

ALGEBRA

December 16, 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

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

is .

4. Write the value of

$$\sin^2 30^\circ + \cos^2 60^\circ \tag{2}$$

.

5. From the quadratic polynomial, the sum and product of whose zeroes are (-3) and 2 respectively.
6. Can $(x^2 - 1)$ be a remainder while dividing $x^4 - 3x^2 + 5x - 9$ by $(x^2 + 3)$? Justify your answer with reasons.
7. If A , B and C are interior angles of $\triangle ABC$, then show that

$$\cos\left(\frac{B+C}{2}\right) = \sin\left(\frac{A}{2}\right) \quad (3)$$

8. Prove that :

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

9. 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.
10. 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.
11. Obtain the zeroes of the polynomial $p(x) = 2x^4 - x^3 - 11x^2 + 5x + 5$ if two zeroes are $\sqrt{5}$ and $-\sqrt{5}$.
12. What minimum is added to $2x^3 - 3x^2 + 6x + 7$ so that the resulting polynomial will be divisible by $x^2 - 4x + 8$?
13. If

$$\cos\left(\sin^{-1} \frac{2}{\sqrt{5}} + \cos^{-1} x\right) = 0 \quad (5)$$

then x is equal to

- (A) $\frac{1}{\sqrt{5}}$
- (B) $-\frac{2}{\sqrt{5}}$
- (C) $\frac{2}{\sqrt{5}}$
- (D) 1