CBSE Grade 9 Mathematics

Polynomials

Q1) If p (x) = x + 1 then find p $(x) + p(-x)$.

Q2) Verify Division Algorithm for the polynomials.

P(x) = $x^3 + x^2 + 2x + 3$ and g(x) = $x + 2$

Q3)Find remainder when polynomial P(x)= $x^3 + 3x^2 + 3x + 1$ is divided by polynomial g(x) = $x + \Pi$ using remainder theorem.

Q4) For what value of d is (x^3 -2d$x^2 + 16$) is divisible by ($x + 2$)

Q5) Multiple choice questions

i) If x^{288} + $2x^{21}$+ m is divisible by ($x + 1$) then the value of m is

(a) 1   (b) 2   (c) -2   (d) -3

ii) When P(x) = $x^3 + mx^2 + 2x + m$ is divided by ($x + m$), the remainder is

(a) 0   (b)- m (c) m (d) 2 m

iii) If g(x)= $x^2 - 2\sqrt{2}x + 1$, then g($2\sqrt{2}$) is = ?

(a) 0   (b) $2\sqrt{2}$ (c) 1   (d) -1

iv) The Zero of polynomial $7x^2$ - 28x

(a) (0,0)   (b) (4,0)   (c) (-4,0)   (d) (7,4)

v) What is degree of a zero polynomial?

(a) 0   (b) 1   (c) Not defined   (d) None of these

Solutions and Hints

Sol 1) p (x) = $x + 1, p\,(-x) = -x + 1 \Longrightarrow$ p $(x) + p(-x) = x + 1 - x + 1 = 2$

Sol 2)

x+2$\overline{)x^3 + x^2 + 2x + 3}($x²- x +4

$\qquad$ - $\underline{x^3 + 2x^2}$

$\qquad$ -x² + 2x

$\qquad$ - $\underline{-x^2 - 2x}$

$\qquad$ 4 x +3

$\qquad$ - 4 $\underline{x + 8}$

$\qquad$ -5

Verification
Division Algorithm P(x)=g(x) x q(x) + r(x)
P(x)= $x^3 + x^2 + 2x + 3$
g$(x) = x + 2$, quotient q$(x) = x^2$- x +4
remainder r(x) = -5
p$(x) = g(x)$ x q(x) + r(x)
p(x) =(x^2- x +4) x $(x + 2) - 5$
=$(x^3+x^2 + 2x + 3)$ Hence Verified.

Sol 3) We have, P(x)= $x^3 + 3x^2 + 3x + 1$ and g(x) = $x + \Pi$.

$\qquad$ Now, g(x) = 0 $\Longrightarrow x + \Pi = 0 \Longrightarrow x = -\Pi$

$\qquad$ By remainder Theorem, P$(-\Pi)$ = $-\Pi^3 + 3\Pi^2 - 3\Pi + 1$

$\qquad$ Hence remainder = $-\Pi^3 + 3\Pi^2 - 3\Pi + 1$

Sol 4) Let p(x) = $(x^3$ -2d$x^2 + 16)$ and g$(x) = x$ +2 then,

$\qquad$ g$(x) = 0 \Longrightarrow x + 2 = 0 \Longrightarrow x = -2$

$\qquad$ If g(x) is factor then by factor theorem, p(-2) = 0

$\qquad$ p(-2) = {$(-2)^3$ -2d$(-2)^2$ + 16} = 0 $\Longrightarrow$ -8 $- 8d + 16 = 0 \Longrightarrow$ d = 1

Sol 5) i) 1 $\qquad$ [Hint 1- 2 + m = 0, m = 1]

$\qquad$ ii) -m $\qquad$ [Hint -$m^3 + m^3$ - 2$m + m$ = - m]

$\qquad$ iii) 1 $\qquad$ [Hint 8 - 8 + 1]

$\qquad$ iv) (0,4) $\qquad$ [Hint $7x(x - 4)$ = 0]

$\qquad$ v) Not defined.[Hint zero polynomial is "0" hence its degree is not

$\qquad$ defined.]