WALT understand different expressions and its values
Success Criteria I know …..
- Sometimes two expressions can give the same result
-

Sometimes two expressions will evaluate to give the same result, no matter what numbers the variables stand for.

For example, $B + B$ and $2 \times B$ will always give the same result.

$B = 3$ → $B + B = 6$
→ $2 \times B = 6$

$B = 11$ → $B + B = 22$
→ $2 \times B = 22$

This means that $B + B$ and $2 \times B$ are equivalent.

▶ **Let's start: Odd one out**

Here are four expressions:
$2 \times B + 6$ $6 + B + B$ $(B + 3) \times 2$ $B + 6$

One of them is not equivalent to the others.
• Copy and complete the table to help you find the odd one out. (The first row has already been done.)

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	$2 \times B + 6$	$6 + B + B$	$(B + 3) \times 2$	$B + 6$
$B = 0$	$2 \times 0 + 6 = 6$	$6 + 0 + 0 = 6$	$(0 + 3) \times 2 = 6$	$0 + 6 = 6$
$B = 1$				
$B = 2$				

Check your understanding

Understanding

1 a If $x = 3$, what does $x + 6$ equal?
 b If $x = 3$, what does $4x$ equal?
 c If $x = 3$, are $x + 6$ and $4x$ equal to each other?

Remember that $4x = 4 \times x$.

2 a If $a = 5$, evaluate $a + 4$.
 b If $a = 5$, evaluate $2 + a + 2$.
 c If $a = 5$, do $a + 4$ and $2 + a + 2$ equal each other?

3 Copy and complete:
Two expressions that are always equal are called _____ expressions.

4 True or false? Explain your answer with a sentence.
'No matter what number you choose for ☐, the values of ☐ + 6 and 6 + ☐ are equal.'

Fill in a table to help you decide if $3a + 6$ and $(a + 2) \times 3$ are equivalent. Use $a = 0$, $a = 1$, $a = 2$, $a = 3$.

Solution

	$a = 0$	$a = 1$	$a = 2$	$a = 3$
$a + 6$	6	9	12	15
$(a + 2) \times 3$	6	9	12	15

They are equivalent.

Explanation

$3a + 6$ and $(a + 2) \times 3$ are equal for all values of a, so they appear to be equivalent. Drawing pictures confirms this.

| a | a | a | :: | | a | : | a | : | a | : |

$3a + 6$　　　$(a + 2) \times 3$

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5 a Copy and complete the following table.

	$a = 0$	$a = 1$	$a = 2$	$a = 3$
$2a + 2$				
$(a + 1) \times 2$				

b Fill in the gap: $2a + 2$ and $(a + 1) \times 2$ are _____ expressions.

Fluency

6 a Copy and complete the following table.

	$B = 0$	$B = 1$	$B = 2$	$B = 3$
$5B + 3$				
$6B + 3$				

b Are $5B + 3$ and $6B + 3$ equivalent expressions?

Equivalent expressions are equal for *all* values.

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7 a Copy and complete this table.

	$6x + 5$	$4x + 5 + 2x$
$x = 1$		
$x = 2$		
$x = 3$		
$x = 4$		

b Are $6x + 5$ and $4x + 5 + 2x$ equivalent?

8 For each of the following pairs, decide if they are equivalent (E) or not equivalent (N).
  a $k + 6$ and $k \times 4$
  b $k \times 3$ and $2 \times k + k$
  c $k + 2$ and $1 + k + 1$
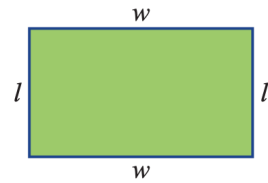 **d** $k + 10$ and $k \times 10$.

Try making k stand for different numbers ($k = 0$, $k = 1$, $k = 2$, etc.) in a table.

Problem solving and reason - extension

9 Give an example of an expression that is equivalent to $4y$.

10 The perimeter of this rectangle is given by $w + l + w + l$.
Write an equivalent expression for the perimeter.

11 The expressions $a + b$ and $b + a$ are equivalent and only contain two terms. How many expressions are equivalent to $a + b + c$ and contain only three terms?

12 Prove that no two of these expressions are equivalent: $4 + x$, $4x$, $x - 4$, $x \div 4$.

Substitute different values for x.

⭐ Matching pairs

13 On the following game board, each box has a partner box. Write all the matches. (For example, A1 and C2 match because $3a + 2a$ is equivalent to $5a$.)

	Column A	Column B	Column C	Column D
Row 1	$3a + 2a$	$6a$	$4a + 2$	$7a$
Row 2	$5 - a - 2a$	10	$5a$	$2 \times (a + 5) - 2a$
Row 3	$(1 + 2a) \times 2$	$2a + 5a$	$2a \times 3$	$5 - 3a$

Check your answers

1 a 9   **b** 12   **c** no

2 a 9   **b** 9   **c** yes

3 equivalent

4 True. When adding numbers, order does not matter.

5 a

	$a = 0$	$a = 1$	$a = 2$	$a = 3$
$2a + 2$	2	4	6	8
$(a + 1) \times 2$	2	4	6	8

  b equivalent

6 a

	$B = 0$	$B = 1$	$B = 2$	$B = 3$
$5B + 3$	3	8	13	18
$6B + 3$	3	9	15	21

  b no

7 a

	$6x + 5$	$4x + 5 + 2x$
$x = 1$	11	11
$x = 2$	17	17
$x = 3$	23	23
$x = 4$	29	29

  b They are equivalent because they are always equal.

8 a N   **b** E   **c** E   **d** N

9 $y + y + y + y$; other answers are possible

10 $2(w + 1)$; other answers are possible

11 6

12 If $x = 8$, all four expressions have different values.

13 A1 and C2, A2 and D3, A3 and C1, B1 and C3, B2 and D2, B3 and D1