Expressions and equations

- Finding the value of an expression
- Simplifying expressions in algebra
- Solving equations using inverse operations

Keywords

You should know

explanation 1

1 Andrew says that $5 + 7 \times 3 = 36$. This is not correct.

How did Andrew get the answer 36?

Explain how you would find the correct answer.

2 Which answer card belongs with which question card?

Which answer card is left over?

Write your own question to go with this answer card.

$10 + 2 \times 3$	$12 - 8 + 3$
$24 \div (3 \times 2)$	$30 - 9 \div 3$
$4 \times (6 + 3)$	$13 - 6 \times 2$
$20 \div 5 \times 2$	$(12 - 8) \div 2$

36   14   8   2   4   1   27   7   16

3 Emily has written this answer as part of her maths homework.

What mistake has Emily made?

Write out the correction for her.

$$15 - 6 \times 2$$
$$= 12 - 15$$
$$= -3$$

4 Work these out.

a	$2 + 3 \times 4$	**b**	$(2 + 3) \times 4$	**c**	$5 \times (2 + 6)$
d	$5 \times 2 + 6$	**e**	$13 - 2 \times 6$	**f**	$(13 - 2) \times 6$
g	$20 \div 5 \times 2$	**h**	$20 \div (5 \times 2)$	**i**	$7 + 6 \div 2$
j	$(7 + 6) \div 2$	**k**	$15 - 7 + 4$	**l**	$15 - (7 + 4)$

5 Work these out.

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**	$30 - (21 + 8)$

explanation 2

6 Copy and complete the table. The first is done for you.

	Start number	Change	Result
	2	5 more than	$2 + 5 = 7$
a	5	11 more than	
b	6		$6 - 4 = 2$
c		double	$2\blacktriangle$
d	♥		$♥ - 1$
e	g	2 more than	
f		6 less than	$\square - 6$
g	t		$t - 9$
h		halve	$\dfrac{b}{2}$
i	h	treble	

7 Put the cards into matching pairs.

5 more than t
t multiplied by 5
5 less than t
t less than 5
t divided by 5

$\dfrac{t}{5}$
$t - 5$
$5t$
$t + 5$
$5 - t$

8 x stands for a number. Write these expressions in words.

a $x - 6$ **b** $4 + x$ **c** $3x$ **d** $x + 4$

e $2x$ **f** $\dfrac{x}{2}$ **g** $x - 4$ **h** $\dfrac{x}{4}$

9 x stands for a number. Write these calculations using symbols.

a 3 more than x **b** 4 times x **c** 4 less than x

d 7 less than x **e** double x **f** 5 more than x

g 3 times x **h** 1 more than x **i** 2 less than x

(explanation 3a)   (explanation 3b)

10 Find the value of each calculation when $x = 10$.

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

d $12 - x$ **e** $2x + 1$ **f** $3x - 5$

g $\dfrac{x}{2}$ **h** $4x - 12$ **i** $5 + 2x$

11 Find the value of each calculation when $x = 5$.

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

e $4 \times (x - 3)$ **f** $18 \div (x - 2)$ **g** $4x - 7$ **h** $12 - x$

i $27 - 2x$ **j** $3(x + 6)$ **k** $\dfrac{x}{2}$ **l** $\dfrac{60}{x + 1}$

12 Find the value of each calculation when $x = 7$ and $y = 4$.

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

e $x + 3y$ **f** $20 - x - y$ ***g** $5 - (x - y)$ ***h** $\dfrac{x - 1}{3}$

13 Simplify these expressions

   a $x + x$

   b $x + x + x + x$

   c $x + x + 2x$

   d $2x + 3x + 5x$

   e $7x + x + 2x$

   f $10x + x + x + x$

14 Simplify these expressions

   a $x + x + x + 1$

   b $x + 1 + 1 + 1 + 1$

   c $x + x + 2$

   d $2x + 3x + 5$

   e $2x + 1 + x$

   f $x + 2 + 3x + 5$

   g $5x + 2 + 3x + 1$

   h $9x + 4 + 2x + 3$

   i $7x + 3 + 2 + 2x$

15 Simplify these expressions

   a $x + y + y$

   b $2x + y + 3x$

   c $3x + y + x + y$

   d $y + x + y + x$

   e $2y + 2x + 7y$

   f $7x + 3x + y$

16 Simplify these expressions

   a $12x + 5y + 6x + 4$

   b $4x + 3y + 2 + x + 3y$

   c $6y + 4 + 5x + 2y + 3$

   d $x + 3 + y + 5$

   e $x + y + 2y + x + 3$

   f $2x + y + 5 + x + 4y$

17 Simplify these expressions.

   a $x + 5 - 2$

   b $x + x - 1$

   c $2x + 1 - x$

   d $2x + 8 - 5$

   e $5x + 13 - 7$

   f $4 + 7x - 4$

   g $6x - 2x + 3$

   h $3x + 5 - 2x$

   i $4x - 3 + 3$

   j $8 + x - 4$

   k $1 + 2x + 4$

   l $3x + 4 - 3$

18 Simplify these expressions.

   a $x + 3 + x$

   b $x + 6 + x - 4$

   c $2x + 5 - x + 3$

   d $2x + 3 - x + 3$

   e $5x + 7 - x - 3$

   f $4 + 7x - 4 - 2x$

   g $9x + 4 - 2x + 3$

   h $6x + 5 + 2x - 3$

   i $4x + 3 - 4x - 3$

   j $3 + 5x + 4 - 2x$

   k $4 + 7x - 1 - 5x$

   l $5x + 4 - 2x - 3$

19 Simplify these expressions.

a $x - y + y$

b $2x + 3y + y$

c $3x + y - x + y$

d $x + 5 + y - 3$

e $5x + 6 - 2y - 3$

f $6 + 4x + y - 3x$

g $5 + 12x - 3 + 4y - 8x$
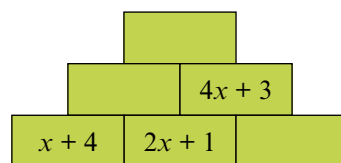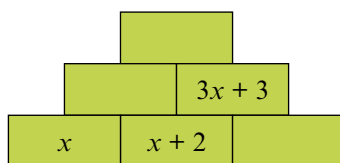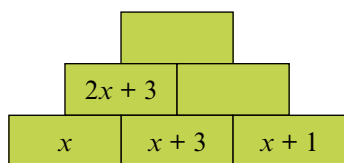
h $x + 4y - y + 5x + 3$

i $2x + 4y - 3 - x + y$

j $4y + 5 - y - 3 - 6x$

k $8 + 5x + 3y - 2y - 6$

l $3x + 7y - 2x - 3y + x + 4y$

20 Copy and complete these algebra addition pyramids.

$2x + 3$				$3x + 3$				$4x + 3$			
x	$x + 3$	$x + 1$	x	$x + 2$		$x + 4$	$2x + 1$				

21 Each of the cards shows an algebraic expression.

A $2x$

B $x + 3$

C $x - 5$

D $7 - x$

E $4 - 2x$

F $3x + 1$

a Which two cards add give a total of $4x + 4$?

b Which two cards add give a total of $x + 5$?

c Which two cards add give a total of 4?

d Which two cards add give a total of 10?

e What is the total of all of the expressions?

explanation 6

22 What is the inverse of each operation?

a $+ 3$

b $\times 5$

c $\div 2$

d $- 6$

e $+ 7$

f $\times 10$

23 Say whether the following statements are true or false.

Give reasons for your answers.

a $x + 2 - 2 = x$ **b** $4y - 4 = y$ **c** $2z \div 2 = z$

d $x - 3 + 3 = x - 6$ **e** $\dfrac{y}{2} \times 2 = y$ **f** $2z + 3 = 5z$

24 Copy and complete. Write the missing operation and number.

a $x + 8 \,\square\square = x$ **b** $x - 9 \,\square\square = x$ **c** $2x \,\square\square = x$

d $\dfrac{x}{3} \,\square\square = x$ **e** $4x \,\square\square = x$ **f** $x - 5 \,\square\square = x$

[explanation 7a]   [explanation 7b]

25 Jenny had this answer marked wrong in her homework.

a Explain the mistake she has made.

b Write the answer out correctly.

$$x + 2 = 5$$
$$\downarrow \qquad \downarrow$$
$$\boxed{+\,2} \qquad \boxed{+\,2}$$
$$\downarrow \qquad \downarrow$$
$$x \quad = \quad 7$$

26 Copy and complete.

a $x + 2 = 6$

$$\downarrow \qquad \downarrow$$
$$\boxed{} \qquad \boxed{}$$
$$\downarrow \qquad \downarrow$$
$$x \;=\; \square$$

b $\dfrac{x}{5} = 3$

$$\downarrow \qquad \downarrow$$
$$\boxed{} \qquad \boxed{}$$
$$\downarrow \qquad \downarrow$$
$$x \;=\; \square$$

c $x - 7 = 13$

$$\downarrow \qquad \downarrow$$
$$\boxed{} \qquad \boxed{}$$
$$\downarrow \qquad \downarrow$$
$$x \;=\; \square$$

d $2x = 24$

$$\downarrow \qquad \downarrow$$
$$\boxed{} \qquad \boxed{}$$
$$\downarrow \qquad \downarrow$$
$$x \;=\; \square$$

e $\dfrac{x}{3} = 5$

$$\downarrow \qquad \downarrow$$
$$\boxed{} \qquad \boxed{}$$
$$\downarrow \qquad \downarrow$$
$$x \;=\; \square$$

f $x - 4 = 11$

$$\downarrow \qquad \downarrow$$
$$\boxed{} \qquad \boxed{}$$
$$\downarrow \qquad \downarrow$$
$$x \;=\; \square$$

27 Solve these equations.

a $\dfrac{x}{10} = 7$ **b** $4x = 24$ **c** $x - 20 = 47$

d $x + 35 = 100$ **e** $\dfrac{x}{2} = 20$ **f** $2x = 10$

g $x - 14 = 26$ **h** $4x = 120$ **i** $5x = 60$

j $\dfrac{x}{8} = 8$ **k** $x + 58 = 94$ **l** $\dfrac{x}{25} = 4$