Lycée Des Arts

Name / Nom: ....

Class / Classe: *Gr8* Section: .... Date: ....

Exam in / Examen de: ***Math*** ***Midterm***

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يمنع استعمال الآلة الحاسبة

Exercice 1: (13½pts)

Consider the expresion:

$\boldsymbol{P(x) = x^2 - a - 3\,(x-5)(1-x)}$

1- Determine the numerical vlaue of a, so that 5 is a **root** of $P(x)$.**(1pt)**

2- From this part on, let $a = 25$.

a. Write $\boldsymbol{P(x)}$ as a product of 2 factors of the 1st degree in $\boldsymbol{x}$. **(1pt)**

b. Find the 2nd root of $\boldsymbol{P(x)}$. **(½pt)**

c. Solve $P(x) = (x-5)^2$. **(1pt)**

3- Let $\boldsymbol{Q(x) = 3(x^2 - 10x + 25) - (10 - 2x)(x+1) + (x-5)(x+3)}$

a. Write $Q(x)$ in the form $ax^2 + bx + c$, where a, b & c are integers to be determined. **(1½pts)**

b. What does $Q(x)$ represent ? For what values of x is it defined? **Justify**. **(¾pt)**

c. Calculate $\boldsymbol{Q}\left(\frac{-1}{2}\right)$, then verify that the answer obtained **<u>is a decimal fraction</u>**. **(1pt)**

4- Show that $\boldsymbol{Q(x)} = 2(x-5)(3x-5)$. **(1pt)**

5- Let $\boldsymbol{ABC}$ be any triangle so that $\boldsymbol{AB = P(x)}$ & $\boldsymbol{AC = Q(x)}$.

a. Does the side $\boldsymbol{AB}$ exist for $\boldsymbol{x} = 5$? Justify. **(¾pt)**

b. Is there a value of x, for which $\boldsymbol{ABC}$ is an isoscles triangle at A? Justify. **(1¼pts)**

6- Let $R(x) = \dfrac{P(x)}{Q(x)}$

a. What does $R(x)$ represent? Justify. **(¾pt)**

b. For which value of x is $R(x)$ **<u>not defined</u>** ? Deduce the domain of definition of $\boldsymbol{R(x)}$. **(1pt)**

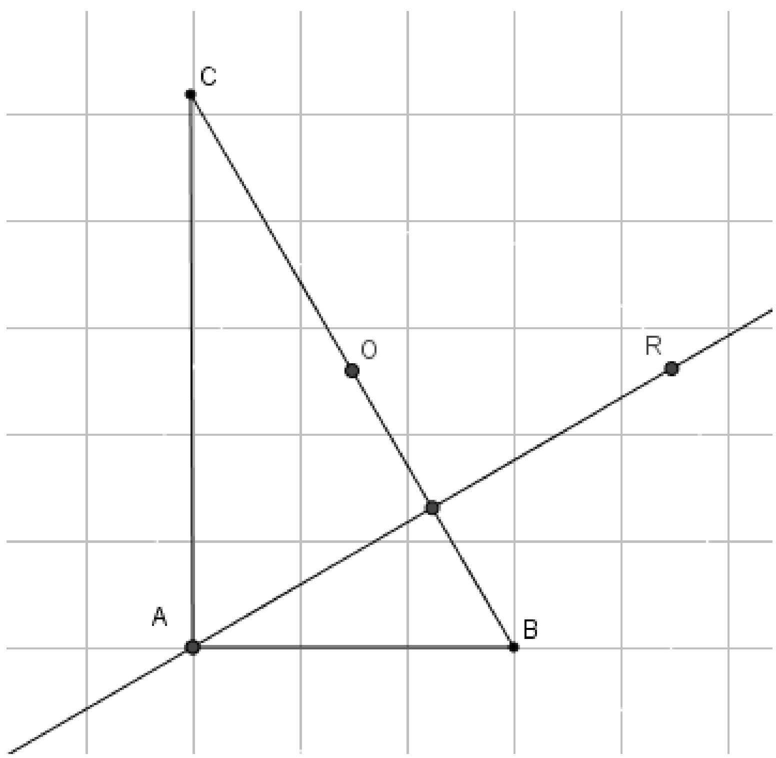
c. Simplify $R(x)$ and then calculate $R\left(\dfrac{1}{2}\right)$.**(1pt)**

d. Solve $\boldsymbol{R(x)} = \frac{-2}{3}$. **(1pt)**

Exercice 2:(13½pts)

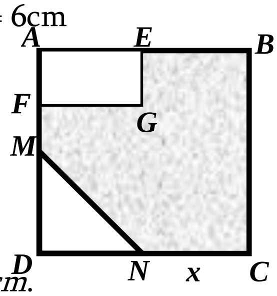
Let ABC be a right triangle at A, where $AB = \frac{3^{32}-3^{31}}{3^{30}\times 2}cm$ & $BC = \frac{4\times 10^{-2}\times 0.5}{0.02\times(30)^{-1}} - 3(3-1)^3 cm$.

1) Prove that: $AB = 3cm$ & $BC = 6cm$. **(2pts)**
2) Let O be the midpoint of $[BC]$ and R be the symmetric of A with respect to (BC).
   a. Draw a clear and coded figure.**(see figure below) (1pt)**
   b. Prove that $\frac{AO}{BC} = \frac{1}{2}$.**(1pt)**
   c. Deduce the nature of triangle AOB.**(¾pt)**
   d. Prove that the quadrilateral $BAOR$ is a rhombus. **(1pt)**
3) Let(C) be the circle circumscribed about triangle ABC & I be the midpoint of $[AC]$.
   a. Indicate the center of circle (C) and prove that the point R belongs to(C). **(1pt)**
   b. Show that (OI) is parallel to (AB) then deduce its length. **(1¼pts)**
   c. Prove that the points O, I & R are collinear. **(1pt)**
4) What does the point O represent in the triangle ARC ?*Justify.* **(1pt)**
5) **(AR) intersects (BC) at E.**
   a. Use the two triangles IOC & EOR to show that $IC = ER$. **(1½pts)**
   b. Show that $O\hat{C}I = E\hat{A}B$. **(1pt)**
6) Find the perimeter of $ABRO$. **(1pt)**



<u>Exercise 3: (13pts)</u>

In the following table **only one of the answers** proposed to each question is correct. Indicated it **with justification**. ()

№	Questions	Answers		
		A	B	C
1.	If $A = \frac{8^2 \times 40^{-1}}{2 \times 6^{-1}} + \frac{1}{5}$ & $B = \frac{1}{5} + \frac{2^{42} + 5 \times 8^{14}}{10 \times 2^{39}}$, then A is **(2pts)**	Inverse of B	Opposite of B	Equal to B
2.	If $x + y = -6$ & $xy = 9$, then $x^2 + y^2 =$ **(1pt)**	36	18	54
3.	ABC is a triangle such that: • $BC = \frac{225^2 \times (-120)}{(-75)^3 \times 72 \times 0.1} + 8$ cm. • M & N are respectively the **midpoints of** $[AB]$ & $[AC]$ with: $MN = (x+2)^2 - (x-1)^2$ **0<x< 4.5,** then $x =$ **(3pts)**	$\frac{1}{3}$	$\frac{5}{2}$	$\frac{7}{6}$
4.	**In the figure below we have :** • $ABCD$ is a **square** so that $AB = 6$cm • $AEGF$ is a **rectangle** so that: • $EG = 2cm$ & $AE = 1 + \frac{4}{9} + \frac{1}{2} \div \frac{9}{28}\,cm$ • N is a point on $[DC]$ such that: $NC = x\,cm$ ($0<x<6$) & M is a point on $[AD]$ so that $DM = 2cm$. • The **area of the shaded region** is **(3pts)** 	$24 + x\,cm^2$	$24\,cm^2$	$36 - x\,cm^2$
5.	ABC is **any triangle** such that: • $[AH]$ is the **<u>height relative</u>** to $[BC]$. • **<u>The perpendicular bisector</u>** (d) of $[AH]$ cuts it at I & cuts $[AB]$ at R. Then R is **(1½pts)**	The midpoint of $[AC]$	The midpoint of $[AB]$	We cannot say anything
6.	The equation $\frac{3x-4}{2} - \frac{7}{8} = \frac{6x-3}{4}$, admits for x **(1pt)**	A unique solution	Infinite solutions	No solution
7.	ABC is an **isosceles triangle** at A such that $BC = 3$cm & $AB = 4$cm. On the **parallel** drawn from A to (BC), place point D such that $AD = BC$. The **parallel** drawn from D to (AC) cuts (BC) at E. Then the quadrilateral $ABED$ is a........ **(1½pts)**	Right trapezoid	Isosceles trapezoid	square

GoodWork