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Surname

Other names

Pearson Edexcel
International GCSE

Centre Number

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Candidate Number

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Further Pure Mathematics

Level 2
Paper 2



Sample assessment material for first teaching September 2017

Time: 2 hours

Paper Reference

4PM1/02**Calculators may be used.**

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain **NO** credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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International GCSE in Further Pure Mathematics Formulae sheet

MensurationSurface area of sphere = $4\pi r^2$ Curved surface area of cone = $\pi r \times$ slant heightVolume of sphere = $\frac{4}{3}\pi r^3$ **Series****Arithmetic series**Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$ **Geometric series**Sum to n terms, $S_n = \frac{a(1-r^n)}{(1-r)}$ Sum to infinity, $S_\infty = \frac{a}{1-r}$ $|r| < 1$ **Binomial series** $(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{r!}x^r + \dots$ for $|x| < 1, n \in \mathbb{Q}$ **Calculus****Quotient rule (differentiation)**

$$\frac{d}{dx} \left(\frac{f(x)}{g(x)} \right) = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

Trigonometry**Cosine rule**In triangle ABC : $a^2 = b^2 + c^2 - 2bc \cos A$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A-B) = \sin A \cos B - \cos A \sin B$$

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$

$$\cos(A-B) = \cos A \cos B + \sin A \sin B$$

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

Logarithms

$$\log_a x = \frac{\log_b x}{\log_b a}$$

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3 O , A and B are fixed points such that

$$\vec{OA} = 4\mathbf{i} + 3\mathbf{j} \quad \vec{OB} = 8\mathbf{i} + p\mathbf{j} \quad \text{and} \quad |\vec{AB}| = 2\sqrt{13}$$

(a) Find the possible values of p .

(3)

Given that $p > 0$

(b) find a unit vector parallel to \vec{AB}

(2)

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(Total for Question 3 is 5 marks)

Question 4 continued

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(Total for Question 4 is 10 marks)

Question 5 continued

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(Total for Question 5 is 7 marks)

Question 6 continued

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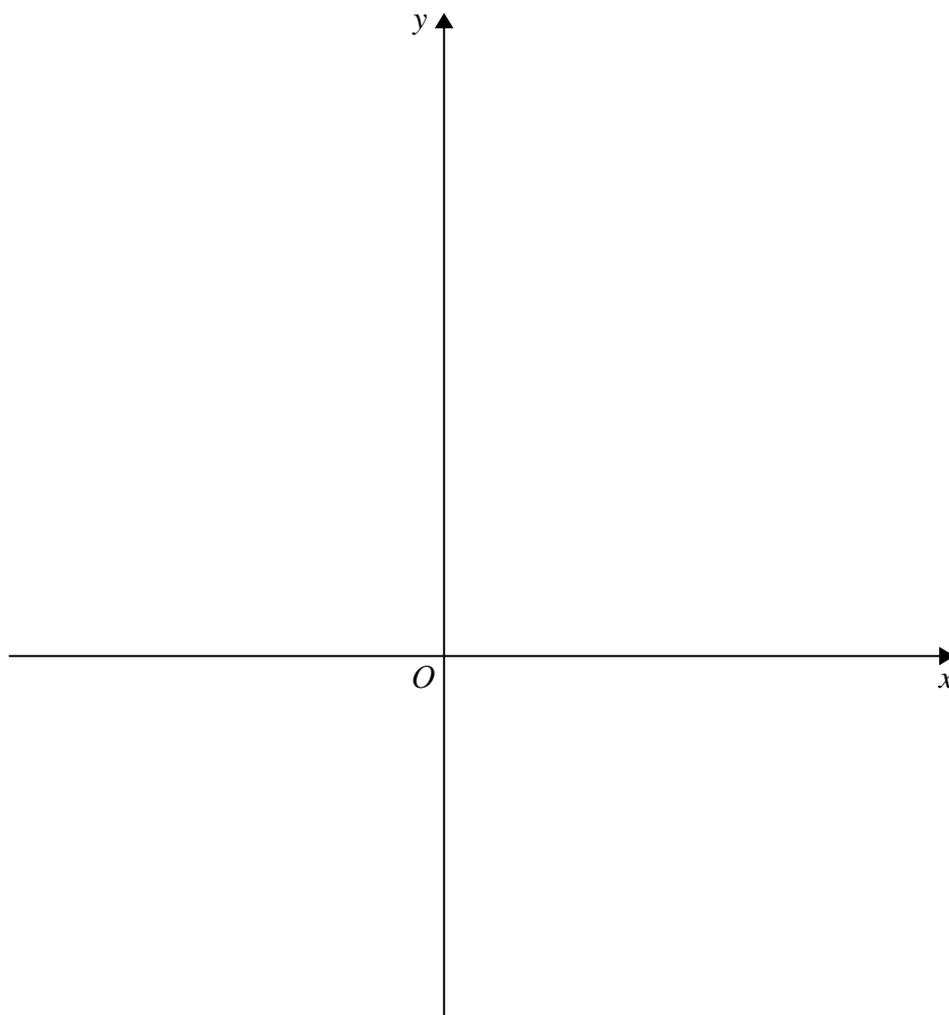
(Total for Question 6 is 7 marks)

7 The curve C with equation

$$y = \frac{ax - 5}{x - b}$$

where a and b are integers, crosses the x -axis at the point $(2.5, 0)$. The asymptote to C which is parallel to the y -axis has equation $x = 1$

- (a) (i) Show that $a = 2$ (3)
- (ii) Find the value of b . (1)
- (b) Find the coordinates of the point where C crosses the y -axis. (1)
- (c) Find the equation of the asymptote to C which is parallel to the x -axis. (1)
- (d) Using the axes below, sketch the curve C showing clearly the asymptotes and the coordinates of the points where C crosses the coordinate axes. (3)



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Question 7 continued

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(Total for Question 7 is 8 marks)

Question 8 continued

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(Total for Question 8 is 11 marks)

Question 9 continued

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Question 9 continued

A large rectangular area with rounded corners, containing 25 horizontal dotted lines for writing.

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Question 9 continued

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(Total for Question 9 is 13 marks)

10

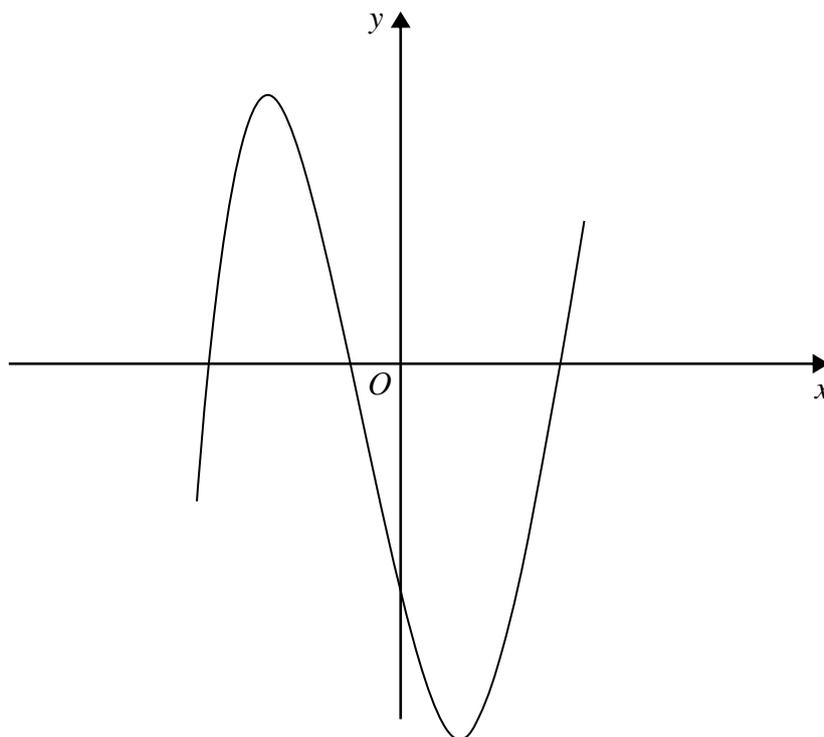


Figure 1

Figure 1 shows the curve M with equation $y = x^3 - 13x - 12$

The point P , with x coordinate -2 , lies on M and line l_1 is the tangent to M at the point P .

(a) Find an equation for l_1 (5)

The point Q lies on M and the line l_2 is the tangent to M at the point Q .

Given that l_1 and l_2 are parallel,

(b) find an equation for l_2 (4)

The normal to M at P meets l_2 at the point R .

(c) Find the coordinates of R . (4)

(d) Find the exact length of the line PR . (2)

The tangent and normal at P and the tangent and normal at Q form a rectangle.

(e) Find the exact area of this rectangle. (3)

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Question 10 continued

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Question 10 continued

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(Total for Question 10 is 18 marks)

Question 11 continued

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Question 11 continued

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(Total for Question 11 is 11 marks)

TOTAL FOR PAPER IS 100 MARKS

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