

عدد المسائل: خمس

مسابقة في مادة الرياضيات
المدة: ساعتان

الاسم:
الرقم:

إرشادات عامة: - يسمح باستعمال آلة حاسبة غير قابلة للبرمجة أو اختزان المعلومات أو رسم البيانات.
- يستطيع المرشح الإجابة بالترتيب الذي يناسبه دون الالتزام بترتيب المسائل الواردة في المسابقة.

I - (2 points)

Show all the steps of calculation:

Given $A = \sqrt{80} - \sqrt{20} + \sqrt{5}$.

- 1) Write A in the form of $m\sqrt{5}$ where m is an integer.
- 2) Let $B = 5\sqrt{5}$.
 - a. Show that the adjacent table is a proportionality table.
 - b. Write $\frac{20}{B-5}$ in the form of $p + \sqrt{5}$ where p is an integer.

A	$2\sqrt{19} + 1$
$2\sqrt{19} - 1$	B

II - (3 points)

A box F contains **twelve** small and big balls.

- 1) If **one** small ball is removed and **one** big ball is added, then the number of small balls becomes double that of big balls.
 - a. Prove that the previous information is modeled by the following system:
$$\begin{cases} x + y = 12 \\ x - 2y = 3 \end{cases}$$
 - b. Solve the previous system and determine the number of small balls and that of big balls.
- 2) In what follows, the box F contains **nine** small balls and **three** big balls.
Five small balls and **eight** big balls are added to this box.
Calculate the percentage of small balls in this box.

III - (5 points)

Given : $a = 6$, $b = 8$, $S = \frac{a \times b}{2}$ and $S' = \frac{(6-x)x}{2}$; x is a real number .

- 1) a. Calculate S.
 - b. Show that $S' = \frac{6x-x^2}{2}$
- 2) a. Verify that : $3(x-2)(x-4) = 3x^2 - 18x + 24$.
 - b. Calculate x so that $S = 6S'$.
- 3) Show that $S' - \frac{9}{2} = \frac{-1}{2}(x-3)^2$.

IV - (5.5 points)

The three parts 1), 2) and 3) are independent.

1) Given the equation (E) : $y = -x + 6$.

- a. Prove that the couple of (3 ; 3) and (6 ; 0) are two solutions of (E).
- b. Calculate y for $x = 0$.
- c. Calculate x for $y = 0$.

2) Given: $a = 3$, $b = 6$ and $c = 4.5$

Prove that $c = \frac{a + b}{2}$

3) Given: $m = 2\sqrt{2}$ and $n = 4$

a. Prove that $\frac{n}{m} = \sqrt{2}$.

b. Prove that $2m^2 = n^2$.

V - (4.5 points)

Given the three numbers $A = \frac{25 \times 10^4 \times 5 \times 10^6}{25 \times (10^3)^3}$, $B = \frac{3 - \frac{1}{2}}{6 - \frac{17}{2}}$ and $C = 5 - \frac{10}{2} \div \frac{5}{4}$

1) Prove that $A = 50$

2) a. Show that $B = -1$

b. Calculate C .

c. Deduce that B and C are opposite numbers.

3) Calculate $\sqrt{\frac{A}{2}} + B^2 - C$.