Activity

1 Work out each of these using a vertical method.

a	34	**b**	29	**c**	56	**d**	67
	×6		×8		×7		×9

e 43 m × 4   **f** 75 g × 7   **g** 84 min × 6   **h** 67 cm × 8

> Decide if the area method would have been more efficient. You could race a partner to see which is faster.

2 Luca and Molly worked out 856 × 7 in different ways.

856 × 7	**800**	**50**	**6**
7	5600	350	42

5600 + 350 + 42 = 5950 + 42
= **5992**

Luca

$\overset{4}{8}56$
$\times 7$
___
2
7 × 6 = 42

$\overset{3\ 4}{8}56$
$\times 7$
___
92
7 × 50 = 350
350 + 40 = 390

$\overset{3\ 4}{8}56$
$\times 7$
___
5992
7 × 800 = 5600
5600 + 300 = 5900

Molly

Which way do you like better? Why?

3 Find the answers to these using a written strategy.

a Scarlett invited 26 people to her birthday party. She ordered six pieces of pizza for each of them. How many pieces did she order?

b The average amount of waste each person produces in a year is 78 kg. How much waste is this for a family of five?

4 Work out the answers to these using a written method.

a 136 × 7	**b** 342 × 8	**c** 269 × 5	**d** 248 × 6
e 58 × 79	**f** 678 × 6	**g** 48 × 73	**h** 64 × 83
i 2387 × 4	**j** 3987× 6	**k** 6407 × 8	**l** 4873 × 3
m 58 × 62	**n** 176 × 12	**o** 384 × 12	**p** 564 × 32

> Try some of these to see if it is more efficient to use a horizontal or area method.

5 A classroom at Jake's school needs some new furniture.

a Work out the cost to buy 8 chairs and 4 desks delivered from each of these places.

The School Room — annual sale
Chairs $38
Desks $174
Delivery $26

All Class
Chairs $46
Desks $168
Delivery $35

b Which is cheaper and by how much?

Brackets in algebra

Sometimes **brackets** are needed when writing an expression.

Examples

Add 4 to a number then multiply by 3

Step 1   add 4 to a number is written as $n + 4$

Step 2   then multiply by 3 is written as $3 \times (n + 4)$ or $3(n + 4)$

> The 3 is put next to the brackets with no $\times$ sign

Activity

> **Discussion**
>
> Why do you think $n + 4$ is put in brackets in the example above?
> Could it be written as $3 \times n + 4$? Explain.

1   Choose the correct answer if n is the number.

a   add 4 to a number then multiply by 6 is written as
   A $6(n + 4)$ **B** $6 \times n + 4$ **C** $n + 4 \times 6$

b   Add 3 to a number then multiply by 4 is written as
   A $4 \times n + 3$ **B** $4n + 3$ **C** $4(n + 3)$

c   Subtract 5 from a number then multiply by 3 is written as
   A $n - 5 \times 3$ **B** $3(n - 5)$ **C** $3 \times n - 5$

d   Subtract 6 from a number then multiply by 2 is written as
   A $n - 6 \times 2$ **B** $2 \times n - 6$ **C** $2(n - 6)$

e   Add 5 to a number then divide by 2 is written as
   A $n + 5 \div 2$ **B** $\dfrac{n + 5}{2}$ **C** $n + \dfrac{5}{2}$

2   Write an expression for these. Let p be the unknown.

a   add 4 to a number then multiply by 3

b   subtract 3 from a number then multiply by 4

c   add 3 to a number then multiply by 6

d   subtract 2 from a number then multiply by 4

e   add 3 to a number then divide by 2

f   subtract 5 from a number then divide by 3

g   add 7 to a number then divide by 4

h   subtract 3 from a number then divide by 8

i   add 5 to a number then multiply by 4 and then divide by 3

j   subtract 4 from a number then multiply by 2 then divide by 3

> Write your expressions without a multiplication sign.
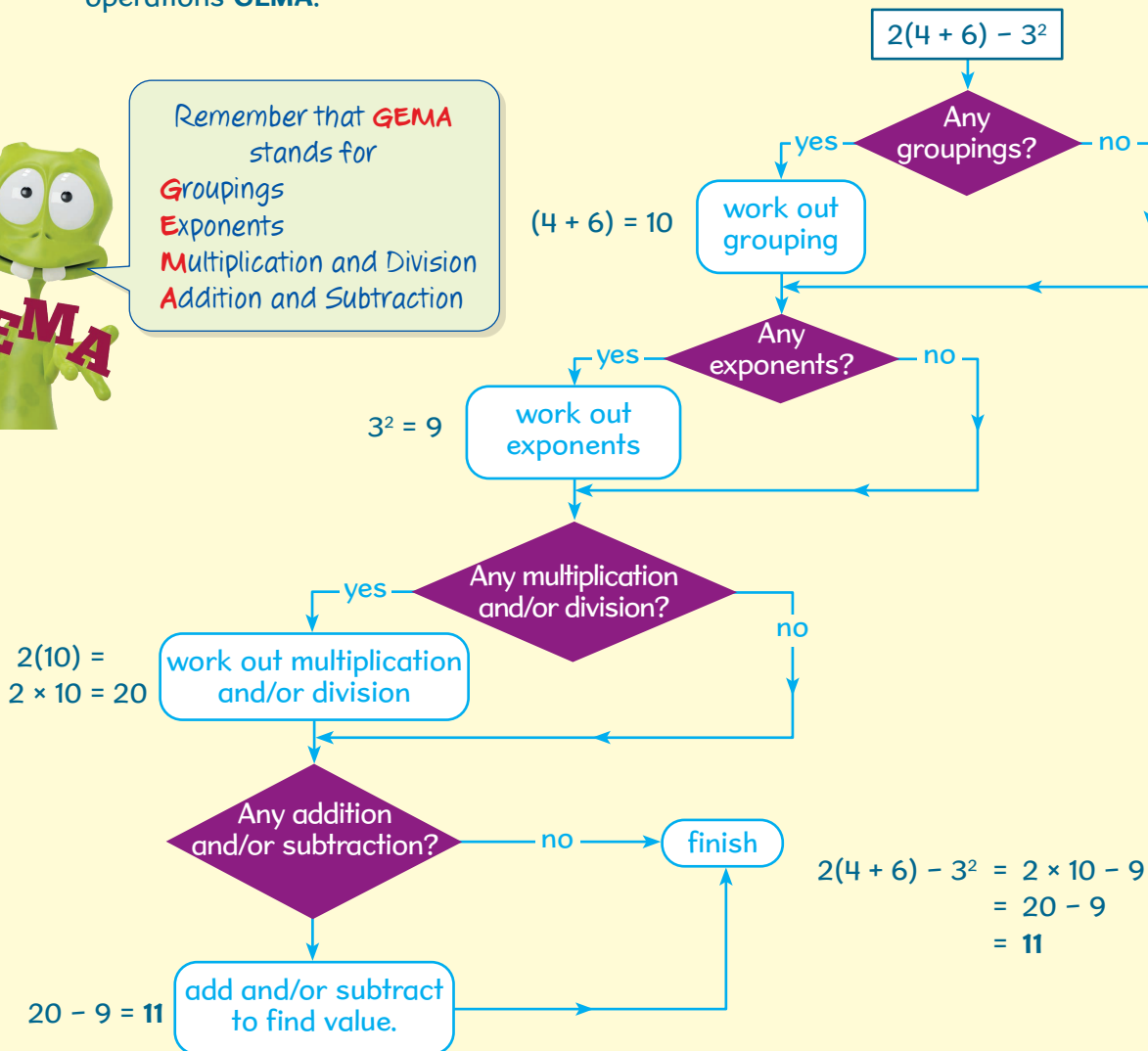
Algorithms and flow charts

A **flow chart** is a type of **algorithm** that shows a sequence of steps and decisions.

Example

This flowchart can be used to find the value of $2(4 + 6) - 3^2$ using the order of operations **GEMA**.

Remember that **GEMA** stands for
Groupings
Exponents
Multiplication and Division
Addition and Subtraction

$2(4 + 6) - 3^2$

Any groupings? — yes → work out grouping

$(4 + 6) = 10$

no →

Any exponents? — yes → work out exponents

$3^2 = 9$

no →

Any multiplication and/or division? — yes → work out multiplication and/or division

$2(10) =$
$2 \times 10 = 20$

no →

Any addition and/or subtraction? — no → finish

$20 - 9 = 11$ — add and/or subtract to find value.

$$2(4 + 6) - 3^2 = 2 \times 10 - 9$$
$$= 20 - 9$$
$$= \mathbf{11}$$

Activity

1 Show, using the flow chart above, the value of these.

a $4^2 + (5 \times 7)$

b $5(12 - 6) + 16$

c $(9 - 5)^2 - (9 \div 3)$

d $4(32 - 12 \times 2)$

e $9^2 - 5^2 \times 2$
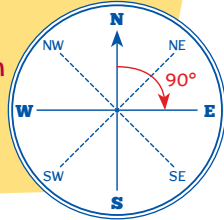
f $38 - 4^2 + (12 - 5)$

Compass directions and angles
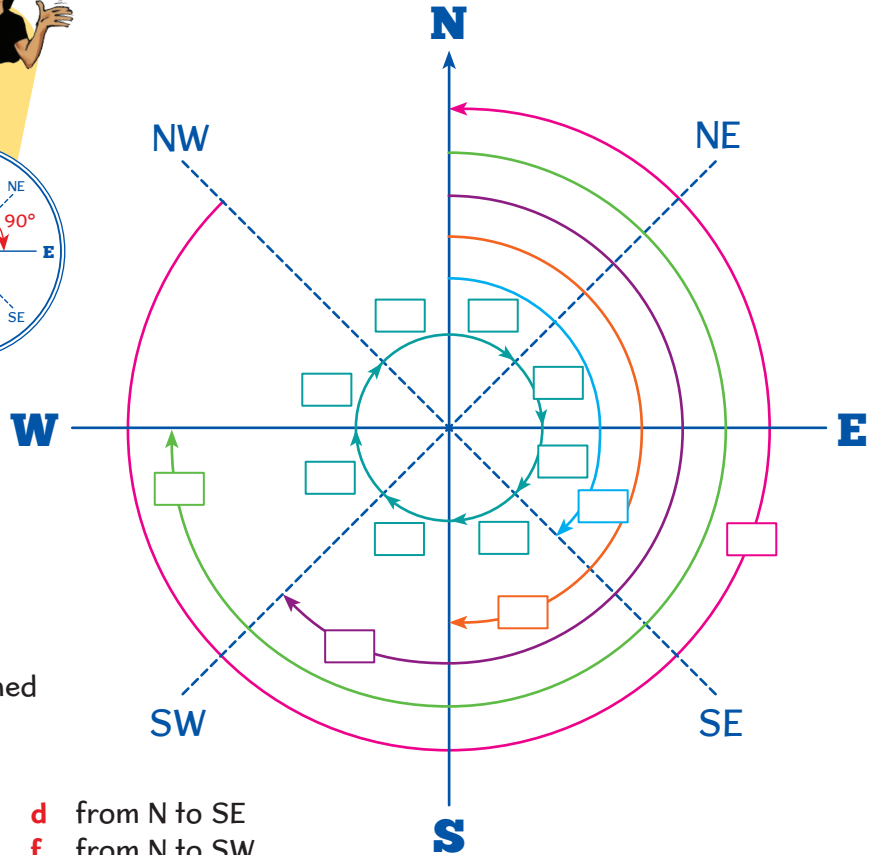
Activity

1   On your copy, fill in the angles in the boxes.

2   What angle did Anaru turn through if he turned

   a   from N to E
   b   from N to NE
   c   from N to S
   d   from N to SE
   e   from N to W
   f   from N to SW
   g   from N to NW
   h   from E to S
   i   from E to SW
   j   from S to NW
   k   from SW to N
   l   from S to NW
   m   from SE to SW
   n   from SE to NW
   o   from SE to N
   p   from SW to NE?

3   A boat was heading SE. It turned clockwise and headed south. Through what angle did it turn?

4   This table shows the take off direction and final heading of some planes. Through what clockwise angle did each turn?

		Take off direction	Final heading
a	NZ 537	SE	W
b	NZ 042	NE	NW
c	NZ 864	SW	N
d	NZ 324	W	SW

Investigation

Investigate the navigation techniques of Māori and Pasifika voyages for locating position and finding the direction of travel.

ANSWERS

NC7–1 *Powers of ten* ....
Activity
1 a 100 **b** 10 000 **c** 10 **d** 1000
  e 100 000 000 **f** 1 000 000 000
  g 100 000 000 000
2 a 10^3 **b** 10^6 **c** 10^2 **d** 10^5
  e 10^7 **f** 10^9 **g** 10^1 **h** 10^{10}

NC7–2 *Powers of ten. Ordering whole numbers using powers of ten cont.* ....
3 a thirty-seven million.
  b five million six hundred and twenty five thousand.
  c one million forty-eight thousand five hundred and seventy-six.
  d thirty million two hundred and seventy-one thousand.
  e one hundred and fourteen million one hundred thousand.
4 a four thousand three hundred.
  b two thousand seven hundred.
  c five thousand two hundred and sixty-two.
  d one hundred and seven thousand.
  e one thousand four hundred and twenty-seven million.
  f one hundred and sixty.
  g two thousand seven hundred and ten.
  h four thousand four hundred and ninety-seven million
Puzzle
426·315

NC7–3 *Ordering whole numbers using powers of ten cont.* ..
Activity
1 a 160 L **b** $6·5 \times 10^2$ MB **c** $8·2 \times 10^2$ m
  d 50 kg **e** 53 000 g **f** $8·9 \times 10^6$ mℓ
  g $4·2 \times 10^7$ km **h** 8 600 000 cm **i** $0·063 \times 10^4$ L
  j 0.0047×10^6 cm
2 a $0·08 \times 10^3$, $8·4 \times 10^1$, $8·6 \times 10^2$
  b $0·54 \times 10^3$, 560×10^1, 52×10^2
  c $1·8 \times 10^3$, $0·17 \times 10^5$, 190 000
  d $0·43 \times 10^2$, 4.2×10^2, 4400
  e 42×10^3, 45 000, 4.6×10^4, 0.43×10^7
  f $0·27 \times 10^6$, 28×10^4, 2 700 000, 2.8×10^6
  g 8.0×10^5, $0·81 \times 10^6$, 7 900 000, 0.08×10^8
3 a 5200 L, $5·3 \times 10^2$ L, $0·54 \times 10^2$ L
  b 8300 m, $0·8 \times 10^4$ m, $8·2 \times 10^2$ m
  c 104 000 m, $0·4 \times 10^5$ m, $1·4 \times 10^2$ m
  d 31 000 cm, $0·3 \times 10^5$ cm, 31×10^3 cm
  e 7 600 000 mℓ, $7·9 \times 10^5$ mℓ, $7·8 \times 10^5$ mℓ, 0.7×10^6 mℓ
  f $9·9 \times 10^6$ g, 99×10^4 g, 980 000 g, $0·9 \times 10^5$ g
  g 56 000 km², 58×10^2 km², 5.4×10^3 km², 05×10^4 km²
4 a Mercury **b** Mount Manaslu **c** Kariba Dam

NC7–4 *Highest common factor (HCF)* ....
Activity
1 a 4 **b** 8 **c** 5 **d** 3 **e** 4 **f** 4
  g 5 **h** 3 **i** 4 **j** 16 **k** 11 **l** 5
  m 25 **n** 6 **o** 20 **p** 25
2 a 8 **b** $6 \div 8, \div 8, \frac{2}{7}$ **c** $\frac{2}{7}$
3 a $\frac{2}{3}$ **b** $\frac{3}{4}$ **c** $\frac{2}{5}$ **d** $\frac{3}{4}$ **e** $\frac{2}{3}$ **f** $\frac{4}{9}$
  g $\frac{5}{8}$ **h** $\frac{1}{3}$ **i** $\frac{5}{9}$ **j** $\frac{2}{5}$ **k** $\frac{1}{4}$ **l** $\frac{4}{9}$
  m $\frac{1}{4}$ **n** $\frac{2}{5}$ **o** $\frac{1}{5}$ **p** $\frac{3}{4}$
4 a 1 **b** No, because the HCF of both numbers is 1.

NC7–5 *Lowest common multiple (LCM)* ....
Activity
1 a 6 **b** 20 **c** 15 **d** 24 **e** 35 **f** 36
  g 12 **h** 60 **i** 70 **j** 54 **k** 21 **l** 40
  m 24 **n** 45 **o** 30 **p** 72
2 a 15 **b** $\frac{6}{15} + \frac{10}{15} = \frac{16}{15}$
3 a $1\frac{1}{6}$ **b** $\frac{11}{20}$ **c** $1\frac{4}{15}$ **d** $1\frac{7}{12}$ **e** $\frac{18}{35}$
  f $\frac{29}{36}$ **g** $\frac{1}{4}$ **h** $\frac{23}{60}$ **i** $\frac{1}{70}$ **j** $\frac{21}{54}$
  k $1\frac{2}{21}$ **l** $\frac{37}{40}$ **m** $\frac{11}{24}$ **n** $1\frac{16}{45}$ **o** $\frac{33}{54}$

NC7–6 *Squares and square roots* ....
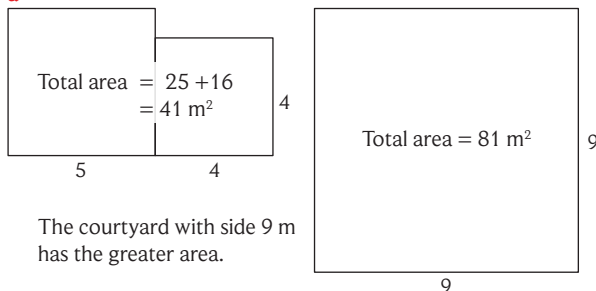*Discussion*
• The numbers 1, 4, 9 and 16 can all be represented by a square of dots or small squares.
• The sides of a square are all the same length. To find the area of a square you multiply the lengths of two sides together which is the same as squaring a number.
Activity
1 a 16 squares **b** 36 squares **c** 49 squares
  d 64 squares **e** 81 squares **f** 1 square
  g 100 squares **h** 4 squares **i** 9 squares
  j 144 squares **k** 256 squares **l** 400 squares
2 a 30^2 **b** 11^2 **c** x^2

NC7–7 *Squares and square roots cont.* ....
3 a 625 **b** 3969 **c** 5·76
  d 161·29 **e** 0·25 **f** 0·005776
4 Dillon is not correct. Numbers greater than 1 when squared get bigger and numbers less than 1 when squared get smaller.
5 a 17·64 m² **b** 27 889 m²
  c 3433·96 cm² **d** 1·96 km²
6 a

Total area $= 25 + 16$ $= 41$ m²

Total area $= 81$ m²

The courtyard with side 9 m has the greater area.

b The square of the sum of 3 and 5 is bigger.
7 a $1^2 = 1$
  $2^2 = 1 + 3$
  $3^2 = 1 + 3 + 5$
  $4^2 = 1 + 3 + 5 + 7$
  $5^2 = 1 + 3 + 5 + 7 + 9$
  $6^2 = 1 + 3 + 5 + 7 + 9 + 11$
  b 27^2 is the sum of the first 27 odd numbers.
8 a 1 **b** 3 (1, 2, 4)
  c 3 (1, 3, 9) **d** 3 (1, 5, 25)
  e 3 (1, 7, 49) **f** 9 (1, 2, 3, 4, 6, 9, 12, 18, 36)
  g 9 (1, 2, 4, 5, 10, 20, 25, 50, 100)
  h 5 (1, 2, 4, 8, 16) **i** 7 (1, 2, 4, 8, 16, 32, 64)
  j 5 (1, 2, 3, 9, 81)
  k The factors are always 1, the number itself and a prime number. For example 9 has factors of 1, 3 and 9 and 3 is a prime number.