Clases de Matemáticas y Física para Bachillerato Internacional

M1**7/4/1/1885 AI5**/5 P-5/**E97/64/38482** www.teoteves.com



Mathematics Standard level Paper 1

Tuesday	12	May	2015	(morning)
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1	hour	30	minute	S

Candidate session number								

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do sol
- You are not permitted access to any calculator for this paper.
- answer all questions in the boxes provided. Section A:
- answer all questions in the answer booklet provided. Fill in your session number Section B: on the front of the answer booklet, and attach it to this examination paper and your cover sheet using the tag provided.
- · Unless otherwise stated in the question, all numerical answers should be given exactly or correct to three significant figures.
- A clean copy of the Mathematics SL formula booklet is required for this paper.
- The maximum mark for this examination paper is [90 marks]. CLASES DELERATION IS OF ESTABLES OF ESTABL

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Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

Section A

Answer **all** questions in the boxes provided. Working may be continued below the lines if necessary.

1. [Maximum mark: 6]

A discrete random variable X has the following probability distribution.

x	0	1	2 3
P(X=x)	$\frac{3}{10}$	$\frac{4}{10}$	$\frac{2}{10}$

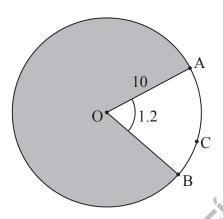
(a)	Find p.	[3]
(b)	Find $E(X)$.	[3]
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2. [Maximum mark: 5]

The following diagram shows a circle with centre O and a radius of $10\,\mathrm{cm}$. Points $A,\,B$ and C lie on the circle.



Angle AOB is 1.2 radians.

(a) Find the length of arc ACB.

[2]

(b) Find the perimeter of the shaded region

[3]

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3.	[Maximum	mark:	6]

1	۵)	Given that $2^m - 8$ and $2^n - 16$, write down the value of m and of n .	[C]
(a)	Given that $Z = \delta$ and $Z = 10$, write down the value of m and of n .	4

(b) Hence or otherwise solve $8^{2x+1} = 16^{2x-3}$. [4]

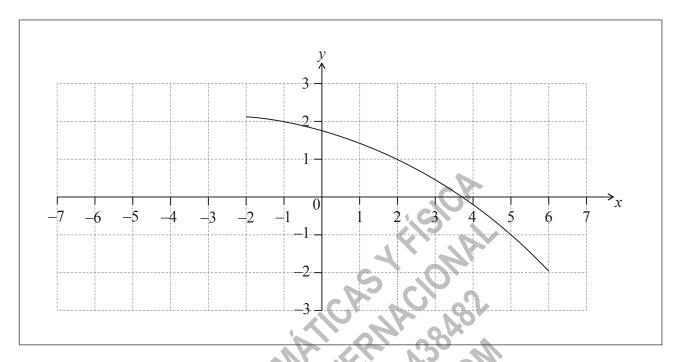
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4. [Maximum mark: 7]

The following diagram shows the graph of a function f.



(a) Find
$$f^{-1}(-1)$$
.

[2]

(b) Find
$$(f \circ f)(-1)$$
.

[3]

(c) On the same diagram, sketch the graph of
$$y = f(-x)$$

[2]

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5. [Maximum mark: 7]

Given that $\sin x = \frac{3}{4}$, where x is an obtuse angle, find the value of

(a) $\cos x$; [4]

(b) $\cos 2x$. [3]

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6. [Maximum mark: 6]

Let
$$f(x) = px^2 + (10 - p)x + \frac{5}{4}p - 5$$
.

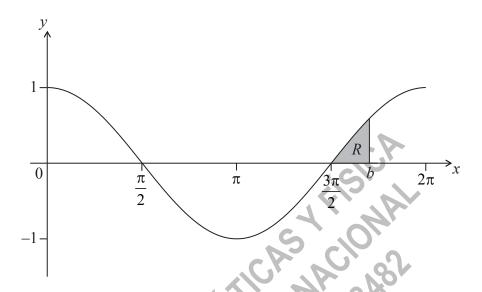
- (a) Show that the discriminant of f(x) is $100 4p^2$. [3]
- (b) Find the values of p so that f(x) = 0 has two **equal** roots. [3]

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7. [Maximum mark: 8]

Let $f(x) = \cos x$, for $0 \le x \le 2\pi$. The following diagram shows the graph of f. There are *x*-intercepts at $x = \frac{\pi}{2}$, $\frac{3\pi}{2}$.



The shaded region R is enclosed by the graph of f, the line x =. Find the value of $\it b$ the x-axis. The area of R is

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Section B

Answer all questions in the answer booklet provided. Please start each question on a new page.

8. [Maximum mark: 16]

A line L passes through points A(-2, 4, 3) and B(-1, 3, 1).

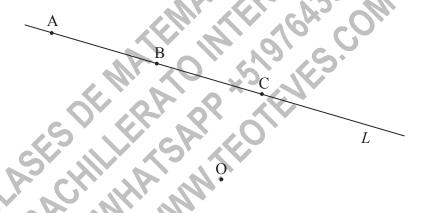
(a) (i) Show that
$$\overrightarrow{AB} = \begin{pmatrix} 1 \\ -1 \\ -2 \end{pmatrix}$$
.

(ii) Find
$$|\overrightarrow{AB}|$$
. [3]

Find a vector equation for L.

[2]

The following diagram shows the line ${\cal L}$ and the origin ${\cal O}$.



Point C has position vector

(c) Show that
$$y = 2$$
. [4]

- Find $\overrightarrow{OC} \cdot \overrightarrow{AB}$. (d)
 - Hence, write down the size of the angle between OC and L. (ii) [3]
- Hence or otherwise, find the area of triangle OAB. [4]

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9. [Maximum mark: 14]

A function f has its derivative given by $f'(x) = 3x^2 - 2kx - 9$, where k is a constant.

(a) Find
$$f''(x)$$
. [2]

The graph of f has a point of inflexion when x = 1.

(b) Show that
$$k = 3$$
. [3]

(c) Find
$$f'(-2)$$
. [2]

- (d) Find the equation of the tangent to the curve of f at (-2,1), giving your answer in the form y = ax + b. [4]
- (e) Given that f'(-1) = 0, explain why the graph of f has a local maximum when x = -1. [3]

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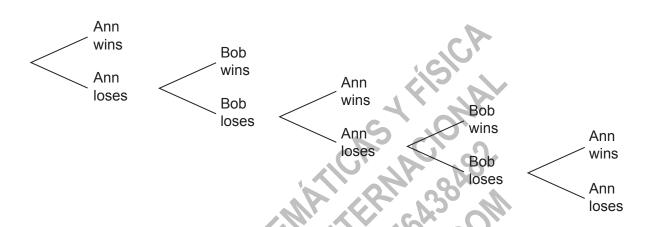
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10. [Maximum mark: 15]

Ann and Bob play a game where they each have an eight-sided die. Ann's die has three green faces and five red faces; Bob's die has four green faces and four red faces. They take turns rolling their own die and note what colour faces up. The first player to roll green wins. Ann rolls first. Part of a tree diagram of the game is shown below.

Ann's 1st roll Bob's 1st roll Ann's 2nd roll Bob's 2nd roll Ann's 3rd roll



(a) Find the probability that Ann wins on her first roll

[2]

(b) (i) The probability that Ann wins on her third roll is $\frac{5}{8} \times \frac{4}{8} \times p \times q \times \frac{3}{8}$.

Write down the value of p and of q

(ii) The probability that Ann wins on her tenth roll is $\frac{3}{8}r^k$ where $r\in\mathbb{Q}$, $k\in\mathbb{Z}$.

Find the value of r and of k.

[6]

(c) Find the probability that Ann wins the game.

[7]

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Answers written on this page will not be marked.



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