Name of student:

28
28

Examiners Report

Use the following codes for evaluation:

A : All Good *B : Silly Mistake* *C : Conceptual Error*

D : Hard question *E : Not Applicable*

Question Number	Marks	Remark	Question Number	Marks	Remark	Question Number	Marks	Remark	Question Number	Marks	Remark
1	6/6	A	4	0	E						
2	0	E	5	3/3	E						
3	7/7	A	6	12/12	E						

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Maths Test

Name: Maanya
Start: 08:04
End: 08:47

Q1) $V = 200\text{cm}^3$

$\frac{dV}{dt} = 2\text{cm}^3/\text{s}$

$\frac{dV}{dt} = 10\pi h\left(\frac{dh}{dt}\right) - \pi h^2\left(\frac{dh}{dt}\right)$ M1A1

$\frac{dh}{dt}(10\pi h - \pi h^2) = \frac{dV}{dt}$ A1

$\frac{dh}{dt} = \frac{2}{10\pi h - \pi h^2}$

$200 = 5\pi h^2 - \frac{1}{3}\pi h^3$ M1

$h = 4.206...$ A1

$\frac{dh}{dt} = 0.026122...$

$\approx 0.0261\ \text{cms}^{-1}$ A1

6/6

Q2) N/A

Q3) a) $\angle HPQ = \theta$ $\quad \frac{dh}{dt} = 10\ \text{ms}^{-1}$

$\tan\theta = \frac{h}{40}$

$\sec^2\theta\left(\frac{d\theta}{dt}\right) = \frac{1}{40} \times \left(\frac{dh}{dt}\right)$ M1

$\frac{d\theta}{dt} = \frac{1}{4\sec^2\theta}$ A1

$\tan\theta = \frac{30}{40}$

$\theta = \arctan\frac{30}{40}$

$= 0.643501108$

$\frac{d\theta}{dt} = \frac{1}{4}\sec^2 0.643501108$

$\sec\theta = \frac{1}{\cos\theta} = \frac{1}{\frac{4}{5}} = \frac{5}{4}$

$\frac{d\theta}{dt} = \frac{16}{4(25)}$

$= 0.16\ \text{rads}^{-1}$ AG

b) $\frac{dh}{dt} = 10$ $\frac{dx}{dt} = ?$

$x^2 = 40^2 + h^2$

$2x\left(\frac{dx}{dt}\right) = 2h\left(\frac{dh}{dt}\right)$ M1

$\frac{dx}{dt} = \frac{20h}{2x}$

$\frac{dx}{dt} = \frac{10h}{x}$ A1

$x = \sqrt{h^2 + 1600}$ A1

$= 50$

$\frac{dx}{dt} = \frac{10 \times 30}{50}$

$= \frac{30}{5}$

$= 6\ ms^{-1}$ A1

7/7

Q4) N1A

Q5)

a) $\frac{dx}{d\theta} = \frac{dx}{dt} \times \frac{dt}{d\theta}$ A1

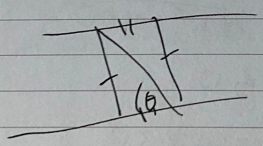
$= \frac{dx}{dt} \div \frac{d\theta}{dt}$

$= \frac{-250}{0.075}$

$= -3333.\overline{33}$

$\approx \frac{-10000}{3}$ AG

b)



$\tan\theta = \frac{3000}{x}$

$x(\theta) = \frac{3000}{\tan\theta}$ A1

c) N/A

d) N/A

3/3

Q6)

a)

(i) $x - 3$ A1

(ii) $xw = 1200$

$w = \frac{1200}{x}$ M1

$\frac{1200}{x} - 4$ A1

(iii) $A = xw$

$= (x-3)\left(\frac{1200}{x} - 4\right)$ A1

$= 1200 - 4x - \frac{3600}{x} + 12$ A1

$= 1212 - 4x - \frac{3600}{x}$

b) $1212 - 4x - \frac{3600}{x} = 800$ M1

[Using GDC]

$x = 9.64\,m$ $w = 124\,m$ A1A1

$x = 93.4$ $w = 12.9\,m$ A1

c) $\frac{dA}{dx} = -4 + \frac{3600}{x^2}$ A1A1A1

d) N/A maximize?

e) N/A

12/12

Total Attempted marks = 28 marks