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## KVPY Interview Important Questions Mathematics Part 1

Q: 1. What is the value of  $0.999999999\dots$ ?

Sol.  $x = 0.999999\dots$

$$10x = 9.99999\dots$$

Subtract  $9x = 9$

$$x = 1$$

Q: 2. Can the sum of square of two odd numbers be a perfect square of an even number i.e.  $a^2 + b^2 = c^2$  where  $a, b$  are odd and  $c$  is even?

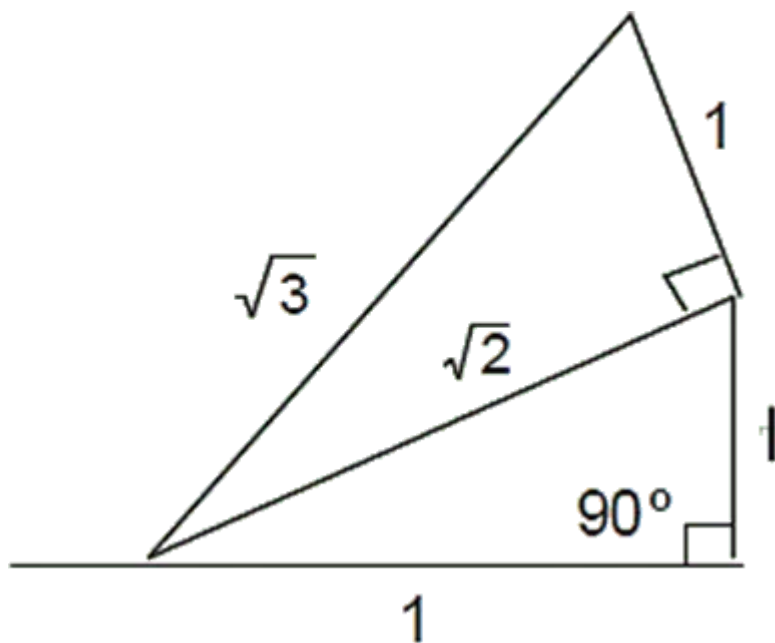
Sol.  $(2n - 1)^2 + (2m - 1)^2 = 2[(n + m)^2] = 2(\text{odd})$  but  $(2p)^2 = 4p^2$  not possible

Q: 3. Prove that Square. Root(2) is an irrational number

Sol.  $\sqrt{2} = \frac{p}{q} \Rightarrow p^2 = 2q^2$  not possible  $\Rightarrow \sqrt{2}$  is irrational

Q: 4. How would you represent an irrational number on the number line using just a Metre Scale and compasses?

Sol.



Q 4 Sol Diagram of Irrational Number

Q: 5. Are prime numbers finite or infinite? If yes, prove it.

Sol. Infinite

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Q: 6. A unit circle has its centre at  $(a, 0)$ . Find the number of points of intersection of this circle with the curve  $x^2 = y^2$

Sol.  $x = \frac{a \pm \sqrt{2-a^2}}{2} \Rightarrow y = \frac{a \pm \sqrt{2-a^2}}{2}$

Q: 7. Is root of a multiplied by root of b always equal to root of ab?

Sol.  $\sqrt{a} \sqrt{b} = \sqrt{ab}$  if at least one a or b is positive

Q: 8. Write the condition for the orthogonality of two circles.

$$2g_1 g_2 + 2f_1 f_2 = c_1 + c_2$$

Q: 9. Write the equation of a hyperbola. When will it become rectangular hyperbola?

Sol.  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  when  $a = b$

Q: 10. How do you find out if three given points are in a straight line?

Sol.  $D = 0 \Rightarrow m_{AB} = m_{BC} = m_{CA}$

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