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Introduction to mathematics exam paper

1.

(i) $x^4 \times x^6 \times x = x^{12}$

(ii) $2x^2 \times 3x^3 \times 2x = 12x^6$

(iii) $\frac{x^4 \times x^3 \times x^2}{x^9} = \frac{3x^9}{x^9} = 3x \quad x=3$

(iv) $(3x^2)^3 = 27x^6$

(v) $\sqrt{x} \times \sqrt{x} = x$

2 (i) $15x - 2 = 12x + 9$

$15x - 12x = 9 + 2$

$3x = 11$

$x = \frac{11}{3}$

$x = 3.67$

$x = 3.67$

(ii)

$3(7x-1) = 6(x+3)$

$21x - 3 = 6x + 18$

$21x - 6x = 18 + 3$

$15x = 21$

$x = \frac{21}{15}$

$x = 1.4$

$x = 1.4$

2.

$$(iii) \frac{5x+3}{4} = \frac{2x-1}{9} = \text{subtract } \frac{5x+3}{4}$$

$$(5x+3) \cdot 9 = 4(2x-1)$$

$$45x+27 = 8x-4$$

$$45x+27-27 = 8x-4-27$$

$$45x = 8x-31$$

$$\text{subtract } 37 \quad 37x = -31$$

$$\frac{37x}{37} = \frac{-31}{37} \quad x = -\frac{31}{37}$$

$$3. (i) 2x^2 + 10x + 21 = 0$$

$$(x+7)(x+3) = 0$$

$$x+7 = 0 \quad x+3 = 0$$

$$x = -7 \quad x = -3$$

$$(ii) x^2 - 3x + 2 = 0$$

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

$$x^2 + 2x - 1x - 2 = 0$$

$$x^2 + x - 2x + 2 = 0$$

$$x^2 - 3x + 2 = 0$$

$$x-2 = 0 \quad x+1 = 0$$

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

$$(iii) x^2 + 12x + 20 = 0 \quad x = -10 \quad x = -2$$

$$(x+10)(x+2) = 0$$

$$x^2 + 2x + 10x + 20 = 0$$

$$x^2 + 12x + 20 = 0$$

$$(iv) x^2 - 64 = 0$$

$$(x-8)(x+8)$$

$$x^2 - 64 = 0$$

$$x = 8 \quad x = -8$$

$$(v) 2x^2 + 9x + 10 = 0$$

$$(2x+5)(x+2) = 0$$

$$2x+5=0 \quad x+2=0$$

$$x = -\frac{5}{2} \quad x = -2$$

$$x = -2.5$$

$$4. \quad 14x^2 + 3x = 11$$

$$14x^2 + 3x - 11 = 0$$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(14)(-11)}}{2(14)} = \frac{-3 \pm \sqrt{625}}{28}$$

$$x = \frac{-3 + \sqrt{9 - 625}}{28}$$

$$x = \frac{-3 + \sqrt{625}}{28} \quad x = \frac{-3 - \sqrt{3^2 - 4(14)(-11)}}{2(14)} = \frac{-3 - \sqrt{625}}{28}$$

$$x = \frac{-3 + 25}{28} = \frac{22}{28} = \frac{11}{14}$$

$$x = \frac{11}{14} \quad x = -1$$

5

$$5x + 3y = 39 \quad (1)$$

$$8x - 2y = 42 \quad (2)$$

$$5x + 3y + (-5x) = 39 + (-5x) \quad (1) \text{ add } -5$$

$$3y = 25x + 39$$

$$\frac{3y}{3} = \frac{-5x + 39}{3} \quad (\text{div by } 3)$$

$$y = -\frac{5}{3}x + 13$$

$$y = -\frac{5}{3}x + 13$$

6

$$8x - 2\left(-\frac{5}{3}x + 13\right) = 42$$

$$\frac{34}{3}x - 26 = 42$$

$$\frac{34}{3}x - 26 + (26) = 42 + (26)$$

$$\frac{34}{3}x = 68$$

Substitute in $y = -\frac{5}{3}x + 13$

$$34x$$

$$\frac{3}{34/3} = \frac{68}{34/3}$$

$$y = -\frac{5}{3}x + 13$$

$$y = -10 + 13$$

$$x = 6$$

$$y = 3$$

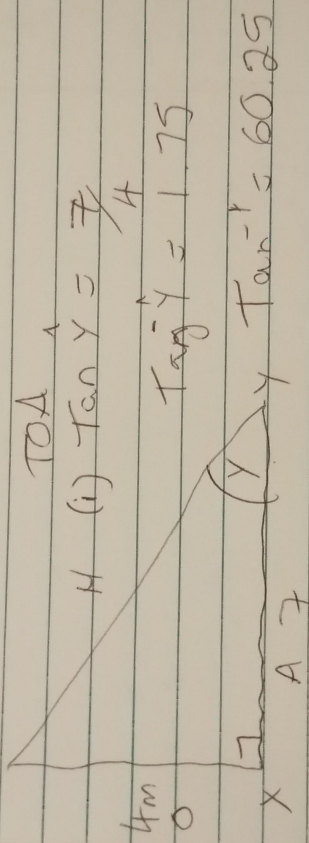
$$6. 5(2x^2 - y^2) - x^2(x^2 - y) - x^2y - x^4$$

$$~~5(2x^2 - y^2) - x^2(x^2 - y)~~$$

$$10x^2 - 5y^2 - x^2(x^2 - y) - x^2y - x^4$$

$$- 2x^4 + 10x^2 - 5y^2$$

7.



$$(ii) 180 - 90 - 60.25$$

$$A \hat{Z} = 29.75$$

$$(iii) YZ = YZ^2 = 7^2 + 4^2$$

$$YZ^2 = 65$$

$$YZ = \sqrt{65}$$

$$YZ = 8.06$$

$$8. (i) \sqrt[3]{x} = x^{\frac{1}{3}}$$

$$(ii) 1 = \frac{1}{x}$$