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Instructions to Candidates:

- Please give the information requested above and enter your name in the space provided at the top right of this page. If your answers are to be marked under a scheme whereby the examiners will not know your identity, fold over and seal down the top right-hand corner of the page (using the gummed label provided) in order to conceal your name.
- Commence each answer on a fresh page.
- Do all rough work in the answer book and cross through it.
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 - be numbered consecutively;
 - be fastened together by the tags available from the invigilator.
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- Your answers must be legibly written **IN INK**. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.

Summary of Marks

Question Numbers Answered	1st Examiner	2nd Examiner (optional)	3rd Examiner (optional)
2	27	30.5	
3	27		
	57.05		
TOTAL			
RESULT			

3 a

$$\begin{array}{rcl} 7x + 4y = 46 & \times 3 & \textcircled{1} \\ 8x + 6y = 57 & \times 2 & \textcircled{2} \end{array}$$

$$\begin{array}{rcl} 21x + 12y = 138 & \textcircled{3} \\ 16x + 12y = 114 & \textcircled{4} \\ \textcircled{3} - \textcircled{4} & & \end{array}$$

$$x = \frac{24}{5} = 4.8$$

$$5x = 24$$

$$x = 5$$

$$\text{Sub } x = \frac{24}{5} \text{ into } \textcircled{1}$$

$$7\left(\frac{24}{5}\right) + 4y = 46$$

$$33\frac{3}{5} + 4y = 46$$

$$4y = 12\frac{2}{5}$$

$$y = 3$$

$$y = \frac{12\frac{2}{5}}{4} = 3\frac{1}{10}$$

3 b

$$3x^2 + 5x - 2 = 0 \quad \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 3$$

$$b = 5$$

$$c = -2$$

$$\frac{-5 \pm \sqrt{(5)^2 - 4 \times 3 \times -2}}{2 \times 3}$$

$$\frac{-5 \pm \sqrt{25 + 24}}{6}$$

$$\frac{-5 \pm \sqrt{49}}{6}$$

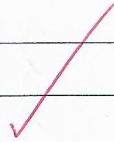
$$x = 0.33$$

$$x = -2.00$$

3 ci

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

$$(x+5)(x+6)$$



1	30
2	15
3	10
5	6

To check

$$(x+5)(x+6)$$

$$x^2 + 6x + 5x + 30$$

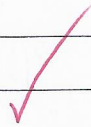
$$x^2 + 11x + 30$$

1

ii

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

$$x(x-11)$$



1	11
---	----

To check

$$x(x-11)$$

$$x^2 - 11x$$

1

iii

$$x^2 - 4 = 0$$

$$(x-2)(x+2)$$

- Difference between 2 Squares

To check

$$(x-2)(x+2)$$

$$x^2 + 2x - 2x - 4$$

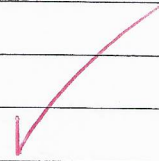
Values of x

3d:

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

$$6x^5 - 12x^4 + 30x^3 - 6x^2$$

$$\frac{dy}{dx} = 30x^4 - 48x^3 + 90x^2 - 12x$$



3

ii

$$y = \frac{7}{x^2} - \frac{4}{x} + 8$$

cross multiply

$$y = 7x - 4x^2 + 8$$



$$\frac{dy}{dx} = 7 - 8x$$



iii

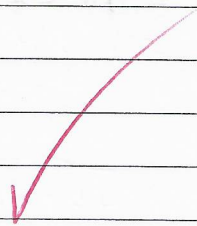
$$y = \frac{\sin x}{\cos x}$$

From trig identities

$$\frac{\sin x}{\cos x} = \tan x$$

$$y = \tan x$$

$$\frac{dy}{dx} = \sec^2(x)$$

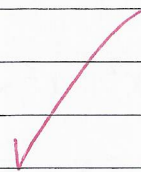


2

3ei

$$y = (2x^2 - 5x + 1)^7$$

$$\frac{dy}{dx} = 7(2x^2 - 5x + 1)^6 (4x - 5)$$



2

ii

$$e^{x^2+4}$$

~~$$\frac{dy}{dx} = x^2 + 4(e)^{x+4}$$~~

$$\frac{dy}{dx} = x^2 + 4(e)^{x+4} (e^{x^2+4})$$



iii

$$\cos^2 2x$$

$$\frac{dy}{dx} = 3(\cos^2 2x) (-2 \sin^2 2x)$$

1

38

sides of Δ

4.5

8.8

12.5

$$\text{area} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{where } s = \frac{a+b+c}{2}$$

$$\frac{4.5 + 8.8 + 12.5}{2} = \frac{25.8}{2}$$

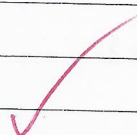
$$s = 12.9$$

$$\sqrt{12.9(12.9-4.5)(12.9-8.8)(12.9-12.5)}$$

$$\sqrt{12.9(8.4)(4.1)(0.4)}$$

$$\sqrt{177.7104}$$

$$\text{area} = 13.33 \text{ cm}^2$$



5

27

2 a i

$$4 - q^2$$

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

difference between 2 squares

2

To check

$$4 + 2q - 2q - q^2$$

ii

$$3ab + 4cd - 6b - 12ad$$

$$3a(a - 4a)$$

See end of paper

iii

$$p^2 - 2p - 63$$

$$(p - 9)(p + 7)$$

$$1 \quad 63$$

$$3 \quad 21$$

$$\boxed{7 \quad 9}$$

3

To check

$$(p - 9)(p + 7)$$

$$p^2 + 7p - 9p - 63$$

$$p^2 - 2p - 63$$

iv

$$q^2 - 4qr$$

$$q(q - 4r)$$

1

To check

$$q(q - 4r)$$

$$q^2 - 4qr$$

26 i

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

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

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

$$66x = 50$$

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

$$x = 0.75$$

0.76

4

ii

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

Cross multiply

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

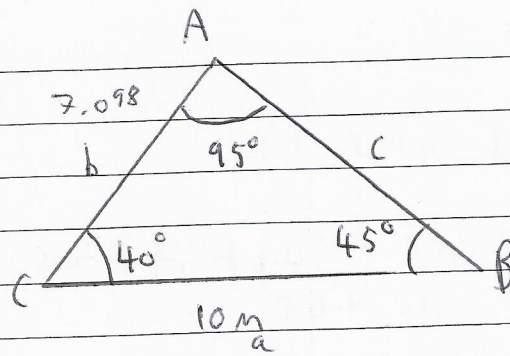
$$3x - 12 = 10x - 5$$

$$-7 = -7x$$

$$x = -1.00$$

3

2 c



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{10}{\sin 95} = \frac{b}{\sin 45} = \frac{c}{\sin 40}$$

$$\frac{10}{\sin 95} = \frac{b}{\sin 45}$$

$$b = \frac{10 \times \sin 45}{\sin 95}$$

$$b = 7.098 \text{ m}$$

$$\frac{10}{\sin 95} = \frac{c}{\sin 40}$$

$$c = \frac{10 \times \sin 40}{\sin 95}$$

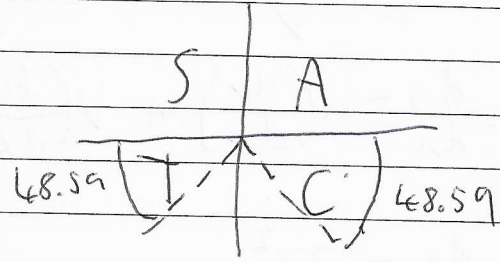
$$c = 6.452 \text{ m}$$

2 di

$$4 \sin x = -3$$

$$\sin x = -\frac{3}{4}$$

$$\sin^{-1}\left(-\frac{3}{4}\right) = 48.59$$



negative number, so negative in Tan and Cos

$$180 + 48.59 = 228.59^\circ$$

$$360 - 48.59 = 311.40^\circ$$

3

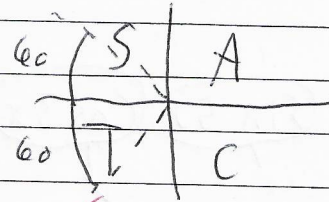
ii

$$\cos x = -0.5$$

$$\cos^{-1}(0.5) = 60$$

$$180 - 60 = 120^\circ$$

$$180 + 60 = 240^\circ$$



2

2ei

$$y = \underbrace{x^3}_u \underbrace{e^{2x}}_v$$

$$\frac{dy}{dx} = u \left(\frac{dv}{dx} \right) + v \left(\frac{du}{dx} \right)$$

$$\frac{du}{dx} = 3x^2$$

$$\frac{dv}{dx} = 2e^{2x}$$

$$\frac{dy}{dx} = x^3(2e^{2x}) + e^{2x}(3x^2)$$

2

ii

$$y = \underbrace{\sin 5x}_u \underbrace{\cos 3x}_v$$

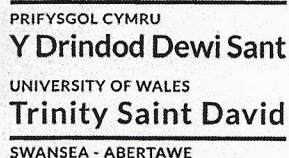
$$\frac{dy}{dx} = u \left(\frac{dv}{dx} \right) + v \left(\frac{du}{dx} \right)$$

$$\frac{du}{dx} = 5 \cos 5x$$

$$\frac{dv}{dx} = -3 \sin 3x$$

$$\frac{dy}{dx} = \sin 5x(-3 \sin 3x) + \cos 3x(5 \cos 5x)$$

2



Question Numbers Answered	1st Examiner	2nd Examiner (optional)	3rd Examiner (optional)
2			
3			
TOTAL			
RESULT			

$$28 \quad Z = 2x^3y - 7y^3x + \sin x \cos y$$

$$\frac{dZ}{dx} = 6x^2y - 7y^3 + \cos x \cos y$$

$$\frac{\partial^2 Z}{\partial x^2} = 12xy - \sin x \cos y \quad (1)$$

$$\frac{\partial^2 Z}{\partial x \partial y} = \cos x (-\sin y) \quad (2)$$

$$\frac{\partial^2 Z}{\partial y^2} = -42yx - \sin x \cos y \quad (3)$$

$$\frac{\partial^2 Z}{\partial x \partial y} = \cos x (-\sin y) \quad (4)$$

$$2a11 \quad 3ab + 4cd - cb - 12ad$$

$$3a(b) + 4(cd) - cb - 4(3ad)$$

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

$$4(d - 3d) + 3(a - 4a) + c(4 - 1) - cb$$

Question No.

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