

3. FACTORISATION OF ① POLYNOMIALS

Class: VIII MATHEMATICS

FOUNDATION⁺ SOLUTIONS

2025-26

TEACHING TASK

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01. $(x+2)(x-3)$
 $= x^2 - x - 6$
 $= ax^2 + bx + c$
 $\text{Ans: } b = -1$

Ans: A

02. A) $x^3 - 8 = x^3 - 2^3 = (x-2)(x^2 + 2x + 4)$ (Correct)
B) $x^3 + 64 = x^3 + 4^3 = (x+4)(x^2 - 4x + 16)$ (Correct)
C) $27 - x^3 = 3^3 - x^3 = (3-x)(9 + 3x + x^2)$ (Correct)
D) $x^3 - 27 = x^3 - 3^3 = (x-3)(x^2 + 3x + 9)$ (Correct)

Ans: —

03. Change the question: Factorise $64a^3 + 125$
 $: 64a^3 + 125 = (4a)^3 + 5^3 = (4a+5)(16a^2 - 20a + 25)$

Ans: D

04. A) $x^2 - 6x + 9 = (x-3)^2$

Ans: A) ②

05. $2x^3 + 3x^2 - 2x - 3$

$f(1) = 2 + 3 - 2 - 3 = 0$

$\therefore (x-1)$ is a factor.

$$\begin{array}{r|rrrr} x-1 & 2 & 3 & -2 & -3 \\ & 0 & 2 & 5 & 3 \\ \hline & 2 & 5 & 3 & 0 \end{array}$$

$\therefore 2x^2 + 5x + 3$

$= 2x^2 + 2x + 3x + 3$

$= 2x(x+1) + 3(x+1)$

$= (x+1)(2x+3)$

$\therefore$ factors are $(x-1)(x+1)(2x+3)$ Ans: D

06. $x^6 + y^6 = (x^2)^3 + (y^2)^3$

$= (x^2 + y^2)(x^4 - x^2y^2 + y^4)$

Ans: B

07. $w=1 \begin{array}{r|rrrr} 1 & 0 & -7 & 6 \\ & 0 & 1 & -6 \\ \hline & 1 & -6 & 0 \end{array}$

Ans: B

$\therefore y^2 + y + 6 = (y+3)(y+2)$

Q. Dividend = x^{100}

Divisor = $x^2 - 3x + 2$

Let Remainder = $ax + b$.

By Division Algorithm we have

$$x^{100} = (x^2 - 3x + 2)Q(x) + (ax + b)$$

$$x^{100} = (x-1)(x-2)Q(x) + (ax + b)$$

put $x=1$ | put $x=2$

$$1 = a+b \rightarrow \textcircled{1} \quad 2^{100} = 2a+b \rightarrow \textcircled{2}$$

$$1 = a+b \rightarrow \textcircled{1} \quad a = 2^{100} - 1, \quad b = 2 - 2^{100}$$

solving $\textcircled{1}$ & $\textcircled{2}$

$$\therefore \text{Remainder} = (2^{100} - 1)x + (2 - 2^{100})$$

Ans: B

Q9. $(25x^2 - 1) + (1 + 5x)^2$

$$= (5x+1)(5x-1) + (5x+1)^2$$

$$= (5x+1) [5x-1 + 5x+1]$$

$$= (5x+1)(10x)$$

Ans: D

10. $\Sigma (a+b)(b-c)$

$$= (a+b)(b-c) + (b+c)(c-a) + (c+a)(a-b)$$

Ans: A

SEE ADVANCED

(4)

01.

$$f(x) = 2x^3 + 3x^2 - 2x - 3$$

$$f(1) = 2 + 3 - 2 - 3 = 0.$$

$\therefore x-1$ is a factor

$x=1$ is a zero of the polynomial

Ans: A, D

02.

$$f(x) = x^2 - px + q$$

$$\alpha + \beta = p, \quad \alpha\beta = q$$

$$\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta \quad \left| \quad \frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta} \right.$$

$$= p^2 - 2q$$

$$= \frac{p}{q}$$

Ans: B, D

03.

Statement I:

$$27x^3 - 8 = (3x)^3 - 2^3 = (3x-2)(9x^2 + 6x + 4)$$

Difference of cubes

Statement II: True

Ans: A, D

04.

Statement I: $f(x) = ax^3 + 3x^2 - 13$

$$f(2) = 8a + 12 - 13 = 0$$

$$\Rightarrow a = \frac{1}{8} \quad (\text{false})$$

Statement II: Conceptual (True)

Ans: D

(5)

Q5. Assertion: $x^4 - 16 = (x^2)^2 - 4^2$
 $= (x^2 + 4)(x^2 - 4)$
 $= (x^2 + 4)(x + 2)(x - 2)$ (True)

Ans: A

Reason: True

Q6. Assertion: $x^2 + 2x + 5$ Can not be factorise using real numbers (False)

Ans: D

Reason: Conceptual (True)

Q7. $(x+y+2z)(x+y)^2 - \left(\frac{x+y+2z-x-y}{2}\right)^2$
 $= (x+y+2z)^2 - z^2$
 $= (x+y+z)^2 - z^2$

Ans: A

Q8. $[(x+2a)(x+4a)][(x+6a)(x+4a)] + 7a^4$
 $= (x^2 + 10ax + 16a^2)(x^2 + 10ax + 24a^2) + 7a^4$
 Let $x^2 + 10ax + 16a^2 = K$
 $\therefore (K)(K + 8a^2) + 7a^4$
 $= K^2 + 8Ka^2 + 7a^4$
 $= (K + 4a^2)^2 - 9a^4$
 $= (K + 4a^2 + 3a^2)(K + 4a^2 - 3a^2)$
 $= (x^2 + 10ax + 20a^2)^2 - (3a^2)^2$

Ans: A

09.08.

6

$$f(x) = x^3 + x^2 - x - 1.$$

A) $f(-1) = -1 + 1 + 1 - 1 = 0$ (True)

B) $(x+1)(x^2-1) = x^3 - x + x^2 - 1$ (True)

C) ~~True~~ $(x+1)(x^2-1)$
 $= (x+1)(x+1)(x-1)$ (True)

D) $x = -1 \left| \begin{array}{r} 1 \quad 1 \quad -1 \quad -1 \\ 0 \quad -1 \quad 0 \quad 1 \\ \hline 1 \quad 0 \quad -1 \quad 0 \end{array} \right.$

Quotient: $x - 1$ (false)

Degree = 2

Ans: D

Ans: A

10. A) $a^2 - b^2 = (a+b)(a-b)$

$$f(x) = 2x^2 + Kx + 3$$

$$f\left(-\frac{1}{2}\right) = 2\left(-\frac{1}{2}\right)^2 + K\left(-\frac{1}{2}\right) + 3 = 0$$

$$\Rightarrow \frac{1}{2} - \frac{K}{2} + 3 = 0$$

$$\Rightarrow 1 - K + 6 = 0$$

$$\Rightarrow K = 7$$

Ans: 7



12.

9

$$a^4(b^2 - c^2) + b^4(c^2 - a^2) + c^4(a^2 - b^2) \\ = K(a^2 - b^2)(b^2 - c^2)(c^2 - a^2)$$

put $a=1, b=2, c=0$

$$1(4-0) + 16(0-1) + 0() \\ = K(1-4)(4-0)(0-1)$$

$$\Rightarrow 4 - 16 = K(-3)(4)(-1)$$

$$\Rightarrow -12 = K \cdot 12$$

$$K = -1$$

Ans: -1

13. a) Conceptual (S)

b) Conceptual (q)

c) Conceptual (x)

d) Conceptual (x)

Ans: S, q, x, x

14 a) $f(4) = 0$ (P)

b) $f(1) = 2$ (q)

c) $f(-5) = 0$ (x)

d) Conceptual (S)

Ans: P, q, S

LEARNER'S TASK

CUQ's

01.

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

Ans: A

8

02.

$$x^2 - 9 = (x+3)(x-3)$$

Ans: B

03.

$$ax^2 + bx + c$$

Ans: B

$$\alpha + \beta = -\frac{b}{a}$$

Ans: A

04

$$\alpha + \beta = 5$$

Ans: A

05

$$a^2 - 2ab + b^2 = (a-b)^2$$

Ans: A

06

Conceptual

Ans: D

07.

Conceptual

Ans: B

08

Conceptual

$$\text{Ans: B}$$

09.

$$\sum_{i=1}^n i = 1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$$

10.

$$f(x) = 4x^3 - 5x^2 + 3x - 4$$

$$f(0) = -4$$

Ans: C

5 ∈ MAINS

01.

$$f(x) = x^2 - px + 6$$

$$f(2) = 4 - 2p + 6 = 0$$

$$p = 5$$

Ans: B

02

$$\begin{aligned}
 6x^2 - x - 2 \\
 = 6x^2 + 3x - 4x - 2 \\
 = 3x(2x+1) - 2(2x+1) \\
 = (2x+1)(3x-2)
 \end{aligned}$$

9

Ans: B

03

$$x^3 + 27 = x^3 + 3^3 = (x+3)(x^2 - 3x + 9)$$

Ans: A

04.

$$\begin{aligned}
 x^3 - 216 &= x^3 - 6^3 \\
 &= (x-6)(x^2 + 6x + 36)
 \end{aligned}$$

Ans: A

05

$$(x+3)(x-5) = 0 \Rightarrow x^2 - 2x - 15$$

Ans: A

06.

$$(x^2 - 4x)(x^2 - 4x - 1) - 20$$

$$\text{put } x^2 - 4x = a$$

$$= (a)(a-1) - 20$$

$$= a^2 - a - 20$$

$$= (a-5)(a+4)$$

$$= (x^2 - 4x - 5)(x^2 - 4x + 4)$$

$$= (x-5)(x+1)(x-2)^2$$

Ans: D

07.

$$f(x) = 3x^3 + x^2 - 20x + 12$$

$$f\left(\frac{4}{3}\right) = 3 \cdot \frac{64}{27} + \frac{16}{9} - 20 \cdot \frac{4}{3} + 12$$

$$= \frac{64}{9} + \frac{16}{9} - \frac{80}{3} + 12 = \frac{80 - 240 + 108}{9} \neq 0$$

Hence $3x-4$ is not a zero

Ans: D

Q8

(10)

$$\begin{aligned}
 f(x) &= 2x^4 - 7x^3 + 0x^2 + b \\
 f(5) &= 162 - 175 + 3a + b = 0 \\
 \Rightarrow 3a + b &= 27
 \end{aligned}$$

Ans: A

$$\begin{aligned}
 09. \quad x^2 - 5x + 6 \\
 (x - \beta)^2 &= (x + \beta)^2 - 4x\beta \\
 &= (5)^2 - 4(6) \\
 &= 25 - 24 \\
 &= 1
 \end{aligned}$$

Ans: A

$$\begin{aligned}
 10. \quad p(x) &= x^2 + x + c \\
 (1 + \alpha)(1 + \beta) &= 1 + \alpha + \beta + \alpha\beta \\
 &= 1 - 1 + c \\
 &= c
 \end{aligned}$$

Ans: D

ADVANCED

Ans: A, B

01. Conceptual

$$(x + \sqrt{2})(x - \sqrt{2}) = x^2 - 2$$

$$\begin{array}{r|rrrr}
 2 & 0 & 0 & 0 & 0 \\
 & 2 & 0 & 0 & 0 \\
 & 0 & -3 & 0 & 4 \\
 & 0 & 0 & -6 & 2 \\
 \hline
 & 0 & -3 & 0 & 0
 \end{array}$$

x = 1, 1/2

$$\begin{aligned}
 \therefore 2x^2 - 3x + 1 &= 2x^2 - 2x - x + 1 \\
 &= 2x(x - 1) - 1(x - 1) \\
 &= (x - 1)(2x - 1)
 \end{aligned}$$

Ans: A, D

03. Conceptually all statements are correct
 Ans: A, B, C, D

04. Statement I:

$$\begin{aligned} & (\sqrt{3}x+2)(4x-\sqrt{3}) \\ &= 4\sqrt{3}x^2 - 3x + 8x - 2\sqrt{3} \\ &= 4\sqrt{3}x^2 + 5x - 2\sqrt{3} \quad (\text{True}) \end{aligned}$$

Statement II: Conceptual (True)

Ans: A

05. Statement I:

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \quad (\text{True})$$

Statement II: Conceptual (False)

Ans: C

06. Assertion: $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ (False)

Reason: Conceptual (True)

Ans: D

07. Assertion: True; Reason: ~~True~~

Ans: A

08. Conceptual

Ans: A

09. $\sum x^2y + y^2 = \sum xy(x+y)$

$$= xy(x+y) + yz(y+z) + zx(z+x)$$

Ans: C

10. $\pi a^2 b^2 = (a^2 b^2)(b^2 c^2)(c^2 a^2)$

Ans: B

11 $\sum a^n + 2 \sum ab$

(12)

$$= a^2 + b^2 + c^2 + 2(ab + bc + ca)$$

$$= (a+b+c)^2$$

Ans: B

12 Conceptual

Ans: B

13 Conceptual

Ans: C

14. $a^3 + 8 = a^3 + 2^3$

$$= (a+2)(a^2 - 2a + 4)$$

$\therefore$ Coefficient of middle term = -2

Ans: -2

15 $f(x) = x^2 - 8x + k$

$$x^2 + \beta^2 = 8x + 0$$

$$\Rightarrow (x + \beta)^2 - 2x\beta = 40$$

$$\Rightarrow 64 - 2k = 40$$

$$\Rightarrow k = 12$$

Ans: 12

16 a) Conceptual (S)

b) Conceptual (q)

c) Conceptual (P)

d) Conceptual (r)

Ans: S, q, P, r

17) Conceptual (2) (13)

$$x^3 - x^2 = 4x + 4$$

b) Conceptual $f(x) = x^3 - x^2 = 4x + 4$

$$f(2) = 8 - 4 - 8 + 4 = 0 \quad (5)$$

c) Conceptual (2)

d) Conceptual (2)

Ans: a, c, e, f

ADDITIONAL PRACTICE QUESTIONS

01. $x^3 - 8y^3 - 36xy - 216$

$$= x^3 - (2y)^3 - 36xy - 216$$

$$= (x - 2y)^3 + 3 \cdot x \cdot 2y (x - 2y) - 36xy - 216$$

$$= (6)^3 + 3 \cdot 6 \cdot 6 (6) - 36 \cdot 6 - 216$$

$$= 36 + 36 \cdot 6 - 36 \cdot 6 - 216$$

$$= 0$$

Ans: A

02. $x^3 + y^3 - 12xy + 64$

$$= (x + y)^3 - 3xy(x + y) - 12xy + 64$$

$$= (-4)^3 - 3 \cdot 4 \cdot (-4) - 12 \cdot 4 + 64$$

$$= -64 + 12 \cdot 4 - 12 \cdot 4 + 64$$

$$= 0$$

Ans: C

03

$$f(x) = 3x^5 + 4x^4 + 35x^3 + 90x^2 - 19x + 53$$

$$f(-5) = -8752$$

Ans: D

04

n is odd $\rightarrow$ let $n = 2m+1$

$$x^m + 1 = x^{m+1}$$

Ans: A

05

$$p(x) = x^2 + 6x + 10$$

let $\alpha, 2\alpha$ be the zeroes

$$\therefore \alpha + 2\alpha = -6$$

$$\Rightarrow \alpha = -2$$

$\therefore$ The zeroes are $-2, -4$.

$$\therefore f(-2) = (-2)^2 + 6(-2) + 10 = 0$$

$$\Rightarrow$$

$$4 - 12 + 10 = 0$$

$$10 = 8$$

$$\Rightarrow$$

Ans: A

06

$$p(x) = x^2 - (a^2 - 3a + 2)x + 4$$

let the roots be $\alpha, -\alpha$.

$$\therefore \alpha + (-\alpha) = a^2 - 3a + 2$$

$$\Rightarrow a^2 - 3a + 2 = 0$$

$$\Rightarrow (a-1)(a-2) = 0$$

$$\Rightarrow a = 1, 2$$

Ans: B

07. $(x-2)(x+3) = 0$

18

$$\neq x^2 + x - 6 = 0$$

$$x^2 + (a+1)x + b = 0$$

$$a+1=1 \quad | \quad b=-6$$

$$\Rightarrow a=0$$

Ans: D

08 $\frac{ab+bc+ca}{abc} = \frac{4}{2}$

Ans: D

$$\Rightarrow \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 2$$

09

$$x \frac{y}{y} + \frac{y}{x} = -1$$

$$x^2 + y^2 + xy = 0$$

$$x^3 - y^3 = (x-y)(x^2 + xy + y^2) = (x-y)(0) = 0$$

Ans: C

$\Rightarrow$ THE END $\Leftarrow$