



Year 11 Mathematics
Preliminary ASSESSMENT TASK 3
TERM 2 Week 6 2003

Set by: SM

Tuesday 3rd June, 2003

- Attempt **ALL** questions.
- Marks may be deducted for careless, insufficient, or illegible work.
- Calculators may be used.
- Begin a new sheet of paper when you are instructed to do so on the paper.
- Not all questions are of equal value.
- Total possible mark is 60.

TIME ALLOWED: 80 minutes

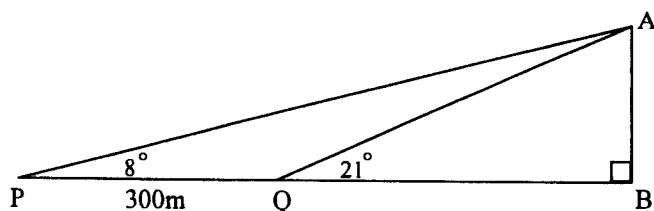
Question 1 :

- (a) Evaluate $\sin 63^\circ 47'$ to 3 decimal places. [1]
- (b) Given that $\tan \theta = \frac{1}{4}$ and that θ is acute, find the exact value of $\cos \theta$ and $\operatorname{cosec} \theta$. [2]
- (c) Find the value of θ if $\sin(\theta + 25^\circ) = \cos 35^\circ$ [2]
- (d) Simplify the expression, $\frac{\operatorname{cosec} 10^\circ}{\sec 80^\circ}$ [1]
- (e) Show that the expression $\frac{\sin 45^\circ}{\cos 30^\circ \cdot \tan 60^\circ} = \frac{\sqrt{2}}{3}$ [3]
- (f) Find the equivalent acute angle expression for $\cos 200^\circ$. [2]
- (g) If $\cos \theta = -\frac{2}{5}$ and $\sin \theta < 0$, find the exact value of $\tan \theta$. [2]
- (h) Solve the following trigonometric equations given that $0^\circ \leq \theta \leq 360^\circ$. Where necessary, give your answer to the nearest degree.
- | | |
|----------------------------------|---|
| (i) $\tan \theta = -\frac{2}{5}$ | (iii) $\cos^2 \theta = \frac{3}{4}$ [2,2] |
| (ii) $2\sin 2\theta = 1$ | (iv) $\sin \theta = 0$ [2,1] |

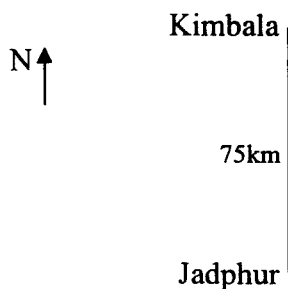
Question 2 : (BEGIN A NEW PAGE)

- (a) Simplify the expression, $\cot \theta \sin \theta$. [1]
- (b) Simplify the expression, $\sec \theta \operatorname{cosec} \theta \tan \theta$. [2]
- (c) Prove that $\tan^2 \theta \cos \theta + \cos \theta = \sec \theta$ [3]

- (d) From position P, John finds the angle of elevation of the top of a tower, AB, to be 8° . After walking 300m directly towards the tower to point Q, he finds the angle of elevation to be 21° .



- (i) Explain why $\angle PAQ = 13^\circ$. [1]
- (ii) Calculate the length of AQ (to 1 decimal place) [3]
- (iii) Find the height of the tower to the nearest metre. [2]
- (e) Jadphur is a town 75km directly south of the town Kimbala, as shown on the diagram. The town Lati is 50km from Kimbala on a bearing of 125° .
- (i) Copy the diagram below and mark in the position of Lati. There should be at least one angle on your diagram [2]



- (ii) Find the distance of Lati to Jadphur to the nearest kilometre. [3]
- (f) (i) On the same set of axes, sketch the graphs of $y = \sin x$ and $y = \tan x$ for $0^\circ \leq x \leq 360^\circ$. [2]
- (ii) By using your graph, or otherwise, predict the number of solutions to the equation $\sin x = \tan x$ for $0^\circ \leq \theta \leq 360^\circ$. [2]

Question 3 : (BEGIN A NEW PAGE)

(a) If $y = 5$, find $\frac{dy}{dx}$. [1]

(b) Find the derivatives of the following functions

(i) $y = 4x^4 - 3x^2 + x - 1$ [1]

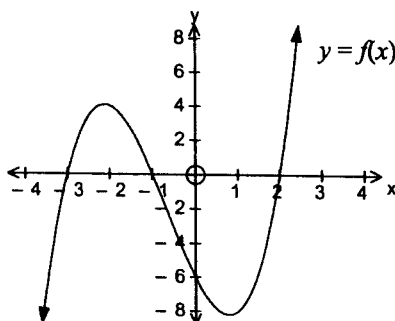
(ii) $y = \frac{1}{x} - \frac{3}{x^2}$ [2]

(iii) $y = \sqrt[3]{x^2}$ [2]

(c) Find the gradient of the tangent to the graph of $y = x^3 - 2x^2 - 1$ at the point where $x = 2$. [2]

(d) Find the equation of the normal to the graph of $y = \frac{x^2}{2} - 1$ at the point where $x = -5$ [4]

(e) The graph of the function $y = f(x)$ is shown below.



(i) Copy the diagram onto your answer sheet and on the same axes, sketch $y = f'(x)$. [2]

(ii) For what values(s) of x is $f'(x) < 0$? [2]

(f) Consider the function $f(x) = \frac{1}{3}x^3 - 2x^2 + 1$. For what value(s) of x is the tangent to the curve horizontal ? [3]

END OF TASK