وزارة التربية والتعليم العالي
المديرية العامة للتربية
دائرة الامتحانات

امتحانات الشهادة الثانوية العامة
الفرع : آداب و إنسانيات

الدورة الإستثنائية للعام 2011

عدد المسائل : ثلاث

مسابقة في مادة الرياضيات
المدة ساعة

الاسم:
الرقم:

ارشادات عامة :- يسمح باستعمال آلة حاسبة غير قابلة للبرمجة او اختزان المعلومات او رسم البيانات
- يستطيع المرشح الإجابة بالترتيب الذي يناسبه (دون الالتزام بترتيب المسائل الوارد في المسابقة)

I- (5 points)

Fadi deposited, in a bank, for a period of 5 years, a capital of 10 000 000 LL at an annual interest rate of 10 %. The interests are compounded quarterly.

1) a- Calculate the future value of this capital at the end of the fifth year.

b- Calculate the total interest.

2) By the end of the fifth year, Fadi withdraws 35% of the total interest of his account.
What is the remaining amount in this account?

II-(5 points)

The 575 students of a secondary school are distributed as follows:
210 students are in the first secondary year, 180 are in the 2^{nd} year and the others are in the 3^{rd} year.
40% of the students in the first year are girls.
50% of the students in the 2^{nd} year are boys.

1) Copy and complete the following table:

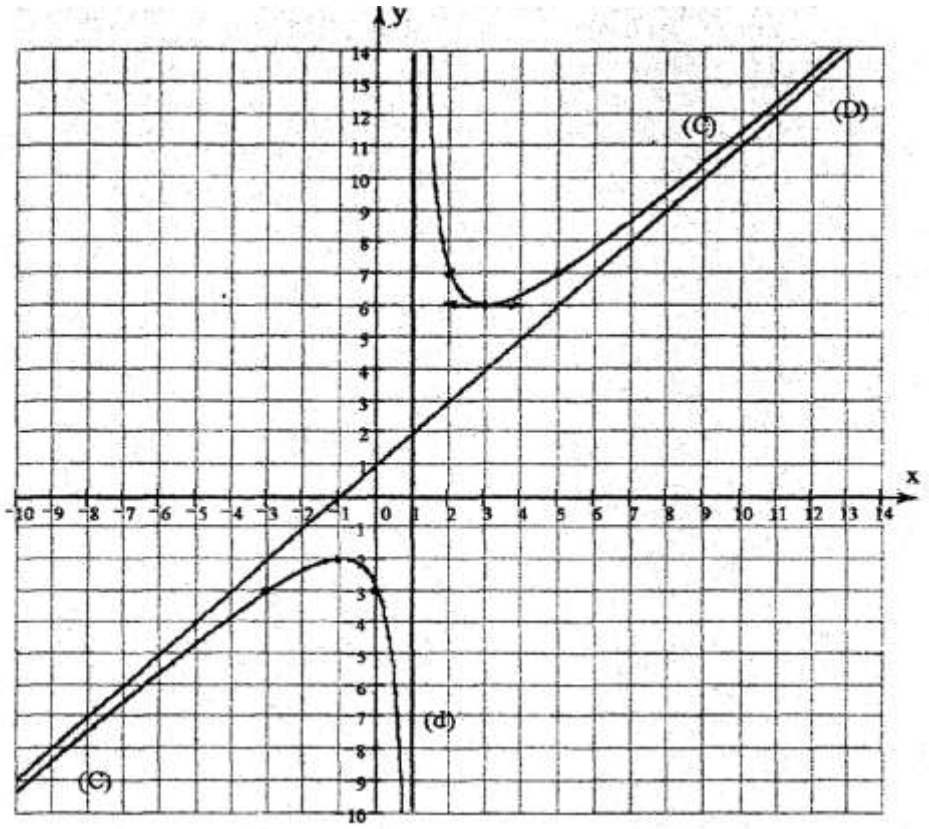
	1^{st} year	2^{nd} year	3^{rd} year	Total
Girls			74	
Boys				
Total	210	180		575

2) One student is randomly chosen from this school.
Consider the following events:
A : « the chosen student is a girl ».
B : « the chosen student is a student in the 3^{rd} secondary year ».
C : « the chosen student is a boy ».
Calculate the following probabilities: p(A), p(C), p(A/B) and $p(B \cup C)$.

3) In this part we choose randomly two students, one after the other, from this secondary school.
Calculate the probability of choosing a boy and a girl from the 3^{rd} secondary year.

III (10 points)

The curve (C) drawn below is the graphical representation of a function f defined on $]-\infty ; 1[\cup]1 ; +\infty[$.
The lines (d) and (D) are the asymptotes of (C).



Using the above graphical representation:

1) Determine:
   a- f (0) and f (– l).
   b- f (3) and $f'(3)$.

2) Compare:
   a- f(1.5) and f(2).
   b- $f'(-2)$ and $f'(2)$.

3) Solve each of the following inequalities:
   a- $f(x) < 0$.
   b- $f(x) \geq 7$.
   c- $f'(x) < 0$.

4) Write an equation of each of the two lines (d) and (D).

5) Write an equation of the tangent to (C) at the point with abscissa 3.

6) Set up the table of variations of f.

7) The function f is given by $f(x) = ax + b + \dfrac{4}{x+c}$.

Determine a, b and c.

QI	Answers	Mark
1a	$V_n = V(1 + i)^n$ with $i = \frac{0.1}{4} = 0.025$ with $n = 5 \times 4 = 20$ and $V = 10^7$ $V_n = 16\,386\,164.4$ LL.	2.5
1b	$I = V_n - V = 6\,386\,164.4$ LL.	1
2	$6\,386\,164.4 \times 35\% = 2\,235\,157.54$; $16\,386\,164.4 - 2\,235\,157.54 = 14\,151\,006.86$ LL.	1.5

QII	Answers	Mark
1	<table><tr><th></th><th>1st year</th><th>2nd year</th><th>3rd year</th><th>Total</th></tr><tr><td>Girls</td><td>84</td><td>90</td><td>74</td><td>248</td></tr><tr><td>Boys</td><td>126</td><td>90</td><td>111</td><td>327</td></tr><tr><td>Total</td><td>210</td><td>180</td><td>185</td><td>575</td></tr></table>	1
2	$p(A) = p(\text{girl}) = \frac{248}{575} = 0.431$; $p(C) = p(\text{boy}) = \frac{327}{575} = 0.529$. $p(A/B)$ = p(the chosen student is a girl knowing that she is in 3rd year) = $\frac{74}{185} = 0{,}4$. $p(B \cup C)$ = p(the chosen student is in 3rd year or a boy) = $p(B \cup C) = p(B) + p(C) - p(B \cap C) = \frac{185}{575} + \frac{327}{575} - \frac{111}{575} = \frac{401}{575} = 0{,}697$	2.5
3	P(choosing a girl and a boy from the 3rd year) = p(girl then boy or boy then girl) = $\frac{111}{575} \times \frac{74}{574} \times 2 = \frac{16428}{330050} = 0.049.$	1.5

QIII	Answers	Mark
1a	$f(0) = -3$; $f(-1) = -2$	0.5
1b	$f(3) = 6$; $f'(3) = 0$	0.5
2a	$f(1.5) > f(2)$ since f is decreasing on $]1;3[$	1
2b	$f'(-2) > 0$, $f'(2) < 0$ so $f'(-2) > f'(2)$.	1
3a	$x < 1$.	1
3b	$1 < x \leq 2$ Or $x \geq 5$.	1
3c	$-1 < x < 1$ or $1 < x < 3$.	1
4	(d) : $x = 1$. (D) : $\frac{y-0}{1-0} = \frac{x+1}{1}$ Let $y = x + 1$.	1
5	$y = 6$.	0.5
6	<table><tr><td>x</td><td>$-\infty$ -1 1 3 $+\infty$</td></tr><tr><td>f '(x)</td><td>+ 0 – – 0 +</td></tr><tr><td>f(x)</td><td>$-\infty$ ↗ -2 ↘ $-\infty$; $+\infty$ ↘ 6 ↗ $+\infty$</td></tr></table>	1.5
7	$a = 1$, $b = 1$ and $c = -1$. (using the equations of the asymptotes)	1