



National  
Qualifications

X847/77/11

Mathematics  
Paper 1 (Non - Calculator)

## Marking Instructions

Please note that these marking instructions have not been standardised based on candidate responses. You may therefore need to agree within your centre how to consistently mark an item if a candidate response is not covered by the marking instructions.



**Marking instructions for each question**

Question		Generic scheme	Illustrative scheme	Max mark
1.	(a)	<ul style="list-style-type: none"> <li>•<sup>1</sup> evidence use of product rule</li>   <li>•<sup>2</sup> complete differentiation</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>3x^2(\dots) + \dots</math></li>   <b>OR</b>   <math>\dots + 5e^{5x}(\dots)</math></ul> <ul style="list-style-type: none"> <li>•<sup>2</sup> <math>3x^2 e^{5x} + 5x^3 e^{5x}</math></li> </ul>	2
	(b)	<ul style="list-style-type: none"> <li>•<sup>3</sup> evidence use of quotient rule with denominator and one term of the numerator correct</li>   <li>•<sup>4</sup> complete differentiation</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>3</sup> <math display="block">\frac{(x^6 + 1)\sec^2 x - \dots}{(x^6 + 1)^2}</math></li>   <b>OR</b>   <math display="block">\frac{\dots - 6x^5 \tan x}{(x^6 + 1)^2}</math></ul> <ul style="list-style-type: none"> <li>•<sup>4</sup> <math display="block">\frac{(x^6 + 1)\sec^2 x - 6x^5 \tan x}{(x^6 + 1)^2}</math></li> </ul>	2

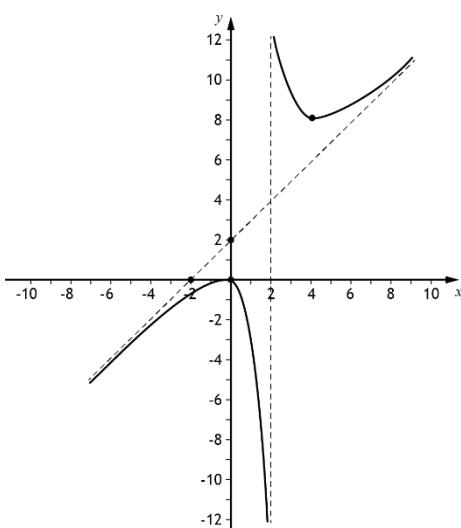
Question		Generic Scheme	Illustrative Scheme	Max Mark
2.	(a)	<ul style="list-style-type: none"> <li>•<sup>1</sup> state the transpose of <math>B</math></li>   <li>•<sup>2</sup> calculate <math>AB'</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>B' = \begin{pmatrix} 4 &amp; 2 &amp; -2 \\ 0 &amp; 3 &amp; 1 \end{pmatrix}</math></li>   <li>•<sup>2</sup> <math>\begin{pmatrix} -8 &amp; 8 &amp; 8 \\ -12 &amp; 15 &amp; 13 \end{pmatrix}</math></li> </ul>	2
	(b)	<ul style="list-style-type: none"> <li>•<sup>3</sup> calculate the determinant of <math>A</math></li>   <li>•<sup>4</sup> find the inverse of <math>A</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>3</sup> <math>\det A = -2</math></li>   <li>•<sup>4</sup> <math>\frac{1}{2} \begin{pmatrix} -7 &amp; 4 \\ -3 &amp; 2 \end{pmatrix}</math></li> </ul>	2

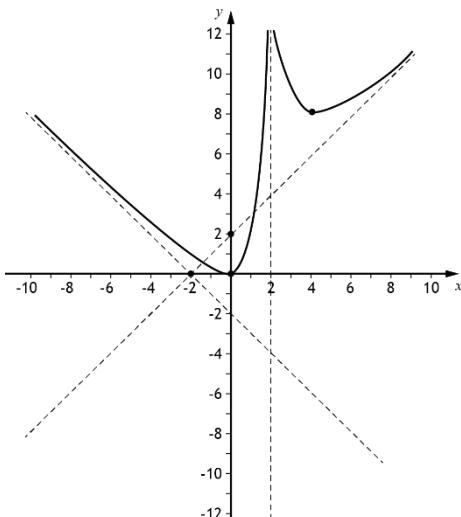
Question		Generic scheme	Illustrative scheme	Max mark
3.		<ul style="list-style-type: none"> <li>•<sup>1</sup> rewrite integral</li>   <li>•<sup>2</sup> integrate and rewrite in terms of <math>\theta</math>, including constant of integration</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\int u^3 du</math></li>   <li>•<sup>2</sup> <math>\frac{1}{4} \sin^4 \theta + c</math></li> </ul>	2

Question		Generic scheme	Illustrative scheme	Max mark
4.		<ul style="list-style-type: none"> <li>•<sup>1</sup> set up augmented matrix</li> <li>•<sup>2</sup> obtain two zeros <sup>1</sup></li> <li>•<sup>3</sup> complete row operations <sup>1</sup></li> <li>•<sup>4</sup> write down value of <math>\lambda</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math display="block">\left( \begin{array}{ccc c} 1 &amp; 2 &amp; 1 &amp; 5 \\ 3 &amp; -1 &amp; 2 &amp; 4 \\ -2 &amp; 3 &amp; \lambda &amp; -8 \end{array} \right)</math></li> <li>•<sup>2</sup> eg <math display="block">\left( \begin{array}{ccc c} 1 &amp; 2 &amp; 1 &amp; 5 \\ 0 &amp; -7 &amp; -1 &amp; -11 \\ 0 &amp; 7 &amp; 2+\lambda &amp; 2 \end{array} \right)</math></li> <li>•<sup>3</sup> <math display="block">\left( \begin{array}{ccc c} 1 &amp; 2 &amp; 1 &amp; 5 \\ 0 &amp; -7 &amp; -1 &amp; -11 \\ 0 &amp; 0 &amp; 1+\lambda &amp; -9 \end{array} \right)</math></li> <li>•<sup>4</sup> -1</li> </ul>	4

Question		Generic scheme	Illustrative scheme	Max mark
5.		<ul style="list-style-type: none"> <li>•<sup>1</sup> correct form of integral</li> <li>•<sup>2</sup> evaluate</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\pi \int_3^5 y^2 dx</math></li> <li>•<sup>2</sup> <math>32\pi</math> (cubic units)</li> </ul>	2

Question		Generic scheme	Illustrative scheme	Max mark
6.	(a)	<ul style="list-style-type: none"> <li>• <sup>1</sup> start to integrate</li> <li>• <sup>2</sup> find expression</li> </ul>	<ul style="list-style-type: none"> <li>• <sup>1</sup> <math>t^3 \dots</math> or <math>\dots - \frac{1}{-2} e^{-2t}</math></li> <li>• <sup>2</sup> <math>t^3 + \frac{1}{2} e^{-2t} - \frac{1}{2}</math></li> </ul>	2
	(b)	<ul style="list-style-type: none"> <li>• <sup>3</sup> differentiate</li> <li>• <sup>4</sup> calculate acceleration</li> </ul>	<ul style="list-style-type: none"> <li>• <sup>3</sup> <math>6t + 2e^{-2t}</math></li> <li>• <sup>4</sup> <math>2\text{ms}^{-2}</math></li> </ul>	2

Question			Generic scheme	Illustrative scheme	Max mark
7	(a)	(i)	• <sup>1</sup> state vertical asymptote		• <sup>1</sup> $x = 2$ 1
		(ii)	• <sup>2</sup> complete algebraic division and restate function • <sup>3</sup> state non-vertical asymptote with justification		• <sup>2</sup> $x + 2 + \frac{4}{x - 2}$ • <sup>3</sup> eg As $x \rightarrow \pm\infty$ , $\frac{4}{x-2} \rightarrow 0$ $\therefore y = x + 2$ 2
		(b)	• <sup>6</sup> sketch showing shape of curve with approach to asymptotes		• <sup>6</sup> 

Question			Generic scheme	Illustrative scheme	Max mark
7	(c)	(i)	• <sup>7</sup> sketch showing shape of curve with approach to asymptotes	• <sup>7</sup> 	1
		(ii)	• <sup>8</sup> state values of $k$	• <sup>8</sup> $0 < k < 8$	1

Question		Generic scheme	Illustrative scheme	Max mark
8.		<ul style="list-style-type: none"> <li>•<sup>1</sup> solve auxiliary equation</li> <li>•<sup>2</sup> state complementary function</li> <li>•<sup>3</sup> state particular integral</li> <li>•<sup>4</sup> differentiate complementary function</li> <li>•<sup>5</sup> evaluate <math>C</math></li> <li>•<sup>6</sup> general solution stated or implied by •<sup>9</sup></li> <li>•<sup>7</sup> differentiate</li> <li>•<sup>8</sup> form equations and solve for one constant</li> <li>•<sup>9</sup> give particular solution</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>m = 2, m = -3</math></li> <li>•<sup>2</sup> <math>y = Ae^{2x} + Be^{-3x}</math></li> <li>•<sup>3</sup> <math>y = Cxe^{2x}</math></li> <li>•<sup>4</sup> <math>\frac{dy}{dx} = Ce^{2x} + 2Cxe^{2x}</math>  <math>\frac{d^2y}{dx^2} = 4Ce^{2x} + 4Cxe^{2x}</math></li> <li>•<sup>5</sup> <math>C = 7</math></li> <li>•<sup>6</sup> <math>y = Ae^{2x} + Be^{-3x} + 7xe^{2x}</math></li> <li>•<sup>7</sup> <math>\frac{dy}{dx} = 2Ae^{2x} - 3Be^{-3x} + 7e^{2x} + 14xe^{2x}</math></li> <li>•<sup>8</sup> <math>A = 4 \text{ or } B = 1</math></li> <li>•<sup>9</sup> <math>y = 4e^{2x} + e^{-3x} + 7xe^{2x}</math></li> </ul>	9

[END OF MARKING INSTRUCTIONS]