Planner

Formulae

- Using a formula
- Simplifying expressions in algebra
- Building and simplifying a formula

Keywords

You should know

explanation 1a | explanation 1b | online

1 What is the value of each expression?

a $2 + 3 \times 4$ **b** $21 - 2 \times 9$ **c** $5(2 + 6)$

d $5 \times 2 + 6$ **e** $8 \times 6 - 3 \times 4$ **f** $8(6 - 3) \times 4$

g $3 \times 5 + 6 \times 4$ **h** $7 + 6 \div 2$ **i** $(7 + 6) \div 2$

j $10 \div 2 + 12 \div 3$ **k** $15 - 7 + 4$ **l** $15 - (7 + 4)$

2 What is the value of each expression?

a $3 \times 4 \times 5$ **b** $3 \times (4 \times 5)$ **c** $54 \div 6 \div 3$

d $54 \div (6 \div 3)$ **e** $18 - (10 - 6)$ **f** $18 - 10 - 6$

g $4 + 7 + 5$ **h** $4 + (7 + 5)$ **i** $9 + (7 - 3)$

j $9 + 7 - 3$ **k** $30 - 21 + 8$ **l** $30 - (21 + 8)$

3 Find the value of each expression when $x = 5$.

a $x + 3$ **b** $2x$ **c** $3x$

d $4x - 7$ **e** $10 - x$ **f** $27 - 2x$

g $15 - x + 3$ **h** $12 - x - 4$ **i** $4 - x$

j $-2x$ **k** $10 - 2x$ **l** $-2x + 10$

4 Find the value of each expression when $y = 3$.

a $3(y + 6)$ **b** $50 - 4(y + 1)$ **c** $12 + 2(y - 1)$

d $3(y + 2y)$ **e** $10 - 2(6 - y)$ **f** $3y - y$

g $(y - 2) + (7 - 2y)$ **h** $y - (2 - y)$ **i** $(y + 1) \times (y + 2)$

5 Find the value of each expression when $x = 12$.

a $\frac{x}{3}$ **b** $\frac{x+8}{4}$ **c** $\frac{x-3}{3}$

d $\frac{3x}{4}$ **e** $\frac{2x}{3}$ **f** $\frac{5x}{6}$

g $\frac{60}{x}$ **h** $\frac{108}{x}$ ***i** $\frac{18}{x-3}$

6 Find the value of each expression when $x = 7$ and $y = 4$.

a $x + y$ **b** $x - y$ **c** $x + 2y$

d $2x + y$ **e** $x + 3y$ **f** $20 - x - y$

g $3(x + y)$ **h** $2x + 5y$ **i** $5 - (x - y)$

j $\frac{x+1}{y}$ **k** $\frac{15}{x-y}$ **l** $\frac{42}{x} - y$

explanation 2a explanation 2b online

7 Simplify these expressions.

a $x + 2 + 3$ **b** $x + 9 - 2$ **c** $x + 3 \times 4$

d $x + x$ **e** $x + x + x$ **f** $x + x - x$

g $2x + x$ **h** $2x - x$ **i** $2x + 3x$

j $3x - 2x$ **k** $5x + 3x + x$ **l** $9x - 2x - 4x$

8 Copy and complete these expressions.

a $39 + 27 + 1 = 39 + 1 + \square = \square$

b $28 + 75 + 25 + 11 = 28 + \square + 11 = \square$

c $327 - 98 - 2 + 30 = 327 - \square + 30 = \square$

d $579 + 86 - 79 = 579 - \square + \square = \square$

e $49 + 78 + 51 + 65 + 22 = 49 + \square + 78 + \square + 65 = \square$

9 Explain what question **8** shows about addition and subtraction.

10 Work out these expressions by rewriting in the simplest order.

a $75 + 49 + 25 + 51 + 88$ **b** $53 + 94 + 6 + 75 + 47$

c $78 + 67 - 18 + 40$ **d** $139 - 43 - 56 - 1$

e $11 - 18 + 58 - 21$ **f** $32 - 54 - 16 + 68$

11 Simplify these expressions by rewriting to group togther like terms.

a $x + 3 + x$ **b** $x + 4 + x + 6$ **c** $2x + 5 + x - 3$

d $x + x - x + x - x$ **e** $5x - 3 - x + 7$ **f** $4 - 2x - 4 + 7x$

12 Simplify these expressions. Rewrite to group together like terms where necessary.

a $x + y + y$ **b** $2x - y + y$ **c** $3x + y - x + y$

d $x + 3 + y + 5$ **e** $x - y + y + x + 3$ **f** $2x + y - 3 - x + 4y$

g $xy + xy$ **h** $2xy + 3xy$ **i** $xyz + xyz$

j $3xy - 4y - 2yx$ **k** $2zyx - yx + 1 + xyz$ **l** $2 + p + pqr - 2 - 3pqr$

13 Write expressions for the following situations as simply as possible:

a Simon has $x + 3$ sweets.
Jo has 4 more sweets than Simon.
How many sweets does Jo have?

b Helen lives x miles away from school.
Jane lives a further y miles from school.
How many miles from school does Jane live?

c Rob has n marbles but loses 5 of them.
How many does he have left?

d Liz has p marbles but loses q of them.
How many does she have left?

14 Jack has k computer games and Jill has t computer games.
Jack swaps 3 of his games for 1 of Jill's.

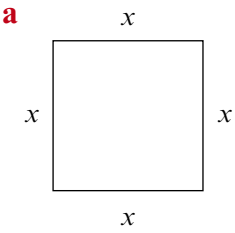
a How many games does Jack then have?

b How many games does Jill have?

explanation 3

15 Find and simplify a formula for the perimeter, P, of each shape.

a



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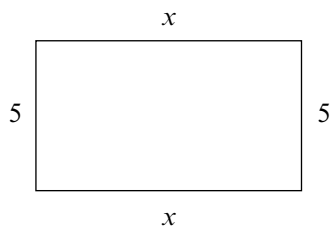

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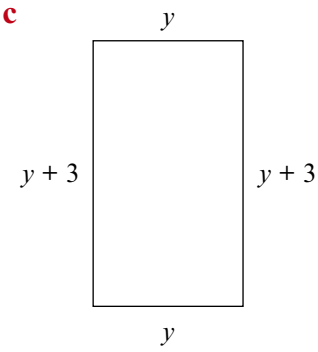
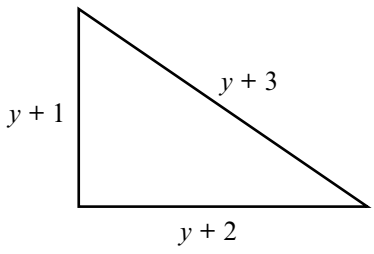


16 Find and simplify a formula for the perimeter, P, of each shape.

a



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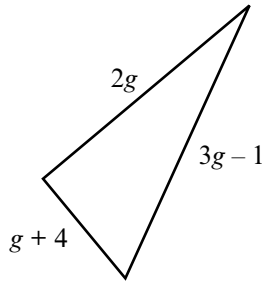

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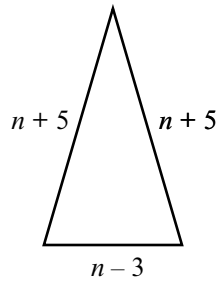

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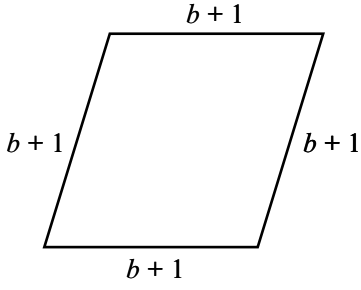

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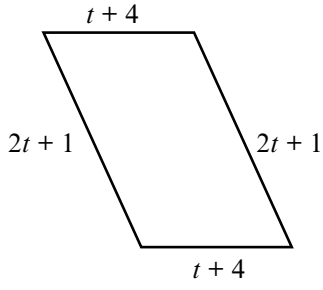

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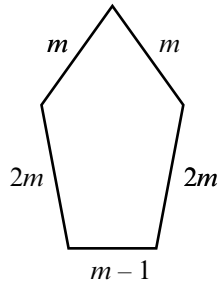

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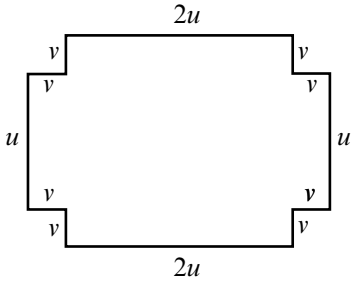

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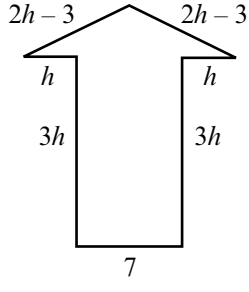

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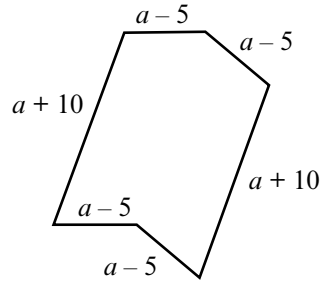


17 A $2x$ B $x + 3$ C $x - 5$

D $7 - x$ E $4 - 2x$ F $3x + 1$

a Which two cards total $4x + 4$?

b Which two cards total $x + 5$?

c Which two cards total 4?

d Which two cards total 10?

e Which three cards total 12?

f Which three cards total $3x + 11$?

g What is the total of all of the expressions on the cards?

explanation 4 online

18 Use the formula $B = H + M$.

a Find B when $H = 5$ and $M = 7$.

b Find B when $H = 5$ and $M = 2$.

c Find B when $H = 3.5$ and $M = 2$.

19 Use the formula $s = \frac{d}{t}$.

a Find s when $d = 12$ and $t = 3$.

b Find s when $d = 56$ and $t = 8$.

c Find s when $d = 150$ and $t = 25$.

d Find d when $s = 20$ and $t = 11$.

20 Use the formula $F = ma$.

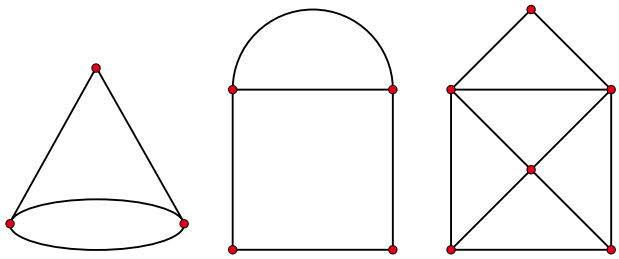
a Find F when $m = 3$ and $a = 10$.

b Find F when $m = 4.8$ and $a = 10$.

c Find F when $m = 5$ and $a = 1.3$.

d Find m when $F = 24$ and $a = 4$.

21 Look at these diagrams.



N	*A*	*R*
3	4	3

N represents the number of red dots.
A represents the number of arcs or lines.
R represents the number of regions or spaces.

The table shows the values of *N*, *A* and *R* for the first diagram. Notice that the outside of the diagram counts as a region, so $R = 3$.

a Copy and complete the table for the other two diagrams.

b Draw some diagrams of your own and fill in the table.

c Work out the value of $N + A - R$ for each row in the table.
What do you notice?
Copy and complete this formula:
$N + A - R =$ □.

22 Copy and complete the table using the formula $v = u + at$.

u	*a*	*t*	*v*
16	2.7	8	
11	5.6	7	
	3.5	12	50
30	6.7		164
45		4.6	79.5

23 Use the formula $d = \frac{m}{v}$ to find *d* to 2 d.p. for these values of *m* and *v*.

a $m = 50$ and $v = 41$

b $m = 220$ and $v = 176$

c $m = 350$ and $v = 423$