Name	 Class
	 Date

Materials

For this paper you must have:

- The booklet of formulae and statistical tables
- You may use a graphics calculator.

Instructions

- Use black ink or black ball-point pen. Pencil should be used for drawing.
- Answer all questions.
- You must answer each question in the space provided for that question. If you require extra space, use a supplementary answer book; do **not** use the space provided for a different question.
- Do not write outside the box around each page.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.

Advice

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- You do not necessarily have to use all the space provided.

	T
Question	Mark
1	
2	
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16	
Total	

Answer ALL questions. Write your a	nswer in the spaces provided.
Show that $(x-2)$ is a factor of $f(x) = x^3 - 9x^2$	+26x-24 [2 m
Hence factorise $f(x)$ completely.	[3 m
Turn over for the n	ext question

2	a a	i	Work out the value of a and the value of b given that $\log_{10} 100 = a$ [1 mark]
	a	ii	$\log_2 b = 4$ [1 mark]
	b		Find the exact value of the solution to the equation $\log_3(2x) = \log_3 6 + \log_3(\frac{1}{x})$ [3 marks]
			Turn over for the next question

3	A curve has equation $y = 2x^3 + 3x^2 - 4x - 1$	
	Find the equation of the normal to the curve at $x = 1$	[6 marks]
	Turn over for the next question	

	of $y = f(x)$ has no turning points.	[4 m
Expand $(1-x^2)'$ in a	ascending powers of x up to the term in x^4	[2 m
	t of the term in x^{10} , giving your answer in the simplest for	rm. [2 m
Find the coefficient		
Find the coefficient		
Find the coefficient		

$\frac{1}{\cos^2 x} - \tan^2 x = 2\cos x$ giving all solutions in the interval $-180^\circ < x < 180^\circ$	Prove that $\frac{1}{\cos^2 \theta} - \tan^2 \theta = 1$	[41
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giving all solutions in the interval $-180^{\circ} < x < 180^{\circ}$		
Give your answers in degrees. Fully justify your answer. [3	Hence, solve the equation $\frac{1}{\cos^2 x} - \tan^2 x = 2\cos x$	
	$\frac{1}{\cos^2 x} - \tan^2 x = 2\cos x$	
		[31
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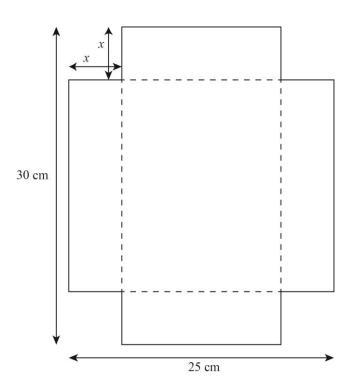
Prove that $f'(x) = 6x$	[5 marks
The that $\Gamma(x) = 0x$	[3 marks
Turn over for the next	question

8	Given that $\mathbf{p} = 4\mathbf{i} - 3\mathbf{j}$, work out	
a	A vector parallel to p with magnitude 20	[3 marks]
b	The unit vector $\hat{\mathbf{p}}$ in the direction of \mathbf{p}	[2 marks]
	Turn over for the next question	

Find angle ABC, in degr	rees, correct to 1 decimal place.	[5 n
	Turn over for the next question	

10	a	$f(x) = x^2 - 4x + k$, where $1 < k < 3$	
		Sketch the curve $y = f(x)$ showing clearly, in terms of k, the coordinates of the points where the	ie
		curve cuts the y-axis, and the coordinates of the turning point.	
		[4 mar	ks]
ŀ	b	The equation $f(x) = -2$ has two distinct solutions. Find the range of values for k [3 mar	ksl

An open-top box is made by cutting a small square with side length x cm from each of the four corners of a rectangular tin sheet, as shown in the diagram.



a Show that the volume of the box, V, can be written as $V = 4x^3 - 110x^2 + 750x$ [2 marks]

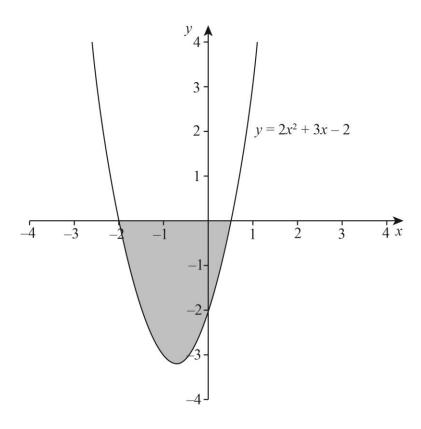
b Find the maximum volume of the box. [8 marks]

Turn over for the next question

Find the length of the chord <i>AB</i>	
Give your answer correct to three significant figures.	[10 n

	as equation $2x+3y=7$ In the gradient of this line.	[1
write down	if the gradient of this fine.	
	he equation of the line l_2 which is parallel to l_1 and passes through th	ne
point (1, 1)		[2]
Give your a	answer in the form $ax + by = c$ where a , b and c are integers.	[31
	is a curve <i>C</i> , with equation $y = x^2 - 4x - 3$, at the points <i>A</i> and <i>B</i> recoordinates of <i>A</i> and <i>B</i> in the form $\frac{p \pm \sqrt{67}}{q}$ where <i>p</i> and <i>q</i> are integrated as $y = \sqrt{67}$.	gers
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14	A garden is in the shape of a triangle ABC with side lengths $AB = 12$ m and $BC = 15$ m. The angle between sides AB and BC is 64°		
a	Find the length AC and the area of the garden.	[4 marks]	
	A gardener covers the surface of the garden evenly with top soil.		
b	If top soil costs £30 per cubic metre and the gardener spends £150 on top soil, find the depth of the soil.	[2 marks]	



Given that the metal used to manufacture the jewellery costs £ 35.50 per cm², find the cost of manufacturing 50 pieces.

[8 marks]

Turn over for the next question
Turn over for the next question

16	Prove that if <i>n</i> is an integer, $n^3 + 6n^2 + 11n + 6$ is always a multiple of three.	
		[5 marks]
	End of questions	