

Pearson Edexcel A Level Mathematics 9MA0

Unit Test 8 Differentiation

Time allowed: 50 minutes

School: www.CasperYC.club

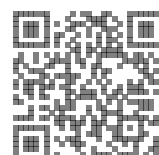
Name:

Teacher:

How I can achieve better:

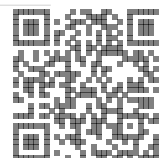
-
-
-

| Question | Points | Score |
|----------|--------|-------|
| 1 | 6 | |
| 2 | 8 | |
| 3 | 6 | |
| 4 | 5 | |
| 5 | 5 | |
| 6 | 8 | |
| 7 | 6 | |
| 8 | 2 | |
| 9 | 4 | |
| Total: | 50 | |



[4]

[2]



The soldier is thrown into the air from ground level.

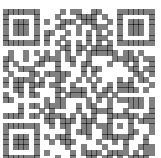
$$H = \frac{4t^{\frac{2}{3}}}{t^2 + 1} \quad 0 \leq t \leq 6s$$

(a) Show that

$$\frac{dH}{dt} = \frac{8(1 - 2t^2)}{3\sqrt[3]{t}(t^2 + 1)^2}$$

(c) Find the exact time when the soldier reaches a maximum height.

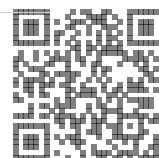
Total: 8



[6]

Show that the equation of the tangent at the point with an x -coordinate of 1 is

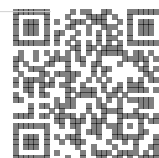
$$y = \left(\frac{e^2 + 2}{e^2}\right)x - \left(\frac{e^2 + 3}{e^2}\right) + \ln(3).$$



(a) $\frac{dy}{dx}$ in terms of y . [2]

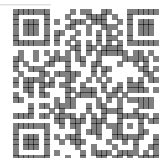
$$\frac{dy}{dx} = \frac{k}{x\sqrt{x^2 - 1}}$$

Total: 5



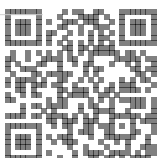
[5]

Find the exact value of $\frac{dy}{dx}$ at the point C with coordinates $(2, 4)$.



$$x = \cos(2t), \quad \text{and} \quad y = \sin(t), \quad -\pi \leq t \leq \pi.$$

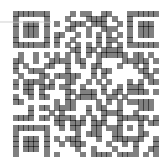
- (a) Find an expression for $\frac{dy}{dx}$ in terms of t . [3]
- Leave your answer as a single trigonometric ratio.
- (b) Find an equation of the normal to the curve at the point A where $t = -\frac{5\pi}{6}$. [5]



(a) Show that C is concave on the interval $[-5, -3]$. [3]

(b) Find the coordinates of the point of inflection. [3]

Total: 6

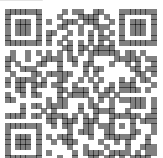


8. In a rainforest, the area covered by trees, F , has been measured every year since 1990.

[2]

It was found that the rate of loss of trees is proportional to the remaining area covered by trees.

Write down a differential equation relating F to t , where t is the numbers of years since 1990.



- The surface area of the sphere is also related to the radius by the formula $S = 4\pi r^2$.

Given that the rate of decrease in surface area, in cm^2s^{-1} , is $\frac{dS}{dt} = -12$, find the rate of decrease of volume $\frac{dV}{dt}$.

