

L6 Mathematics Mock

Paper 2 (Teacher Y)

January 2019

2018-2019

Duration: 1 hour

Total number of marks: 47

Write your answers on file paper.

You are permitted to use a scientific or graphical calculator in this paper.

Final answers should be given to a degree of accuracy appropriate to the context.

Relevant information from the formula booklet is given below:

Formulae

AS Level Mathematics A (H230)

Binomial series

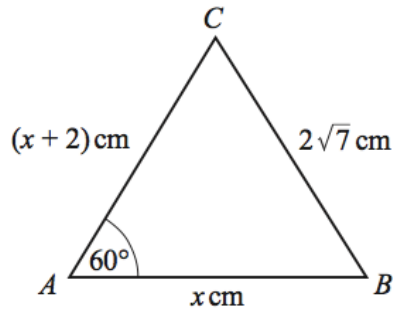
$$(a+b)^n = a^n + {}^n C_1 a^{n-1}b + {}^n C_2 a^{n-2}b^2 + \dots + {}^n C_r a^{n-r}b^r + \dots + b^n \quad (n \in \mathbb{N}),$$

$$\text{where } {}^n C_r = \binom{n}{r} = \frac{n!}{r!(n-r)!}$$

Differentiation from first principles

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

1.



The diagram shows triangle ABC , with $AB = x$ cm, $AC = (x + 2)$ cm, $BC = 2\sqrt{7}$ cm and angle $CAB = 60^\circ$.

(i) Find the value of x . [4]

(ii) Find the area of triangle ABC , giving your answer in an exact form as simply as possible. [2]

2. Consider the function $f(x) = 15x^3 - 47x^2 + kx + 8$.

(a) Given that $x - 2$ is a factor of $f(x)$, find the value of k . [2]

(b) Use polynomial division to find $f(x) \div (x - 2)$. [2]

(c) Hence, or otherwise, state the solutions to the equation $f(x) = 0$ [3]

3. Shaded the region defined by the inequalities $5 + 2x - 3x^2 \geq 0$ and $x > 1$.

[5]

4.

Solve the simultaneous equations

$$x^2 + y^2 = 34, \quad 3x - y + 4 = 0.$$

[5]

5.

(i) Sketch the curve $y = x^2(3 - x)$ stating the coordinates of points of intersection with the axes. [3]

(ii) The curve $y = x^2(3 - x)$ is translated by 2 units in the positive direction parallel to the x -axis. State the equation of the curve after it has been translated. [2]

(iii) Describe fully a transformation that transforms the curve $y = x^2(3 - x)$ to $y = \frac{1}{2}x^2(3 - x)$. [2]

6. (a) Find the first four terms in the expansion of $(2 - 3x)^6$ in increasing powers of x . [5]
- (b) Hence find the term in x^2 in the expansion of $(1 + 4x)(2 - 3x)^6$ [2]

7.

The circle $x^2 + y^2 - 8x + 2y = 0$ passes through the origin O. Line OA is a diameter to this circle.

- (i) Find the equation of the line OA, giving your answer in the form $ax + by = 0$, where a and b are integers. [5]
- (ii) The tangent to the circle at point A meets the x -axis at the point B. Find the area of triangle OAB. [6]