Evaluate algebraic expressions with directed numbers

1 Use the bar models to help you substitute $y = -5$ into the expressions.

a) $2y + 3$

y	y	3

-7

$2(y + 3)$

y	3
y	3

-4

b) $8 + 4y$

8	y	y	y	y

-12

$4(2 + y)$

2	y	2	y
2	y	2	y

-12

What is the same and what is different in each part?

2 Evaluate the expressions when $g = -8$

a) $2g + 7 =$ -9

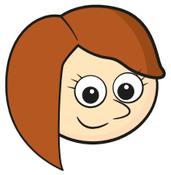
b) $2g - 7 =$ -23

c) $2 + 7g =$ -54

d) $7g - (-2) =$ -54

3 Rosie and Jack are substituting $b = -2$ into this expression.

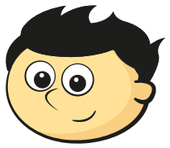
$5 - 4b$



Rosie

The answer is –3

I think the answer is 13



Jack

Who is correct? Jack

What mistake do you think the other person made?

Rosie has calculated $5-8$ not $5-(-8)$

4 Evaluate the expressions when $h = -7$

a) $2h + 16 =$ 2

b) $2h - 16 =$ -30

c) $16 - 2h =$ 30

d) $-16 - 2h =$ -2

5 Evaluate the expressions by substituting the values $a = -6$, $b = 5$, $c = 2$ and $d = -4$

a) $a - d =$ -2

$7(a - d) =$ -14

$-7(a - d) =$ 14

b) $ab =$ -30

$2(ab) =$ -60

$\frac{ab}{2} =$ -15

c) $2d =$ -8

$d^2 =$ 16

$2d - d^2 =$ -24

6 $x = -2$ $y = 10$ $z = 3$

Using only letters, write algebraic expressions that give these answers.

e.g.

a) 12 $y - x$

b) –20 xy

c) –15 $x - y - z$

d) –60 xyz

Compare answers with a partner. Did you get the same expressions?

7 Filip is evaluating the expression $n - p^2$ when $n = -7$ and $p = -3$

$$-7 - -3^2$$
$$= -7 - -9$$
$$= -7 + 9$$
$$= 2$$

What mistake has Filip made?

Correct his working out.

$-7 - (-3)^2 = -7 - 9 = -16$

How could Filip make sure he doesn't make this mistake again?

Use brackets.

8 Here are some expression cards.

$m - k$ mk $\frac{k}{m}$

$\frac{m}{k}$ $2k - 8m$ k^2

What is the range of the cards when $k = -8$ and $m = -2$?

64

9 An approximate rule for converting degrees Fahrenheit (F) to degrees Celsius (C) is given by the formula.

$$C = \frac{F - 30}{2}$$

a) Use this rule to convert 18 °F into °C.

-6°C

b) Aisha substitutes a different value for F and gets $C = 0$

What was Aisha's value for F?

30°F

10 If y is negative, which card would give the greater value?

$y + x$ $y - x$

Does it matter what the value of x is?