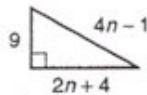
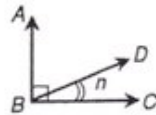
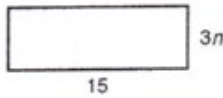


# Generalised arithmetic

Match each description with its correct algebraic expression in the box.  
The capital letters in the box are a code which gives the answer to the riddle below.

- 1 Total cost of  $n$  books at \$12 each
- 2 Andrew's age in 12 years' time if he is  $n$  this year
- 3 The even number just before  $n$  if  $n$  is also even
- 4 Product of  $9n$  and  $5n$
- 5 Change from \$ $n$  after spending \$90
- 6 Subtract  $n$  from 2
- 7 Double  $n$
- 8 Number of hours in  $n$  days
- 9 Number of minutes in  $n$  seconds
- 10 Perimeter of this rectangle
- 11 Area of this rectangle
- 12 Number of cents in  $n$  dollars
- 13 Amount of each share when \$45 $n$  is evenly shared among 5 people
- 14 Half of  $6n + 30$
- 15 Number of km travelled after  $n$  hours at a speed of 18 km/h
- 16 Cost of one pen if five cost  $n$  cents altogether
- 17 Number of minutes in  $n$  hours
- 18 Size of  $\angle ABD$
- 19 Monica's age  $n$  years ago if she is 12 today
- 20 The odd number before  $n$  if  $n$  is even
- 21 Difference between  $2n$  and 7
- 22 Number of times  $n$  goes into 45
- 23 Profit made when an item is bought for \$25, then sold for \$ $n$
- 24 Length of a square with perimeter 20 $n$
- 25 Average of 8 and  $n$
- 26 Perimeter of this triangle
- 27 Area of this triangle
- 28 Number of hours between 10 am and  $n$  pm
- 29 Area of a square with length  $n$
- 30 Sale price of an item with a marked price of \$25 and a discount of \$ $n$
- 31 Change from \$15 after buying three books at \$ $n$  each
- 32 Number of metres in  $n$  centimetres
- 33 Average of  $n$  and  $n + 2$



- |   |                   |
|---|-------------------|
| D | $n - 1$           |
| S | $n - 2$           |
| E | $n + 1$           |
| R | $2 - n$           |
| D | $n + 2$           |
| U | $12 - n$          |
| I | $25 - n$          |
| S | $2n$              |
| Y | $5n$              |
| O | $12n$             |
| E | $n + 12$          |
| H | $9n$              |
| B | $18n$             |
| O | $60n$             |
| S | $\frac{n}{5}$     |
| E | $n - 90$          |
| O | $45n$             |
| W | $\frac{45}{n}$    |
| V | $100n$            |
| O | $n - 25$          |
| R | $90 - n$          |
| S | $24n$             |
| A | $\frac{n}{60}$    |
| M | $n^2$             |
| L | $45n^2$           |
| U | $3n + 15$         |
| O | $6n + 12$         |
| E | $6n + 30$         |
| S | $9n + 18$         |
| E | $\frac{n + 8}{2}$ |
| B | $7 - 2n$          |
| T | $2n - 7$          |
| N | $15 - 3n$         |
| L | $\frac{n}{100}$   |

Miss Calculate asked Robert 'What would you have if you had \$24 in one pocket and \$47 in another?' What was Robert's answer?

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

# Algebra review

1 Simplify the following.

a  $6u + 10 - u - 3$  \_\_\_\_\_  
 b  $4xy + 3b - 2xy + b$  \_\_\_\_\_  
 c  $n^2 + n^2$  \_\_\_\_\_  
 d  $5t - 7t^2 + 4t + 2t^2$  \_\_\_\_\_

e  $9m - m - 9 + 4$  \_\_\_\_\_  
 f  $-4de + 7de + e$  \_\_\_\_\_  
 g  $2x - y + 3y - x$  \_\_\_\_\_  
 h  $2ab + 5b + 2ab - 5b$  \_\_\_\_\_

2 Write an algebraic expression for each statement.

- a The cost in dollars of four tennis balls which cost \$ $d$  each. \_\_\_\_\_  
 b The difference between 10 and  $k$ . \_\_\_\_\_  
 c The number of days in  $y$  weeks. \_\_\_\_\_  
 d Simone's age in  $t$  years if she is 14 this year. \_\_\_\_\_  
 e The change in dollars from \$100 after buying  $m$  tickets at \$6 each. \_\_\_\_\_  
 f The average of three consecutive numbers beginning with  $n$ . \_\_\_\_\_

3 Simplify the following.

a  $7d \times 3e$  \_\_\_\_\_  
 b  $2 \times p \times q \times p \times q$  \_\_\_\_\_  
 c  $a^2 \times a$  \_\_\_\_\_  
 d  $4r \times 4r$  \_\_\_\_\_  
 e  $kp \times pr$  \_\_\_\_\_  
 f  $3b^2 \times 3b^2$  \_\_\_\_\_

g  $6m^4 \times 2m^2$  \_\_\_\_\_  
 h  $18bc^2 + 3bc$  \_\_\_\_\_  
 i  $6x + 3xy$  \_\_\_\_\_  
 j  $15m + 10n$  \_\_\_\_\_  
 k  $20u + 2u$  \_\_\_\_\_  
 l  $\frac{4a^2}{8}$  \_\_\_\_\_

4 If  $x = 4$  and  $w = -2$ , then evaluate the following.

a  $x - w$  \_\_\_\_\_ c  $5w^2$  \_\_\_\_\_ e  $4w - 2x + 5$  \_\_\_\_\_  
 b  $3x + w$  \_\_\_\_\_ d  $\frac{w}{x}$  \_\_\_\_\_ f  $x^2 + w$  \_\_\_\_\_

5 The area of a trapezium is given by the formula  $A = \frac{1}{2}(a + b)h$ .

Find the area of a trapezium which has parallel sides of length 3 cm and 7 cm and a perpendicular height of 5 cm. \_\_\_\_\_

6 Expand and simplify.

a  $x(x - 3)$  \_\_\_\_\_ e  $2(y - 5) + 4(y + 7)$  \_\_\_\_\_  
 b  $-4(2x + 6)$  \_\_\_\_\_ f  $7 - 2(r + 1)$  \_\_\_\_\_  
 c  $u(w - 4)$  \_\_\_\_\_ g  $a(a + 5) + 3(a - 2)$  \_\_\_\_\_  
 d  $-2(6 - 5b)$  \_\_\_\_\_ h  $2(p + q) - (2p + q)$  \_\_\_\_\_

7 For this rectangle, write an algebraic expression for:

a its perimeter \_\_\_\_\_  
 b its area \_\_\_\_\_

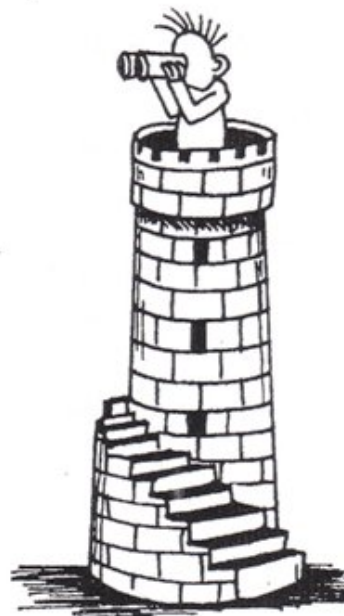


8 From a tower of height  $h$  metres, you can see for a distance of  $d$  km, where  $d$  is given by the formula  $d = 8\sqrt{\frac{h}{5}}$ .

How far could you see from the top of Sydney Tower, which has a height of 320 metres? \_\_\_\_\_

9 Simplify these algebraic fractions.

a  $\frac{5x}{10} - \frac{3x}{10}$  \_\_\_\_\_ d  $\frac{a}{2} - \frac{a}{3}$  \_\_\_\_\_ g  $\frac{24p}{5q} \times \frac{15q}{3}$  \_\_\_\_\_  
 b  $\frac{2u}{5} + \frac{u}{3}$  \_\_\_\_\_ e  $\frac{17}{4d} - \frac{3}{d}$  \_\_\_\_\_ h  $\frac{3r}{2x} + \frac{10}{6x}$  \_\_\_\_\_  
 c  $\frac{3m}{8} + \frac{m}{2}$  \_\_\_\_\_ f  $\frac{2w}{3} \times \frac{3y}{10}$  \_\_\_\_\_ i  $\frac{16ab}{15c} + \frac{2b}{5}$  \_\_\_\_\_





# FIND THE FAMOUS AUSTRALIANS.

22

EXPAND THE BRACKETS IN THE QUESTIONS BELOW AND JOIN THE QUESTION TO THE ANSWER ON THE RIGHT OF THE PAGE TO FIND THE PUZZLE CODE.

## 1980 WORLD RACING CHAMPION...

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

$3(2a + 4b)$	•								• $-9x + 6y$
$8(x - 2y)$	•	(G)					(8)		• $4a - 6b$
$5a(3a - 1)$	•			(E)					• $-32x + 12$
$-3(3x - 2y)$	•		(O)	(15)	(A)		(14)		• $-12a + 6b$
$7(b - 3a)$	•								• $6a^2 - 12a$
$2x(x - y)$	•	(3)		(E)	(10)	(6)		(J)	• $5xy - 20y^2$
$-2(3b - 2a)$	•					(S)			• $9x^2 - 45x$
$-4(8x - 3)$	•		(O)	(18)					• $6a + 12b$
$5x(x + y + 2)$	•	(17)						(U)	• $8x - 16y$
$-(4a - 6b)$	•		(A)						• $5x^2 + 5xy + 10x$
$9x(x - 5)$	•	(1)	(13)			(N)			• $15a^2 - 5a$
$5b(a + 2b)$	•	(N)	(5)	(9)				(L)	• $-4a + 6b$
$5y(x - 4y)$	•				(N)	(4)			• $5x - 2y$
$-(2y - 5x)$	•				(A)			(16)	• $-21a + 7b$
$-12(a - \frac{1}{2}b)$	•	(S)				(12)			• $2x^2y - 8xy$
$15(x + 3y)$	•		(2)		(D)				• $2x^2 - 2xy$
$-2a(6 - 3a)$	•							(L)	• $5ab + 10b^2$
$2xy(x - 4)$	•	(19)							• $15x + 45y$
$-1(12b - 6a)$	•		(11)			(H)			• $6a - 12b$



## 1972 OLYMPIC CHAMPION...

10	11	12	13	14	15	16	17	18	19
----	----	----	----	----	----	----	----	----	----

## FACTORISE .

### 1. Complete

$$a) 4x + 8 = 4(x + 2)$$

$$b) 6a + 18 = 6(a + 3)$$

$$c) 9m - 9 = 9(m - 1)$$

$$d) 8a - 12 = 4(2a - 3)$$

$$e) 5x + 10y = 5(x + 2y)$$

$$f) 12p - 3q = 3(4p - q)$$

$$g) 21x - 14y = 7(3x - 2y)$$

$$h) 12pq - 15x = 3(4q - 5x)$$

$$i) ax + bx = x(a + b)$$

$$j) mn - np = n(m - p)$$

$$k) ab - ac = a(b - c)$$

$$l) xy + x = x(y + 1)$$

$$m) 2ax + 4ay = 2a(x + 2y)$$

$$n) y^2 - 5y = y(y - 5)$$

$$o) 8x^2 - 6x = 2x(4x - 3)$$

$$p) 5at - 3a^2t = at(5 - 3a)$$

### 2. Factorise completely

$$a) 2x + 10 = 2(x + 5)$$

$$b) 6a + 4 = 2(3a + 2)$$

$$c) 7y + 21 = 7(y + 3)$$

$$d) 28 + 4x = 4(7 + x)$$

$$e) 24x + 6 = 6(4x + 1)$$

$$f) 10m^2 - 4mn = 2m(5m - 2n)$$

$$g) 3ab + 6a^2 = 3a(b + 2a)$$

$$h) 5mn - 10mp = 5m(n - 2p)$$

$$i) x^2 + xy = x(x + y)$$

$$j) 12x^2 + 4xy = 4x(3x + y)$$

$$k) a^2p - ap^2 = ap(a - p)$$

$$l) 9pq - 6qr = 3q(3p - 2r)$$

### 3. Factorise each of the following

$$a) ab + ac + ad = a(b + c + d)$$

$$b) 3x + xy + xz = x(3 + y + z)$$

$$c) m^2 - 3m + mn = m(m - 3 + n)$$

$$d) 7a - ab + a^2 = a(7 - b + a)$$

$$e) p^2 + pq - 5p = p(p + q - 5)$$

$$f) 2x + 4y - 6z = 2(x + 2y - 3z)$$

$$g) 10a - 5b + 15c = 5(2a - b + 3c)$$

$$h) 9x^2 + 6x - 12 = 3(3x^2 + 2x - 4)$$

$$i) x^2y + xy + xy^2 = xy(x + 1 + y)$$

$$j) a^2b^2 + 3a^2b + 2ab^2 = ab(ab + 3a + 2b)$$

## PART A:



# SPEED SKILLS 19

When  $x = 5$ , evaluate:

- |             |            |         |          |              |
|-------------|------------|---------|----------|--------------|
| 1. $x + 4$  | 3. $x - 2$ | 5. $2x$ | 7. $8x$  | 9. $12 - x$  |
| 2. $x + 10$ | 4. $x - 5$ | 6. $7x$ | 8. $20x$ | 10. $20 + x$ |

When  $k = 10$ , evaluate:

- |          |             |             |              |
|----------|-------------|-------------|--------------|
| 11. $7k$ | 13. $2k$    | 15. $k + 9$ | 17. $k - 4$  |
| 12. $8k$ | 14. $k + 5$ | 16. $k - 7$ | 18. $12 - k$ |

When  $r = 6$ , evaluate:

- |             |              |          |          |
|-------------|--------------|----------|----------|
| 19. $r + 5$ | 21. $10 - r$ | 23. $3r$ | 25. $6r$ |
| 20. $9 + r$ | 22. $7 - r$  | 24. $5r$ | 26. $8r$ |

If  $a = 5$ ,  $b = 6$ , find the value of:

- |              |             |           |           |
|--------------|-------------|-----------|-----------|
| 27. $a + 8$  | 29. $a + b$ | 31. $ab$  | 33. $4ab$ |
| 28. $b + 10$ | 30. $4b$    | 32. $2ab$ | 34. $5ab$ |

If  $x = 4$ ,  $y = 5$ , find the value of:

- |          |             |           |              |
|----------|-------------|-----------|--------------|
| 35. $7x$ | 37. $x + y$ | 39. $2xy$ | 41. $6x + y$ |
| 36. $5y$ | 38. $xy$    | 40. $3xy$ | 42. $4x - y$ |

If  $m = 8$ ,  $s = 3$ , find the value of:

- |             |          |              |              |
|-------------|----------|--------------|--------------|
| 43. $ms$    | 45. $5m$ | 47. $2m + s$ | 49. $m + 7s$ |
| 44. $m + s$ | 46. $9s$ | 48. $5m - s$ | 50. $m - 2s$ |

## PART B:

Simplify each expression by expanding the grouping symbols and then collecting like terms

1. $3(x+2) + 2(x+1)$ = =	2. $3(x+5) + 7x - 8$ = =	3. $2x+7 + 5(x-1)$ = =
4. $4(3x+2) + 5(x-4)$ = =	5. $2(a+1) + 5(a-1)$ = =	6. $5(y+2) + 3(y+4)$ = =
7. $4(3a+1) - 10a + 2$ = =	8. $5x+7 + 2(2x+7)$ = =	9. $6a - 3(a+5)$ = =
10. $8x - 3(1-2x) + 10$ = =	11. $5(n-5) - 3(n+7)$ = =	12. $x(x+y) + y(x+y)$ = =



# 4.5



# MATHS Quest 9

## Code puzzle

for New South Wales 5.1 Pathway

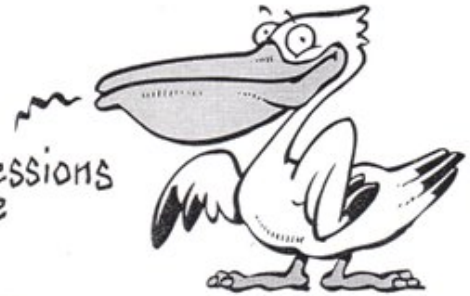
Name: ..... Class: .....



How do you tell if an egg is hard boiled or raw without breaking it?



Simplify the expressions to find the puzzle answer code.



<b>A</b> = $3a \times 5a =$	<b>G</b> = $7b \times 2b \times b =$	<b>O</b> = $5a \times 7e =$
<b>A</b> = $2b \times 3a =$	<b>G</b> = $10ae + 5e =$	<b>O</b> = $21b^2e + 3be =$
<b>B</b> = $2b \times 3b \times 2 =$	<b>G</b> = $30ae + 6a =$	<b>P</b> = $2c \times 3c =$
<b>B</b> = $c \times 3a \times c =$	<b>H</b> = $20a^2e + 4e =$	<b>P</b> = $\frac{10a^2c^2}{2a} =$
<b>B</b> = $2c \times c \times 3c =$	<b>I</b> = $12a^2c + 6a =$	<b>R</b> = $a \times 8a + 2a =$
<b>D</b> = $5e \times 2e =$	<b>I</b> = $\frac{16bc}{8b} =$	<b>R</b> = $2b \times 3e \times 7 =$
<b>D</b> = $7e \times 3a =$	<b>I</b> = $\frac{10abc}{2ac} =$	<b>S</b> = $\frac{18ca^2}{2ca^2} =$
<b>E</b> = $2c \times 2a =$	<b>I</b> = $\frac{15a^2e}{5a} =$	<b>S</b> = $e \times 2e \times 3e =$
<b>E</b> = $3e \times 2c \times e =$	<b>L</b> = $\frac{50a^2b^2}{10ab} =$	<b>S</b> = $32a^2b + 2b =$
<b>E</b> = $6a \times 2b \times a =$	<b>L</b> = $\frac{a^2b}{b} =$	<b>S</b> = $2a \times 4b =$
<b>E</b> = $2e \times 2e \times 2e =$	<b>N</b> = $\frac{24a^2b^2}{8ab^2} =$	<b>T</b> = $\frac{64be^2}{16e} =$
<b>G</b> = $5c \times 5c =$	<b>N</b> = $100c^2e + 20c =$	<b>W</b> = $2 \times 3a \times 4e =$
<b>9</b> <b>6c<sup>2</sup></b> <b>2ac</b> <b>5ce</b> <b>5b</b> <b>4be</b>		<b>W</b> = $\frac{35c^2e}{5c} =$

<b>5a<sup>2</sup></b>	<b>6ab</b>	<b>4a</b>	<b>21ae</b>	<b>3ac<sup>2</sup></b>	<b>35ae</b>	<b>3ae</b>	<b>5ab</b>	<b>6ce<sup>2</sup></b>	<b>10e<sup>2</sup></b>	<b>8e<sup>3</sup></b>	<b>5e</b>	<b>14b<sup>3</sup></b>	<b>6e<sup>3</sup></b>	<b>8ab</b>	<b>5ac<sup>2</sup></b>	<b>2c</b>	<b>3a</b>
<b>42be</b>	<b>15a<sup>2</sup></b>	<b>24ae</b>	<b>4ac</b>	<b>2a</b>	<b>25c<sup>2</sup></b>	<b>16a<sup>2</sup></b>	<b>7ce</b>	<b>7b</b>	<b>12b<sup>2</sup></b>	<b>6c<sup>3</sup></b>	<b>a<sup>2</sup></b>	<b>12a<sup>2</sup>b</b>					