



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> <li>OR</li> <li><math>\dots + 5e^{5x}(\dots)</math></li> <li>•<sup>2</sup> <math>3x^2e^{5x} + 5x^3e^{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>\frac{(x^6 + 1)\sec^2 x - \dots}{(x^6 + 1)^2}</math></li> <li>OR</li> <li><math>\frac{\dots - 6x^5 \tan x}{(x^6 + 1)^2}</math></li> <li>•<sup>4</sup> <math>\frac{(x^6 + 1)\sec^2 x - 6x^5 \tan x}{(x^6 + 1)^2}</math></li> </ul>	2

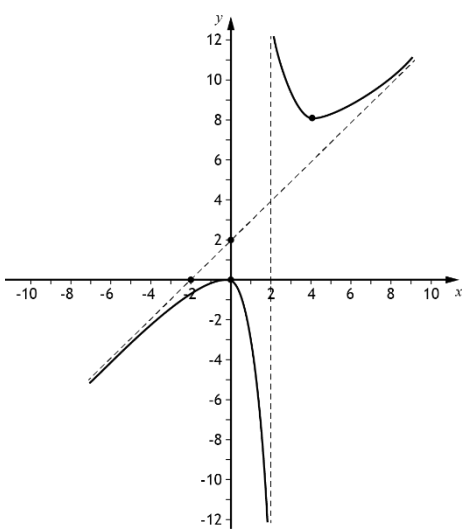
Question			Generic Scheme	Illustrative Scheme	Max Mark
2.	(a)		<ul style="list-style-type: none"> <li>•<sup>1</sup> state the transpose of <math>B</math></li> <li>•<sup>2</sup> calculate <math>AB'</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>B' = \begin{pmatrix} 4 &amp; 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

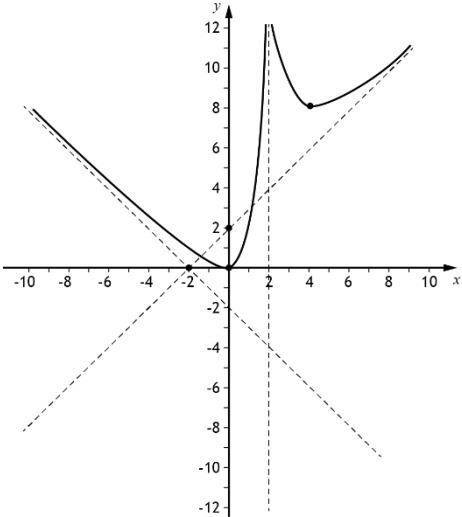
Question			Generic scheme	Illustrative scheme	Max mark
4.			<ul style="list-style-type: none"> <li>•<sup>1</sup> set up augmented matrix</li> <li>•<sup>2</sup> obtain two zeros <sup>1</sup></li> <li>•<sup>3</sup> complete row operations <sup>1</sup></li> <li>•<sup>4</sup> write down value of <math>\lambda</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\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>\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>\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> <math>-1</math></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> 	1



Question			Generic scheme	Illustrative scheme	Max mark
7	(c)	(i)	<p>•<sup>7</sup> sketch showing shape of curve with approach to asymptotes</p>	<p>•<sup>7</sup></p> 	1
		(ii)	<p>•<sup>8</sup> state values of <math>k</math></p>	<p>•<sup>8</sup> <math>0 &lt; k &lt; 8</math></p>	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</math> or <math>B = 1</math></li> <li>•<sup>9</sup> <math>y = 4e^{2x} + e^{-3x} + 7xe^{2x}</math></li> </ul>	9

[END OF MARKING INSTRUCTIONS]