

## MATHS QUIZ 2012

### H.S.S SECTION

#### Trial Question

Number 2012 is the sum of three prime numbers. What is the smallest of them ?

#### Numbers

1) Consider the A.P 1,4,7,----- Is  $10^{10}$  a term of this sequence ?

2) Using the four digits 1,2,3,4 without repetition 24 four digit numbers can be made . What is the sum of all these numbers ?

3) Find the sum

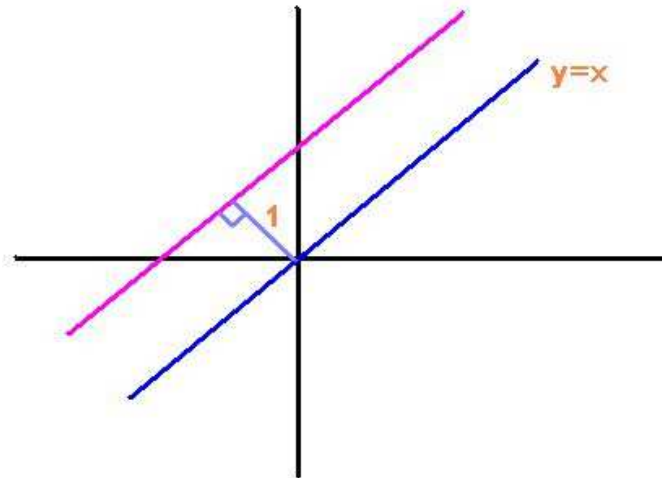
$$\frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \dots + \frac{1}{99 \times 100}$$

4) Let  $3 \leq x \leq 5$  and  $1 \leq y \leq 2$  between what number x-y lie ?

5) Consider the complex number Z with  $|Z| = 1$  . What is the maximum possible value of  $\left| Z + \frac{1}{Z} \right|$

## Geometry

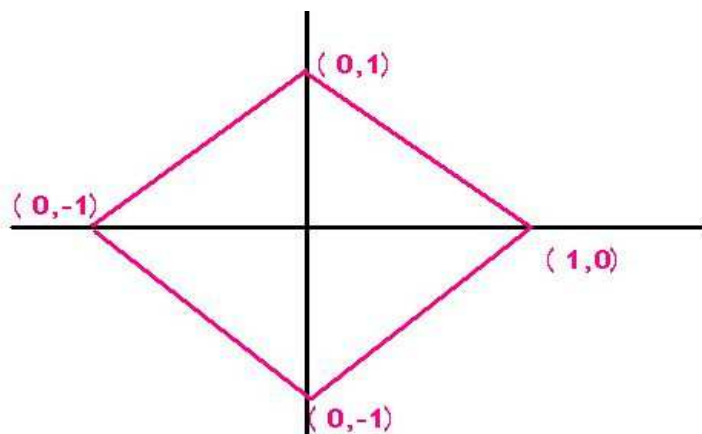
6) A line is drawn parallel to line  $y=x$  at a distance 1 unit above



What is the equation of this line ?

7) What is the equation of a circle passing through the points  $(2,0)$ ,  $(0,2)$  and  $(0,0)$

8)

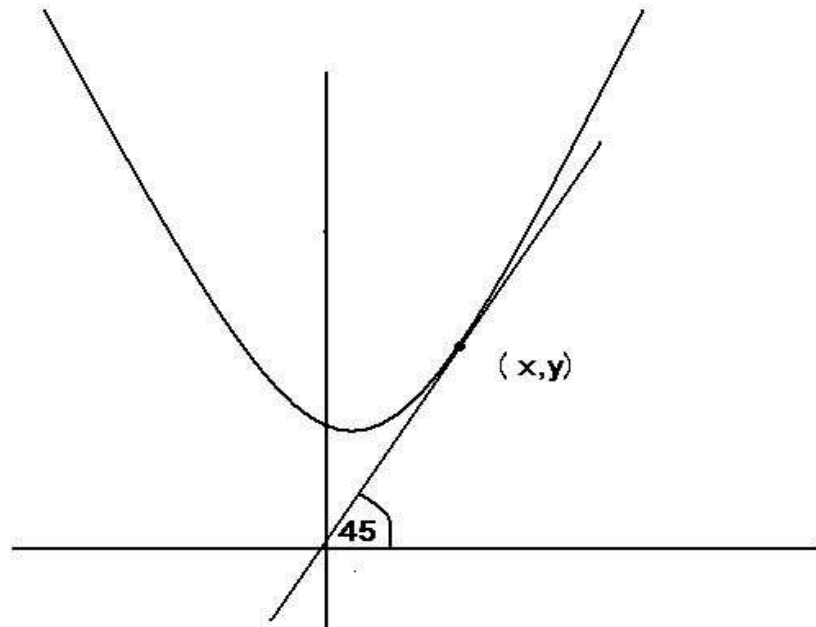


Find a single equation that represents the boundary of the square ?

9) Consider all points in the Argand plane denoting complex numbers  $Z$  with

$$|z - i| + |z + i| = 3. \text{ What curve does it form ?}$$

10) The figure shows a parabola of the equation  $y = x^2 + 1$  and a tangent to it making an angle  $45^\circ$  with the X-axis



What are the coordinates of point of contact ?

Take your pick

11) Let  $Q$  be the set of all rational numbers and let sets  $A$  and  $B$  be defined by

$$A = \{x \in Q, x = 2y \text{ for some } y \text{ in } Q\}$$

$$B = \{x \in Q, x = 2y - 1 \text{ for some } y \text{ in } Q\}$$

What is the relation between  $A$  and  $B$  ?

a)  $A \cap B = \emptyset$     b)  $Q - A = B$     c)  $A = B$

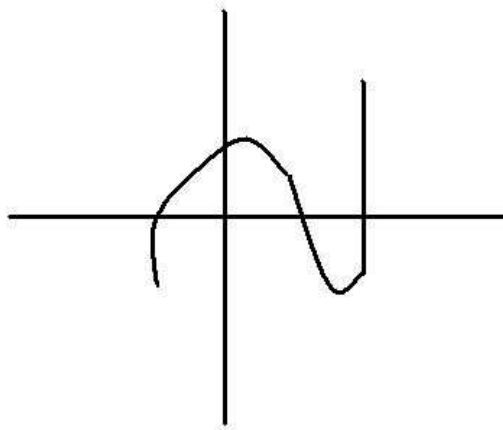
12)  $x^2 < x$  for a real number  $x$ . Which is the same as this statement ?

- a)  $x > 1$    b)  $x < 1$    c)  $0 < x < 1$

13) Let  $Z$  be a complex number with  $|Z| = 1$  and let  $\overline{Z}$  be the conjugate of  $Z$  which is true ?

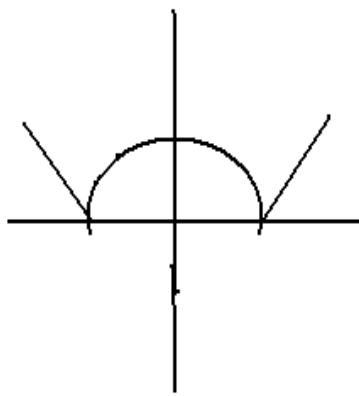
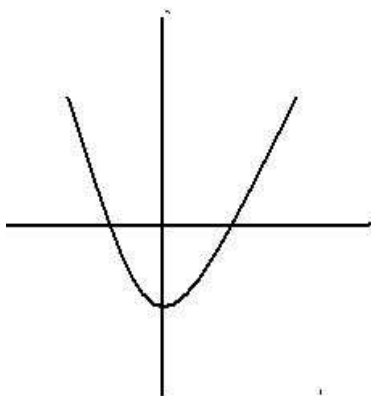
- a)  $\overline{\overline{Z}} = Z$    b)  $\overline{\overline{Z}} = \frac{1}{Z}$    c)  $\overline{\overline{Z}} = Z^2$

14) This is the graph of a function on the set of real number . Which is the function



- a)  $y = x^2 - x$    b)  $y = x^3 - x$    c)  $y = x^4 - 4$

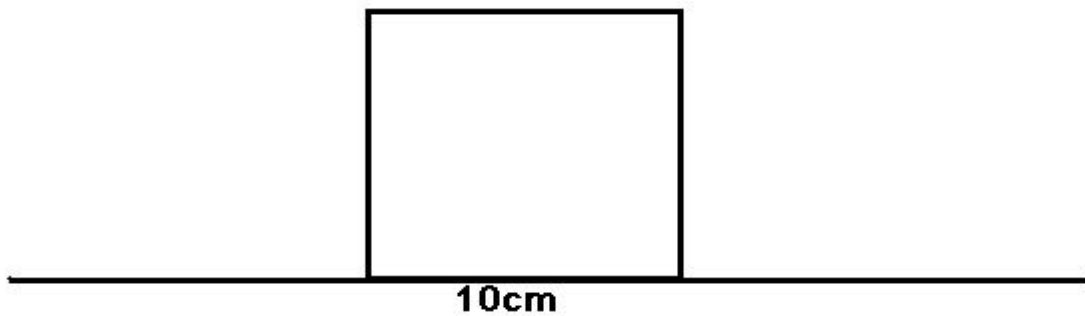
15) Which of the following curves is the graph of  $y = |x^2 - 1|$



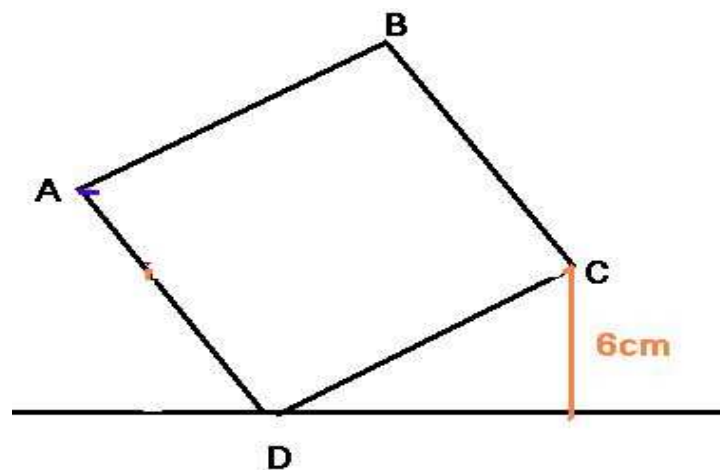
## Math and the world

16) Two taps open into a tank. When the large tap alone is open it take 2 hours to fill the tank. When the small tap alone is open it take 4hours to fill the tank.If both taps are open how many hours will it take to fill the tank .

17) A square of side 10cm is arranged as shown

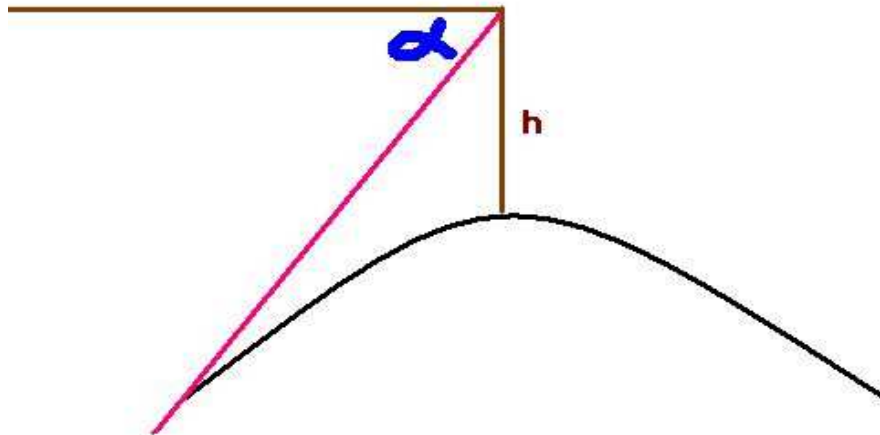


If the same square is inclined as shown how much will the vertex A raise

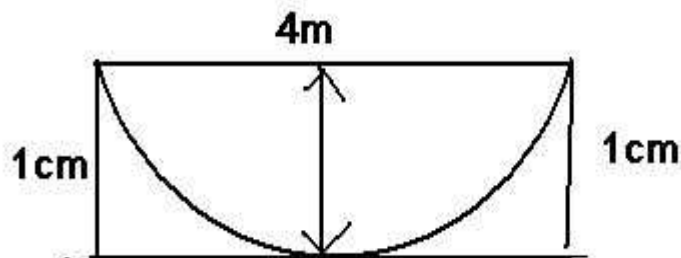


( can not recollect the question properly)

18) In the figure shown below 'h' is the height of a mountain. From the top of the mountain the horizon is seen at an angle of depression  $\alpha$ . Give an expression for radius of earth. Consider earth as a perfect sphere.



19) The figure shows the dimensions of the cross section of a parabolic dish antenna. How much high from the vertex of the parabola should the feed of the antenna. (can't recollect the question properly)



20) An object is thrown up with a speed of 20m/s travels upwards and its height from ground after 't' seconds is  $h=20t-5t^2$ . How high will the object go before falling down ?