Year 2 **Pure Mathematics Examination Revision : Health Check N° 6**

Your Prescription Is Attached

Any solution based entirely on graphical
or numerical methods is not acceptable

Marks Available : 30

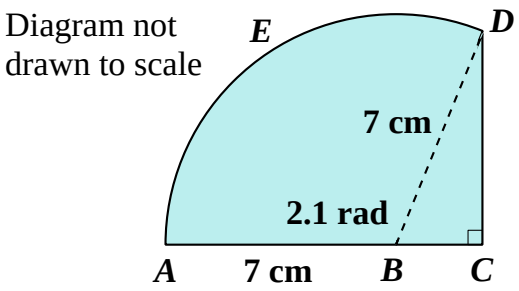
Question 1

Differentiate $\frac{x^4}{\cos 3x}$ with respect to x

[4 marks]

Question 2

A-Level Examination Question from May 2014, Paper C2, Q5 (Edexcel)



The diagram shows the shape *ABCDEA* which consists of a right-angled triangle *BCD* joined to a sector *ABDEA* of a circle with radius 7 cm and centre .
A, *B* and *C* lie on a straight line with *AB* = 7 cm.
Given that the size of angle *ABD* is exactly 2.1 radians,

(a) find, in cm, the length of the arc *DEA*

[2 marks]

(b) find, in cm, the perimeter of the shape *ABCDEA*, giving your answer to 1 decimal place

[4 marks]

Question 3

(a) Express $12\sin x + 5\cos x$ in the form $R\sin(x + \alpha)$, where R and α are constants $R > 0$ and $0 < \alpha < 90°$. Round α to 1 decimal place.

[4 marks]

A runner's speed, v in m/s, in an endurance race can be modelled by the equation,

$$v(x) = \frac{50}{12\sin\left(\frac{2x}{5}\right)° + 5\cos\left(\frac{2x}{5}\right)°}, \quad 0 \leqslant x \leqslant 300$$

where x is the time in minutes since the beginning of the race.

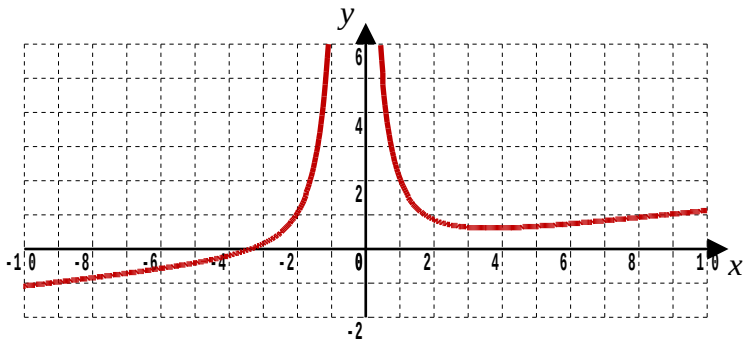
(b) Find the minimum value of v

[2 marks]

(c) Find the time into the race when this speed occurs.

[1 mark]

Question 4



The graph is of the function,

$$f(x) = \frac{32}{(3x + 1)^2} + \frac{x}{9}$$

Find the exact value of x at the minimum point.

[4 marks]

Question 5

A-Level Examination Question from June 2017, Paper C3, Q9 (Edexcel)

(a) Prove that $\sin 2x - \tan x = \tan x \cos 2x, \qquad x \neq (2n + 1)90°, \; n \in \mathbb{Z}$

[4 marks]

(b) Given that $x \neq 90°$ and $x \neq 270°$, solve, for $0 \leqslant x < 360°$

$$\sin 2x - \tan x = 3 \tan x \sin x$$

Give your answers in degrees to one decimal place where appropriate.

[5 marks]