الأحد 7 تموز 2013 | مسابقة في مادة الرياضيات | الاسم:
عدد المسائل: ثلاث | المدة: ساعة واحدة | الرقم:

ملاحظة: يُسمح باستعمال آلة حاسبة غير قابلة للبرمجة أو إختزان المعلومات أو رسم البيانات.
يستطيع المُرشّح الإجابة بالترتيب الذي يناسبه (دون الإلتزام بترتيب المسائل الوارد في المسابقة).

I – (5 points)

To have access to a private beach, a group of 4 kids and 3 adults have to pay 150 000 LL as entrance fees.

The price of the adult's ticket is double that of the kid's ticket.

1) Determine the price of the kid's ticket and the price of the adult's ticket.

2) In August, the price of the kid's ticket decreases by 10% while that of the adult's ticket increases by 20%.

What are then the entrance fees that will be paid in August, by the same group?

II – (5 points)

The following table shows the grades of 24 students of a class in the mathematics final exam.

Grade over 20	**[0 ; 5[**	**[5 ; 10[**	**[10 ; 15[**	**[15 ; 20]**
Frequency	**4**	**5**	**8**	**7**

1) Calculate the average grade of the class in this exam.

2) The passing grade in this exam is greater than or equal to 10.

A student is chosen randomly from this class.

Consider the following events:

A: « the chosen student passes the exam »,

B: « the chosen student gets a grade less than 15».

a- Calculate the probability P(A).

b- Knowing that the student passes the exam, calculate the probability that the student gets a grade less than 15.

3) The papers of this exam are placed in a box. Two papers are selected randomly from this box one after the other and without replacement.

Calculate the probability of selecting a paper of a student who passed the exam then a paper of a student who didn't pass.

III – (10 points)

The table of variations below is that of a function f defined over $]-\infty;1[\cup]1;+\infty[$.

x	$-\infty$		-3		1		$+\infty$
f '(x)		$-$	0	$+$	‖	$-$	
f (x)	0	↘	-1	↗	$+\infty$ ‖ $+\infty$	↘	0

Denote by (C) the representative curve of f in an orthonormal system.

1) Answer by true or false, with justification, each of the following statements.

a- The line with equation y = –1 is tangent to (C).

b- The y-axis is an asymptote to (C).

c- f (–5) > f (–4).

d- f '(–2) < f '(2).

e- The equation f(x) = –2 has one solution.

2) a- Knowing that $f(x)=\dfrac{mx+8}{(x-1)^2}$, use the table of variations to calculate m.

b- Calculate the coordinates of the points of intersection of (C) with the coordinate axes.

c- Draw (C).

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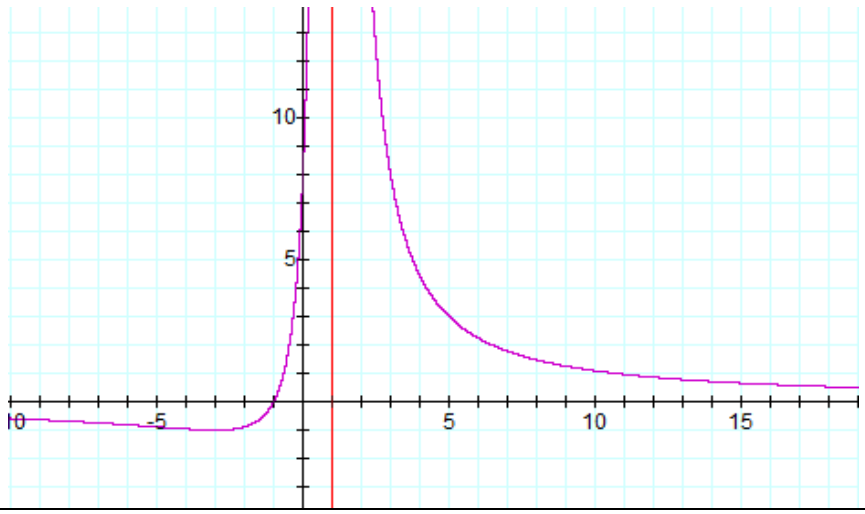
Q_1	Answers	M
1	Let x be the amount paid by a kid and y the amount paid by an adult. $\begin{cases} 4x+3y=150\,000 \\ y=2x \end{cases} \rightarrow x=15\,000$ and $y=30\,000$. A kid has to pay 15 000LL and an adult has to pay 30 000LL.	3
2	$4\times(15\,000-0.1\times15\,000)+3\times(30\,000+0.2\times30\,000)+=162000$ So the group would have to pay 162000 LL.	2
Q_2	Answers	M
1	Using calculator $\bar{x}=11.25$.	1
2a	$P(A)=\frac{15}{24}=\frac{5}{8}$.	1
2b	$P(B/A)=\frac{8}{15}$	1.5
3	P(paper of student passed then paper of a student who didn't)= $\frac{15}{24}\times\frac{9}{23}=\frac{45}{184}$	1.5
Q_3	Answers	M
1a	**True**. f '(–3) = 0 then the equation of the tangent at the point with abscissa –3 is y = f (–3) = –1.	1
1b	**False.** The function f is defined at zero.	1
1c	**True.** Over $]-\infty;-3[$ f is decreasing hence f (–5) >f (–4).	1
1d	**False.** f '(–2) >0 and f '(2) < 0.	1
1e	**False.** $f(x)\geq -1$ over $]-\infty;1[$ and $f(x)>0$ over $]1;+\infty[$	1
2a	f (–3) = –1, $-1=\frac{m(-3)+8}{16}$; which gives $m=8$.	1
2b	For $(C)\cap x'x$, y = 0 then the point is $(-1;0)$ and $(C)\cap y'y$, x = 0 then the point is $(0;8)$.	2
2c		2