

عدد المسائل: ثلاث	اسم: الرقم:	مسابقة في مادة الرياضيات المدة ساعة
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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)

In a perfume shop, the sum of the initial prices of a perfume bottle and of a lotion tube is 100 000 LL.

The perfume shop announces the following offer:

« Buy a box containing both a perfume bottle and a lotion tube and get a discount of 10% on the price of the perfume and a discount of 15% on the price of the lotion ».

The price of a box becomes 88 000 LL.

- 1) What is the initial price of a perfume bottle and that of a lotion tube?
- 2) A customer bought 75 boxes and received a supplementary discount of 5% on the price of a box. What amount must he pay?

II- (5 points)

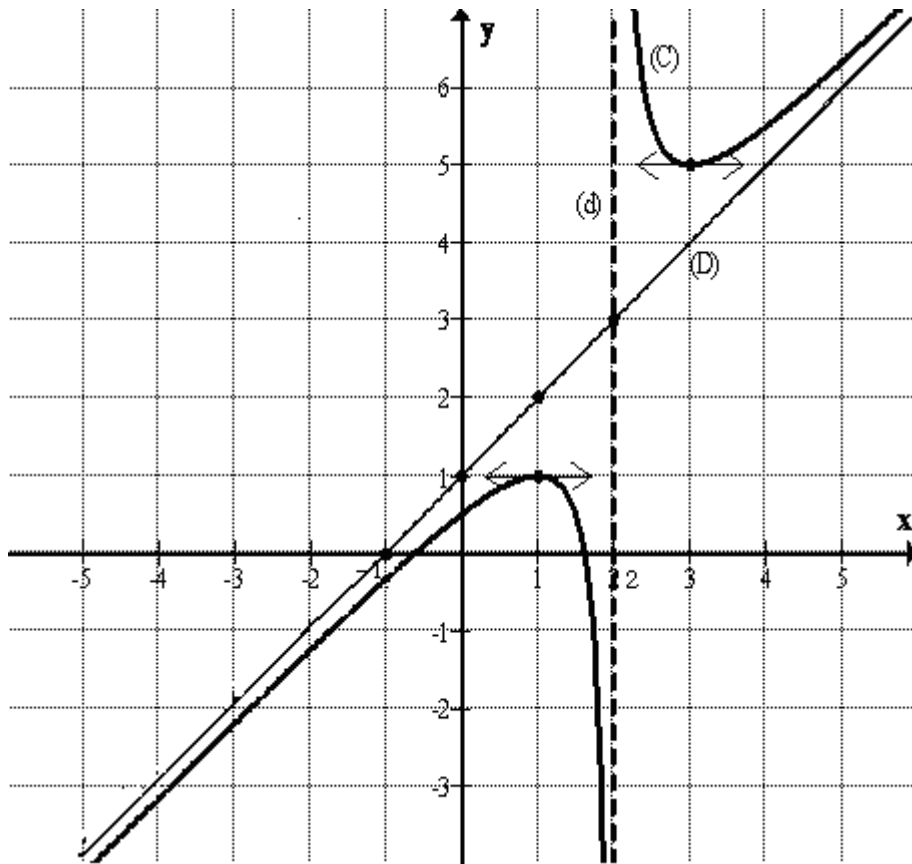
A box contains 60 tokens distributed as shown in the following table:

	Blue	Green
Large	15	10
Small	17	18

- 1) A token is drawn randomly from this box.
 - a- What is the probability that it is small?
 - b- What is the probability that it is small and blue?
 - c- Knowing that the chosen token is small, what is the probability that it is blue ?
- 2) Two tokens are drawn randomly and successively without replacement from this box. What is the probability of drawing 2 small tokens ?

III- (10 points)

The curve (C) shown below is the representative curve, in an orthonormal system, of a function f that is defined on $] -\infty; 2[\cup] 2; +\infty[$.



- 1) Determine $f'(1)$, $f'(3)$ and solve $f'(x) < 0$.
- 2) Solve $f(x) \geq 4$.
- 3) Solve $f(x) < 1$.
- 4) Find $\lim_{\substack{x \rightarrow 2 \\ x > 2}} f(x)$ and $\lim_{\substack{x \rightarrow 2 \\ x < 2}} f(x)$.
- 5) Find $\lim_{x \rightarrow -\infty} f(x)$ and $\lim_{x \rightarrow +\infty} f(x)$.
- 6) Determine an equation of each of the lines (d) and (D).
- 7) Set up the table of variations of f .
- 8) In all what follows take $f(x) = \frac{ax^2 + bx - 1}{x - 2}$, where a and b are real numbers.
 - a- Calculate a and b .
 - b- Verify that $f(x) = x + 1 + \frac{1}{x - 2}$ and deduce that the line of equation $y = x + 1$ is an asymptote to (C).

QI	Answer	Mark
1	Let x be the initial price of a bottle of perfume and y that of a lotion tube, then: $x + y = 100\ 000$ and $x(1 - \frac{10}{100}) + y(1 - \frac{15}{100}) = 88\ 000$; $0.9x + 0.85y = 88\ 000$ Using a calculator: $x = 60\ 000$ LL and $y = 40\ 000$ LL.	3
2	The price of a box is $88\ 000$ LL. The customer must pay : $[88\ 000 \times (1 - \frac{5}{100})] \times 75 = 6\ 270\ 000$ LL.	2

Q II	Answer	Mark
1a	From the table, the probability of drawing a small token is $\frac{35}{60}$.	1
1b	ty of obtaining a small blue token is $\frac{17}{60}$.	1
1c	Knowing that the chosen token is small, the probability that it is blue is $\frac{17}{35}$.	1
2	The probability of obtaining two small tokens is $\frac{35}{60} \times \frac{34}{59} = \frac{119}{354}$	2

Q III	Answer	Mark
1	$f'(1) = 0$, $f'(3) = 0$ $f'(x) < 0$ for $x \in]1;2[\cup]2;3[$	1
2	$f(x) \geq 4$ for $x \in]2;+\infty[$	1
3	$f(x) < 1$ for $x \in]-\infty;1[\cup]1;2[$	1
4	$\lim_{x \rightarrow 2^-} f(x) = +\infty$, $\lim_{x \rightarrow 2^+} f(x) = -\infty$.	1
5	$\lim_{x \rightarrow -\infty} f(x) = -\infty$, $\lim_{x \rightarrow +\infty} f(x) = +\infty$.	1
6	(d): $x = 2$; (D) passes through A(-1, 0) and B(0, 1) so : (D): $y = x + 1$.	1
7		1.5
8a	$f(1)=1$ gives $a + b = 0$ and $f(3)=5$ gives $9a+3b=6$ then : $a=1$, $b=-1$	1
8b	$f(x) = x + 1 + \frac{1}{x-2} = \frac{x^2 - x - 1}{x-2}$; $\lim_{x \rightarrow +\infty} (f(x) - (x+1)) = \lim_{x \rightarrow +\infty} \frac{1}{x-2} = 0$ $\lim_{x \rightarrow -\infty} (f(x) - (x+1)) = \lim_{x \rightarrow -\infty} \frac{1}{x-2} = 0$. Hence the line of equation $y = x + 1$ is an asymptote of (C)	1.5