



# Math mid term revision

Qena Student Club

## MA.1.07



1- For  $(y + 5)^2 = -12(x - 2)$ :

- A) Its focus is  $(-1, -5)$  and the graph open to the left
- B) Its focus is  $(-1, -5)$  and the graph open to the right
- C) Its focus is  $(-1, -5)$  and the graph open to upward
- D) Its focus is  $(-1, -5)$  and the graph open to downward

2-Write an equation for the graph with the given characteristics,  
focus  $(3, -4)$  and vertex  $(1, -4)$ .

- A)  $y + 4 = 8(x - 1)^2$
- B)  $(y + 4)^2 = 4(x - 1)$
- C)  $(y + 4)^2 = 8(x - 1)$
- D)  $(y + 4)^2 = 8(x - 1)^2$





[3] Use finite differences and a system of equations to find the degree of a polynomial function that fits the data. You may want to use a calculator.

- A) First degree
- B) Second degree
- C) Third degree
- D) Fourth degree

X	1	2	3	4	5	6
F(X)	-4	0	10	26	48	76

[4] The arch of the railroad track bridge below is in the shape of a parabola. The two main support towers are 208 meter apart and 80 meters tall. The distance from the top of the parabola to the water is 60 meters. The equation that models the shape of the arch. Let the railroad track represented the x-axis.

- A)  $y^2 = -180.27(x + 20)$
- B)  $x^2 = -180.27(y + 20)$
- C)  $(x + 60)^2 = -20(y + 180.27)$
- D)  $x^2 = 180.27(y - 20)$





[5] If  $c + di = (x+y) + i(x-y) \cdot ((x+y) - i(x-y))$ , then  $c^2 + d^2 = \dots$

- A) 1
- B)  $x^2 + y^2$
- C)  $x^2 - y^2$
- D)  $2xy$

[6] If  $z = \lambda + 4i \sqrt{1 + \lambda i}$  is real number,  $\lambda$  is real number. Then the possible values of  $\lambda$  is ...

- A)  $\pm 2$
- B)  $\mathbb{R} - \{2\}$
- C)  $\mathbb{R} - \{-2, 2\}$
- D)  $\mathbb{R} - \{-2\}$





[7] If  $\alpha$  and  $\beta$  are two roots of  $x^2 + px + p^2 + q = 0$ , then the value of  $\alpha^2 + \alpha\beta + \beta^2 + q = \dots$

- A) 0
- B) 1
- C)  $q$
- D)  $p^2$

[8] Let  $f(x) = x^2 - x + 1, x \geq \frac{1}{2}$ , then the solution of the equation  $f(x) = f^{-1}(x)$  is ...

- A) 0
- B)  $\frac{1}{2}$
- C) 1
- D) 2





[9] If  $(0, 4)$  and  $(0, 2)$  are respectively the vertex and the focus point of the parabola, then the equation is...

A)  $x^2 = 32 - 8y$

B)  $x^2 = 8y - 32$

C)  $y^2 = 8x - 32$

D)  $y^2 = 32 - 8x$

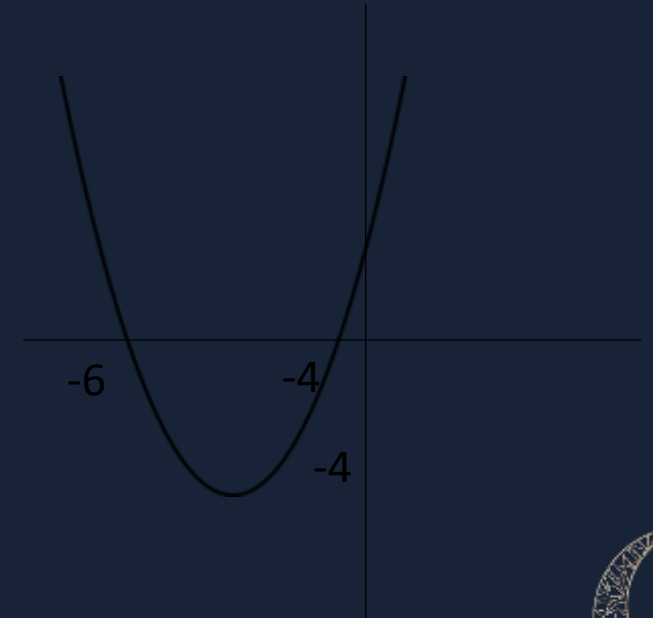
[10] Which quadratic equation represents the parabola shown?

A)  $y = (x + 4)^2 + 4$

B)  $y = (x - 4)^2 + 4$

C)  $y = (x + 4)^2 - 4$

D)  $y = (x - 4)^2 - 4$





[11] The quadratic equation whose roots are  $2 + 3i$  and  $2 - 3i$  is...

A)  $x^2 - 4x + 13 = 0$

B)  $x^2 + 4x + 13 = 0$

C)  $x^2 - 4x - 5 = 0$

D)  $x^2 + 4x + 1 = 0$

[12] The graphs of four quadratic functions are shown. Which equation has a positive discriminant?

A)  $f(x) = 0$

B)  $g(x) = 0$

C)  $h(x) = 0$

D)  $l(x) = 0$





[13] The focus of the parabola  $y^2 = 16x$  is ...

- A) (-4, 0)
- B) (0, 4)
- C) (0, -4)
- D) (4, 0)

[14] The latus rectum of the parabola  $y^2 = 12x$  is...

- A) 4
- B) 8
- C) 12
- D) 24

[15] The vertex of the parabola  $y^2 - 4x - 4y = 0$  is...

- A) (1, 5)
- B) (-1, 2)
- C) (-2, -4)
- D) (-4, 4)





[16] The roots of the quadratic equation

$(a + b - 2c)x^2 - (2a - b - c)x + (a - 2b + c) = 0$  are...

A)  $(a + b + c)$  and  $(a - b - c)$

B)  $1\sqrt{2}$  and  $a - 2b + c$

C) 1 and  $a$

D) None of the above

[17] The roots of  $x^2 - (2b - 1)x + (b^2 - b - 20) = 0$ .

A)  $b + 5$

B)  $b + 4$  and  $b - 5$

C)  $b + 5$  and  $b - 5$

D)  $b - 5$

[18] What is the value of  $(4 - 5i)(12 + 11i)$ ?

A)  $103 + 16i$

B)  $103 - 16i$

C)  $16i - 103$

D) 103



[19]  $1+5i/-3i=...$

A)  $3i$

B)  $-3i$

C)  $1 + 3i$

D)  $(1 + 3i)^2$



[20] If the ratio between the two roots of the equation  $x^2 + bx + c = 0$  is the same as the ratio of the roots  $x^2 + qx + r = 0$  so...

A)  $br^2 = qc^2$

B)  $b^2r = q^2c$

C)  $q^2c^2 = b^2r^2$

D)  $bq = rc$





[21]The towers of a suspension bridge are 800 feet apart and rise 160 feet above the road. The cable between them has the shape of a parabola, and the cable just touches the road midway between the towers.

What is the height of the cable 100 feet from a tower?

- A- 95 feet
- B- 89 feet
- C- 92 feet
- D- 90 feet





[22]If  $Z_1$  and  $Z_2$  are two conjugate complex numbers then  $Z_1+Z_2$  can be equal .....

a .  $9 - 4 i$

b .  $5 i$

c .  $13$

d .  $1 + I$

[23]If  $a, b \in \mathbb{R}$  and  $a + b i = \sqrt{2}$  then .....

a .  $a = 2$  and  $b = 2$

b .  $a = - 2$  and  $b = - 2$

c .  $a = \pm 2$  and  $b = \pm 2$

d . None of these .





[24] If  $x = 2$  is one of the roots of the equation

$$x^2 - 2ax + 2(a^2 - 6) = 0, \text{ then } a = \dots\dots\dots$$

a .  $1 + \sqrt{5}$

b .  $1 - \sqrt{5}$

c . a and b

d . None of these

[25] If one of the two roots of the equation  $ax^2 + bx + c = 0$  is half the other root then  $2b^2 = \dots\dots\dots$

a .  $3ac$

b .  $5ac$

c .  $7ac$

d .  $9ac$





[26] If the difference between the two roots of the equation  $3x^2 - 2x + c = 0$  equals the difference between roots of the equation

$$2x^2 - cx + 3 = 0 \text{ then } 9c^2 + 48c = \dots\dots\dots$$

- a . 0
- b . 49
- c . 144
- d . 232

[27] The S.S in  $\mathbb{R}$  of the inequality  $x^2 \leq 9$  is .....

- a .  $[-3, 3]$
- b .  $\mathbb{R} - [-3, 3]$
- c .  $] - 3, 3 [$
- d .  $\mathbb{R} - ] - 3, 3 [$





[28] The algebraic form of the complex number whose modulus = 3 and its amplitude =  $\pi$  is ....

- a . -3
- b . - 3 i
- c . 3 + 3 i
- d . -3 - 3 I

[29]  $4 (\cos 16 + i \sin 16) \times 5/3 (\cos 14 - i \sin 14) = \dots\dots\dots$

- a . - 5 - 5  $\sqrt{I}$
- b . 5 + 5  $\sqrt{I}$
- c . 5 - 5  $\sqrt{i}$
- d . - 5 + 5  $\sqrt{i}$





[30] If  $L + 3$  and  $M + 3$  are the two roots of the equation  $x^2 - 5x + 11 = 0$

then the equation whose roots are  $L^2 M$  and  $M^2 L$  is .....

- a .  $x^2 - 36 = 0$
- b .  $x^2 + 5x + 125 = 0$
- c .  $x^2 - 16x + 58 = 0$
- d . None of these

[31] An arched underpass has the shape of a parabola. A road passing under the arch is 25 feet wide, and the maximum height of the arch is 15 feet. Then the equation for the parabolic arch is .....

- a .  $12x^2 + 125y - 1875 = 0$
- b .  $12y^2 + 125x - 1875 = 0$
- c .  $12x^2 + 15y - 1875 = 0$
- d .  $-12x^2 + 125y - 1875 = 0$







[32]For the parabola  $2y^2+ 12 y - 8 x + 10 = 0$  the coordinates of the vertex is .....

a . ( -1 , 3 )

b . ( -1 , -3 )

c . ( 3 , 1 )

d . ( 3 , - 1 )

[33]For the parabola  $2y^2+ 12 y - 8 x + 10 = 0$  The equation of the directrix is .....

a .  $x = -3$

b .  $x = - 2$

c .  $y = - 3$

d .  $y = - 2$





[34] For the parabola  $2y^2 + 12y - 8x + 10 = 0$  the equation of the line of symmetry is .....

- a .  $x = -3$
- b .  $x = -2$
- c .  $y = -3$
- d .  $y = -2$

[35] the equations of the lines joining the vertex of the parabola  $y^2 = 6x$  to the points on it which have abscissa ( x- coordinate ) = 24 are .....

- a .  $x = 0.5$  and  $x = -0.5$
- b .  $y = 0.5$  and  $y = -0.5$
- c .  $y = 0.5x$  and  $y = -0.5x$
- d .  $x = 0.5y$  and  $x = -0.5y$





[36]the equation of the parabola whose Focus at (5 , 5) and directrix  $x + y = 2$  is .....

a .  $x^2 - 16x + y^2 - 16y - 2xy + 96 = 0$

b .  $x^2 + 16x + y^2 - 16y - 2xy - 96 = 0$

c .  $x^2 - 16x - y^2 + 16y - 2xy + 96 = 0$

d .  $x^2 + 16x - y^2 + 16y + 2xy + 96 = 0$

[37]If,  $(a + 1)x^2 + 2(a+1)x + (a - 2) = 0$ , then, for what parameter of 'a' the given equation have imaginary roots?

a)  $(-\infty, -1)$

b)  $(-1, \infty)$

c)  $(-1, 1)$

d)  $(-\infty, \infty)$





[38]What is the value of x if

$$(a + 2b - 3c)x^2 + (b + 2c - 3a)x + (c + 2a - 3b) = 0$$

where a, b, c are in A.P?

- a) 1/2
- b) 1/4
- c) 2/3
- d) 3/4

[39]Find the focus of parabola with equation  $x^2 = -100y$ .

- a) (0, 25)
- b) (0, -25)
- c) (25, 0)
- d) (-25, 0)





[40] Find the equation of directrix of parabola  $y^2=100x$ .

- a)  $x=25$
- b)  $x=-25$
- c)  $y=25$
- d)  $y=-25$

[41] If,  $x^4 + 4x^3 + 6ax^2 + 6bx + c$  is divisible by  $x^3 + 3x^2 + 9x + 3$ . Then, what is the value of  $a + b + c$ ?

- a) 4
- b) 6
- c) 7
- d) 10





[42]The length of the latus rectum of the parabola  $x^2=ay+by+c$  is

- a)  $a/4$
- b)  $a/3$
- c)  $1/a$
- d)  $1/4a$

[43]Find the coordinate of focus for the parabola.

$$5y^2=16x$$

- a)  $(4/5, 0)$
- b)  $(0, 4/5)$
- c)  $(-4/5, 0)$
- d)  $(0, -4/5)$





[44]The sum of the reciprocals of Rehman's ages 3 years ago and 5 years from now is  $\frac{1}{3}$ . The present age of Rehman is:

- a) 7
- b) 10
- c) 5
- d) 6

[45]A quadratic equation  $ax^2 + bx + c = 0$  has no real roots, if

- a)  $b^2 - 4ac > 0$
- b)  $b^2 - 4ac = 0$
- c)  $b^2 - 4ac < 0$
- d)  $b^2 - ac < 0$





[46]  $1/z$  is for complex number  $z$ .

- a) additive inverse
- b) additive identity element
- c) multiplicative identity element
- d) multiplicative inverse

[47]  $0+0i$  is for complex number  $z$ .

- a) additive inverse
- b) additive identity element
- c) multiplicative identity element
- d) multiplicative inverse







[48] In  $z=4+i$ , what is the real part?

- a) 4
- b)  $i$
- c) 1
- d)  $4+i$

[49]  $(x+3) + i(y-2) = 5+i2$ , find the values of  $x$  and  $y$ .

- a)  $x=8$  and  $y=4$
- b)  $x=2$  and  $y=4$
- c)  $x=2$  and  $y=0$
- d)  $x=8$  and  $y=0$





[50]the necessary condition which makes the equation  $ax^2+bx +c=0$  quadratic is....

- a)  $a>0$
- b)  $a< 0$
- c)  $a\neq 0$

[51] Discuss the nature of the roots of the equations  $(a+ c - b) x^2 + 2cx + (b + c -$

$a)=0$

- A) real and equal
- b) real and un equal
- c) imaginary
- d) none of these





## ANSWERS

[1]A	[11]A	[24]c	[37]a
[2]C	[12]B	[25]d	[38]b
[3]B	[13]D	[26]d	[39]B
[4]B	[14]C	[27]a	[40]b
[5]A	[15]B	[28]a	[41]c
[6]A	[16]C	[29]a	[42]b
[7]A	[17]B	[30]b	[43]a
[8]C	[18]B	[31]a	[44]a
[9]A	[19]A	[32]b	[45]c
[10]C	[20]B	[33]b	[46]d
	[21]d	[34]c	[47]b
	[22]c	[35]c	[48]a
	[23]c	[36]a	[49]b
			[50]c
			[51]b



## MA.1.08



• If  $X=4$  is one of the root of the equation:  $X^2+mX= 4$  , Then.....

- a)  $m= -3$
- b)  $m$  is an even number
- c)  $(1-m)$  is a perfect square
- d) a and c are correct

Answer : D

• What will be the value of  $f(x)$  if,  $2A, A + B, C$  are integers and  $f(x) = Ax^2 + Bx + C = 0$ ?

- a) Natural Number
- b) Unpredictable
- c) Integer
- d) Complex Number

• answer: C





• Find the focus of parabola with equation  $y^2=100x$ .

- a) (0, 25)
- b) (0, -25)
- c) (25, 0)
- d) (-25, 0)

**Answer: c**

Find the focus of parabola with equation  $x^2= -100y$

- a) (0, 25)
- b) (0, -25)
- c) (25, 0)
- d) (-25, 0)

**Answer: b**



If,  $x^4 + 4x^3 + 6ax^2 + 6bx + c$  is divisible by  $x^3 + 3x^2 + 9x + 3$ . Then, what is the value of  $a + b + c$ ?

- a) 4
- b) 6
- c) 7
- d) 10

**Answer: c**

The sum of two numbers is 27 and product is 182. The numbers are:

- a) 12 and 13
- b) 13 and 14
- c) 12 and 15
- d) 13 and 24

**Answer: B**





The sum of the reciprocals of Rehman's ages 3 years ago and 5 years from now is  $\frac{1}{3}$ . The present age of Rehman is:

- a) 7
- b) 10
- c) 5
- d) 6

**Answer: A**

Quadratic equation  $ax^2 + bx + c = 0$  has no real roots, if

- a)  $b^2 - 4ac > 0$
- b)  $b^2 - 4ac = 0$
- c)  $b^2 - 4ac < 0$
- d)  $b^2 - ac < 0$

**Answer: (c)**





If  $X=4$  is one of the root of the equation:  $X^2+mX= 4$  , Then.....

- a)  $m= -3$
- b)  $m$  is an even number
- c)  $(1-m)$  is a perfect square
- d) a and c are correct

**Answer : D**

The quadratic equation in  $x$  of real co-factor and in which one of its roots is  $(1+5\sqrt{3} i)/(\sqrt{3}+4i^7)$  .....

- a )  $x^2 + 2\sqrt{x} + 4 = 0$
- b )  $x^2 + 2x + 4 = 0$
- c )  $x^2 = x - 3$
- D )  $x^2 + 3x - 5 = 0$

**Answer A**







Which of the following is a quadratic equation

a)  $x^2 + 2x + 1 = (4 - x)^2 + 3$

b)  $-2x^2 = (5 - x)(2x - 2/5)$

c)  $(k + 1)x^2 + (3/2)x = 7$  where  $k = -1$

d)  $x^3 - x^2 = (x - 1)^3$

Answer: D

Answers:

1-  $(3\sqrt{3})^{x+1} = 27$

2-  $4^{x-3} = 3^{2x-6}$

3-  $\frac{3^{3x+3^{2x}+3^x}}{3^{2x+3^{x+1}}} = 1$

4-  $(\frac{2}{3})^{x+5} = (3\frac{3}{8})^{-2}$

5-  $2^{x+1} + 2^{x-1} = 5$

6-  $5^x + \frac{125}{5^x} = 30$

7-  $2xb^{4 \log_b x} = 486$

8-  $[\log(2 + \log_2(x + 1))] = 0$

9-  $\log_x(1/8) = -3/4$

10-  $9^x - 3^x - 8 = 0$

1- 1

2- 3

3- -2

4- 1

5- 1

6- 1 or 2

7- 3

8- 255

9- 16

10-  $\ln \frac{1+\sqrt{33}}{2} / \ln 3$



Answers:



11- $\log_8\left(\frac{u^3}{v}\right)^2$

12- $\log_2\frac{x^2(x-1)^3}{(2x+1)^4}$

13- $\log\sqrt{\frac{x^2+4}{(x^2+1)(x^3-7)^2}}$

14- $\log_2\left(\frac{x(x^2+1)}{\sqrt{x^2-1}}\right)$

Find the expression of the following using combining:

.....  
....  
15- $\log_2 A + \log_2 B - 2 \log_2 C$

16- $4 \log x - \frac{1}{3} \log(x^2 + 1) + 2 \log(x - 1)$

11- $6 \log_8 u - 2 \log_8 v$

12- $2 \log_2 x + 3 \log_2(x - 1) - 4 \log_2(2x + 1)$

13- $\frac{1}{2} [\log(x^2 + 4) - \log(x^2 + 1) - 2 \log(x^3 - 7)]$

14- $\log 2x + \log_2(x^2 + 1) - \frac{1}{2} \log_2(x^2 - 1)$

15- $\log_2\left(\frac{AB}{C^2}\right)$

16- $\log\frac{x^4(x-1)^2}{\sqrt[3]{x^2+1}}$

Answers:

Choose the correct answer from a, b, c or d: -

17- by combining  $\log_3 5 + 5 \log_3 2$  the expression will be .....

- a-  $\log_3 160$     b-  $\log_3 150$     c-  $\log_3 125$     d-  $\log_3 50$

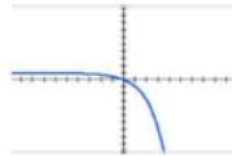
18-the domain of the function  $f(x)=\log_2(x + 1)$  is .....

- a-  $(-\infty, \infty)$     b-  $(-1, \infty)$     c-  $(-1,3)$     d-  $(\infty,-1)$

19-the domain of the following function is.....

- a-  $(-\infty,1)$     b-  $(-\infty, \infty)$     c-  $(-\infty, 0)$

- d-  $(1, -\infty)$



20-the domain of the function  $f(x)=-6^{x+3} - 9$  is .....

- a-  $(-\infty, \infty)$     b-  $(-\infty, -9)$     c-  $(-9, \infty)$     d-  $(\infty, -\infty)$

17- a

18- b

19- b

20- a





Find the value of each of the following logarithms.

- a.  $\log_5 25$       b.  $\log_2 16$       c.  $\log_{1/3} 9$   
 d.  $\log_7 7$       e.  $\log_6 1$       f.  $\log_4 \frac{1}{2}$

**Solution**

- a.  $\log_5 25 = y \Leftrightarrow 25 = 5^y$  or  $5^2 = 5^y$      $y = 2$   
 b.  $\log_2 16 = y \Leftrightarrow 16 = 2^y$  or  $2^4 = 2^y$      $y = 4$

**Solution continued**

- c.  $\log_{1/3} 9 = y \Leftrightarrow 9 = \left(\frac{1}{3}\right)^y$  or  $3^2 = 3^{-y}$      $y = -2$   
 d.  $\log_7 7 = y \Leftrightarrow 7 = 7^y$  or  $7^1 = 7^y$      $y = 1$   
 e.  $\log_6 1 = y \Leftrightarrow 1 = 6^y$  or  $6^0 = 6^y$      $y = 0$   
 f.  $\log_4 \frac{1}{2} = y \Leftrightarrow \frac{1}{2} = 4^y$  or  $2^{-1} = 2^{2y}$      $y = -\frac{1}{2}$

Given that  $\log_5 z = 3$  and  $\log_5 y = 2$ , evaluate each expression.

- a.  $\log_5(yz)$       b.  $\log_5(125y^7)$   
 c.  $\log_5 \sqrt{\frac{z}{y}}$       d.  $\log_5(z^{1/30}y^5)$

**Solution**

- a.  $\log_5(yz) = \log_5 y + \log_5 z$   
 $= 2 + 3$   
 $= 5$

**Solution continued**

- b.  $\log_5(125y^7) = \log_5 125 + \log_5 y^7$   
 $= \log_5 5^3 + 7\log_5 y$   
 $= 3 + 7(2) = 17$   
 c.  $\log_5 \sqrt{\frac{z}{y}} = \log_5 \left(\frac{z}{y}\right)^{1/2} = \frac{1}{2}(\log_5 z - \log_5 y)$   
 $= \frac{1}{2}(3 - 2) = \frac{1}{2}$





Solve  $\log(3x + 2) + \log(x - 1) = 1$ . Give the exact value(s) of the solution(s).

### Solution

The number  $\frac{1 - \sqrt{145}}{6}$  is negative, so  $x - 1$  is negative. Therefore,  $\log(x - 1)$  is not defined and this proposed solution must be discarded.

Since  $\frac{1 + \sqrt{145}}{6} > 1$ , both  $3x + 2$  and  $x - 1$  are positive and the solution set is  $\left\{ \frac{1 + \sqrt{145}}{6} \right\}$ .

A chemical spill deposits 60,000 cubic meters of soluble toxic waste into a large lake. If 20% of the waste is removed every year, how many years will it take to reduce the toxin to 1000 cubic meters?

### Solution

In the equation  $A = A_0 e^{rt}$ , we need to find  $A_0$ ,  $r$ , and the time when  $A = 1000$ .

### Solution continued

1. **Find  $A_0$ .** Initially ( $t = 0$ ), we are given  $A_0 = 60,000$ . So

$$A = 60,000 e^{rt}$$

2. **Find  $r$ .** When  $t = 1$  year, the amount of toxin will be 80% of its initial value, or

$$\frac{80}{100} (60,000) = 48,000.$$

### Solution continued

3. **Find  $t$  when  $A = 1000$ .**

$$\begin{aligned} 1000 &= 60,000 e^{t \ln\left(\frac{4}{5}\right)} \\ \frac{1}{60} &= e^{t \ln\left(\frac{4}{5}\right)} & t &= \frac{\ln\left(\frac{1}{60}\right)}{\ln\left(\frac{4}{5}\right)} \\ \ln\left(\frac{1}{60}\right) &= t \ln\left(\frac{4}{5}\right) & t &\approx 18.3 \end{aligned}$$

It will take approximately 18 years to reduce toxin to 1000 m<sup>3</sup>.





# Thanks

Made by

Qena Student Club

