

செயல்தீர்வு

மன்/ புனித அன்னை திரேசா ஹோ.க.த.க. பாடசாலை

தரம் : 10

ஆசிரியர் : திரு.ம.தீபன்

இருபடிக்க கோவைகளின் காரணிகள்

❖ அட்சரகணித கோவைகளின் காரணிகள்

உதாரணம் :

i. $3x + 6 = 3(x+2)$

ii. $4a^2 + 12a = 4a(a+3)$

iii. $n^2 + 3mn + 4n + 12m = n(n+3m) + 4(n+3m)$
 $= (n+3m) (n+4)$

iv. $a(2p-q) + b(q-2p) = a(2p-q) - b(2p-q)$
 $= (2p-q) (a-b)$

1. பின்வரும் அட்சரகணிதகோவைகள் ஒவ்வொன்றினதும் காரணிகளை வேறுபடுத்துக.

i. (a) $5a+10 = \dots\dots\dots$ (b) $x^2 - x = \dots\dots\dots$

(c) $3p^2q - 6p = \dots\dots\dots$ (d) $2a - 4a^2 = \dots\dots\dots$

(e) $x^2y - xy = \dots\dots\dots$

(f) $5a^2 - 10ab - 5b^2 = \dots\dots\dots$

(g) $2a^2b - 6a^2b^2 + 4ab^2 = \dots\dots\dots$

(h) $x^2yz + xy^2z - xyz^2 = \dots\dots\dots$

ii. (a) $p(m+n) + q(m+n) = \dots\dots\dots$

(b) $a(2x+y) - b(2x+y) = \dots\dots\dots$

(c) $3(x-2) - xy + 2y = \dots\dots\dots$

(d) $4a + 8 + b(a+2) = \dots\dots\dots$

(e) $p^2 - pq + 3p - 3q = \dots\dots\dots$

2. கீழே தரப்பட்டுள்ள கோவைகளின் காரணிகளை வேறுபடுத்துக.

i. $a(p-q) - b(q-p) = a(p-q) + b(p-q)$
 $= (p-q) (a+b)$

ii. $n(2m-n) - p(n-2m) = \dots\dots\dots$

iii. $2a(x-2y) + 3b(2y-x) = \dots\dots\dots$

iv. $4p(a+2b) - q(2b+a) = \dots\dots\dots$

v. $x(2b+d) - y(-2b-d) = \dots\dots\dots$

❖ மூலறுப்பு இருபடிக்கோவைகளின் காரணிகள்
உதாரணம் :

$$\begin{aligned} \text{i. } x^2 + 5x + 6 &= x^2 + 3x + 2x + 6 \\ &= x(x+3) + 2(x+3) \\ &= (x+3)(x+2) \end{aligned}$$

$$\begin{array}{c} +6 \times x^2 \\ \downarrow \\ +6x^2 \\ \swarrow \searrow \\ (+3x) \quad (+2x) \end{array}$$

$$\begin{aligned} \text{ii. } x^2 - 7x + 6 &= x^2 - 6x - 1x + 6 \\ &= x(x-6) - 1(x-6) \\ &= (x-6)(x-1) \end{aligned}$$

$$\begin{array}{c} +6 \times x^2 \\ \downarrow \\ +6x^2 \\ \swarrow \searrow \\ (-6x) \quad (-1x) \end{array}$$

$$\begin{aligned} \text{iii. } x^2 + x - 6 &= x^2 + 3x - 2x - 6 \\ &= x(x+3) - 2(x+3) \\ &= (x+3)(x-2) \end{aligned}$$

$$\begin{array}{c} -6 \times x^2 \\ \downarrow \\ -6x^2 \\ \swarrow \searrow \\ (+3x) \quad (-2x) \end{array}$$

$$\begin{aligned} \text{iv. } x^2 - 5x - 6 &= x^2 - 6x + 1x - 6 \\ &= x(x-6) + 1(x-6) \\ &= (x-6)(x+1) \end{aligned}$$

$$\begin{array}{c} -6 \times x^2 \\ \downarrow \\ -6x^2 \\ \swarrow \searrow \\ (-6x) \quad (+1x) \end{array}$$

(01) பின்வரும் மூலறுப்பு இருபடிக்கோவைகள் ஒவ்வொன்றினதும் காரணிகளை வேறுபடுத்துக.

$$\begin{aligned} \text{i. } a^2 + 9a + 8 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{ii. } x^2 + 7x + 6 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{iii. } n^2 - 7n + 10 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{iv. } m^2 - 9m + 14 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{v. } p^2 + 7p - 18 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{vi. } x^2 + x - 12 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{vii. } a^2 - 5a - 6 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{viii. } n^2 - 6n - 7 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{ix. } y^2 - 4y - 5 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{x. } m^2 - 6m - 40 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{xi. } p^2 - 8p + 15 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{xii. } y^2 + 12y + 35 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

(02) மூன்றுப்பு இருபடிக்கோவைகளின் காரணிகள் (மேலும்)

$$\begin{aligned} \text{(i) } x^2 + 7xy + 10y^2 &= x^2 + 5xy + 2xy + 10y^2 \\ &= x(x+5y) + 2y(x+5y) \\ &= (x+5y)(x+2y) \end{aligned}$$

$$\begin{array}{c} +10y^2 \times x^2 \\ \downarrow \\ +10y^2 x^2 \\ \swarrow \quad \searrow \\ (+5xy) \quad (+2xy) \end{array}$$

$$\begin{aligned} \text{(ii) } m^2 + 6mn + 8n^2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(iii) } p^2 - 9pq + 18q^2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(iv) } p^2 - 8pq + 15p^2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(v) } m^2 - 6mn - 40n^2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(vi) } a^2 - 4ab - 5b^2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(vii) } x^2 + 12xy + 32y^2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

(03) மூன்றுப்பு இருபடிக்கோவைகளின் காரணிகள் (மேலும்)

$$\begin{aligned} \text{(i) } 3a^2 + 4a + 1 &= 3a^2 + 3a + 1a + 1 \\ &= 3a(a+1) + 1(a+1) \\ &= (a+1)(3a+1) \end{aligned}$$

$$\begin{array}{c} +1 \times 3a^2 \\ \downarrow \\ +3a^2 \\ \swarrow \quad \searrow \\ (+3a) \quad (+1a) \end{array}$$

$$\begin{aligned} \text{(ii) } 5a^2 + 7a + 2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(iii) } 4x^2 - x - 3 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(iv) } 2x^2 + 3x - 5 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(v) } 6x^2 + 3x - 3 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(vi) } 2m^2 + 7mn - 6n^2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(vii) } 10m^2 - 17mn + 3n^2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(viii) } 6a^2 + 7ab - 5b^2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

$$\begin{aligned} \text{(ix) } 4x^2 - 10xy - 6y^2 &= \dots\dots\dots \\ &= \dots\dots\dots \\ &= \dots\dots\dots \end{aligned}$$

❖ இரு வர்க்கங்களில் வித்தியாசம் மூலம் காரணிப்படுத்தல்.

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

ஆகவே $a^2 - b^2 = (a+b)(a-b)$

உதாரணம் :

$$\begin{aligned} \text{i. } x^2 - 9 &= x^2 - 3^2 \\ &= (x+3)(x-3) \end{aligned}$$

$$\begin{aligned}
\text{ii. } 16 - a^2 &= 4^2 - a^2 \\
&= (4+a)(4-a) \\
\text{iii. } m^2n^2 - 1 &= (mn)^2 - 1^2 \\
&= (mn+1)(mn-1) \\
\text{iv. } 9a^2 - 16 &= (3a)^2 - 4^2 \\
&= (3a+4)(3a-4) \\
\text{v. } 3p^2 - 27q^2 &= 3(p^2 - 9q^2) \\
&= 3(p^2 - (3q)^2) \\
&= 3(p+3q)(p-3q)
\end{aligned}$$

(01) பின்வரும் அடசரகணித கோவைகள் ஒவ்வொன்றையும் காரணிகளாக வேறுபடுத்துக.

(i) $n^2 - 4 = \dots\dots\dots$	(ii) $a^2 - 81 = \dots\dots\dots$
$= \dots\dots\dots$	$= \dots\dots\dots$
(iii) $100 - x^2 = \dots\dots\dots$	(iv) $25a^2 - 16b^2 = \dots\dots\dots$
$= \dots\dots\dots$	$= \dots\dots\dots$
(v) $16a^2 - 1 = \dots\dots\dots$	(vi) $x^2y^2 - 9 = \dots\dots\dots$
$= \dots\dots\dots$	$= \dots\dots\dots$
(vii) $12x^2 - 3 = \dots\dots\dots$	(viii) $9a^2 - 16 = \dots\dots\dots$
$= \dots\dots\dots$	$= \dots\dots\dots$
(ix) $144 - 4x^2 = \dots\dots\dots$	(x) $9x^2y^2 - 1 = \dots\dots\dots$
$= \dots\dots\dots$	$= \dots\dots\dots$

❖ இரு வர்க்கங்களில் வித்தியாசத்தின் காரணிகள் (மேலும்)

உதாரணம் :

$$\begin{aligned}
\text{i. } (x+2)^2 - y^2 &= ((x+2) + y)((x+2) - y) \\
&= (x+2+y)(x+2-y) \\
\text{ii. } (x+2)^2 - (x+3)^2 &= ((x-2) + (x+3))((x-2) - (x+3)) \\
&= (x-2+x+3)(x-2-x-3) \\
&= (2x+1)(-5) \\
&= -5(2x+1)
\end{aligned}$$

(01) காரணிகளை வேறுபடுத்துக.

(i) $(a+1)^2 - 9$	(ii) $(2x+1)^2 - 16$
$\dots\dots\dots$	$\dots\dots\dots$
$\dots\dots\dots$	$\dots\dots\dots$
(iii) $(2p+1)^2 - p^2$	(iv) $(2p+3)^2 - 9q^2$
$\dots\dots\dots$	$\dots\dots\dots$
$\dots\dots\dots$	$\dots\dots\dots$
(v) $100 - (y-4)^2$	(vi) $(m+2)^2 - (m+3)^2$
$\dots\dots\dots$	$\dots\dots\dots$
$\dots\dots\dots$	$\dots\dots\dots$
(vii) $(a-1)^2 - (a-5)^2$	(vii) $(y+6)^2 - (y-2)^2$
$\dots\dots\dots$	$\dots\dots\dots$
$\dots\dots\dots$	$\dots\dots\dots$