

AS Level Mathematics B (MEI)
H630/02 Pure Mathematics and Statistics

Question Set 5

- 1 Solve the inequality $2x+5 < 6x-3$. [2]
- 2 Use integration to show that the area bounded by the x -axis and the curve with equation $y = (x-1)^2(x-3)$ is $\frac{4}{3}$ square units. [6]
- 3 **In this question you must show detailed reasoning.**
 A circle has centre $(2, -1)$ and radius 5.
 A straight line passes through the points $(1, 1)$ and $(9, 5)$.
 Find the coordinates of the points of intersection of the line and the circle. [8]
- 4 **In this question you must show detailed reasoning.**
 Solve the equation $3 \cos \theta + 8 \tan \theta = 0$ for $0^\circ < \theta < 360^\circ$, giving your answers correct to the nearest degree. [6]
- 5 The equation of a curve is $y = 24\sqrt{x} - 8x^{\frac{3}{2}} + 16$.
- (a) Find $\frac{dy}{dx}$. [3]
- (b) Find the coordinates of the turning point. [3]
- (c) Determine the nature of the turning point. [2]
- 6 A car is travelling along a stretch of road at a steady speed of 11 ms^{-1} .
 The driver accelerates, and t seconds after starting to accelerate the speed of the car, V , is modelled by the formula
 $V = A + B(1 - e^{-0.17t})$.
 When $t = 3$, $V = 13.8$.
- (a) Find the values of A and B , giving your answers correct to 2 significant figures. [3]
 When $t = 4$, $V = 14.5$ and when $t = 5$, $V = 14.9$.
- (b) Determine whether the model is a good fit for these data. [2]
- (c) Determine the acceleration of the car according to the model when $t = 5$, giving your answer correct to 3 decimal places. [2]
 The car continues to accelerate until it reaches its maximum speed.
 The speed limit on this road is 60 kmh^{-1} . All drivers who exceed this speed limit are recorded by a speed camera and automatically fined £100.
- (d) Determine whether, according to the model, the driver of this car is fined £100. [3]

Total Marks for Question Set 5: 40 marks

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