RD SHARMA
Solutions
Class 8 Maths
Chapter 6
Ex *6.6*

Q1 Write the following squares of binomials as trinomials

We know that, $(a+b)^2 = a^2 + 2ab + b^2$ and

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

(i) $(x+2)^2$

Sol:

$(x+2)^2$ is in the form of $(a+b)^2 = a^2 + 2ab + b^2$

here, a = x , b = 2

=> $x^2 + 2 \times x \times 2 + b^2$

=> $x^2 + 4x + b^2$

(ii) $(8a+3b)^2$

Sol:

$(8a+3b)^2$ is in the form of $(a+b)^2 = a^2 + 2ab + b^2$

here, a = 8a, b = 3b

=> $(8a)^2 + 2 \times (8a) \times (3b) + (3b)^2$

=> $64^2 + 48ab + 36b^2$

(iii) $(2m+1)^2$

Sol:

$(2m+1)^2$ is in the form of $(a+b)^2 = a^2 + 2ab + b^2$

here, a =2m, b = 1

=> $(2m)^2 + 2 \times (2m) \times (1) + (1)^2$

=> $4m^2 + 4m + 1$

(iv) $(9a + \frac{1}{6})^2$

Sol:

$(9a + \frac{1}{6})^2$ is in the form of $(a+b)^2 = a^2 + 2ab + b^2$

here, a = 9a, b = $\frac{1}{6}$

=> $(9a)^2 + 2 \times (9a) \times (\frac{1}{6}) + (\frac{1}{6})^2$

=> $81a^2 + 3a + \frac{1}{36}$

(v) $(x + \frac{x^2}{2})^2$

Sol:

$(x + \frac{x^2}{2})^2$ is in the form of $(a+b)^2 = a^2 + 2ab + b^2$

here, a = x, b = $\frac{x^2}{2}$

$\Rightarrow x^2 + 2 \times x \times (\frac{x^2}{2}) + (\frac{x^2}{2})^2$

$\Rightarrow x^2 + x^3 + \frac{x^4}{4}$

(vi) $(\frac{x}{4} - \frac{y}{3})^2$

Sol:

$(\frac{x}{4} - \frac{y}{3})^2$ is in the form of $(a-b)^2 = a^2 - 2ab + b^2$

here, $a = \frac{x}{4}$, $b = \frac{y}{3}$

$\Rightarrow (\frac{x}{4})^2 - 2 \times (\frac{x}{4}) \times (\frac{y}{3}) + (\frac{y}{3})^2$

$\Rightarrow \frac{x^2}{16} - \frac{1}{6}xy + \frac{y^2}{9}$

(vii) $(3x - \frac{1}{3x})^2$

Sol:

$(3x - \frac{1}{3x})^2$ is in the form of $(a-b)^2 = a^2 - 2ab + b^2$

here, $a = 3x$, $b = \frac{1}{3x}$

$\Rightarrow (3x)^2 - 2 \times 3x \times (\frac{1}{3x}) + (\frac{1}{3x})^2$

$\Rightarrow 9x^2 - 2 + \frac{1}{9x^2}$

(viii) $(\frac{x}{y} - \frac{y}{x})^2$

Sol:

$(\frac{x}{y} - \frac{y}{x})^2$ is in the form of $(a-b)^2 = a^2 - 2ab + b^2$

here, $a = \frac{x}{y}$, $b = \frac{y}{x}$

$\Rightarrow (\frac{x}{y})^2 - 2 \times (\frac{x}{y}) \times (\frac{y}{x}) + (\frac{y}{x})^2$

$\Rightarrow \frac{x^2}{y^2} - 2 + \frac{y^2}{x^2}$

(ix) $(\frac{3a}{2} - \frac{5b}{4})^2$

Sol:

$(\frac{3a}{2} - \frac{5b}{4})^2$ is in the form of $(a-b)^2 = a^2 - 2ab + b^2$

here, $a = \frac{3a}{2}$, $b = \frac{5b}{4}$

$\Rightarrow (\frac{3a}{2})^2 - 2 \times (\frac{3a}{2}) \times (\frac{5b}{4}) + (\frac{5b}{4})^2$

$\Rightarrow \frac{9a^2}{4} - \frac{15ab}{4} + \frac{25b^2}{16}$

(x) $(a^2b - bc^2)^2$

Sol:

$(a^2b - bc^2)^2$ is in the form of $(a-b)^2 = a^2 - 2ab + b^2$

here, a = a^2b, b = bc^2

=> $(a^2b)^2 - 2 \times (a^2b) \times (bc^2) + (bc^2)^2$

=> $a^4b^2 - 2a^2b^2c^2 + b^2c^4$

Q2 Find the product of the following binomials

(i) (2x + y) (2x + y)

sol:

(2x + y) (2x + y) can be written as $(2x + y)^2$

=> $(2x + y)^2$

we know that, $(a + b)^2 = a^2 + 2ab + b^2$

=> $(2x)^2 + 2 \times (2x) \times (y) + y^2$

=> $4x^2 + 4xy + y^2$

(ii) (a + 2b) (a – 2b)

sol:

we know that (a + b) (a – b) = $a^2 - b^2$

here, a = a, b = 2b

=> $a^2 - (2b)^2$

=> $a^2 - 4b^2$

(iii) $(a^2 + bc) - (a^2 - bc)$

sol:

we know that (a + b) (a – b) = $a^2 - b^2$

here, a = a^2, b = bc

=> $(a^2)^2 - (bc)^2$

=> $a^4 - b^2c^2$

(iv) $(\frac{4x}{5} - \frac{3y}{4})(\frac{4x}{5} + \frac{3y}{4})$

sol:

we know that (a + b) (a – b) = $a^2 - b^2$

here, a = $\frac{4x}{5}$, b = $\frac{3y}{4}$

=> $(\frac{4x}{5})^2 - (\frac{3y}{4})^2$

=> $\frac{16x^2}{25} - \frac{9y^2}{16}$

(v) $(2x + \frac{3}{y})(2x - \frac{3}{y})$

sol:

we know that (a + b) (a – b) = $a^2 - b^2$

here, a = 2x, b = $\frac{3}{y}$

=> $(2x)^2 - (\frac{3}{y})^2$

=> $4x^2 - \frac{9}{y^2}$

(vi) $(2a^3 + b^3)(2a^3 – b^3)$

sol:

we know that $(a + b)(a – b) = a^2 – b^2$

here, $a = 2a^3$, $b = b^3$

=> $(2a^3)^2 – (b^3)^2$

=> $4a^6 – b^6$

(vii) $(x^4 + \frac{2}{x^2})(x^4 – \frac{2}{x^2})$

sol:

we know that $(a + b)(a – b) = a^2 – b^2$

here, $a = x^4$, $b = \frac{2}{x^2}$

=> $(x^4)^2 – (\frac{2}{x^2})^2$

=> $x^8 – \frac{4}{x^4}$

(viii) $(x^3 + \frac{1}{x^3})(x^3 – \frac{1}{x^3})$

sol:

we know that $(a + b)(a – b) = a^2 – b^2$

here, $a = x^3$, $b = \frac{1}{x^3}$

=> $(x^3)^2 – (\frac{1}{x^3})^2$

=> $x^6 – \frac{1}{x^6}$

Q3 Using the formula for squaring a binomial, evaluate the following

(i) $(102)^2$

sol:

$(102)^2$ can be written as $(100 + 2)^2$

we know that, $(a + b)^2 = a^2 + 2ab + b^2$

here, a = 100, b = 2

=> $(100 + 2)^2$

=> $(100)^2 + 2 \times (100) \times 2 + 2^2$

=> 10000 + 400 + 4

=> 10404

(ii) $(99)^2$

sol:

$(99)^2$ can be written as $(100 – 1)^2$

we know that, $(a – b)^2 = a^2 – 2ab + b^2$

here, a = 100, b = 1

=> $(100 – 1)^2$

=> $(100)^2 – 2 \times (100) \times 1 + 1^2$

=> $10000 - 200 + 1$

=> 9801

(iii) $(1001)^2$

sol:

$(1001)^2$ can be written as $(1000 + 1)^2$

we know that, $(a + b)^2 = a^2 + 2ab + b^2$

here, $a = 1000$, $b = 1$

=> $(1000 + 1)^2$

=> $(1000)^2 + 2 \times (1000) \times 1 + 1^2$

=> $1000000 + 2000 + 1$

=> 1002001

(iv) $(999)^2$

sol:

$(999)^2$ can be written as $(1000 - 1)^2$

we know that, $(a - b)^2 = a^2 - 2ab + b^2$

here, $a = 1000$, $b = 1$

=> $(1000 - 1)^2$

=> $(1000)^2 - 2 \times (1000) \times 1 + 1^2$

=> $1000000 - 2000 + 1$

=> 998001

(v) $(703)^2$

sol:

$(703)^2$ can be written as $(700 + 3)^2$

we know that, $(a + b)^2 = a^2 + 2ab + b^2$

here, $a = 700$, $b = 3$

=> $(700 + 3)^2$

=> $(700)^2 + 2 \times (700) \times 3 + 3^2$

=> $490000 + 4200 + 9$

=> 494209

Q4 Simplify the following using the formula: (a + b) (a – b) = $a^2 - b^2$

(i) $(82)^2 - (18)^2$

sol:

$(82)^2 - (18)^2$
here, $a = 82$, $b = 18$

=> $(82 + 18)(82 - 18)$

=> 100×64

=> 6400

(ii) $(467)^2 - (33)^2$

sol:

$(467)^2 - (33)^2$
here, a = 467, b = 33

=> (467 + 33) (467 – 33)

=> 500×434

=> 217000

(iii) $(79)^2 - (69)^2$

sol:

$(79)^2 - (69)^2$
here, a = 79, b = 69

=> (79 + 69) (79 – 69)

=> 148×10

=> 1480

(iv) 197×203

sol:

Since, $\frac{197+203}{2} = \frac{400}{2} = 200$

197×203 can be written as (200 + 3) (200 – 3)

=> (200 + 3) (200 – 3)

=> $(200)^2 - (3)^2$

=> 40000 – 9

=> 39991

(v) 113×87

sol:

Since, $\frac{113+87}{2} = \frac{200}{2} = 100$

113×87 can be written as (100 + 13) (100 – 13)

=> (100 + 13) (100 – 13)

=> $(100)^2 - (13)^2$

=> 10000 – 169

=> 9831

(vi) 95×105

sol:

Since, $\frac{95+105}{2} = \frac{200}{2} = 100$

95×105 can be written as (100 + 5) (100 – 5)

=> (100 + 5) (100 – 5)

=> $(100)^2 - (5)^2$

=> 10000 – 25

=> 9975

(vii) 1.8×2.2

sol:

Since, $\frac{1.8+2.2}{2} = \frac{4}{2} = 2$

1.8×2.2 can be written as (2 + 0.2) (2 – 0.2)

=> (2 + 0.2) (2 – 0.2)

=> $(2)^2 - (0.2)^2$

=> 4 – 0.04

=> 3.96

(viii) 9.8 × 10.2

sol:

Since, $\frac{9.8+10.2}{2} = \frac{20}{2} = 10$

9.8 × 10.2 can be written as (10 + 0.2) (10 – 0.2)

=> (10 + 0.2) (10 – 0.2)

=> $(10)^2 - (0.2)^2$

=> 100 – 0.04

=> 99.96

Q5 Simplify the following using identities

(i) $\frac{(58)^2-(42)^2}{16}$

sol:

The numerator is in the form of (a + b) (a – b) = $a^2 - b^2$

$\frac{(58)^2-(42)^2}{16} = \frac{(58+42)(58-42)}{16}$

=> $\frac{(58)^2-(42)^2}{16} = \frac{100\times16}{16}$

=> $\frac{(58)^2-(42)^2}{16} = 100$

(ii) (178 × 178)– (22 × 22)

sol:

we know that, (a + b) (a – b) = $a^2 - b^2$

=> (178 × 178)– (22 × 22) = $(178)^2 - (22)^2$

=> (178 × 178)– (22 × 22) = (178 + 22) (178 – 22)

=> (178 × 178)– (22 × 22) = 200 × 156

=> (178 × 178)– (22 × 22) = 31200

(iii) $\frac{(198\times198)-(102\times102)}{96}$

sol:

we know that, (a + b) (a – b) = $a^2 - b^2$

=> $\frac{(198\times198)-(102\times102)}{96} = \frac{(198)^2-(102)^2}{96}$

=> $\frac{(198\times198)-(102\times102)}{96} = \frac{(198+102)(198-102)}{96}$

=> $\frac{(198\times198)-(102\times102)}{96} = \frac{300\times96}{96}$

=> $\frac{(198\times198)-(102\times102)}{96} = 300$

(iv) (1.73 × 1.73)– (0.27 × 0.27)

sol:

we know that, $(a + b)(a - b) = a^2 - b^2$

=> $(1.73 \times 1.73) - (0.27 \times 0.27) = (1.73)^2 - (0.27)^2$

=> $(1.73 \times 1.73) - (0.27 \times 0.27) = (1.73 + 0.27)(1.73 - 0.27)$

=> $(1.73 \times 1.73) - (0.27 \times 0.27) = 2 \times 1.46$

=> $(1.73 \times 1.73) - (0.27 \times 0.27) = 2.92$

(v) $\frac{(8.63\times8.63)-(1.37\times1.37)}{0.726}$

sol:

we know that, $(a + b)(a - b) = a^2 - b^2$

=> $\frac{(8.63\times8.63)-(1.37\times1.37)}{0.726} = \frac{(8.63)^2-(1.37)^2}{0.726}$

=> $\frac{(8.63\times8.63)-(1.37\times1.37)}{0.726} = \frac{(8.63+1.37)(8.63-1.37)}{0.726}$

=> $\frac{(8.63\times8.63)-(1.37\times1.37)}{0.726} = \frac{10\times7.26}{0.726}$

=> $\frac{(8.63\times8.63)-(1.37\times1.37)}{0.726} = 10 \times 10$

=> $\frac{(8.63\times8.63)-(1.37\times1.37)}{0.726} = 100$

Q6 Find the value of x, if:

(i) $4x = (52)^2 - (48)^2$

sol:

we know that, $(a + b)(a - b) = a^2 - b^2$

=> $4x = (52)^2 - (48)^2$

=> $4x = (52 + 48)(52 - 48)$

=> $4x = 100 \times 4$

=> $4x = 400$

=> $x = \frac{400}{4}$

=> $x = 100$

(ii) $14x = (47)^2 - (33)^2$

sol:

we know that, $(a + b)(a - b) = a^2 - b^2$

=> $14x = (47)^2 - (33)^2$

=> $14x = (47 + 33)(47 - 33)$

=> $14x = 80 \times 14$

=> $14x = 1120$

=> $x = \frac{1120}{14}$

=> $x = 80$

(iii) $5x = (50)^2 - (40)^2$

sol:

we know that, $(a + b)(a - b) = a^2 - b^2$

=> $5x = (50)^2 - (40)^2$

$\Rightarrow 5x = (50 + 40)(50 - 40)$

$\Rightarrow 5x = 90 \times 10$

$\Rightarrow 5x = 900$

$\Rightarrow \quad x = \frac{900}{5}$

$\Rightarrow \quad x = 180$

Q7 If $x + \frac{1}{x} = 20$, find the value of $x^2 + \frac{1}{x^2}$

sol:

Given that,

$x + \frac{1}{x} = 20$

squaring on both sides

$\Rightarrow (x + \frac{1}{x})^2 = (20)^2$

$\Rightarrow (x + \frac{1}{x})^2 = 400$

we know that, $(a + b)^2 = a^2 + 2ab + b^2$

$\Rightarrow x^2 + 2 \times x \times \frac{1}{x} + (\frac{1}{x})^2 = 400$

$\Rightarrow x^2 + 2 + (\frac{1}{x})^2 = 400$

$\Rightarrow x^2 + \frac{1}{x^2} = 400 - 2$

$\Rightarrow x^2 + \frac{1}{x^2} = 398$

hence, $x^2 + \frac{1}{x^2} = 398$

Q8 If $x - \frac{1}{x} = 3$, find the values of $x^2 + \frac{1}{x^2}, x^4 + \frac{1}{x^4}$

sol:

Given that,

$x - \frac{1}{x} = 3$

squaring on both sides

$\Rightarrow (x - \frac{1}{x})^2 = (3)^2$

$\Rightarrow (x - \frac{1}{x})^2 = 9$

we know that, $(a - b)^2 = a^2 - 2ab + b^2$

$\Rightarrow x^2 - 2 \times x \times \frac{1}{x} + (\frac{1}{x})^2 = 9$

$\Rightarrow x^2 - 2 + (\frac{1}{x})^2 = 9$

$\Rightarrow x^2 + \frac{1}{x^2} = 9 + 2$

$\Rightarrow x^2 + \frac{1}{x^2} = 11$

Again, squaring on both sides

$\Rightarrow (x^2 + \frac{1}{x^2})^2 = (11)^2$

$\Rightarrow (x^2 + \frac{1}{x^2})^2 = 121$

$\Rightarrow x^2 + 2 \times (x^2) \times (\frac{1}{x^2}) + (\frac{1}{x^2})^2 = 121$

$\Rightarrow x^4 + 2 + \frac{1}{x^4} = 121$

$\Rightarrow x^4 + \frac{1}{x^4} = 121 - 2$

=> $x^4 + \frac{1}{x^4} = 119$

hence, $x^4 + \frac{1}{x^4} = 119$

Q9 If $x^2 + \frac{1}{x^2} = 18$, find the values of $x + \frac{1}{x}$, $x - \frac{1}{x}$

sol:

Given that,

$x^2 + \frac{1}{x^2} = 18$, find the values of $x + \frac{1}{x}$, $x - \frac{1}{x}$

consider, $x + \frac{1}{x}$

squaring the above equation

$(x + \frac{1}{x})^2 = x^2 + 2 \times x \times \frac{1}{x} + (\frac{1}{x})^2$

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

=> $(x + \frac{1}{x})^2 = x^2 + 2 + \frac{1}{x^2}$

=> $(x + \frac{1}{x})^2 = 18 + 2$

=> $(x + \frac{1}{x})^2 = 20$

=> $x + \frac{1}{x} = \pm\sqrt{20}$

consider, $x - \frac{1}{x}$

squaring the above equation

$(x - \frac{1}{x})^2 = x^2 - 2 \times x \times \frac{1}{x} + (\frac{1}{x})^2$

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

=> $(x - \frac{1}{x})^2 = x^2 - 2 + \frac{1}{x^2}$

=> $(x - \frac{1}{x})^2 = 18 - 2$

=> $(x - \frac{1}{x})^2 = 16$

=> $x - \frac{1}{x} = \pm\sqrt{20}$

=> $x - \frac{1}{x} = \pm 4$

Q10 If x + y = 4 and xy = 2,find the value of $x^2 + y^2$

sol:

Given that,

$x + y = 4$ and $xy = 2$

we know that, $(a + b)^2 = a^2 + 2ab + b^2$

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

=> $x^2 + y^2 = 4^2 - (2 \times 2)$

=> $x^2 + y^2 = 16 - 4$

=> $x^2 + y^2 = 12$

Q11 If x – y = 7 and xy = 9,find the value of $x^2 + y^2$

sol:

Given that,

$x - y = 7$ and $xy = 9$

we know that, $(a-b)^2 = a^2 - 2ab + b^2$

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

=> $x^2 - y^2 = 7^2 + (2 \times 9)$

=> $x^2 - y^2 = 49 + 18$

=> $x^2 - y^2 = 67$

Q12 If 3x + 5y = 11 and xy = 2,find the value of $9x^2 + 25y^2$

sol:

Given that,

$3x + 5y = 11$ and $xy = 2$

we know that, $(a+b)^2 = a^2 + 2ab + b^2$

$(3x+5y)^2 = (3x)^2 + 2 \times (3x) \times (5y) + (5y)^2$
=> $(3x+5y)^2 = 9x^2 + 30xy + 25y^2$

=> $9x^2 + 25y^2 = (3x+5y)^2 - 10xy$

=> $9x^2 + 25y^2 = (11)^2 - (30 \times 2)$

=>$9x^2 + 25y^2 = 121 - 60$

=> $9x^2 + 25y^2 = 61$

Q13 Find the values of the following expressions

(i) $16x^2 + 24x + 9$ **when x =** $\frac{7}{4}$

Sol:

Given, $16x^2 + 24x + 9$ and $x = \frac{7}{4}$

we know that, $(a+b)^2 = a^2 + 2ab + b^2$

$16x^2 + 24x + 9 = (4x+3)^2$

=> $16x^2 + 24x + 9 = (4(\frac{7}{4}) + 3)^2$

=> $16x^2 + 24x + 9 = (7+3)^2$

=> $16x^2 + 24x + 9 = (10)^2$

=> $16x^2 + 24x + 9 = 100$

(ii) $64x^2 + 81y^2 + 144xy$ **when x = 11 and y =** $\frac{4}{3}$

sol:

Given, $64x^2 + 81y^2 + 144xy$ and $x = 11$, $y = \frac{4}{3}$

we know that, $(a+b)^2 = a^2 + 2ab + b^2$

$64x^2 + 81y^2 + 144xy = (8x+9y)^2$

=> $64x^2 + 81y^2 + 144xy = (8(11) + 9(\frac{4}{3}))^2$

=> $64x^2 + 81y^2 + 144xy = (88+12)^2$

=> $64x^2 + 81y^2 + 144xy = (100)^2$

$\Rightarrow 64x^2 + 81y^2 + 144xy = 10000$

(iii) $81x^2 + 16y^2 - 72xy$ **when** $x = \frac{2}{3}$

and $y = \frac{3}{4}$

sol:

Given that, $81x^2 + 16y^2 - 72xy$ and $x = \frac{2}{3}$,

$y = \frac{3}{4}$

we know that, $(a-b)^2 = a^2 - 2ab + b^2$

$81x^2 + 16y^2 - 72xy = (9x - 4y)^2$

$\Rightarrow 81x^2 + 16y^2 - 72xy = (9(\frac{2}{3}) - 4(\frac{3}{4}))^2$

$\Rightarrow 81x^2 + 16y^2 - 72xy = (6-3)^2$

$\Rightarrow 81x^2 + 16y^2 - 72xy = 3^2$

$\Rightarrow 81x^2 + 16y^2 - 72xy = 9$

Q14 If $x + \frac{1}{x}$ **= 9, find the value of** $x^4 + \frac{1}{x^4}$

sol:

Given,

$x + \frac{1}{x} = 9$

squaring on both sides

$(x + \frac{1}{x})^2 = 9^2$

$\Rightarrow (x + \frac{1}{x})^2 = 81$

$\Rightarrow x^2 + 2 \times x \times \frac{1}{x} + (\frac{1}{x})^2 = 81$

$\Rightarrow x^2 + 2 + \frac{1}{x^2} = 81$

$\Rightarrow x^2 + \frac{1}{x^2} = 81 - 2$

$\Rightarrow x^2 + \frac{1}{x^2} = 79$

Again, squaring on both sides

$(x^2 + \frac{1}{x^2})^2 = (79)^2$

$\Rightarrow (x^2 + \frac{1}{x^2})^2 = 6241$

$\Rightarrow (x^2)^2 + 2 \times (x^2) \times (\frac{1}{x^2}) + (\frac{1}{x^2})^2 = 6241$

$\Rightarrow x^4 + 2 + \frac{1}{x^4} = 6241$

$\Rightarrow x^4 + \frac{1}{x^4} = 6241 - 2$

$\Rightarrow x^4 + \frac{1}{x^4} = 6239$

Q15 If $x + \frac{1}{x}$ **= 12, find the value of** $x - \frac{1}{x}$

sol:

Given that,

$x + \frac{1}{x} = 12$

squaring on both sides

$(x+\frac{1}{x})^2 = (12)^2$
=> $(x+\frac{1}{x})^2 = 144$

=> $x^2 + 2 \times x \times \frac{1}{x} + (\frac{1}{x})^2 = 144$

=> $x^2 + 2 + \frac{1}{x^2} = 144$

=> $x^2 + \frac{1}{x^2} = 144 - 2$

=> $x^2 + \frac{1}{x^2} = 142$

Here,

$(x - \frac{1}{x})^2 = x^2 - 2 \times x \times \frac{1}{x} + (\frac{1}{x})^2$
$= x^2 - 2 + \frac{1}{x^2}$

=> $(x - \frac{1}{x})^2 = x^2 - 2 + \frac{1}{x^2}$

=> $(x - \frac{1}{x})^2 = 142 - 2$

=> $(x - \frac{1}{x})^2 = 140$

=> $x - \frac{1}{x} = \pm\sqrt{40}$

Q16 If 2x + 3y = 14 and 2x – 3y = 2, find the value of xy

Sol:

we know that, $(a+b)(a-b) = a^2 - b^2$

Given, 2x + 3y = 14 and 2x – 3y = 2

squaring (2x + 3y) and (2x – 3y) and then subtracting them, we get

$(2x+3y)^2 - (2x-3y)^2 = [(2x+3y)+(2x-3y)][(2x+3y)-(2x-3y)]$
=> $(2x+3y)^2 - (2x-3y)^2 = 4x \times 6y$

=> $(2x+3y)^2 - (2x-3y)^2 = 24xy$

=> $(14)^2 - (2)^2 = 24xy$

=> (14 + 2) (14 – 2) = 24xy

=> $16 \times 12 = 24xy$

=> 24xy = 192

=> $xy = \frac{192}{8}$

=> xy = 8

hence, xy = 8

Q17 If $x^2 + y^2 = 29$ and xy = 2, Find the value of

(i) x + y

sol

Given,

$x^2 + y^2 = 29$ and xy = 2

squaring the (x + y)

$(x+y)^2 = x^2 + 2 \times x \times y + y^2$
=> $(x+y)^2 = 29 + (2 \times 2)$

=> $(x+y)^2 = 29 + 4$

=> $(x+y)^2 = 33$

$\Rightarrow x + y = \pm\sqrt{33}$

(ii) x – y

sol:

Given,

$x^2 + y^2 = 29$ and $xy = 2$

squaring the $(x - y)$

$(x-y)^2 = x^2 - 2 \times x \times y + y^2$
$\Rightarrow (x-y)^2 = 29 - (2 \times 2)$

$\Rightarrow (x-y)^2 = 29 - 4$

$\Rightarrow (x-y)^2 = 25$

$\Rightarrow x - y = \pm\sqrt{25}$

$\Rightarrow x + y = \pm 5$

(iii) $x^4 + y^4$

Sol:

Given,

$x^2 + y^2 = 29$ and $xy = 2$

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

$\Rightarrow x^4 + y^4 = (x^2 + y^2)^2 - 2(xy)^2$

$\Rightarrow x^4 + y^4 = (29)^2 - 2(2)^2$

$\Rightarrow x^4 + y^4 = 841 - 8$

$\Rightarrow x^4 + y^4 = 833$