

Test 2

Friday 28 Sept. 2018

Maths 10

Arithmetic (solving equations)

* ANSWERS *

Solve the following equations

$$1) \frac{x-2}{3} + \frac{x+1}{2} = \frac{x}{6}$$

$$\Leftrightarrow 2(x-2) + 3(x+1) = x$$

$$\Leftrightarrow 5x - 1 = x \Rightarrow x = \frac{1}{4}$$

$$S = \left\{ \frac{1}{4} \right\}$$

$$2) \frac{3}{x-2} - \frac{2}{x+1} = 0$$

$$x \neq 2$$

$$3(x+1) - 2(x-2) = 0$$

$$\Leftrightarrow x \neq -1$$

$$\Leftrightarrow x = -7$$

$$S = \{-7\}$$

$$3) (x-3)^2 - (x+2)^2 = -5$$

First method:

$$(x^2 - 6x + 9) - (x^2 + 4x + 4) = -5$$

$$\cancel{x^2} - 6x + 9 - \cancel{x^2} - 4x - 4 = -5$$

$$\Leftrightarrow -10x = -10 \Rightarrow x = 1$$

Second method:

$$((x-3) - (x+2)) \times ((x-3) + (x+2)) = -5$$

$$\Leftrightarrow (-5)(2x-1) = -5$$

$$\Leftrightarrow (2x-1) = 1 \Leftrightarrow 2x = 2 \Rightarrow x = 1$$

$$S = \{1\}$$

$$4) (2x-1)^2 = 2(x-1)^2 + 2(x-2)^2 + 7$$

$$\Leftrightarrow 4x^2 - 4x + 1 = 2(x^2 - 2x + 1) + 2(x^2 - 4x + 4) + 7$$

$$\Leftrightarrow 4\cancel{x^2} - 4\cancel{x} + 1 = 2\cancel{x^2} - 4\cancel{x} + 2 + 2\cancel{x^2} - 8x + 8 + 7$$

$$\Leftrightarrow 1 = -8x + 17 \Rightarrow x = \frac{16}{8} = 2$$

$$S = \{2\}$$

$$5) x^2 - 10x + 100 = 7x + 40$$

$$\Leftrightarrow x^2 - 17x + 60 = 0$$

$$\Leftrightarrow (x - 12)(x - 5) = 0$$

$$S = \{5, 12\}$$

$$6) x^2 = 10(300 + 7x)$$

$$\Leftrightarrow x^2 - 70x - 3000 = 0$$

$$\Leftrightarrow (x + 100)(x - 30) = 0$$

$$S = \{30, 100\}$$

$$7) \frac{1}{(x-1)} - \frac{1}{(x+1)} = \frac{x}{(x-1)(x+1)}$$

$$x \neq 1$$

$$x \neq -1$$

$$(x+1) - (x-1) = x$$

$$\Rightarrow x = 2$$

$$S = \{2\}$$

Bonus

$$\text{i) } \frac{1}{(x-1)} - \frac{1}{(x+1)} = 1$$

$$x \neq 1$$

$$x \neq -1$$

$$(x+1) - (x-1) = 1$$

$$\Leftrightarrow x^2 - 1 = 1 \quad \Leftrightarrow x^2 = 2$$

$$S = \{\sqrt{2}\}$$

$$\text{ii) } \frac{3x}{(2x+7)} - \frac{x}{(x+1)} = 0$$

$$x \neq -\frac{7}{2}$$

$$x \neq -1$$

$$3x(x+1) - x(2x+7) = 0$$

$$\Leftrightarrow 3x^2 + 3x - 2x^2 - 7x = 0$$

$$\Leftrightarrow x^2 - 4x = 0$$

$$\Leftrightarrow x(x-4) = 0$$

$$S = \{0, 4\}$$