Using Symbols and Expressions to Think Mathematically— Set 7

(A) *Students can factorise, expand and simplify algebraic expressions.*

Students may solve these equations slightly differently or in a more simplified way skipping some steps below.

Example 1: Expand	Example 2: Factorise	Example 3: Simplify
$6(x + 4)$ $= 6 \times x + 6 \times 4$ $= 6x + 24$	$6x + 24$ $= 6 \times x + 6 \times 4$ $= 6(x + 4)$	$\dfrac{(x - 3)(x + 4)}{(x - 3)(x - 4)} = \dfrac{x + 4}{x - 4}$
Example 4: Expand Quadratic	Example 5: Factorise	Example 6: Solve
$(x - 3)(x + 4)$ $= x \times x + x \times 4 - 3 \times x - 3 \times 4$ $= x^2 + 4x - 3x - 12$ $= x^2 + x - 12$	$x^2 + x - 12$ Need numbers that multiply to -12 and add to +1 i.e. -3 and +4 $= (x - 3)(x + 4)$	$(x - 3)(x + 4) = 0$ Each part can be = 0, as 0 times anything is 0 $x - 3 = 0$ OR $x + 4 = 0$ $x = 3$ OR $x = -4$

(B) *Can solve simultaneous equations.*

Students may solve these equations slightly differently or in a more simplified way skipping some steps below.

Substitution

$3x + y = 10$
$2x + y = 8$
Rearrange bottom equation
$y = 8 - 2x$
Put into second equation
$3x + (8 - 2x) = 10$
$3x + 8 - 2x = 10$
$x + 8 = 10$
$x = 2$

Elimination

$3x + y = 10$
$2x + y = 8$
Subtract the bottom equation from the top equation
- $3x - 2x = x$
- $y - y = 0$
- $10 - 8 = 2$
$x + 0 = 2$
$x = 2$

(C) *Can model real world situations and to solve problems, including quadratic equations, using correct algebraic notation.*

Natasha has a small square painting with a frame of constant width around it. The painting (without the frame) has an area of 49 cm². The area of the framing is 32cm².

Form an equation and solve it to find the dimensions of the frame.

Form an Equation
Area $= x^2 = 49 + 32$
Solve
$x^2 = 81$
$x = 9$ or -9
Frame cannot be negative width, so must be 9cm wide, and 9cm tall as the frame is square.

Extension:
As the painting is 49cm² and a square, it must be 7cm x 7cm, so the frame must be 1cm thick on each side.