Lycée Des Arts

Name: ………………..…………………………………………..…………

Class : ***Grade 8*** Section: ……. Date : ………………

Exam in: ***Math*** ***Mid-Term***

إرشادات:
1. أكتب بخط واضح ومقروء.
2. عدد الأسئلة اربعة .
3. يمكنك البدء في أي سؤال تريد.
4. العلامة ا لقصوى 25.

I. (4pts)

Decide if each statement is true or false and justify.

1) Given: $E = \dfrac{(-7)^3 \times (-5)^{-4}}{49 \times 5^{-6} \times (-7)}$, then E is the square of 5. (¾ pt)
2) Let $f(x) = \dfrac{-x+1}{x+2}$, then f is defined for any natural integer. (¾ pt)
3) Given $f(x) = x^2 - 2x - 2$, then $f(1-\sqrt{3}) = 2\sqrt{3} - 6$. (1pt)
4) If ABC is a triangle such that D, E, and F are the respective midpoints of [AB], [AC], and [BC], then DEFB is a parallelogram. (¾ pt)
5) Given $AB = \sqrt{75}$, $AC = 3\sqrt{27}$, and $BC = 2\sqrt{12}$, then the points A, B, and C are collinear in this order. (¾ pt)

II. (4pts)

Given the real numbers:

$A = \dfrac{8}{3} + 5 \div \left(1 - \dfrac{2}{5}\right)$; $B = \dfrac{55 \times 10^3 \times 2^{10}}{10^4 \times 2^9}$

$C = (3\sqrt{5} - 1)(\sqrt{5} + 1) - (\sqrt{5} + 1)^2$; $D = 36 \times 10^{-6} \times (2 \times 10^{-1})^{-2}$

1) Write A and B in the form of an irreducible fraction, then deduce that A = B.(1½pts)
2) Simplify C and state the type of the obtained number with justification. (1¼pts)
3) Write D in the form of a decimal number then in the scientific notation.(1¼pts)

III.(9pts)

In this exercise the two parts A and B are independent.

Part A:

Consider the two polynomials.

$P(x) = (5x - 4)^2 - (1 - 3x)^2$

$Q(x) = 4x^2 - 12x + 9 + 3(2x - 3)(2 - x) - 4x + 6$

1) a) Write P(x) in the form $ax^2 + bx + c$ where a, b, and c are integers to be determined. (1pt)

b) Solve the equation $P(x) = 14x^2 - 34x + 23$ (1pt)

2) a) Show that $4x^2 - 12x + 9$ is a perfect square then prove that:

   $Q(x) = (2x - 3)(-x + 1)$.(1pt)

   b) Show that $x = \frac{3}{2}$ is a common root for P(x) and Q(x): (1 ½ pts)

3) Let $T(x) = \frac{P(x)}{Q(x)}$

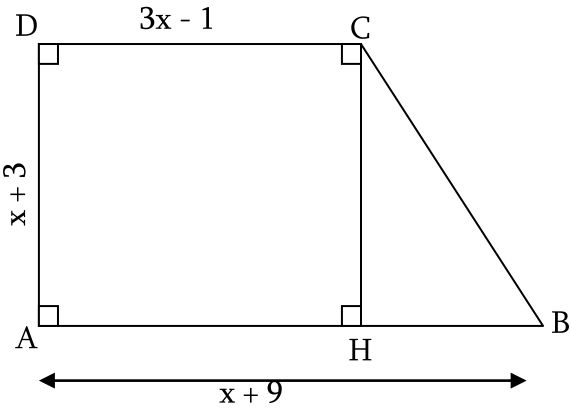
   a) Use a suitable remarkable identity to factorize P(x). (1pt)
   b) Precise the values of x for which T(x) is defined, then simplify T(x). (1pt)

Part B:

Consider the right trapezoid ABCD such that: $AD = x + 3$, $DC = 3x - 1$, and $AB = x + 9$ (see figure to the right).

The unit of length is cm and $x > 1$.

1) Verify that the area of the trapezoid ABCD is $A = 2x^2 + 10x + 12$. (1pt)
2) Determine the value of x so that the rectangle AHCD becomes a square.(¾ pt)
3) In case $x = 2$, calculate the area of the trapezoid ABCD. (¾ pt)



IV. (8pts)

Consider the following information:

- ABC is a triangle such that BC = 5cm, $\hat{ABC} = 60^o$, and $\hat{ACB} = 30^o$.
- Point S is the symmetric of A with respect to (BC).
- [AS] and [BC] intersect at O.
- The perpendicular drawn from S to [AC] cuts [BC] at T.

1) Draw a figure. (1pt)
2) Calculate $\hat{BAC}$ and deduce that (AB) and (ST) are parallel. (1pt)
3) a) Show that the two triangles ABO and OTS are congruent then deduce that O is the midpoint of [BT]. (1 ½ pts)

   b) Show that the quadrilateral ABST is a rhombus. (¾ pt)
4) a) Show that: $\hat{SAC} = 60^o$. (¾ pt)

   b) What does straight-line (CO) represent for [AS]. (¾ pt)

   c) Deduce that triangle ACS is equilateral. (¾ pt)
5) Let M be the symmetric of S with respect to C and D be the symmetric of A with respect to C.

   a) Draw M and D. (½ pt)

   b) Precise the nature of the quadrilateral ASDM. (1pt)

Good Work