Trigonometry – 2021/20 GCE AS Mathematics A

1. Oct/2021/Paper_H230/01/No.1

In the triangle ABC, $AB = 3$, $BC = 4$ and angle $ABC = 30°$. Find the following.

(a) The area of the triangle. **[2]**

(b) The length AC. **[2]**

(c) The angle ACB. **[3]**

2. Oct/2021/Paper_H230/02/No.5

(a) Show that the equation $2\cos x \tan^2 x = 3(1+\cos x)$ can be expressed in the form

$5\cos^2 x + 3\cos x - 2 = 0$. **[3]**

(b) **In this question you must show detailed reasoning.**

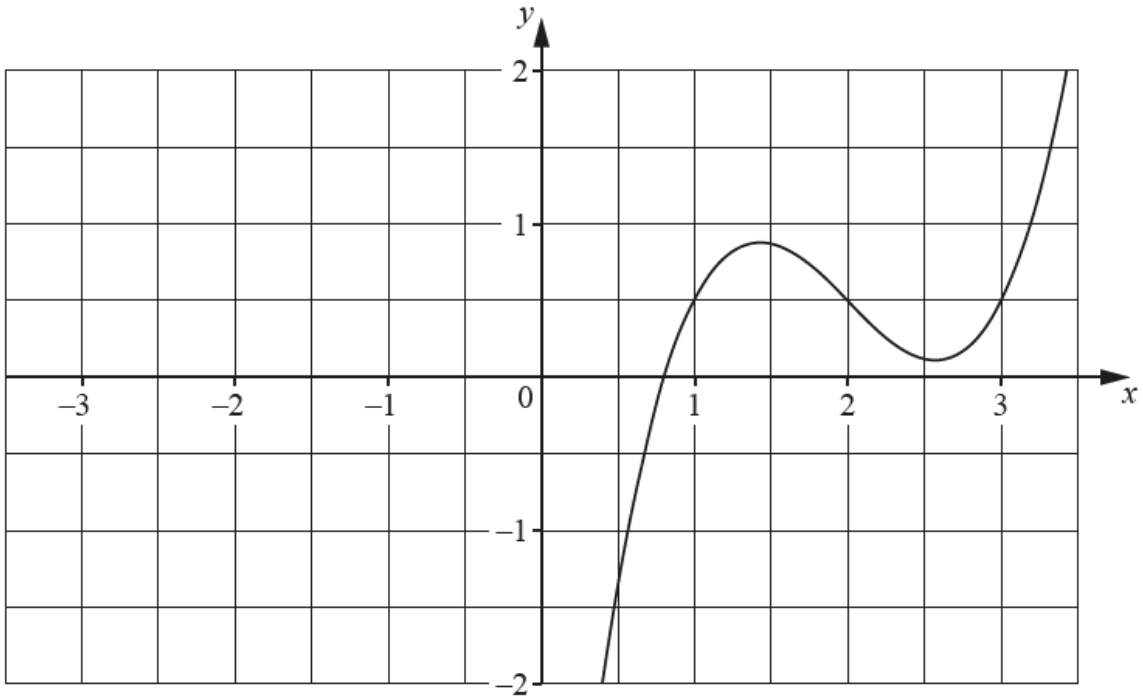
Hence solve the equation

$2\cos 3\theta \tan^2 3\theta = 3(1+\cos 3\theta)$,

giving all values of θ between 0° and 120°, correct to **1** decimal place where appropriate. **[6]**

3. Oct/2020/Paper_H230/01/No.3

The diagram shows the curve $y = \mathrm{f}(x)$, where $\mathrm{f}(x)$ is a cubic polynomial in x.
This diagram is repeated in the Printed Answer Booklet.



(a) State the values of x for which $\mathrm{f}(x) < \frac{1}{2}$, giving your answer in set notation. **[3]**

(b) On the diagram in the Printed Answer Booklet, draw the graph of $y = \mathrm{f}(-x)$. **[2]**

(c) Explain how you can tell that $\mathrm{f}(x)$ cannot be expressed as the product of three real linear factors. **[1]**

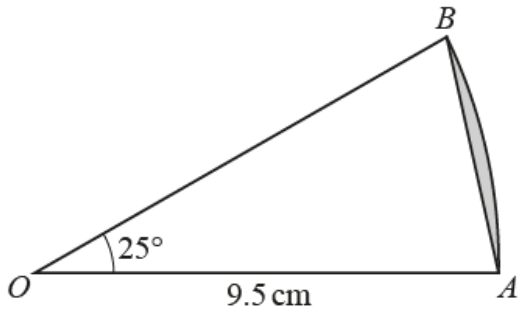
4. Oct/2020/Paper_H230/01/No.3

In this question you must show detailed reasoning.

(a) Solve the equation $4\sin^2\theta = \tan^2\theta$ for $0° \leqslant \theta \leqslant 180°$. **[5]**

(b) Prove that $\dfrac{\sin^2\theta - 1 + \cos\theta}{1 - \cos\theta} \equiv \cos\theta \quad (\cos\theta \neq 1)$. **[3]**

5. Oct/2020/Paper_H230/02/No.1



The diagram shows a sector AOB of a circle with centre O and radius 9.5 cm. The angle AOB is 25°.

(a) Calculate the length of the straight line AB. **[2]**

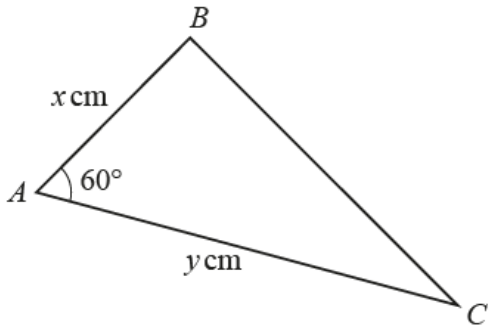
(b) Find the area of the segment shaded in the diagram. **[3]**

6. June/2019/Paper_H230/01/No.3(b)

The polynomial $f(x)$ is defined by $f(x) = 2x^3 + 3x^2 - 8x + 3$.

(b) Hence solve the equation $2\sin^3\theta + 3\sin^2\theta - 8\sin\theta + 3 = 0$ for $0° \leqslant \theta < 360°$. **[5]**

7. June/2019/Paper_H230/01/No.6



The diagram shows triangle ABC, with $AB = x$ cm, $AC = y$ cm and angle $BAC = 60°$. It is given that the area of the triangle is $(x+y)\sqrt{3}$ cm^2.

(a) Show that $4x+4y = xy$. **[2]**

When the vertices of the triangle are placed on the circumference of a circle, AC is a diameter of the circle.

(b) Determine the value of x and the value of y. **[4]**

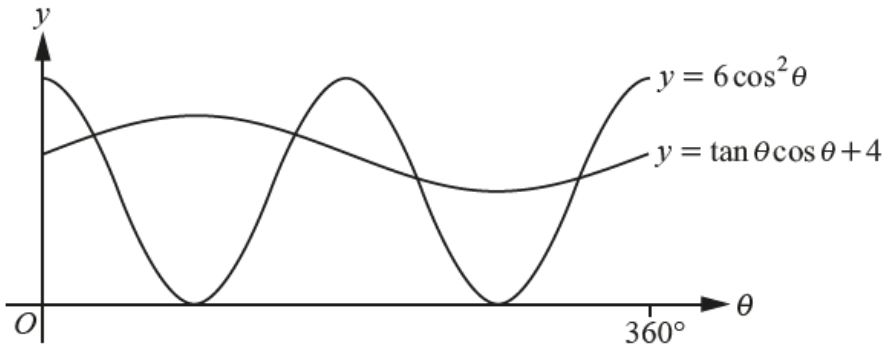
8. June/2019/Paper_H230/02/No.6

In this question you must show detailed reasoning.

(a) Show that the equation $6\cos^2\theta = \tan\theta\cos\theta + 4$

can be expressed in the form $6\sin^2\theta + \sin\theta - 2 = 0$. **[2]**

(b)



The diagram shows parts of the curves $y = 6\cos^2\theta$ and $y = \tan\theta\cos\theta + 4$, where θ is in degrees.

Solve the inequality $6\cos^2\theta > \tan\theta\cos\theta + 4$ for $0° < \theta < 360°$. **[5]**