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## MULTIPLE CHOICE QUESTION (MCQ)

**Answer.1.** Let  $f(x) = 2x^2 + kx$

Since,  $(x + 1)$  is a factor

$$f(-1) = 0$$

$$\Rightarrow 2(-1)^2 + k(-1) = 0$$

$$\Rightarrow 2 - k = 0$$

$$\Rightarrow k = 2$$

**Correct Option :** (c)

**Answer.2.**  $(249)^2 - (248)^2 = (249 - 248)(249 + 248)$

$$= (1)(497)$$

$$= 497$$

**Correct Option :** (d)

**Answer.3.**  $\frac{x}{y} + \frac{y}{x} = -1 \Rightarrow x^2 + y^2 = -xy$

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

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

$$= (x - y) \times 0$$

$$= 0$$

**Correct Option :** (c)

**Answer.4.**  $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

$$= 0 \times (a^2 + b^2 + c^2 - ab - bc - ca)$$

$$[\because a + b + c = 0]$$

$$= 0$$

$$a^3 + b^3 + c^3 - 3abc = 0$$

$$\therefore a^3 + b^3 + c^3 = 3abc$$

**Correct Option :** (d)

**Answer.5.**  $\left(3x + \frac{1}{2}\right)\left(3x - \frac{1}{2}\right) = 9x^2 - p$

$$\left\{(3x)^2 - \left(\frac{1}{2}\right)^2\right\} = 9x^2 - p$$

$$\left(9x^2 - \frac{1}{4}\right) = 9x^2 - p$$

$$\text{So, } p = \frac{1}{4}$$

**Correct Option :** (c)

**Answer.6.**  $(x + 3)^3 = x^3 + 3^3 + 3 \times (x^2) \times 3 + 3 \times x \times (3^2)$

$$= x^3 + 27 + 9x^2 + 27x$$

Coefficient of  $x = 27$

**Correct Option :** (d)

**Answer.7.**  $(x + y)^3 - (x^3 + y^3)$

$$= (x + y)^3 - \{(x + y)(x^2 - xy + y^2)\}$$

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

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

$$= (x + y)(3xy)$$

So,  $3xy$  is a factor.

**Correct Option :** (d)

**Answer.8.**  $(25x^2 - 1) + (1 + 5x)^2$   
 $= 25x^2 - 1 + 1 + 25x^2 + 10x$   
 $= 50x^2 + 10x$   
 $= 10x(5x + 1)$

So,  $10x$  is a factor.

**Correct Option : (d)**

**Answer.9.**  $p(x) = x^3 - 20x + 5k$

Since,  $(x + 5)$  is a factor.

$p(-5) = 0$

$\Rightarrow (-5)^3 - 20(-5) + 5k = 0$

$\Rightarrow -125 + 100 + 5k = 0$

$\Rightarrow 5k = 25$

$\Rightarrow k = 5$

**Correct Option : (b)**

**Answer.10.** Let  $f(x) = x^3 + 10x^2 + mx + n$

$(x + 2) = 0 \Rightarrow x = -2$

$(x - 1) = 0 \Rightarrow x = 1$

Now,  $f(-2) = 0$  and  $f(1) = 0$

[ $\because (x + 2)$  and  $(x - 1)$  are factors.]

So,  $f(-2) = 0$

$\Rightarrow (-2)^3 + 10 \times (-2)^2 + (-2)m + n = 0$

$\Rightarrow -8 + 40 - 2m + n = 0$

$\Rightarrow 2m - n = 32$

... (i)

And,  $f(1) = 0$

$\Rightarrow (1)^3 + 10 \times (1)^2 + m + n = 0$

$\Rightarrow 1 + 10 + m + n = 0$

$\Rightarrow m + n = -11$

... (ii)

Adding (i) and (ii),

$\Rightarrow 2m - n + m + n = 32 - 11$

$\Rightarrow 3m = 21$

$\Rightarrow m = 7$

... (iii)

Using (ii) and (iii),

$\Rightarrow 7 + n = -11$

$\Rightarrow n = -18$

$\therefore m = 7$  and  $n = -18$

**Correct Option : (b)**

**Answer.11.**  $(104 \times 96) = ?$

$(104 \times 96) = (100 + 4) \times (100 - 4)$

$= (100)^2 - (4)^2$

$= 10000 - 16$

$= 9984$

**Correct Option : (b)**

**Answer.12.**  $(305 \times 308) = ?$

$(305 \times 308) = 305 \times (300 + 8)$

$= (305 \times 300) + (305 \times 8)$

$= (91500 + 2440)$

$= 93940$

**Correct Option : (c)**

**Answer.13.**  $(207 \times 193) = ?$

$(207 \times 193) = 207 \times (200 - 7)$

$$\begin{aligned}
 &= (207 \times 200) - (207 \times 7) \\
 &= (41400 - 1449) \\
 &= 39951
 \end{aligned}$$

**Correct Option : (b)**

**Answer.14.**  $4a^2 + b^2 + 4ab + 8a + 4b + 4$

$$\begin{aligned}
 4a^2 + b^2 + 4ab + 8a + 4b + 4 &= (2a)^2 + (b)^2 + (2)^2 + 2(2a)(b) + 2(b)(2) + 2(2)(2a) \\
 &= (2a + b + 2)^2
 \end{aligned}$$

**Correct Option : (a)**

**Answer.15.**  $(x^2 - 4x - 21) = ?$

$$\begin{aligned}
 (x^2 - 4x - 21) &= x^2 - 7x + 3x - 21 \\
 &= x(x - 7) + 3(x - 7) \\
 &= (x - 7)(x + 3)
 \end{aligned}$$

**Correct Option : (c)**

**Answer.16.**  $(4x^2 + 4x - 3) = ?$

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

**Correct Option : (c)**

**Answer.17.**  $6x^2 + 17x + 5 = ?$

$$\begin{aligned}
 6x^2 + 17x + 5 &= 6x^2 + 15x + 2x + 5 \\
 &= 3x(2x + 5) + 1(2x + 5) \\
 &= (2x + 5)(3x + 1)
 \end{aligned}$$

**Correct Option : (b)**

**Answer.18.** Let  $x^3 + 2x^2 - x - 2 = f(x)$

$$\begin{aligned}
 f(-1) &= \{(-1)^3 + 2(-1)^2 - (-1) - 2\} \\
 &= (-1 + 2 + 1 - 2) \\
 &= 0
 \end{aligned}$$

**Correct Option : (c)**

**Answer.19.**  $3x^3 + 2x^2 + 3x + 2 = ?$

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

**Correct Option : (d)**

**Answer.20.**  $a + b + c = 0$

$$\begin{aligned}
 \Rightarrow a^3 + b^3 + c^3 - 3abc &= 0 \\
 \Rightarrow a^3 + b^3 + c^3 &= 3abc \\
 \left(\frac{a^2}{bc} + \frac{b^2}{ac} + \frac{c^2}{ab}\right) &= \frac{1}{abc}(a^3 + b^3 + c^3) \\
 &= \frac{1}{abc}(3abc) \\
 &= 3
 \end{aligned}$$

**Correct Option : (d)**

**Answer.21.**  $(x^3 + y^3 + z^3 - 3xyz) = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$   
 $= (x + y + z)(x^2 + y^2 + z^2 + 2xy + 2yx + 2zx - 3xy - 3yz - 3zx)$

$$\begin{aligned}
&= (x + y + z)[(x^2 + y^2 + z^2 + 2xy + 2yx + 2zx) - 3(xy + yz + zx)] \\
&= (x + y + z)[(x + y + z)^2 - 3(xy + yz + zx)] \\
&= 9 \times [(9)^2 - 3 \times (23)] \\
&= 9 \times (81 - 69) \\
&= 9 \times 12 \\
&= 108
\end{aligned}$$

**Correct Option : (a)**

**Answer.22.**  $\left(\frac{a}{b} + \frac{b}{a}\right) = -1$

$$\Rightarrow \frac{a}{b} + \frac{b}{a} = -1$$

$$\Rightarrow \frac{a^2 + b^2}{ab} = -1$$

$$\Rightarrow a^2 + b^2 + ab = 0$$

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

$$= (a - b) \times 0$$

$$= 0$$

**Correct Option : (d)**

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