

Janice 16/10

Mudgee High School

Year 12 2010 HSC

Assessment Task 4

Mathematics

$$\frac{40\frac{1}{2}}{48}$$

$$\frac{43\frac{1}{2}}{48}$$

Time allowed : 70 minutes plus reading time.

Instructions for candidates:

- ◆ **Attempt all questions**
- ◆ **Answer questions on your own paper**
- ◆ **Start each question (number) on a NEW SHEET OF PAPER**
- ◆ **Show all working**
- ◆ **Write your name on every answer page and your question booklet**
- ◆ **Number questions clearly**
- ◆ **Hand in all of your work, in order, as one bundle**

Question 1**Marks**

- (a) Change $\frac{\pi}{4}$ to degrees. 1
- (b) Convert 225° to radians in terms of π . 1
- (c) Find the exact area of the minor segment formed if an angle of $\frac{\pi}{4}$ is subtended at the centre of a circle of radius 10 cm 2
- (d) Evaluate $\lim_{\theta \rightarrow 0} \frac{\sin \frac{\theta}{4}}{\theta}$ 2
- (e) Solve $\cos x = -\frac{\sqrt{3}}{2}$ for $0 \leq x \leq 2\pi$ 2
- (f) The area of the sector of a circle with radius 4 cm is $\frac{6\pi}{5} \text{ cm}^2$. Find the angle, in radians, that is subtended at the centre of the circle. 2
- (g) The arc length when a sector of a circle is subtended by an angle of $\frac{\pi}{5}$ at the centre is $\frac{4\pi}{5}$ m. Find the radius of the circle. 2

END OF QUESTION 1

Question 2**Marks**

- (a) Sketch (i) $y = 3 \cos x$ for $0 \leq x \leq 2\pi$ 2
- (ii) $y = 1 - \sin 4x$ for $0 \leq x \leq \pi$ 2
- Clearly showing amplitude and intercepts.

- (b) Differentiate (i) $\tan 4x$ 1
(ii) $2 \cos^2 3x$ 2
- (c) Find (i) $\int 4 \sin \frac{x}{2} dx$ 1
(ii) $\int_0^{\frac{\pi}{16}} \sec^2 4x dx$ 2
- (d) Find the volume, correct to 2 decimal places, of the solid formed when the curve $y = \sec \pi x$ is rotated about the x-axis from $x = 0$ to $x = 0.2$ 2

END OF QUESTION 2

Question 3

Marks

- (a) Evaluate $\log_5 \frac{1}{125}$ 1
- (b) Solve $6^{x-4} = 10$, correct to 2 decimal places 2
- (c) Given $\log_6 4 = 0.77$ and $\log_6 5 = 0.90$, find:
(i) $\log_6 20$ 2
(ii) $\log_6 16$ 2
(iii) $\log_6 24$ 2
- (d) Find the equation of the normal to the curve $y = e^{2x}$ at the point where $x = 2$, in exact form. 3

END OF QUESTION 3

Question 4**Marks**

- (a) Differentiate (i) e^{2x-6} 1
- (ii) $1 - \log_e 4x$ 1
- (iii) $\log_e(x^3 + x)$ 1
- (iii) $\frac{\log_e x}{e^x}$ 2
- (b) Evaluate in exact form $\int_0^2 (e^{2x} + 1) dx$ 2
- (c) Evaluate $\int_1^5 \frac{x^2}{x^3+2} dx$ 2
- (d) Show that $\frac{x-8}{x^2-x-6} = \frac{2}{x+2} - \frac{1}{x-3}$.
- Hence find $\int \frac{x-8}{x^2-x-6} dx$ in fully simplified form using log laws. 3

END OF QUESTION 4