


$$\frac{83}{100}$$

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12 Pages

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
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.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
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1	Student Number	2022125
2	Title of Examination Paper	
3	Module Code	
4	Date and Time of Examination	
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[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)

$$1. i. \quad \frac{4a^3 - 6a^2 - 12a}{2a} = 2a^2 - 3a - 6 \quad (6)$$

$$ii. \quad \frac{36m^3n^3 + 15m^4n^2 + 3m^5n}{3m^5n} = 12m^{-2}n^2 + 5m^{-1}n + 1 \quad (6)$$

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

$$\begin{array}{r|rrr} -5 & 6 & 19 & 10 \\ & -30 & -55 & \\ \hline & 6 & -11 & 65 \end{array}$$

$$6x - 11 + \frac{65}{2x+5}$$

(1)

$$iv. \quad \frac{6p^2q^3r}{3p^3q^3r^{-2}} = 2p^{-1}r^3 \quad (6)$$

$$v. \quad \frac{2sg}{16h} \times \frac{4gh^2}{4gh} \times \frac{32gh^3}{12g^3} \quad (2)$$

$$2sg(4gh)(12g^3) + 4gh^2(16h)(12g^3) + 32gh^3(16h)(4gh)$$

$$8g^2gh(12g^3) + 64gh^3(12g^3) + 512gh^4(4gh)$$

$$\frac{96g^5gh + 768gh^3g^3 + 2048g^2h^5}{(16h)(4gh)(12g^3)}$$

2.a.i.

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

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

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

$$66x = 50$$

$$x = \frac{50}{66}$$

(8)

$$x = 0.76$$

(30
30)

ii.

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

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

$$-12 = 7x - 5$$

$$-7 = 7x$$

$$x = -1$$

(7)

2.b.i.

$$4 - q^2$$

$$2 \times 2 = 4$$

$$(-q+2)(q+2)$$

(5)

ii.

$$3ab + 4cd - cb - 12ad$$

$$3a(b-4d) + c(4d-b)$$

$$\cancel{(3a+c)} \cancel{(b-4d)}$$

$$(3a-c)(b-4d)$$

(5)

iv.

$$q^2 - 4qr$$

$$q(q-4r)$$

(5)

3.

$$2x + 4y = 16$$

$$3x + 2y = 7$$

$$3x + 2y = 7$$

$$6x + 4y = 14$$

$$4y = 14 - 6x$$

$$2x + 4y = 16$$

$$2x + 14 - 6x = 16$$

$$14 - 4x = 16$$

$$14 = 4x + 16$$

$$-2 = 4x$$

$$x = -0.5$$

$$2x + 4y = 16$$

$$2(-0.5) + 4y = 16$$

$$-1 + 4y = 16$$

$$4y = 17$$

$$y = 4.25$$

$$3x + 2y = 7$$

$$3(-0.5) + 2(4.25) = 7$$

$$-1.5 + 8.5 = 7$$

$$7 = 7$$

10/10

$$x = -\frac{1}{2}$$

$$y = 4\frac{1}{4}$$

4.

$$A = \begin{vmatrix} 1 & 1 & 6 \\ 1 & 2 & 2 \\ 1 & 3 & -1 \end{vmatrix}$$

$$A^{-1} = \frac{A^T}{|A|}$$

$$|A| = 1 \begin{vmatrix} 2 & 2 \\ 3 & -1 \end{vmatrix} - 1 \begin{vmatrix} 1 & 2 \\ 1 & -1 \end{vmatrix} + 6 \begin{vmatrix} 1 & 2 \\ 1 & 3 \end{vmatrix} \quad \begin{vmatrix} + & - & + \\ - & + & - \\ + & - & + \end{vmatrix}$$

$$|A| = 1(2 \times -1) - 1(1 \times -1) + 6(1 \times 3 - 2 \times 1)$$

$$|A| = -2 + 1 + 36$$

$$|A| = 35$$

4,

$$|A| = 26$$

$$A^{-1} = \frac{A^T}{|A|}$$

$$A = \begin{vmatrix} 1 & 1 & 6 \\ 1 & 2 & 2 \\ 1 & 3 & -1 \end{vmatrix}$$

$$A^T = \begin{vmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 6 & 2 & -1 \end{vmatrix}$$

~~$$A^{-1} = \begin{vmatrix} \frac{1}{26} & \frac{1}{26} & \frac{6}{26} \\ \frac{1}{26} & \frac{2}{26} & \frac{3}{26} \\ \frac{6}{26} & \frac{2}{26} & \frac{-1}{26} \end{vmatrix}$$~~

$$\frac{02}{10}$$

$$A^{-1} = \begin{vmatrix} \frac{1}{26} & \frac{1}{26} & \frac{1}{26} \\ \frac{1}{26} & \frac{2}{26} & \frac{3}{26} \\ \frac{6}{26} & \frac{2}{26} & \frac{-1}{26} \end{vmatrix} = \begin{vmatrix} \frac{1}{26} & \frac{1}{26} & \frac{1}{26} \\ \frac{1}{26} & \frac{1}{13} & \frac{3}{26} \\ \frac{6}{26} & \frac{1}{13} & \frac{-1}{26} \end{vmatrix}$$

5.

$$\frac{x+7}{(x-2)(x+1)}$$

$$\frac{A}{(x-2)} + \frac{B}{(x+1)}$$

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

$$\text{let } x = 2$$

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

$$9 = 3A$$

$$A = 3$$

$$\text{let } x = -1$$

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

$$6 = -3B$$

$$3B = -6$$

$$B = -2$$

(10/10)

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

$$\frac{3}{x-2} - \frac{2}{x+1}$$

6.i.

$$x^2 + 11x + 30 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-11 \pm \sqrt{11^2 - (4 \times 1 \times 30)}}{2 \times 1}$$

$$\frac{-11 + \sqrt{11^2 - (4 \times 1 \times 30)}}{2}$$

$$\frac{-11 + \sqrt{121 - 120}}{2} = \frac{-11 + \sqrt{1}}{2}$$

$$x = -5$$

4

$$\frac{-11 - \sqrt{1}}{2} = -6$$

$$x = -5$$

$$x = -6$$

6. ii.

$$x^2 - 11x = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{11 + \sqrt{-11^2 - (4 \times 1 \times 0)}}{2 \times 1} = \frac{11 + \sqrt{121}}{2}$$

$$x = 11$$

(3)

$$\frac{11 - \sqrt{121}}{2} = 0$$

$$x = 11$$

$$x = 0$$

(16
10)

6. iii.

$$x^2 - 4 = 0$$

$$\frac{-0 \pm \sqrt{0^2 - (4 \times 1 \times -4)}}{2}$$

$$\frac{\pm \sqrt{16}}{2}$$

(3)

$$x = 2$$

$$x = -2$$