Algebraic Formulae - Expansion of Squares

PRACTICE SET 50 [PAGE 93]

Practice Set 50 | Q 2 | Page 93

Which of the options given below is the square of the binomial $\left(8-\frac{1}{x}\right)$?

Options

$64-\frac{1}{x^2}$

$64+\frac{1}{x^2}$

$64-\frac{16}{x}+\frac{1}{x^2}$

$64+\frac{16}{x}+\frac{1}{x^2}$

Solution:

$64-\frac{16}{x}+\frac{1}{x^2}$

Explanation:

The given binomial is $\left(8-\frac{1}{x}\right)$.

$\left(8-\frac{1}{x}\right)^2$

$$= (8)^2 - 2 \times (8) \times \left(\frac{1}{x}\right) + \left(\frac{1}{x}\right)^2 \ldots\ldots$$

$$\left[\because (a-b)^2 = a^2 - 2ab + b^2\right]$$

$$= 64 - \frac{16}{x} + \frac{1}{x^2}$$

Hence, the correct answer is option $64 - \frac{16}{x} + \frac{1}{x^2}$

Practice Set 50 | Q 3 | Page 93

Of which of the binomials given below is $m^2n^2 + 14mnpq + 49p^2q^2$ the expansion?

1. (m + n) (p + q)
2. (mn − pq)
3. (7mn + pq)
4. **(mn + 7pq)**

Solution: Let us check each of the given options.

(m + n)(p + q)
= m(p + q) + n(p + q)
= mp + mq + np + nq
So, it is not the correct option.

$(mn - pq)^2$
$= (mn)^2 - 2 \times (mn) \times (pq) + (pq)^2$ .....[$\because (a - b)^2 = a^2 - 2ab + b^2$]
$= m^2n^2 - 2mnpq + p^2q^2$
So, it is not the correct option.

$(7mn + pq)^2$
$= (7mn)^2 + 2 \times (7mn) \times (pq) + (pq)^2$ .....[$\because (a + b)^2 = a^2 + 2ab + b^2$]
$= 49m^2n^2 + 14mnpq + p^2q^2$
So, it is not a correct option.

$(mn + 7pq)^2$
$= (mn)^2 + 2 \times (mn) \times (7pq) + (7pq)^2$ .....[$\because (a + b)^2 = a^2 + 2ab + b^2$]
$= m^2n^2 + 14mnpq + 49p^2q^2$
So, it is a correct option.

Hence, the correct answer is option $(mn + 7pq)^2$.

Practice Set 50 | Q 4.1 | Page 93

Use an expansion formula to find the value.

$(997)^2$

Solution: It is known that, $(a + b)^2 = a^2 + 2ab + b^2$ and $(a - b)^2 = a^2 - 2ab + b^2$

$(997)^2$
$= (1000 - 3)^2$
$= (1000)^2 - 2 \times 1000 \times 3 + (3)^2$
$= 1000000 - 6000 + 9$
$= 994009$

Practice Set 50 | Q 4.2 | Page 93

Use an expansion formula to find the value.

$(102)^2$

Solution: It is known that, $(a + b)^2 = a^2 + 2ab + b^2$ and $(a - b)^2 = a^2 - 2ab + b^2$

$(102)^2$
$= (100 + 2)^2$
$= (100)^2 + 2 \times 100 \times 2 + (2)^2$
$= 10000 + 400 + 4$
$= 10404$

Practice Set 50 | Q 4.3 | Page 93

Use an expansion formula to find the value.

$(97)^2$

Solution: It is known that, $(a + b)^2 = a^2 + 2ab + b^2$ and $(a - b)^2 = a^2 - 2ab + b^2$

$(97)^2$
$= (100 - 3)^2$
$= (100)^2 - 2 \times 100 \times 3 + (3)^2$
$= 10000 - 600 + 9$
$= 9409$

Practice Set 50 | Q 4.4 | Page 93

Use an expansion formula to find the value.

$(1005)^2$

Solution: It is known that, $(a + b)^2 = a^2 + 2ab + b^2$ and $(a - b)^2 = a^2 - 2ab + b^2$

$(1005)^2$
$= (1000 + 5)^2$
$= (1000)^2 + 2 \times 1000 \times 5 + (5)^2$
$= 1000000 + 10000 + 25$
$= 1010025$

PRACTICE SET 51 [PAGE 93]

Practice Set 51 | Q 1.1 | Page 93

Use the formula to multiply the following.

$(x + y) (x - y)$

Solution: It is known that, $(a + b) (a - b) = a^2 - b^2$.

$(x + y) (x - y)$

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

$= x^2 - y^2$

Practice Set 51 | Q 1.2 | Page 93

Use the formula to multiply the following.

$(3x - 5) (3x + 5)$

Solution: It is known that, $(a + b) (a - b) = a^2 - b^2$.

$(3x - 5) (3x + 5)$

$= (3x)^2 - (5)^2$

$= 9x^2 - 25$

Practice Set 51 | Q 1.3 | Page 93

Use the formula to multiply the following.

$(a + 6) (a - 6)$

Solution: It is known that, $(a + b) (a - b) = a^2 - b^2$.

$(a + 6) (a - 6)$

$= (a)^2 - (6)^2$

$= a^2 - 36$

Practice Set 51 | Q 1.4 | Page 93

Use the formula to multiply the following.

$$\left(\frac{x}{5} + 6\right)\left(\frac{x}{5} - 6\right)$$

Solution: It is known that, $(a + b) (a - b) = a^2 - b^2$.

$$\left(\frac{x}{5}+6\right)\left(\frac{x}{5}-6\right)$$

$$=\left(\frac{x}{5}\right)^2-(6)^2$$

$$=\frac{x^2}{25}-36$$

Practice Set 51 | Q 2.1 | Page 93

Use the formula to find the value.

502 × 498

Solution: It is known that, (a + b) (a − b) = $a^2 - b^2$.

502 × 498
= (500 + 2) × (500 − 2)
= $(500)^2 - (2)^2$
= 250000 − 4
= 249996

Practice Set 51 | Q 2.2 | Page 93

Use the formula to find the value.

97 × 103

Solution: It is known that, (a + b) (a − b) = $a^2 - b^2$.

97 × 103
= (100 − 3) × (100 + 3)
= $(100)^2 - (3)^2$
= 10000 − 9
= 9991

Practice Set 51 | Q 2.3 | Page 93

Use the formula to find the value.

54 × 46

Solution: It is known that, (a + b) (a − b) = $a^2 - b^2$.

54 × 46
= (50 + 4) × (50 − 4)
= $(50)^2 - (4)^2$
= 2500 − 16
= 2484

Practice Set 51 | Q 2.4 | Page 93

Use the formula to find the value.

98 × 102

Solution: It is known that, $(a + b)(a - b) = a^2 - b^2$.

98 × 102
= (100 − 2) × (100 + 2)
= $(100)^2 - (2)^2$
= 10000 − 4
= 9996

PRACTICE SET 52 [PAGE 94]

Practice Set 52 | Q 1.1 | Page 94

Factorise the following expression and write in the product form.

$201a^3b^2$

Solution: $201a^3b^2$

= 3 × 67 × a × a × a × b × b

Practice Set 52 | Q 1.2 | Page 94

Factorise the following expression and write in the product form.

$91xyt^2$

Solution: $91xyt^2$

= 7 × 13 × x × y × t × t

Practice Set 52 | Q 1.3 | Page 94

Factorise the following expression and write in the product form.

$24a^2b^2$

Solution: $24a^2b^2$

= 2 × 2 × 2 × 3 × a × a × b × b

Practice Set 52 | Q 1.4 | Page 94

Factorise the following expression and write in the product form.

tr^2s^3

Solution: tr^2s^3

$= t \times r \times r \times s \times s \times s$

PRACTICE SET 53 [PAGE 94]

Practice Set 53 | Q 1.01 | Page 94

Factorise the following expression.

$p^2 - q^2$

Solution: $p^2 - q^2$

$= (p)^2 - (q)^2$

$= (p + q)(p - q)$ .....[$\because (a + b)(a - b) = a^2 - b^2$]

Practice Set 53 | Q 1.02 | Page 94

Factorise the following expression.

$4x^2 - 25y^2$

Solution: $4x^2 - 25y^2$

$= (2x)^2 - (5y)^2$

$= (2x + 5y)(2x - 5y)$ .....[$\because a^2 - b^2 = (a + b)(a - b)$]

Practice Set 53 | Q 1.03 | Page 94

Factorise the following expression.

$y^2 - 4$

Solution: $y^2 - 4$

$= (y)^2 - (2)^2$

$= (y + 2)(y - 2)$ .....[$\because a^2 - b^2 = (a + b)(a - b)$]

Practice Set 53 | Q 1.04 | Page 94

Factorise the following expression.

$$p^2 - \frac{1}{25}$$

Solution:

$$p^2 - \frac{1}{25}$$

$$= (p)^2 - \left(\frac{1}{5}\right)^2$$

$$= \left(p + \frac{1}{5}\right)\left(P - \frac{1}{5}\right)$$ .....[$\because a^2 - b^2 = (a + b)(a - b)$]

Practice Set 53 | Q 1.05 | Page 94

Factorise the following expression.

$$9x^2 - \frac{1}{16}y^2$$

Solution:

$$9x^2 - \frac{1}{16}y^2$$

$$= (3x)^2 - \left(\frac{1}{4}y\right)^2$$

$$= \left(3x + \frac{1}{4}y\right)\left(3x - \frac{1}{4}y\right)$$ .....[$\because a^2 - b^2 = (a + b)(a - b)$]

Practice Set 53 | Q 1.06 | Page 94

Factorise the following expression.

$$x^2 - \frac{1}{x^2}$$

Solution:

$$x^2 - \frac{1}{x^2}$$

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

$$= \left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$ .....[$\because a^2 - b^2 = (a + b)(a - b)$]

Practice Set 53 | Q 1.07 | Page 94

Factorise the following expression.

$a^2b - ab$

Solution: $a^2b - ab$

$= ab(a - 1)$

Practice Set 53 | Q 1.08 | Page 94

Factorise the following expression.

$4x^2y - 6x^2$

Solution: $4x^2y - 6x^2$

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

Practice Set 53 | Q 1.09 | Page 94

Factorise the following expression.

$$\frac{1}{2}y^2 - 8z^2$$

Solution:

$$\frac{1}{2}y^2 - 8z^2$$

$$= \frac{1}{2}\left(y^2 - 16z^2\right)$$

$$= \frac{1}{2}\left[(y)^2 - (4z)^2\right]$$

$$= \frac{1}{2}(y + 4z)(y - 4z)$$ .....[$\because a^2 - b^2 = (a + b)(a - b)$]

Practice Set 53 | Q 1.1 | Page 94

Factorise the following expression.

$2x^2 - 8y^2$

Solution: $2x^2 - 8y^2$

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

$= 2[(x)^2 - (2y)^2]$

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