

- يسمح بإستعمال آلة حاسبة غير قابلة للبرمجة
- يمكن الإجابة على المسائل بالترتيب الذي تريد
- يرجى الإجابة بخط واضح ومرتب
- العلامة القصوى من 30
- عدد المسائل: 5

1st exercise: (4 ½ pts)

Decide if each statement is true or false. Justify.

- 1) A bag contains a number of balls classified in the following way: 10% of the balls are red, 15% of the balls are white, $\frac{2}{5}$ of the balls are green, and 42 balls are black.

Therefore the total number of balls is 500. (1 ½ pts)

- 2) The following table below is a proportionality table. : (1 ½ pts)

$\left(\frac{1-\sqrt{2}}{2\sqrt{2}-3}\right)^2$	$\frac{\sqrt{5}+\sqrt{3}}{\sqrt{2}}$
$\frac{\sqrt{5}-\sqrt{3}}{\sqrt{2}}$	$3-2\sqrt{2}$

- 3) In an orthonormal system of axes $x'Ox$, $y'Oy$, consider the point $A(m+3, 2)$ and the straight-line (d) of equation $2y = x$ (m is a real number)
- a) The locus of point A is the straight-line of equation $x = 2$. (¾ pt)
- b) For $m = 1$, A belongs to (d). (¾ pt)

2nd exercise: (4 ½ pts)

- 1) Show that $(x+y)^2 - (x-y)^2 = 4xy$. (1pt)
- 2) Consider the system $\begin{cases} x+y=22 \\ x.y=112 \end{cases} \quad (x > y)$
- a) Using part 1 and the system, prove that $(x-y)^2 = 36$ and deduce the value of $(x-y)$. (1 ½ pts)
- b) Calculate x and y . (1pt)
- 3) Determine the dimensions of a rectangle of perimeter equals to 44m and area equals to 112m². (1pt)

3rd exercise: (4pts)

A car agency published a new advertisement about selling a new car model at 21,750,000 LL. This price increases 10% for *V.A.T.* (value tax added).

This agency offers its customers two types of payment: "Cash" (نقدي) or "Installment" (تقسيط)

However, if the customer chooses "Installment" payment, another 20% is added for the bank.

- 1) Show that if the customer chooses "Installment" payment then the final price after the two successive increases is 28,710,000LL. (1 ½ pts)
- 2) Given x the initial price of the car and y the final price after the two successive increases.
 - a) Write the linear function modeling this situation (y in terms of x). (1 ½ pts)
 - b) Deduce the percentage of increase. (1pt)

4th exercise: (10pts)

Consider the orthonormal system $x'Ox$; $y'Oy$ below :

1) Determine by graphical reading the coordinates of the points S, K, D, C and A. (1pt)

2) a) Calculate the length SC using a **rule** then a convenient right triangle. (1 ½ pts)

b) Knowing that $SK = \sqrt{5}$ and $KC = \sqrt{10}$, show that SKDC is inscribed in a circle (C) whose center and radius are to be determined. (2pts)

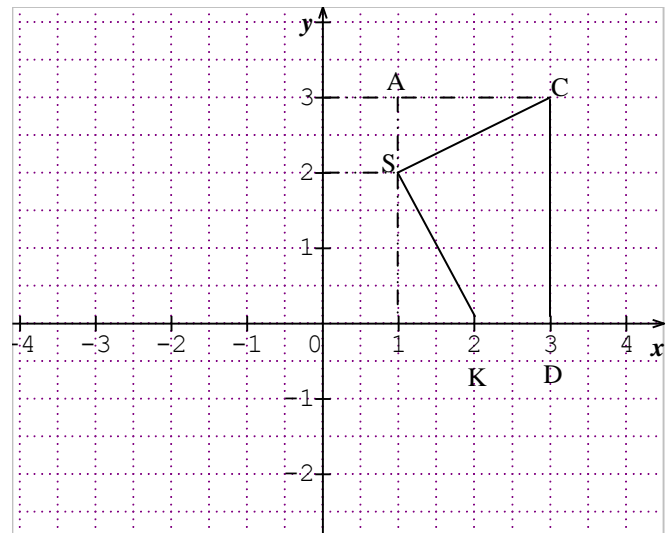
3) What is the relative position of the point G(1, 1) with respect to the circle (C)? (1pt)

4) a) Show by calculation that the slope of (CD) does not exist then find its equation. (1 ½ pts)

b) M is the midpoint of [CD].

Determine the coordinates of M and the equation of the perpendicular bisector (Δ) of [CD]. (1½pts)

5) Determine the equation of the tangent (T) to (C) at S then find the x and y intercepts of (T). (1½pts)



5th exercise: (7pts)

(C) and (C') are two circles of same center O and respective radii $R = 2\text{cm}$ and $R' = 3R$.

Mark two points A and C on the circle (C) such that $\hat{AOC} < 90^\circ$. The straight-lines (OA) and (OC) cut (C') at B and D respectively. The parallel to (BC) through D cuts (OB) at E.

Let $BC = x$ (x is a real non zero positive number).

1) Draw a figure. (1pt)

2) Show that (AC) and (BD) are parallel and deduce that $\frac{AC}{BD} = \frac{1}{3}$. (1 ½ pts)

3) Show that $\frac{OC}{OD} = \frac{BC}{DE}$. Calculate DE in terms of x then find the numerical value of OE. (1 ½ pts)

4) a) Show that for the triangle ODE to be a right triangle at D, then x should verify the equation:
 $9x^2 = 288$ (1pt)

b) Deduce the value of x so that (DE) is tangent to (C) at D. (1pt)

5) Let M be a variable point of (C). Determine the locus of I the midpoint of [AM]. (1pt)