SUBSTITUTION (TWO STEP)

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

Replace the letter with its value, then calculate. Multiply or divide before adding or subtracting, unless there are brackets.

If a = 5:

2a = 2 × 5 = 10

2a + 1 = 10 + 1 = 11

1 a = 3. Work out:

a) $4a$ = ☐ b) $a + 7$ = ☐ c) a^2 = ☐

d) $\frac{a}{3}$ = ☐ e) $10 - a$ = ☐ f) $5a$ = ☐

2 Work out. Remember: brackets first, then × and ÷, then + and –.

a) $2 \times 6 + 1$ = ☐ b) $2 \times (6 + 1)$ = ☐

c) $20 - 3 \times 4$ = ☐ d) $(20 - 3) \times 4$ = ☐

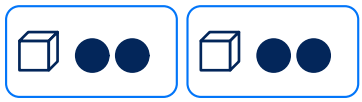
3 Each cube is worth 5. Each counter is worth 1. Find the total.

a) 

total = ☐

b) 

total = ☐

c) 

total = ☐

4 Find the output when the input is 4.

a) 4 → × 3 → + 2 → ☐ b) 4 → + 1 → × 5 → ☐

5 Hiring a bike costs £3 for each hour plus a £5 fee. What does it cost for 4 hours?

£ ☐

6 Lucy says that when x = 3, 2x + 4 = 27. Explain her mistake and give the correct answer.

SUBSTITUTION (TWO STEP)

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

x	→	× 3	→	+ 4	→	3x + 4
2	→	× 3	→	+ 4	→	10

When x = 2:

3x + 4 = 3 × 2 + 4

= 6 + 4 = 10

1 x = 2. Use each machine to find the value of the expression.

a) 5x – 1

2 → × 5 → – 1 → ☐

b) 2(x + 3)

2 → + 3 → × 2 → ☐

c) $\frac{x}{2}$ + 7

2 → ÷ 2 → + 7 → ☐

d) 4x + 3

2 → × 4 → + 3 → ☐

2 y = 5. Fill in the boxes.

a) 2y + 3 = 2 × ☐ + 3 = ☐

b) 4y – 7 = 4 × ☐ – 7 = ☐

c) 3(y + 1) = 3 × (☐ + 1) = ☐

d) $\frac{y + 5}{2}$ = (☐ + 5) ÷ 2 = ☐

3 a = 10. Work out:

a) 3a + 2 = ☐ b) 3(a + 2) = ☐ c) 2a – 5 = ☐

d) $\frac{a}{5}$ + 1 = ☐ e) a^2 + 1 = ☐ f) 50 – 2a = ☐

4 A taxi costs £2 per mile plus £3. The cost in pounds is 2m + 3, where m is the miles.

a) Find the cost for 5 miles. £ ☐ b) Find the cost for 12 miles. £ ☐

5 x = 7. Which is greater, 2x + 3 or 2(x + 3)? Show your working.

2x + 3 = ☐ 2(x + 3) = ☐ greater: ☐

SUBSTITUTION (TWO STEP)

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

If x = 4: $3x + 2 = 12 + 2 = 14$ $3(x + 2) = 3 \times 6 = 18$ $\frac{x+6}{2} = 10 \div 2 = 5$

On a calculator, use brackets so the operations happen in the right order.

1 x = 4. Work out the value of each expression.

a) **3x + 2** = ☐

b) **3(x + 2)** = ☐

c) $\frac{x}{2} + 6$ = ☐

d) $\frac{x+6}{2}$ = ☐

e) $x^2 - 5$ = ☐

f) $2x^2$ = ☐

g) **20 – 3x** = ☐

h) **5(x – 7)** = ☐

2 Work out. You may use a calculator.

a) **4y – 1.5 when y = 2.5** = ☐

b) **2y + 10 when y = –3** = ☐

c) **5(y + 0.8) when y = 1.2** = ☐

d) **$y^2 + 3$ when y = 0.5** = ☐

3 Use the formulae.

a) v = u + at. Find v when u = 5, a = 2 and t = 3. ☐

b) F = 1.8C + 32. Change 25°C to °F. ☐

c) $A = \frac{1}{2}bh$. Find A when b = 6 and h = 4. ☐

4 To find $\frac{x+8}{2}$ when x = 6, Kai types 6 + 8 ÷ 2 into his calculator and gets 10.

Explain Kai's mistake and find the correct value.

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5 Explain why 3(a + 2) is always 4 more than 3a + 2.

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SUBSTITUTION (TWO STEP)

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

1 a = 3 and b = –2. Work out:

a) $2a + b$ = ☐ b) $a(b + 5)$ = ☐ c) $\frac{a - b}{5}$ = ☐

d) $a^2 + b^2$ = ☐ e) $3b - a$ = ☐ f) $ab + 10$ = ☐

2 Find the value of x in each case.

a) $3x + 2 = 20$ x = ☐ b) $\frac{x}{4} - 1 = 4$ x = ☐

c) $2(x + 5) = 7$ x = ☐ d) $x^2 + 1 = 50$ x = ☐

3 Is each statement always, sometimes or never true? Circle your answer.
If it is sometimes true, give an example of when it is true and when it is not.

a) When n is a whole number, 2n + 1 is odd. ALWAYS SOMETIMES NEVER

b) 3(x + 2) is greater than 3x + 2. ALWAYS SOMETIMES NEVER

c) $\frac{x}{2} + 3$ is less than $\frac{x + 3}{2}$ ALWAYS SOMETIMES NEVER

d) $x^2 - 1$ is positive. ALWAYS SOMETIMES NEVER

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4 Find three pairs of values for a and b so that 2a + b = 10.
One pair must include a negative number.

a = ☐ b = ☐ a = ☐ b = ☐ a = ☐ b = ☐

CHALLENGE

5 Here are four expression cards.

$2x + 1$	$2(x + 1)$	$\frac{x}{2} + 1$	$x^2 + 1$

a) Find each value when x = 3. ☐ ☐ ☐ ☐

b) Find two values of x that make $2x + 1$ equal to $x^2 + 1$. ☐ ☐

c) Can $\frac{x}{2} + 1$ ever be the largest card? Explain. .....