


$$\frac{100}{100}$$

FORENAME(S): JESAMY

12 Pages

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3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
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[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)

Q1

$$i) \frac{4a^3 - 6a^2 - 12a}{2a} \rightarrow 2a^2 - 3a - 6$$

(6) *

$$ii) \frac{36m^3n^3 + 15m^4n^2 + 3m^5n}{3m^3n} \rightarrow 12n^2 + 5mn + m^2$$

(6)

$$iii) (6x^2 + 19x + 10) \div (2x + 5)$$

$$\begin{array}{r} 3x + 2 \\ 2x+5 \overline{) 6x^2 + 19x + 10} \\ \underline{6x^2 + 15x} \\ 4x + 10 \\ \underline{4x + 10} \\ 0 \end{array} = \underline{3x + 2}$$

(6)

$$iv) \frac{6p^2q^3r}{3p^3q^3r^{-2}} \rightarrow 2p^{-1}r^3$$

(6)

$$v) \frac{2fg}{16h} \times \frac{4gh^2}{4fh} \times \frac{32fh^3}{12f^3}$$

$$\rightarrow \frac{2fg \times 4gh^2 \times 32fh^3}{16h \times 4fh \times 12f^3} \rightarrow \frac{256f^2g^2h^5}{768f^4h^2}$$

$$= \frac{f^2g^2h^5}{3f^4h^2} = \frac{g^2h^3}{3f^2}$$

(6)

$$\begin{aligned} & \cancel{(2a+2)(a-3)} \\ & \cancel{2a^2 + 2a - 6a - 6} \end{aligned}$$

$$\cancel{\frac{12n^2 + 5mn + m^2}{(m+n)(m+n)}}$$

Q2a

i) $(2x-1)(3x+5) = (6x-5)(x-9)$

$$6x^2 - 3x + 10x - 5 = 6x^2 - 5x - 54x + 45$$

$$6x^2 + 7x - 5 = 6x^2 - 59x + 45$$

$$7x - 5 = -59x + 45$$

$$66x - 5 = 45$$

$$66x = 50$$

$$\underline{66x = 40}$$

$$x = 50/66 = 25/33$$

$$\underline{x = 40/66 = 20/33}$$

ii) $\frac{x-4}{5} = \frac{2x-1}{3}$

$$\frac{x-4}{5} - \frac{2x-1}{3} = 0$$

$$3(x-4) - 5(2x-1)$$

$$3x - 12 - 10x + 5 = 0$$

$$-7x - 7 = 0$$

$$-7 = 7x$$

$$x = -1$$

2b

i) $4 - q^2 \rightarrow (2-q)(2+q)$

ii) $3ab + 4cd - cb - 12ad$
 $(3a - c)(b - 4d)$

$$\underline{3ab + 4cd - cb}$$

iv) $q^2 - 4qr \rightarrow q(q - 4r)$

Q3 $2x + 4y = 16$
 $3x + 2y = 7 \times 2$

$$\begin{array}{r} 2x + 4y = 16 \\ 6x + 4y = 14 - \\ \hline -4x = 2 \end{array}$$

$$\begin{aligned} -4x &= 2 \\ x &= 2/-4 \\ x &= -\frac{1}{2} \end{aligned}$$

$$\begin{aligned} 2(-\frac{1}{2}) + 4y &= 16 \\ -1 + 4y &= 16 \\ 4y &= 17 \\ y &= 17/4 \text{ or } 4.25 \end{aligned}$$

$$\begin{aligned} 6(-\frac{1}{2}) + 4y &= 14 \\ -3 + 4y &= 14 \\ 4y &= 17 \end{aligned}$$

Q4 $\begin{bmatrix} 1 & 1 & 6 \\ 1 & 2 & 2 \\ 1 & 3 & -1 \end{bmatrix}$

$$\begin{aligned} \det A &= (-2 + 2 + 18) - (12 + 6 - 1) \\ &= 18 - 17 \\ &= 1 \end{aligned}$$

$$m = \begin{bmatrix} 1 & 2 & 1 & 2 & 2 \\ 1 & 6 & 1 & 6 & 1 \\ 1 & 3 & 1 & 3 & 1 \end{bmatrix} = \begin{bmatrix} -2-6 & -1-2 & 3-2 \\ -1-18 & -1-6 & 3-1 \\ 2-12 & 2-6 & 2-1 \end{bmatrix}$$

$$= \begin{bmatrix} -8 & -3 & 1 \\ -19 & -7 & 2 \\ -10 & -4 & 1 \end{bmatrix} \times \begin{bmatrix} + & - & + \\ - & + & - \\ + & - & + \end{bmatrix} = \begin{bmatrix} -8 & 3 & 1 \\ 19 & -7 & -2 \\ -10 & 4 & 1 \end{bmatrix}$$

$$m^T = \begin{bmatrix} -8 & 19 & -10 \\ 3 & -7 & 4 \\ 1 & -2 & 1 \end{bmatrix}$$

$$A^{-1} = \frac{1}{1} \begin{bmatrix} -8 & 19 & -10 \\ 3 & -7 & 4 \\ 1 & -2 & 1 \end{bmatrix} = \begin{bmatrix} -8 & 19 & -10 \\ 3 & -7 & 4 \\ 1 & -2 & 1 \end{bmatrix}$$

$$Q5 \quad \frac{x+7}{(x-2)(x+1)} = \frac{\cancel{A}}{\cancel{(x+1)}} \frac{A}{x-2} + \frac{B}{x+1}$$

$$x+7 = A(x+1) + B(x-2)$$

$$\begin{array}{ll} \underline{x=2} & \underline{x=-1} \\ 2+7 = A(2+1) + B(0) & -1+7 = A(0) + B(-1-2) \\ 9 = 3A & 6 = -3B \\ A = 3 & B = -2 \end{array}$$

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

$$\left(\frac{10}{10} \right)$$

Q6

$$\begin{array}{l} \text{i) } x^2 + 11x + 30 = 0 \\ (x+5)(x+6) = 0 \\ x = -5, -6 \end{array}$$

$$\left(\frac{10}{10} \right)$$

$$\begin{array}{l} \text{ii) } x^2 - 11x = 0 \\ x(x-11) = 0 \\ x = 0, 11 \end{array}$$

$$\begin{array}{l} \text{iii) } x^2 - 4 = 0 \\ (x+2)(x-2) = 0 \\ x = 2, -2 \end{array}$$

Q4 $A = \begin{bmatrix} 1 & 1 & 6 \\ 1 & 2 & 2 \\ 1 & 3 & -1 \end{bmatrix}$ $\det(A) = (-2+2+18) - (12+6+1) = 18-19 = -1$

$$\begin{bmatrix} 2 & 2 & 1 & 2 & 1 & 2 \\ 3 & -1 & 1 & -1 & 1 & 3 \\ 1 & 6 & 1 & 6 & 1 & 1 \\ 1 & 3 & 1 & 3 & 1 & 1 \\ 1 & 2 & 1 & 2 & 1 & 1 \end{bmatrix} = \begin{bmatrix} -8 & -3 & 1 \\ -19 & -7 & 2 \\ -10 & -4 & 1 \end{bmatrix} = \begin{bmatrix} -8 & 3 & -1 \\ 19 & -7 & -2 \\ -10 & 4 & -1 \end{bmatrix}$$

$$\begin{bmatrix} -8 & 19 & -10 \\ 3 & -7 & 4 \\ 1 & -2 & 1 \end{bmatrix}$$

$$\frac{2fg}{16h} \times \frac{4gh^2}{4fh} \times \frac{32fh^3}{12f^3} = \frac{fg \times gh \times 8h^3}{8h \times f \times 3f^2} = \frac{8fg^2h^4}{24f^3h} = \frac{g^2h^3}{3f^2}$$

$$\frac{fg}{8h} \times \frac{gh}{f} \times \frac{8h^3}{3f^2} = \frac{fg \times gh \times 8h^3}{8h \times f \times 3f^2} = \frac{8fg^2h^4}{24f^3h} = \frac{g^2h^3}{3f^2}$$

$$\frac{fg \times gh \times 8h^3}{8h \times f \times 3f^2} = \frac{8fg^2h^4}{24f^3h} = \frac{g^2h^3}{3f^2}$$

$$(2x+1)(3x+5) = (6x+5)(x-9)$$

$$6x^2 - 3x + 10x - 5 = 6x^2$$