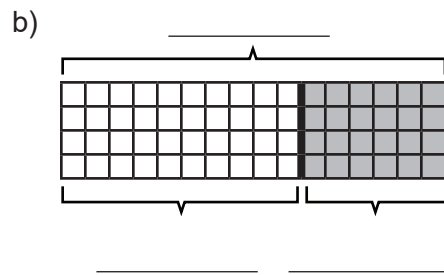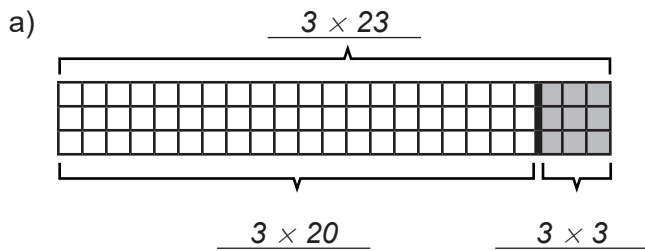
2. Fill in the blanks as shown.

a) 7×23

7×20 7×3

$7 \times 23 = (7 \times 20) + (7 \times 3)$

b) _____

_____ _____

_____

c)

_____

_____   _____

_____

d)

_____

_____   _____

_____
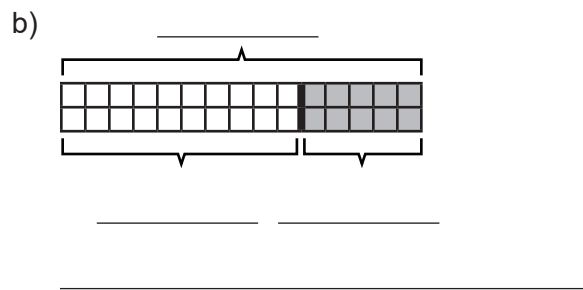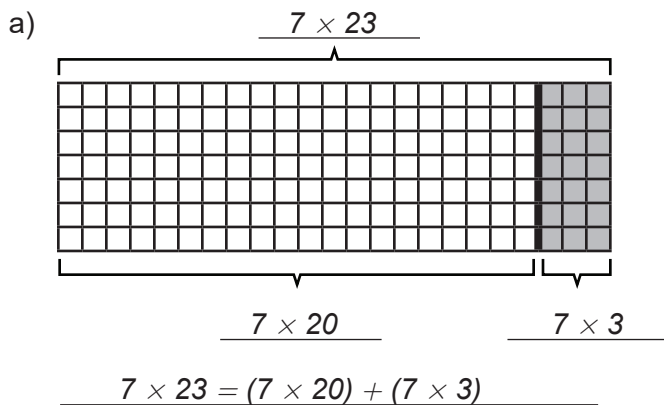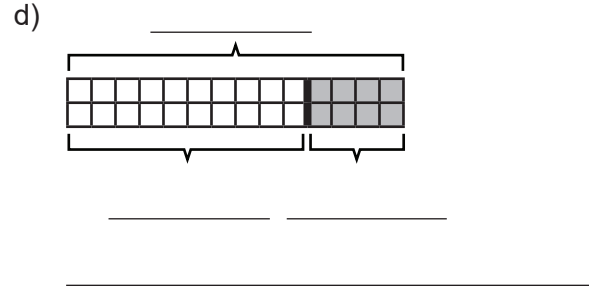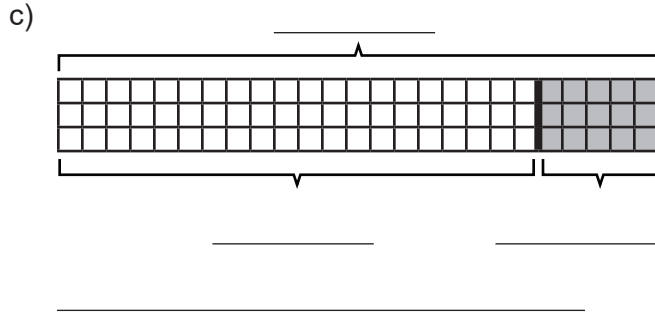
To multiply 3×42, Lewis draws:

$42 \quad + \quad 42 \quad + \quad 42$

← 3 groups of 40

← 3 groups of 2

$3 \times 42 = (3 \times 40) + (3 \times 2)$
$\quad = 120 + 6 = 126$

Dory draws:

	40	+	2
3	3×40		3×2

$3 \times 42 = (3 \times 40) + (3 \times 2)$
$\quad = 120 + 6 = 126$

---
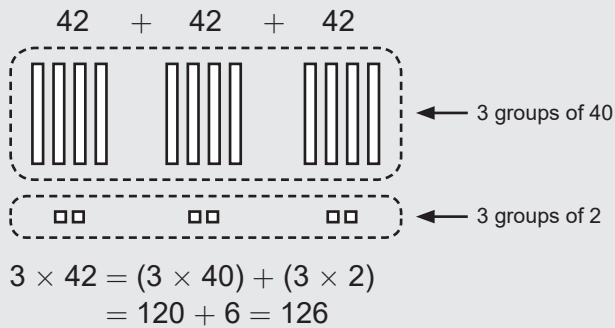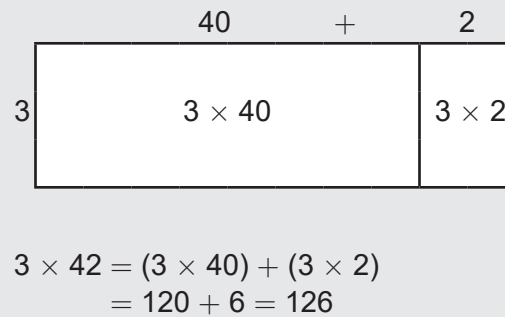
3. Use the picture to write a multiplication as a sum.

a)

	20	+	3
5	5×20		←— 5×3

$5 \times 23 = (5 \times 20) + (5 \times 3)$

b)

	30	+	6
4	4×30		4×6

$4 \times 36 = (\quad \times \quad) + (\quad \times \quad)$

c)

	10	+	4
3			

_____

d)

	30	+	4
3			

_____
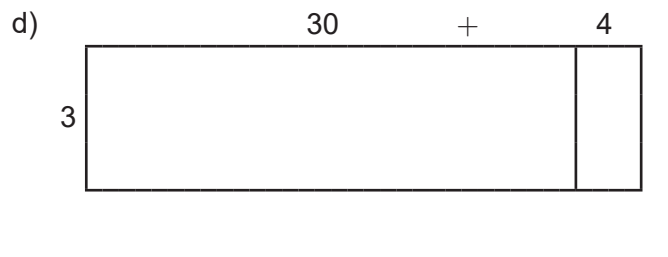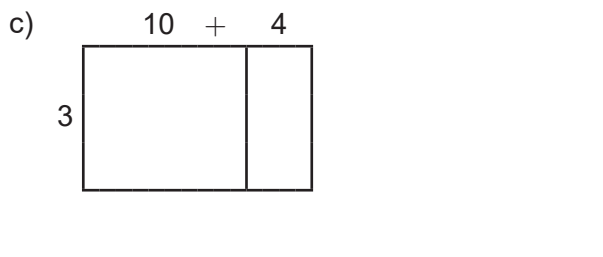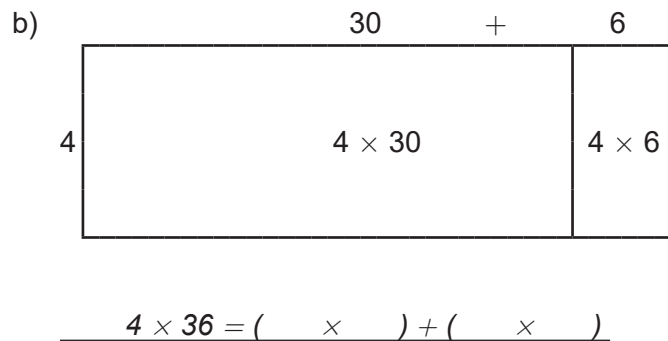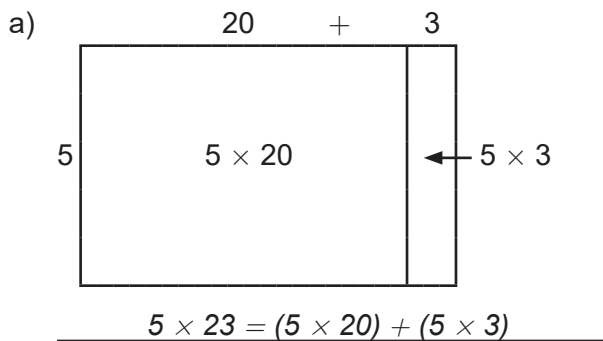
4. Rewrite the product in expanded form.

a) $\mathbf{4} \times 62 = (\mathbf{4} \times \underline{\textit{60}}) + (\mathbf{4} \times \underline{\textit{2}})$

b) $\mathbf{2} \times 73 = (\mathbf{2} \times \underline{\quad}) + (\mathbf{2} \times \underline{\quad})$

c) $\mathbf{5} \times 41 = (\mathbf{5} \times \underline{\quad}) + (\mathbf{5} \times \underline{\quad})$

d) $\mathbf{3} \times 32 = (\mathbf{3} \times \underline{\quad}) + (\mathbf{3} \times \underline{\quad})$

e) $2 \times 84 = (\underline{\quad} \times \underline{\quad}) + (\underline{\quad} \times \underline{\quad})$

f) $5 \times 91 = (\underline{\quad} \times \underline{\quad}) + (\underline{\quad} \times \underline{\quad})$

g) $3 \times 52 = $ _____

h) $2 \times 64 = $ _____

5. Rewrite the product in expanded form. Find the product.

a) $2 \times 23 = $ _(2 × 20) + (2 × 3)_

            $= $ _40 + 6_

            $= $ _46_

b) $4 \times 62 = $ _____

            $= $ _____

            $= $ _____

c) $3 \times 72 = $ _____

            $= $ _____

            $= $ _____

d) $9 \times 91 = $ _____

            $= $ _____

            $= $ _____

e) $7 \times 26 = $ _____

            $= $ _____

            $= $ _____

f) $5 \times 67 = $ _____

            $= $ _____

            $= $ _____

g) $8 \times 52 = $ _____

            $= $ _____

            $= $ _____

h) $9 \times 33 = $ _____

            $= $ _____

            $= $ _____

6. A construction company is cutting a hole in the road to replace a section of water pipe. The dimensions of the hole are shown. Write the product in expanded form and solve.

$8 \times 47 \ = $ _____

         $= $ _____

         $= $ _____ m^2

8 m

47 m
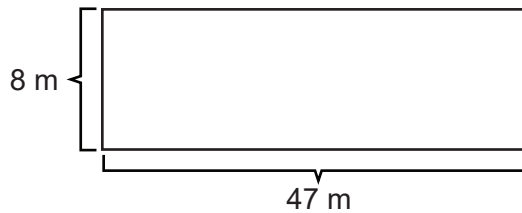
7. A store owner wants to carpet one of her showrooms and the hallway beside it. The dimensions of the showroom and hallway are shown. Write the product in expanded form and solve.

$9 \times 34 \ = $ _____

         $= $ _____

         $= $ _____ m^2

2 m hall

7 m showroom

34 m
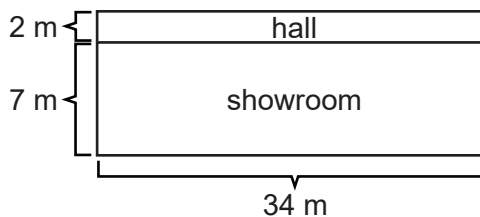
8. A community centre needs a cover for their swimming pool. The dimensions must be 7 m by 56 m. Write the dimensions as a product in expanded form and solve.

How to solve $3 \times 42 = (3 \times 40) + (3 \times 2)$

$= (3 \times 4 \text{ tens}) + (3 \times 2 \text{ ones})$

Step 1:

Multiply the ones digit by 3
(3×2 ones $= 6$ ones).

	4	2
×		3
		6
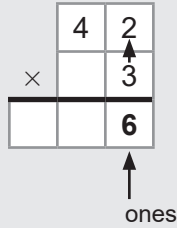
ones

Step 2:

Multiply the tens digit by 3
(3×4 tens $= 12$ tens).

Regroup 10 tens as 1 hundred.

	4	2
×		3
1	2	6

hundreds   tens

1. Multiply.

a)

	8	3
×		3

b)

	6	3
×		2

c)

	9	2
×		3

d)

	9	4
×		2

e)

	7	4
×		2
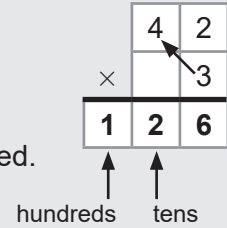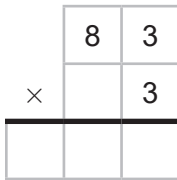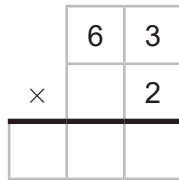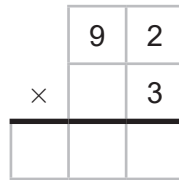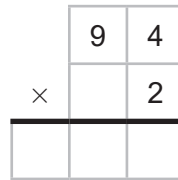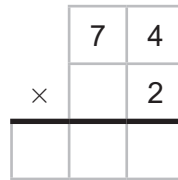
How to solve with regrouping $7 \times 53 = (7 \times 50) + (7 \times 3)$

$= (7 \times 5 \text{ tens}) + (7 \times 3 \text{ ones})$

Step 1:

Multiply 3 ones by 7
($7 \times 3 = 21$).

	2	
	5	3
×		7
		1

Step 2:

Regroup 20 ones as 2 tens.

2. Multiply the ones digits and regroup.

a)

	3	
	2	7
×		5
		5

b)

	1	
	8	5
×		2
		0

c)

	2	6
×		3

d)

	1	9
×		4

e)

	4	9
×		5

f)

	8	6
×		4

g)

	4	7
×		7

h)

	5	7
×		3

i)

	4	6
×		5

j)

	3	8
×		2
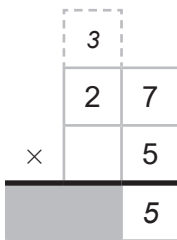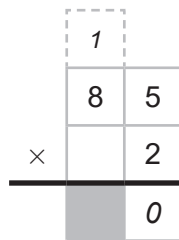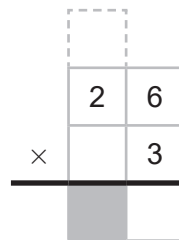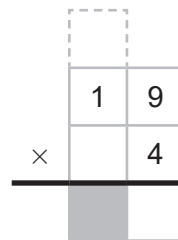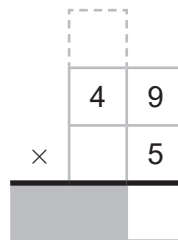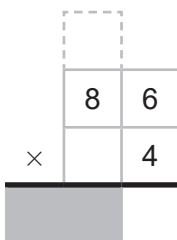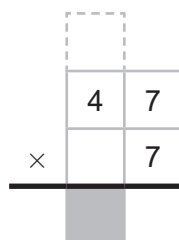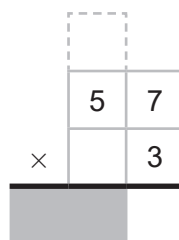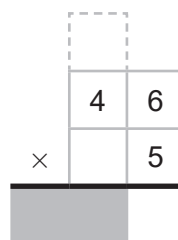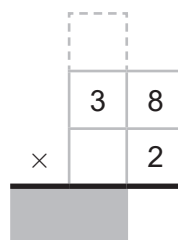
Step 3:		**Step 4:**	
Multiply 5 tens by 7 (7 × 5 tens = 35 tens).		Add 2 tens to the result (35 + 2 = 37 tens).	
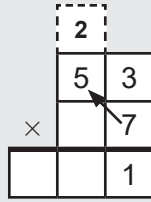
Step 3 grid:
```
        2
      5 3
×       7
      ___
        1
```

Step 4 grid:
```
        2
      5 3
×       7
      ___
    3 7 1
```
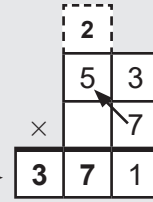
3. Complete the multiplication using **Steps 3** and **4**.

a)
```
   1
  2 4
×   3
 ___
  7 2
```

b)
```
   4
  3 5
×   9
 ___
    5
```

c)
```
   2
  1 5
×   5
 ___
    5
```

d)
```
   2
  7 3
×   7
 ___
    1
```

e)
```
   3
  8 9
×   4
 ___
    6
```
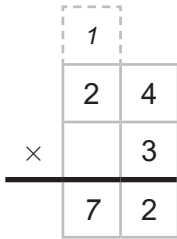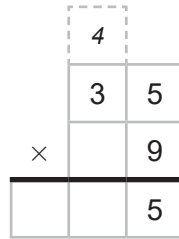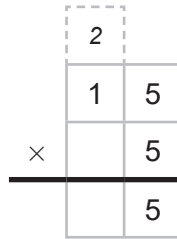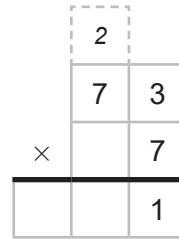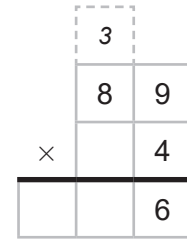
4. Complete **all steps** of the multiplication.

a)
```
  3 5
×   9
 ___
```

b)
```
  4 5
×   4
 ___
```

c)
```
  2 3
×   7
 ___
```

d)
```
  2 6
×   6
 ___
```

e)
```
  5 7
×   2
 ___
```

5. Multiply.

a)
```
  2 7
×   4
 ___
```

b)
```
  3 6
×   5
 ___
```

c)
```
  2 4
×   8
 ___
```

d)
```
  4 5
×   6
 ___
```

e)
```
  5 6
×   3
 ___
```
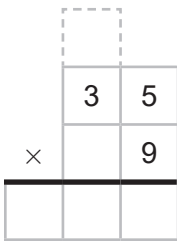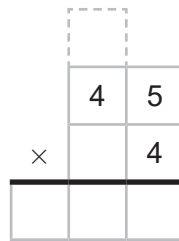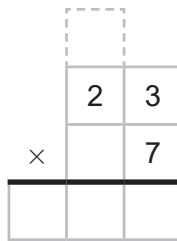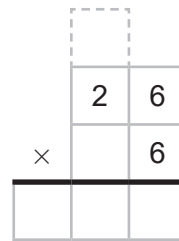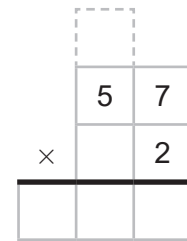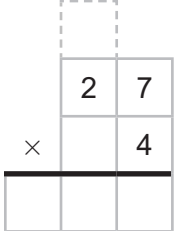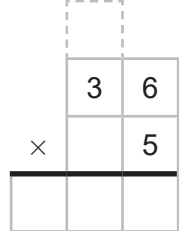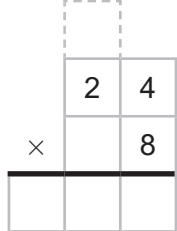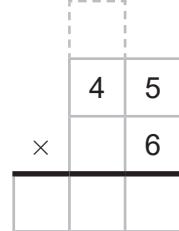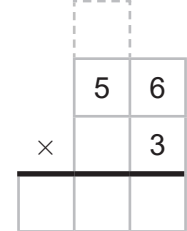
6. Multiply. Regroup when you need to.

a)
```
  3 7
×   5
 ___
```

b)
```
  2 5
×   3
 ___
```

c)
```
  5 4
×   2
 ___
```

d)
```
  3 5
×   7
 ___
```

e)
```
  8 6
×   2
 ___
```
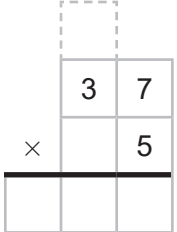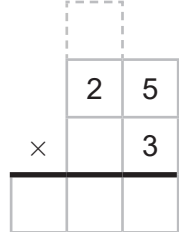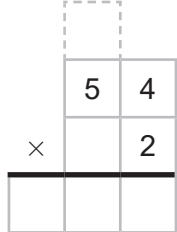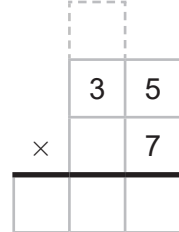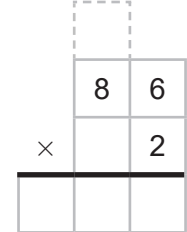
7. Mary wants to give 5 flowers to each of her 12 friends. Multiply using a grid to determine how many flowers she needs.

8. A square is painted on the ground in the schoolyard. All four sides are 15 m long. Multiply using a grid to determine the total length of the sides.

Kelly multiplies 2×213 in three ways.

With a chart:

hundreds	tens	ones
2	1	3
$\times$		2
4	2	6

In expanded form:

$$200 + 10 + 3$$
$$\underline{\qquad\quad \times\, 2}$$
$$= 400 + 20 + 6$$
$$= 426$$

With base ten materials:
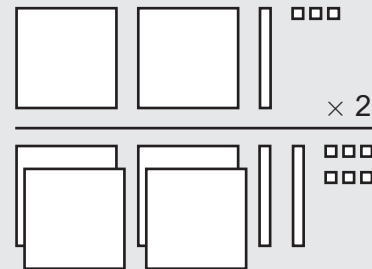
1. Rewrite the multiplication in expanded form. Then multiply.

a) 213   _____ + _____ + _____
   $\times$ 3   _____ $\times$ 3

          = _____ + _____ + _____

          = _____

b) 342   _____ + _____ + _____
   $\times$ 2   _____ $\times$ 2

          = _____ + _____ + _____

          = _____

2. Multiply.

a)
1	3	4
$\times$		2

b)
3	1	2
$\times$		3

c)
2	1	2
$\times$		4

d)
2	3	3
$\times$		3

e)
3	1	4
$\times$		2

3. Multiply by regrouping ones as tens.

a)
	1	
1	2	3
$\times$		4
4	9	2

b)
3	2	5
$\times$		3

c)
1	1	4
$\times$		5

d)
1	1	2
$\times$		6

e)
1	1	3
$\times$		7

4. Multiply by regrouping tens as hundreds.

a)
1		
2	4	1
$\times$		4
9	6	4

b)
1	7	1
$\times$		5

c)
1	3	2
$\times$		4

d)
1	2	1
$\times$		8

e)
2	5	3
$\times$		3

5. Use grid paper to multiply. Regroup as necessary.

a) 437×2 b) 156×4 c) 114×6 d) 232×4 e) 187×3

Sometimes, you need to regroup hundreds as thousands. When there are no other thousands, you don't need to show the regrouping on top—you can put the regrouping in the answer right away.

Example:

		5	1	2
×				4
2	0	4	8

6. Multiply by regrouping where necessary.

a)
	8	3	4
×			2

b)
	2	9	1
×			3

c)
	8	3	1
×			5

d)
	9	0	6
×			4

e)
	2	2	7
×			4

7. Multiply. You may need to regroup more than once.

a)
	1	3	
	8	3	6
×			5
4	1	8	0

b)
	6	3	1
×			7

c)
	2	6	4
×			6

d)
	3	7	8
×			3

e)
	1	5	3
×			9

8. Multiply by regrouping where necessary.

a)
	6	8	1
×			3

b)
	2	7	0
×			6

c)
	9	6	5
×			7

d)
	8	0	5
×			8

e)
	9	6	1
×			3

f)
	9	7	2
×			8

BONUS ▶
	5	8	4	3	9	0	2	1	6	8
×										7

BONUS ▶ For some species of salmon, a female lays 1150 eggs in a nest. If a female has 5 nests, how many eggs does she lay?
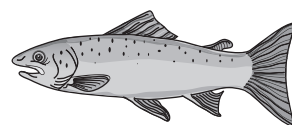
BONUS ▶ Sam types 5700 words in one hour. How many words can he type in 8 hours?

NS5-20 Estimation in Multiplication

1. Round to the nearest ten.

   a) 32 __*30*__   b) 56 _____   c) 93 _____   d) 28 _____

   e) 85 _____   f) 64 _____   g) 20 _____   h) 15 _____

2. Round to the nearest hundred.

   a) 263 __*300*__   b) 349 _____   c) 580 _____   d) 803 _____

   e) 909 _____   f) 650 _____   g) 400 _____   h) 145 _____

≈ ← Mathematicians use this symbol to mean "approximately equal to."

---

3. Estimate the product by rounding to the nearest hundred.

   a) $321 \times 184 \approx$ __*300 × 200 = 60 000*__   b) $542 \times 461 \approx$ _____

   c) $829 \times 196 \approx$ _____   d) $487 \times 760 \approx$ _____

4. Use estimation to decide if the product is reasonable. Explain your thinking.

   a) $51 \times 77 = 4827$ _____

   b) $38 \times 93 = 5108$ _____

   c) $194 \times 286 = 69\,984$ _____

5. Predict the range where the product will be.

   A. 1 to 10   **B.** 11 to 100   **C.** 101 to 500   **D.** 501 to 1000   **E.** above 1000

   a) 3×23 __*B*__   b) 31×27 ____   c) 11×42 ____   d) 45×78 ____

For all word problems, estimate then use a calculator to check your prediction.

6. Canadian eggs are sorted by mass. The minimum mass for a Grade A egg to be classified as small is 42 g, medium is 49 g, large is 56 g, extra-large is 63 g, and jumbo is 70 g. Estimate and then calculate the mass of 6 small, 6 medium, 6 large, 6 extra-large, and 6 jumbo eggs. Why can you not use estimation to distinguish between large and extra-large eggs?

7. Ms. K has eight 12-inch rulers and seven 15 cm rulers for students who forgot to bring their own. Estimate and then calculate the total length of the 12-inch rulers and the 15 cm rulers.

BONUS ▶ Hanna donated 78 hardcover books to charity. She estimated that if all the books were sold for $6 each the charity would make about $800. Is Hanna's estimate good? Why?

8. Jayden takes an average of 17 days to read one book. How many days will he take to read four books?

9. A typical computer keyboard has 46 keys for the numbers and letters. How many number and letter keys do 7 keyboards have?

10. A piece of lined notebook paper has 27 lines to write in. How many lines do 5 pieces of lined notebook paper have?
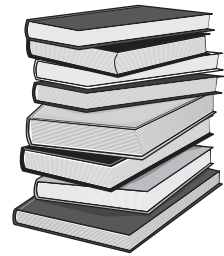
11. Lela and Tasha each spend $6 a day to buy lunch at school.

a) If they both bought lunch on 73 days last year, how much did each girl spend and how much did they spend altogether?

b) If Lela bought lunch on 63 days, and Tasha bought lunch on 57 days, how much did each girl spend and how much did they spend altogether?

BONUS ▶ Sharon spends 185 hours on her computer each month during the school year. She goes to school for nine months every year and estimates that she spends about 1800 hours using her computer each school year. Is her estimate reasonable? Why?

12. A hockey arena charges $379 for one hour of ice time. How much does 5 hours of ice time cost?

13. An unlimited season ski pass at Whistler for a child between the ages of 7 and 12 costs $489. How much would 4 passes cost?

14. The smallest type of armadillo is about 107 mm long. If seven armadillos lined up from head to tail, how long would the line be?

15. In some countries, it costs only $9 to buy lunch for a child for half a year. How much money is needed to pay for lunch for a school of 354 children for half a year?

16. Each Canadian uses an average of 329 litres of water per day. That is equivalent to 168 bottles of water.

a) How many litres of water do five people use in one day?

b) How many bottles of water would five people use in one day?

17. About 2477 mm of precipitation falls in North Vancouver, BC each year. How many millimetres of precipitation fall in 3 years?

18. A mid-sized jet burns about 2153 litres of fuel every hour. How much fuel is burned in 4 hours?

19. Ben walks to school and back every day. In total he takes 3418 steps. How many steps does he take in five days?

20. Five friends walk up the CN Tower to raise money for a charity. There are 1776 steps up to the main deck. How many steps do the five friends take altogether to get to the main deck?

BONUS ▶ A farmer's field is the shape of a square. Each side is 193 metres long. She has 710 metres of wire fence. Use estimation to decide if she has enough wire to go around the entire field. If there is not enough wire, estimate how much more wire fence is needed.

To multiply 37 × 20, first multiply 37 × 2, then multiply by 10.

$$
\begin{array}{|c|c|c|}
\hline
 & \boxed{1} & \\
\hline
 & 3 & 7 \\
\hline
\times & & 2 \\
\hline
 & 7 & 4 \\
\hline
\end{array}
\quad \xrightarrow{\times\,10} \quad = 740
$$

1. Multiply.

a) 43 × 60

$$
\begin{array}{|c|c|c|}
\hline
 & 4 & 3 \\
\hline
\times & & 6 \\
\hline
 & & \\
\hline
\end{array}
\quad \xrightarrow{\times\,10} \quad = \underline{\hspace{1cm}}
$$

b) 29 × 40

$$
\begin{array}{|c|c|c|}
\hline
 & 2 & 9 \\
\hline
\times & & 4 \\
\hline
 & & \\
\hline
\end{array}
\quad \xrightarrow{\times\,10} \quad = \underline{\hspace{1cm}}
$$

c) 32 × 70

$$
\begin{array}{|c|c|c|}
\hline
 & 3 & 2 \\
\hline
\times & & 7 \\
\hline
 & & \\
\hline
\end{array}
\quad \xrightarrow{\times\,10} \quad = \underline{\hspace{1cm}}
$$
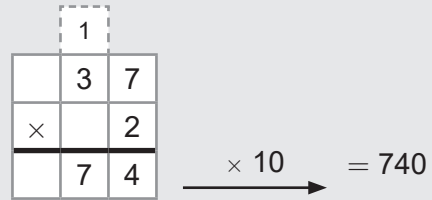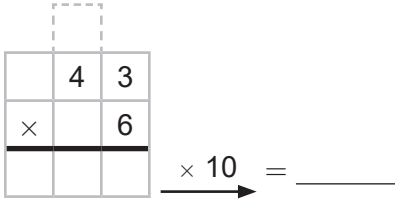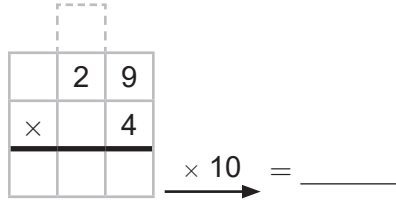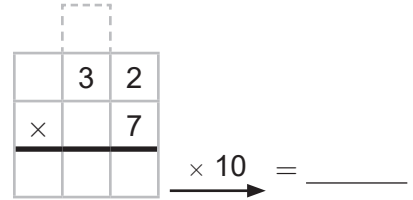
To multiply 37 × 20 without first multiplying 37 × 2:

Step 1: Write 0 to show multiplying by 20, not by 2.

$$
\begin{array}{|c|c|c|}
\hline
 & 3 & 7 \\
\hline
\times & 2 & 0 \\
\hline
 & & 0 \\
\hline
\end{array}
\quad \longleftarrow \text{write 0}
$$
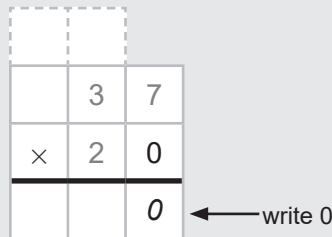
Step 2: Multiply 37 × 2 exactly as before.

$$
\begin{array}{|c|c|c|}
\hline
 & \boxed{1} & \\
\hline
 & 3 & 7 \\
\hline
\times & 2 & 0 \\
\hline
 7 & 4 & 0 \\
\hline
\end{array}
$$

2. Multiply.

a)
$$
\begin{array}{|c|c|c|}
\hline
 & 3 & 4 \\
\hline
\times & 4 & 0 \\
\hline
 & & \\
\hline
\end{array}
$$

b)
$$
\begin{array}{|c|c|c|}
\hline
 & 5 & 5 \\
\hline
\times & 2 & 0 \\
\hline
 & & \\
\hline
\end{array}
$$

c)
$$
\begin{array}{|c|c|c|}
\hline
 & 4 & 3 \\
\hline
\times & 5 & 0 \\
\hline
 & & \\
\hline
\end{array}
$$

d)
$$
\begin{array}{|c|c|c|}
\hline
 & 2 & 5 \\
\hline
\times & 7 & 0 \\
\hline
 & & \\
\hline
\end{array}
$$

e)
$$
\begin{array}{|c|c|c|}
\hline
 & 2 & 6 \\
\hline
\times & 8 & 0 \\
\hline
 & & \\
\hline
\end{array}
$$
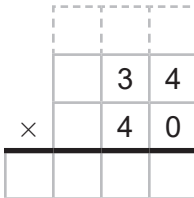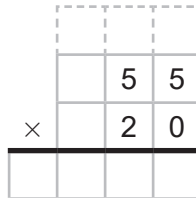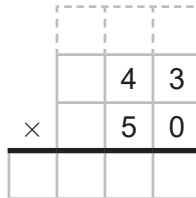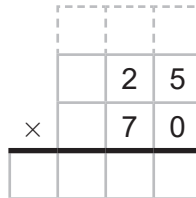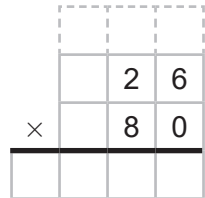
David uses a picture to show the expanded form of 37 × 20. He splits 37 into a multiple of 10 and a one-digit number.

a multiple of 10   a one-digit number

$37 \times 20 = (\mathbf{30} \times 20) + (\mathbf{7} \times 20)$

$ = 600 + 140$

$ = 740$

20

37 { 30 × 20 } 30 ← a multiple of 10

7 × 20 } 7 ← a one-digit number
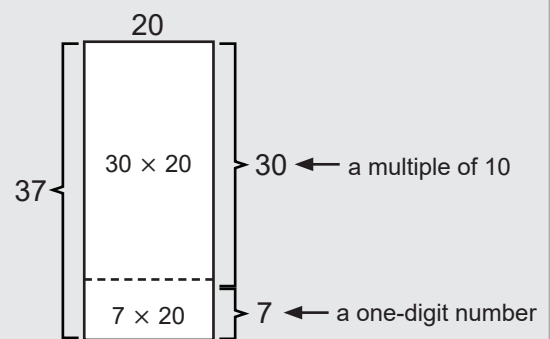
3. Multiply.

a) 58 × 30

b) 63 × 50

c) 76 × 40

d) 89 × 20

To multiply 37 × 25, split 25 into a multiple of 10 and a one-digit number.
The picture shows why this works.

a multiple of 10   a one-digit number

$37 \times 25 = (37 \times \mathbf{20}) + (37 \times \mathbf{5})$

$= 740 + 185$

$= 925$

37×25
| 37 × 20 |
| 37 × 5 |
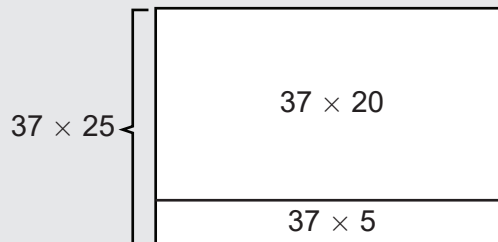
4. Multiply. Do the rough work in your notebook.

a) 34 × 27

34 × 7 = _____

34 × 20 = _____

so 34 × 27 = _____

b) 46 × 32

46 × 2 = _____

46 × 30 = _____

so 46 × 32 = _____

c) 53 × 26

53 × 6 = _____

53 × 20 = _____

so 53 × 26 = _____

d) 68 × 45

68 × 5 = _____

68 × 40 = _____

so 68 × 45 = _____

You can record the steps in multiplying two-digit numbers on a grid. Example: Find 37 × 25.

Step 1: 37 × 5 →

	3	
	3	7
×	2	5
1	**8**	**5**

Step 2: 37 × 20 →

1	3	
	3	7
×	2	5
1	8	5
7	**4**	**0**

Step 3: Add results →

1	3	
	3	7
×	2	5
1	8	5
7	4	0
9	**2**	**5**

5. Practise Step 1.

a)

		1
	2	4
×	1	3
	7	2

= 24 × 3

b)

	3	5
×	3	4

c)

	5	2
×	4	4

d)

	1	6
×	2	5

6. Practise Step 2.

a)

2	3	
	3	4
×	6	8
2	7	2
2	0	4	0

= 34 × 60

b)

	1	
	6	9
×	5	2
1	3	8

c)

	3	
	5	5
×	3	6
3	3	0

d)

	3	
	6	7
×	2	5
3	3	5

7. Practise Steps 1 and 2.

a) Regrouping for 35×30

		1	3	← Regrouping for 35×7
		3	5	
	×	3	7	
	2	4	5	$= 35 \times 7$
1	0	5	0	$= 35 \times 30$

b)
		4	2
	×	3	4

c)
		4	5
	×	3	5

d)
		1	6
	×	4	2

8. Multiply.

a)
		3	7
	×	2	5
+			0

b)
		6	9
	×	5	3
+			0

c)
		7	4
	×	5	2

d)
		5	9
	×	3	2

9. Multiply.

a)
		3	8
	×	2	5

b)
		4	6
	×	1	9

c)
		2	7
	×	5	2

d)
		5	6
	×	3	4

e)
		6	7
	×	1	9

f)
		7	3
	×	4	7

g)
		8	5
	×	5	6

h)
		9	4
	×	6	4

10. One section of seats in a concert hall has 14 rows with 58 seats in each row. How many seats are there in the section?

11. A national park has 57 camping areas. Each area has space for 24 people. How many people can camp in the park at the same time?

Number Sense 5-21 69

Multiplying 126 × 37 can be broken up into steps:

Step 1: Multiply 126 × 7.

Step 2: Multiply 126 × 30.
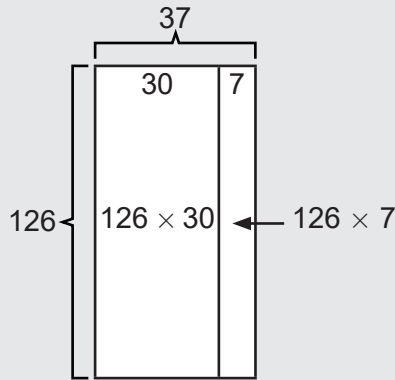
Step 3: Add the results.

$126 \times 37 = 126 \times (30 + 7)$
$= (126 \times 30) + (126 \times 7)$
$= 3780 + 882$
$= 4662$

1. Multiply, showing the three steps.

a) 415 × 53

b) 293 × 57

c) 638 × 29

Matt multiplies 256 × 63. He uses a grid to keep track of the steps of multiplication:

Step 1: He multiplies 256 × 3.

	1	1	
	2	5	6
×		6	3
	7	6	8

$3 \times 6 = 18$

$(3 \times 5) + 1 = 16$

$(3 \times 2) + 1 = 7$

2. Practise the first step of multiplication.

a)

		1	
	1	4	9
×		3	2
	2	9	8

b)

	7	3	3
×		5	4

c)

	5	6	7
×		3	5

d)

	8	4	5
×		4	7

Step 2: Matt continues multiplying 256 × 63 by multiplying 256 × 60. To avoid confusion with the regrouping, he crosses out the regrouping done in the first step.

$6 \times 6 = 36$

$(6 \times 5) + 3 = 33$

$(6 \times 2) + 3 = 15$

	3	3		
		1	1	
		2	5	6
×			6	3
		7	6	8
1	5	3	6	0

— Cross out the regrouping done in Step 1.

— Don't forget the zero!

3. Practise the second step of multiplication.

a)

	1	2		
		1	1	
		1	4	9
×			3	2
		2	9	8
	4	4	7	0

b)

		1	1	
		7	3	3
×			5	4
		2	9	3	2
				0

c)

		3	3	
		5	6	7
×			3	5
		2	8	3	5

d)

		3	3	
		8	4	5
×			4	7
		5	9	1	5

e)

		5	2	
		3	8	4
×			4	6
		2	3	0	4

f)

			2	
		5	2	7
×			6	3
		1	5	8	1

g)

		1	1	
		8	3	4
×			5	4
		3	3	3	6

h)

		1	3	
		9	2	5
×			3	7
		6	4	7	5

4. Practise Steps 1 and 2 of multiplication.

a)
```
  1  1
     ʒ  ʑ
     2  8  6
×       2  4
  1  1  4  4
  5  7  2  0
```

b)
```
     5  3  6
×       3  5
              0
```

c)
```
     8  2  5
×       4  3
```

d)
```
     6  7  4
×       5  6
```

e)
```
     7  1  3
×       3  8
```

f)
```
     4  9  2
×       6  5
```

g)
```
     4  0  8
×       7  4
```

h)
```
     9  3  6
×       2  7
```

Step 3: Matt completes the multiplication by adding the products of 256 × 60 and 256 × 3.

5. Multiply.

a)
```
  4  5
     ı  ʑ
     4  5  7
×       8  3
  1  3  7  1
3  6  5  6  0
3  7  9  3  1
```

b)
```
     2  3  8
×       4  6
```

c)
```
     7  1  4
×       8  3
```

d)
```
     5  2  3
×       7  4
```

BONUS ▶

e)
```
  2  5  3  4
×        3  7
```

f)
```
  2  9  3  6
×        6  4
```

g)
```
  5  3  6  5
×        6  8
```

6. Bicycle wheels commonly have 28, 32, or 36 spokes. How many spokes do 175 of each kind of wheel have?