

Name: .....

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



Exam in: **Math**

**Midterm**

1. إرشادات: 1. أكتب بخط واضح ومقروء.

2. عدد الأسئلة اربعة .

3. يمكنك البدء في أي سؤال تريد.

4. العلامة ا لقصوى 25.

5. يسمح استخدام الآلة الحاسبة فقط للتأكد من الاجابات.

### Exercise I: (6pts)

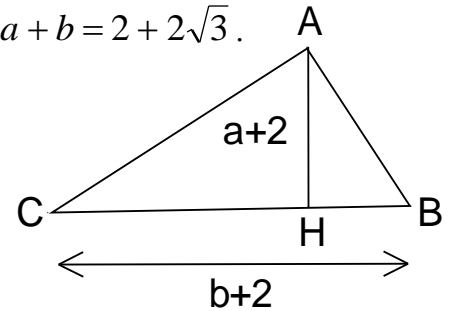
In the table below, only one of the proposed answers to each question is correct. Write down the number of each question and give with justification, the answer corresponding to it.

No.	Questions	Answers		
		A	B	C
1.	Given the two numbers: $A = \sqrt{54} - \sqrt{216}$ and $B = -\sqrt{147} + \sqrt{75}$	$A < B$	$A > B$	$A = B$
2.	$3^{-1} - 3^{-3} =$	$\left(\frac{2}{3}\right)^3$	$\frac{2^3}{3}$	$-\left(\frac{2}{3}\right)^3$
3.	Let $f(x) = 3x^2 - 6x + 5$ then $f(1 + \sqrt{5}) = \dots$	$17 - 6\sqrt{5}$	17	13
4.	ABCD is a rhombus whose diagonals are such that $AC = (x - 2)$ and $BD = (x + 2)$  If the area of ABCD is $6cm^2$ , then	$x = 4$ or $x = -4$	$x = 4$	$x = 2$ or $x = -2$
5.	Given the real number $E = \frac{3^{210} - 5 \times 9^{104}}{2 \times 81^{52}}$ then	2	$\frac{1}{2}$	$-\frac{1}{2}$
6.	If $x < 0$ , then $\sqrt{9x^2 + 16x^2} =$	7x	5x	- 5x

**Exercise II: (6 ½ pts)**

The following exercises are independent

- Given  $R = 3\sqrt{75} - 2\sqrt{48} + \sqrt{27}$  and  $N = -2\sqrt{2} + 3\sqrt{72} - \sqrt{200}$ .
  - Write R in the form  $a\sqrt{3}$  and N in the form  $b\sqrt{2}$  where a and b are two integers to be determined. (1 ½ pts)
  - Compare R and N. (¾ pt)
  - Justify that  $R - N$  is a positive irrational number. (¾ pt)
- Show that  $\sqrt{(\pi - 3)^2} + \sqrt{(2 - \pi)^2} - 2\sqrt{(1 - \pi)^2} = -3$ . (1pt)
- Consider the two real numbers a and b such that:  $ab = 2\sqrt{3}$  and  $a + b = 2 + 2\sqrt{3}$ .
  - Calculate the numerical value of:  $a^2b + ab^2$ . (1pt)
  - In the triangle ABC to the right:  $BC = (b + 2)$  cm and the height  $AH = (a + 2)$  cm. Show that the area of the triangle ABC is  $(4 + 3\sqrt{3})\text{cm}^2$ . (1 ½ pts)

**Exercise III: (5 ½ pts)**

Consider the two polynomials:

$$A(x) = (3 - x)^2 - (x - 3)(7x + 4) + m + 2x^2$$

$$B(x) = 9x^2 + 12x + 4 - (x - 1)^2$$

- Calculate the value of m so that 3 is a root of A(x). (½ pt)
- Show that  $9x^2 + 12x + 4$  is a perfect square, then deduce that  $B(x) = (2x + 3)(4x + 1)$ . (1 ¼ pts)

**Suppose that  $m = -18$ .**

- Write A(x) in the form of a product of two factors of the 1<sup>st</sup> degree. (1pt)

- Consider the fractional expression:  $P(x) = \frac{A(x)}{B(x)}$ .

a) Determine the values of x so that P(x) exists, then simplify P(x). (¾ pt)

b) Does the equation  $P(x) = -\frac{13}{10}$  admit a solution? Justify. (1pt)

c) Show that  $h(\sqrt{2}) = 13 - 9\sqrt{2}$ . (1pt)

**Exercise IV: (7pts)**

Consider an equilateral triangle ABC. D is the point symmetric of A with respect to C. The median [AO] in triangle ABC cuts [BD] in F and the perpendicular to [BC] through C cuts [BD] in G. (O is the midpoint of [BC])

- Draw a figure. (¾ pt)
  - Determine the nature of triangle ABD? (¾ pt)
- Show that  $BF = FG = GD$ . (1pt)
- Show that  $\hat{FCG} = 60^\circ$ . Show that triangle FCG is equilateral. (¾ pt)
- Determine the nature of triangle DCF? (¾ pt)
- Let K be the symmetric of F with respect to C. Determine the nature of the quadrilateral AFDK. Justify. (1pt)
- The perpendicular to (BD) issued from D cuts (AK) in P. Determine the nature of ABDP. Justify. (1pt)
- Suppose that  $AP = 2\sqrt{3} + 1$  and  $AB = 2\sqrt{3} - 1$ . Show that the area of the rectangle ABDP is a natural number. (1pt)

*Good Work*