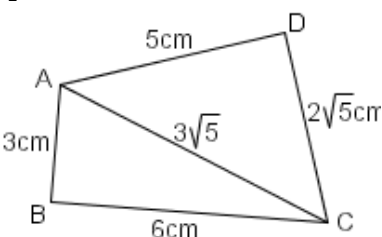


**إرشادات عامة:**

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

**1<sup>st</sup> exercise: (4pts)**

For each question, there is one correct solution, indicate with **justification** the right response.

No.	Questions	Answers		
		a	b	c
1.	If, $A = \frac{\sqrt{2.5 \times 10^3} \times \sqrt{3600}}{\sqrt{2 \times 10^2} \times \sqrt{27 \times 10^4}}$ , then	$A = \sqrt{6}$	$A = \frac{\sqrt{6}}{6}$	$A = \frac{\sqrt{6}}{2}$
2.	If $x = (3\sqrt{5} - 1)(\sqrt{5} + 1) - (\sqrt{5} - 1)^2$ , then	$x = 10 + 2\sqrt{5}$	$x = 10 + 4\sqrt{5}$	$x = 8$
3.	If, $r = 2^{15} + 2^{15}$ , then	$r = 4^{15}$	$r = 2^{16}$	$r = 2^{30}$
4.	In the coded figure below, ABCD is a quadrilateral  , then	ABCD is a parallelogram	ABCD is a right trapezoid	The four points A, B, C and D belong to the same circle of diameter [AC].

**2<sup>nd</sup> exercise: (4pts)**

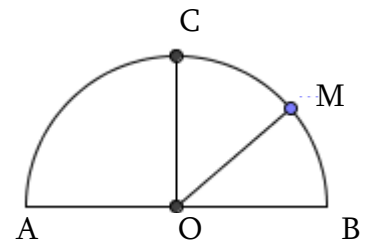
1. a) Compare the numbers  $a = 3\sqrt{2}$  and  $b = 2\sqrt{5}$ . Then deduce the simplification of  $\sqrt{(3\sqrt{2} - 2\sqrt{5})^2}$ . (½ pt)
- b) Develop  $(1 - \sqrt{5})^2$ . (½ pt)
- c) Given  $E = 1 + \sqrt{(3\sqrt{2} - 2\sqrt{5})^2} - 2\sqrt{6 - 2\sqrt{5}} - (1 + \sqrt{2})(\sqrt{2} - 4)$ .  
Prove that  $E$  is an integer. (¾ pt)
2. Given that  $a, b$  &  $c$  are three real non - zero numbers:  $\frac{2}{a} = \frac{1}{b} + \frac{1}{c}$ .
  - a) Calculate  $b$ , so that  $a = -2$  &  $c = -\frac{4}{3}$ . (¾ pt)
  - b) Is it possible to find the value of  $c$  such that  $a = 1.5$  &  $b = \frac{3}{4}$ ? Why? (½ pt)
  - c) Suppose in this part that  $c = -(x + 1)$  and  $b = x - 1$  where  $x > 0$ .
    - i) Prove that  $\frac{1}{a} = \frac{1}{x^2 - 1}$ . (½ pt)
    - ii) Calculate  $x$  if  $a = 3$ . (½ pt)

**3<sup>rd</sup> exercise: (3pts)**

- A. 1) Expand and reduce the expression  $E = (x-1)^2 - (x-2)(x-3)$ . (½ pt)  
2) Use the preceding result to calculate the expression  $A = (9999)^2 - 9998 \times 9997$ . (½ pt)
- B. 1) Develop and reduce the expression  $(x+1)(x-5)$ . (½ pt)  
2) Given  $f(x) = \frac{3x-6+(x^2-4x+4)}{x^2-4x-5}$ .  
a. For what values of  $x$ ,  $f(x)$  is defined? (½ pt)  
b. Simplify  $f(x)$ . (½ pt)  
c. Solve the equation  $f(x) = \frac{1}{2}$ . (½ pt)

**4<sup>th</sup> exercise: (4pts)**

Consider the semi-circle of center  $O$  and diameter  $AB = 6cm$ .  
Let  $C$  be the midpoint of  $\widehat{arcAB}$  and  $M$  be any point on the  $\widehat{arcBC}$ .  $[AM]$  cuts the bisector of  $\widehat{COM}$  at  $I$ .



- 1) Reproduce and complete the adjacent figure. (½ pt)
- 2) Calculate the measure of the angle  $\widehat{AMC}$ . (½ pt)
- 3) What does the line  $(OI)$  represent with respect to segment  $[CM]$ ? Justify. (1pt)
- 4) Prove that the triangle  $CIM$  is a right isosceles triangle. (1pt)
- 5) Prove that as  $M$  describes the  $\widehat{arcBC}$  the point  $I$  will vary on a fixed circle whose center and radius are to be determined. (1pt)

**5<sup>th</sup> exercise: (5pts)**

Consider a circle  $(C)$  of center  $O$  and diameter  $AB = 8cm$ . Let  $M$  be the symmetric of  $O$  with respect to the point  $A$ ; and  $(MT)$  the tangent at  $T$  to the circle  $(C)$ .

- 1) Draw a figure. (½ pt)
- 2) a) Compute the measure of  $[MT]$  &  $[AT]$ . Deduce the nature of triangle  $ATO$ . (1pt)  
b) Calculate the measure in degrees of the angle  $\widehat{AMT}$ . (½ pt)
- 3) Calculate  $BT$  and prove that the triangle  $MTB$  is isosceles. (1pt)
- 4) The line parallel to  $(AT)$  passing through  $O$  cuts  $(MT)$  at a point  $E$ . Calculate the length of  $OE$  &  $TE$ . What is the nature of triangle  $MOE$ ? Justify. (1pt)
- 5) Prove that  $(BT)$  is tangent to  $(C)$  at  $B$ . (1pt)