ALGEBRA

December 11, 2023

1. The value(s) of k for which the quadratic equation $2x^2 + kx + 2 = 0$ has equal roots, is

   (A) 4

   (B) ± 4

   (C) -4

   (D) 0

2. on dividing a polynomial $p(x)$ by $x^2 - 4$, quotient and remainder are found to be x and 3 respectively. The polynomial $p(x)$ is

   (A) $3x^2 + x - 12$

   (B) $x^3 - 4x + 3$

   (C) $x^2 + 3x - 4$

   (D) $x^3 - 4x - 3$

3. Simplest form of

$$\frac{1 + \tan^{2A}}{1 + \cot^{2A}}$$

   is .

4. Write the value of

$$\sin^2 30^\circ + \cos^2 60^\circ$$

   .

5. From the quadratic polynomial, the sum and product of whose zeroes are (-3) and 2 respectively.

6. If A, B and C are interior angles of $\triangle ABC$, then show that

$$\cos\left(\frac{B+C}{2}\right) = \sin\left(\frac{A}{2}\right)$$

7. Prove that :

$$(\sin^4\theta - \cos^4\theta + 1)cosec^2\theta = 2$$

8. Sum of the areas of two squares is $544m^2$. If the difference of their perimeters is $32m$, find the sides of the two squares.

9. A motor boat whose speed is $18Km/h$ in still water takes 1 hour more to go $24Km$ upstream than to return down stream to the same spot. Find the speed of the stream.

10. Obtain the zeroes of the polynomial $p(x) = 2x^4 - x^3 - 11x^2 + 5x + 5$ if two zeroes are $\sqrt{5}$ and $-\sqrt{5}$.

11. What minimum is added to $2x^3 - 3x^2 + 6x + 7$ so that the resulting polynomial will be divisible by $x^2 - 4x + 8$?

12. If $\cos\left(sin^{-1}\frac{2}{\sqrt{5}} + \cos^{-1}x\right) = 0$, then x is equal to

    (A) $\frac{1}{\sqrt{5}}$

    (B) $-\frac{2}{\sqrt{5}}$

    (C) $\frac{2}{\sqrt{5}}$

    (D) 1