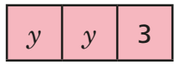
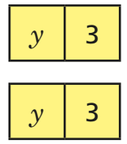
Evaluate algebraic expressions with directed numbers

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

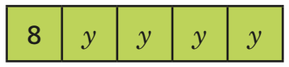
a) $2y + 3$



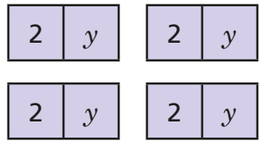
$2(y + 3)$



b) $8 + 4y$



$4(2 + y)$



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

2 Evaluate the expressions when $g = -8$

a) $2g + 7 =$ ☐

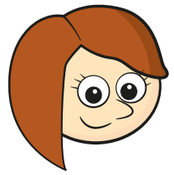
b) $2g - 7 =$ ☐

c) $2 + 7g =$ ☐

d) $7g - (-2) =$ ☐

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

$5 - 4b$



Rosie: The answer is –3

Jack: I think the answer is 13

Who is correct? _____

What mistake do you think the other person made?

_____

_____

4 Evaluate the expressions when $h = -7$

a) $2h + 16 =$ ☐

b) $2h - 16 =$ ☐

c) $16 - 2h =$ ☐

d) $-16 - 2h =$ ☐

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

a) $a - d =$ ☐

$7(a - d) =$ ☐

$-7(a - d) =$ ☐

b) $ab =$ ☐

$2(ab) =$ ☐

$\frac{ab}{2} =$ ☐

c) $2d =$ ☐

$d^2 =$ ☐

$2d - d^2 =$ ☐

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

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

a) 12 _____

b) –20 _____

c) –15 _____

d) –60 _____

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

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

$$\begin{aligned} &-7 - -3^2 \\ &= -7 - -9 \\ &= -7 + 9 \\ &= 2 \end{aligned}$$

What mistake has Filip made?

Correct his working out.

_____

_____

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

_____

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 $m = -2$?

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.

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

What was Aisha's value for 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?