Exercise 6.6

Q.1 Write the following squares of binomials as trinomials.

(i) $(x+2)^2$ (ii) $(8a+3b)^2$ (iii) $(2m+1)^2$

(iv) $(9a+\frac{1}{6})^2$ (v) $(x+\frac{x^2}{2})^2$ (vi) $(\frac{x}{4}-\frac{y}{3})^2$

(vii) $(3n-\frac{1}{3n})^2$ (viii) $(\frac{x}{y}-\frac{y}{x})^2$ (ix) $(\frac{3a}{2}-\frac{5b}{4})^2$

(x) $(a^2b-bc^2)^2$ (xi) $(\frac{2a}{3b}+\frac{2b}{3a})^2$ (xii) $(x^2-ay)^2$

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

$= x^2+2\times x\times 2+(2)^2$ $\{\because (a+b)^2=a^2+2ab+b^2\}$

$= x^2+4x+4$

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

$= 64a^2+48ab+9b^2$

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

$= 4m^2+4m+1$ $\{(a+b)^2=a^2+2ab+b^2\}$

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

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

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(v) $\left(x+\frac{x^2}{2}\right)^2 = (x^2) + 2\times x\times\frac{x^2}{2} + \left(\frac{x^2}{2}\right)^2$

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

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

$= \left(\frac{x}{4}\right)^2 - 2\times\frac{x}{4}\times\frac{y}{3} + \left(\frac{y}{3}\right)^2$ $\{(a-b)^2 = a^2 - 2ab + b^2\}$

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

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

$= (3x)^2 - 2\times 3x\times\frac{1}{3x} + \left(\frac{1}{3x}\right)^2$ $\{\because (a-b)^2 = a^2 - 2ab + b^2\}$

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

(viii) $\left(\frac{x}{y}-\frac{y}{x}\right)^2 = \left(\frac{x}{y}\right)^2 - 2\times\frac{x}{y}\times\frac{y}{x} + \left(\frac{y}{x}\right)^2$

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

(ix) $\left(\frac{3a}{2}-\frac{5b}{4}\right)^2 = \left(\frac{3a}{2}\right)^2 - 2\times\frac{3a}{2}\times\frac{5b}{4} + \left(\frac{5b}{4}\right)^2$

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

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

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

$\Rightarrow a^4b^2 - 2a^2b^2c^2 + b^2c^4$

(xi) $\left(\frac{2a}{3b} + \frac{2b}{3a}\right)^2$

$= \left(\frac{2a}{3b}\right)^2 + 2 \times \frac{2a}{3b} \times \frac{2b}{3a} + \left(\frac{2b}{3a}\right)^2$ $\left\{\because (a+b)^2 = a^2 + 2ab + b^2\right\}$

$= \frac{4a^2}{9b^2} + \frac{8}{9} + \frac{4b^2}{9a^2}$

(xii) $(x^2 - ay)^2$

$= (x^2)^2 - 2 \times x^2 \times ay + (ay)^2$ $\left\{\because (a-b)^2 = a^2 - 2ab + b^2\right\}$

$= x^4 - 2x^2ay + a^2y^2$

Q.2 Find the product of the following binomials.

(i) $(2x+y)(2x+y)$ (ii) $(a+2b)(a-2b)$ (iii) $(a^2+bc)(a^2-b$

(iv) $\left(\frac{4x}{5} - \frac{3y}{4}\right)\left(\frac{4x}{5} + \frac{3y}{4}\right)$ (v) $\left(2x + \frac{3}{y}\right)\left(2x - \frac{3}{y}\right)$

(vi) $(2a^3+b^3)(2a^3-b^3)$ (vii) $\left(x^4 + \frac{2}{x^2}\right)\left(x^4 - \frac{2}{x^2}\right)$

(viii) $\left(x^3 + \frac{1}{x^3}\right)\left(x^3 - \frac{1}{x^3}\right)$

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Solution (i) $(2x+y)(2x+y)$

$= (2x+y)^2$

$= (2x)^2 + 2 \times 2x \times y + (y)^2$ { using $(a+b)^2 = a^2+2ab+b^2$ }

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

(ii) $(a+2b)(a-2b)$ { using $(a+b)(a-b) = a^2-b^2$ }

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

$= a^2 - 4b^2$

(iii) $(a^2+bc)(a^2-bc)$ { $(a+b)(a-b) = a^2-b^2$ }

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

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

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

$= \left(\frac{4x}{5}\right)^2 - \left(\frac{3y}{4}\right)^2$ ($(a+b)(a-b) = a^2-b^2$)

$= \frac{16}{25}x^2 - \frac{9}{4}y^2$

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

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

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

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(vi) $(2a^3+b^3)(2a^3-b^3)$

$= (2a^3)^2 - (b^3)^2$ $\{\because (a+b)(a-b) = a^2-b^2\}$

$= 4a^6 - b^6$

(vii) $\left(x^4+\frac{2}{x^2}\right)\left(x^4-\frac{2}{x^2}\right)$

$= (x^4)^2 - \left(\frac{2}{x^2}\right)^2$ $\{\because (a+b)(a-b) = a^2-b^2\}$

$= x^8 - \frac{4}{x^4}$

(viii) $\left(x^3+\frac{1}{x^3}\right)\left(x^3-\frac{1}{x^3}\right)$

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

$= x^6 - \frac{1}{x^6}$

Q.3 Using the formula for squaring a binomial, evaluate the following:

(i) $(102)^2$ (ii) $(99)^2$ (iii) $(1001)^2$ (iv) $(999)^2$

(v) $(103)^2$

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Solution: (i) $(102)^2 = (100+2)^2$

$= (100)^2 + 2\times100\times2 + (2)^2$

$= 10000 + 400 + 4$

$= 10404$

(ii) $(99)^2 = (100-1)^2$

$= (100)^2 - 2\times100\times1 + (1)^2$

$= 10000 - 200 + 1$

$= 9801$

(iii) $(1001)^2 = (1000+1)^2$

$= (1000)^2 + 2\times1000\times1 + (1)^2$

$= 1000000 + 2000 + 1$

$= 1002001$

(iv) $(999)^2 = (1000-1)^2$

$= (1000)^2 - 2\times1000\times1 + (1)^2$

$= 1000000 - 2000 + 1$

$= 998001$

(v) $(703)^2 = (700+3)^2$

$= (700)^2 + 2\times700\times3 + (3)^2$

$= 490000 + 4200 + 9$

$= 494201$

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Q4 Simplify the following using the formula

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

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

$= 64 \times 100$

$= 6400$

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

$= 434 \times 500$

$= 217000$

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

$= 10 \times 148$

$= 1480$

(iv) $197 \times 203 = (200-3)(200+3)$

$= (200)^2-(3)^2 = 40000-9$

$= 39991$

(v) $113 \times 87 = (100+13)(100-13)$

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

$= 10000-169 = 9831$

(vi) $95 \times 105 = (100-5)(100+5)$

$= (100)^2-(5)^2 = 10000-25$

$= 9975$

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(vii) $1.8 \times 2.2 = (2-0.2)(2+0.2)$

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

$= 4 - 0.04 = 3.96$

(viii) $9.8 \times 10.2 = (10-0.2)(10+0.2)$

$= (10)^2 - (0.2)^2 = 100 - 0.04$

$= 99.96$

Q.5 Simplify the following using the identities.

(i) $\dfrac{58^2 - 42^2}{16}$ (ii) $178 \times 178 - 22 \times 22$

(iii) $\dfrac{198 \times 198 - 102 \times 102}{96}$ (iv) $1.73 \times 1.73 - 0.27 \times 0.27$

(v) $\dfrac{8.63 \times 8.63 - 1.37 \times 1.37}{0.726}$

Solution: (i) $\dfrac{58^2 - 42^2}{16} =$

$= \dfrac{(58+42)(58-42)}{16}$ $\{a^2 - b^2 = (a+b)(a-b)\}$

$= \dfrac{100 \times 16}{16} = 100$

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(i) $178 \times 178 - 22 \times 22$

$= (178)^2 - (22)^2$

$= (178+22)(178-22)$

$\{ a^2 - b^2 = (a+b)(a-b) \}$

$= 200 \times 156$

$= 31200$

(ii) $\frac{198 \times 198 - 102 \times 102}{96}$

$= \frac{(198)^2 - (102)^2}{96} = \frac{(198+102)(198-102)}{96}$

$= \frac{300 \times 96}{96} = 96$

(iii) $1.73 \times 1.73 - 0.27 \times 0.27$

$= (1.73)^2 - (0.27)^2$

$= (1.73+0.27)(1.73-0.27)$

$= 2 \times 1.46 = 2.92$

(iv) $\frac{8.63 \times 8.63 - 1.37 \times 1.37}{0.726}$

$= \frac{(8.63)^2 - (1.37)^2}{0.726} = \frac{(8.63+1.37)(8.63-1.37)}{0.726}$

$= \frac{10.00 \times 7.26}{0.726} = \frac{10 \times 726 \times 10}{726}$

$= 100$

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Q6 Find the value of x, if

(i) $4x = (52)^2 - (48)^2$ (ii) $14x = (47)^2 - (33)^2$

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

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

$\Rightarrow 4x = (52+48)(52-48)$ $\{\because a^2 - b^2 = (a+b)(a-b)\}$

$4x = 100 \times 4$

$4x = 400$

$\Rightarrow x = \frac{400}{4} = 100$

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

$\Rightarrow 14x = (47+33)(47-33)$ $\{\because a^2 - b^2 = (a+b)(a-b)\}$

$\Rightarrow 14x = 80 \times 14$

$\Rightarrow x = \frac{80 \times 14}{14} = 80$

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

$= (50+40)(50-40)$

$5x = 90 \times 10$

$\Rightarrow x = \frac{90 \times 10}{5}$

$x = 180$

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Q.7 If $x+\frac{1}{x}=20$, find the value of

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

Sol: $\because \quad x+\frac{1}{x}=20$

squaring both sides

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

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

$\therefore x^2+\frac{1}{x^2}=400-2=398$

Q.8 If $x-\frac{1}{x}=3$, find the values of $x^2+\frac{1}{x^2}$ and $x^4+\frac{1}{x^4}$.

Sol: $\because \quad x-\frac{1}{x}=3$

squaring both sides.

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

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

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

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

Again squaring both sides.

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

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

$\Rightarrow \quad x^4 + \frac{1}{x^4} = 121 - 2 = 119$

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

Q.9 If $x^2 + \frac{1}{x^2} = 18$, find the values of $x + \frac{1}{x}$ and $x - \frac{1}{x}$.

Sol: If $x^2 + \frac{1}{x^2} = 18$

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

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

$= 20$

$\Rightarrow \quad x + \frac{1}{x} = \sqrt{20} = 2\sqrt{5}$

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

$= 18 - 2$

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

$\Rightarrow \quad x - \frac{1}{x} = 4$

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Q.10 If $x+y=4$ and $xy=2$, find the value of x^2+y^2.

Sol: $\because \quad x+y=4$

squaring both sides

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

$\Rightarrow x^2+y^2+2xy = 16$

$\Rightarrow x^2+y^2+2(2) = 16$

$\Rightarrow x^2+y^2 = 16-4$

$= 12$

$\therefore x^2+y^2 = 12$

Q.11 If $x-y=7$, $xy=9$, find x^2+y^2.

Solution: $\because \quad x-y=7$

squaring both sides

$\Rightarrow (x-y)^2 = 7^2$

$\Rightarrow x^2+y^2-2xy = 49$

$\Rightarrow x^2+y^2-2(9) = 49$

$\Rightarrow x^2+y^2-18 = 49$

$\Rightarrow x^2+y^2 = 49+18$

$= 67$

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Q.12 If $3x+5y=11$ and $xy=2$, find the values of $9x^2+25y^2$.

Sol: $\because \quad 3x+5y=11$

squaring both sides.

$\Rightarrow (3x+5y)^2 = 11^2$

$\Rightarrow 9x^2+25y^2+30xy = 121$

$\Rightarrow 9x^2+25y^2+30(2) = 121$

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

$= 61$

$\therefore 9x^2+25y^2 = 61$

Q.13 Find the values of the following expressions.

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

Sol: $16\left(\frac{7}{4}\right)^2+24\left(\frac{7}{4}\right)+9$

$= 16\left(\frac{49}{16}\right)+6\times7+9$

$= 49+42+9 = 100$

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$= \left(4\times11 + 9\times\frac{4}{3}\right)^2$

$= (44+12)^2 = (56)^2 =$

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

$= 64(11)^2+81\left(\frac{4}{3}\right)^2+144\times11\times\frac{4}{3}$

$= 64\times121 + 81\times\frac{16}{9} + (48\times11\times4)$

$= 7744 + 144 + 2112 = 10000$

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

$\because\ 81x^2+16y^2-72xy = (9x)^2+(4y)^2-2\times9x\times4y$

$= (9x-4y)^2$

$= \left\{9\left(\frac{2}{3}\right)-4\left(\frac{3}{4}\right)\right\}^2$

$= (6-3)^2 = (3)^2 = 9$

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Q.14 If $x+\frac{1}{x}=9$, find $x^4+\frac{1}{x^4}$.

Sol: $\because\ x+\frac{1}{x}=9$

squaring both sides

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

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

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

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

squaring both sides

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

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

$$=6239$$

Q.15 If $x+\frac{1}{x}=12$, find the value of $x-\frac{1}{x}$

Solution: $\because\ x+\frac{1}{x}=12$

squaring both sides

$$\Rightarrow \left(x+\frac{1}{x}\right)^2=12^2$$

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

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

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

$\Rightarrow \left(x-\frac{1}{x}\right)^2=142-2=140.$

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$\therefore \quad x - \frac{1}{x} = \pm\sqrt{140}$

Q.16 If $2x+3y=14$ and $2x-3y=2$, find the value of xy. (Hint: use $(2x+3y)^2-(2x-3y)^2=24xy$

Solution: $\because \quad (2x+3y)^2-(2x-3y)^2 = 24xy$

$\Rightarrow \quad (14)^2-(2)^2 = 24xy$

$\Rightarrow \quad 196-4 = 24xy$

$\Rightarrow \quad \frac{192}{24} = xy$

$\Rightarrow \quad xy = 8$

Q.17 If $x^2+y^2 = 29$ and $xy=2$, find the value of

(i) $x+y$ (ii) $x-y$ (iii) x^4+y^4

Solution: (i) We are given $x^2+y^2=29$, $xy=2$

$\because \quad (x+y)^2 = x^2+y^2+2xy$

$= 29+2(2)$

$= 29+4$

$= 33$

$\therefore \quad x+y = \pm\sqrt{33}$

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

$= 29-2(2)$

$= 29-4$

$= 25 \quad \therefore \quad x-y = \sqrt{25} = \pm 5$

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(iii) x^4+y^4

$\because \quad x^2+y^2 = 29$

squaring

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

$\Rightarrow x^4+y^4+2(xy)^2 = 841$

$= x^4+y^4+2(2)^2 = 841$

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

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

$= 833.$

Q.18 What must be added to each of the following expressions to make it a whole square?

(i) $4x^2-12x+7$ (ii) $4x^2-20x+20$

Solution: We have

$4x^2-12x+7 = (2x)^2-2\times2\times3x+7$

From above expression, First term $= 2x$.

Second term $= 3$

As, we know $(3)^2 = 9$

$\therefore$ To make it whole square we should add $9-7=2$.

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(ii) $4x^2 - 20x + 20$

It is clear from equation that

$$4x^2 - 20x + 20 = (2x)^2 - 2 \times 2x \times 5 + 20$$

To make it whole square it should be 25 in place of 20.

$\therefore$ Required number $= 25 - 20$
$= 5$

Q.19 Simplify

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

Solution $\{(x-y)(x+y)\}(x^2+y^2)(x^4+y^4)$

$\Rightarrow \{(x^2-y^2)(x^2+y^2)\}(x^4+y^4)$ $\{\because (a+b)(a-b) = a^2-b^2\}$

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

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

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

$= x^8 - y^8$

(ii) $(2x-1)(2x+1)(4x^2+1)(16x^4+1)$

Solution: $\{(2x-1)(2x+1)\}(4x^2+1)(16x^4+1)$

$\Rightarrow \{(2x)^2 - (1)^2\}(4x^2+1)(16x^4+1)$

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$\Rightarrow (4x^2-1)(4x^2+1)(16x^4+1)$

$\Rightarrow \{(4x^2)^2-(1)^2\}(16x^4+1)$

$= (16x^4-1)(16x^4+1)$

$\Rightarrow (16x^4)^2-(1)^2 = 256x^8-1$

(iii) $(7m-8n)^2+(7m+8n)^2$

$\Rightarrow \{(7m)^2-2\times 7m\times 8n+(8n)^2\}+\{(7m)^2+2\times 7m\times 8n+(8n)^2\}$

$= (49m^2-112mn+64n^2)+(49m^2+112mn+64n^2)$

$= (49m^2+49m^2)+(-112mn+112mn)+(64n^2+64n^2)$

$= 98m^2+0+128n^2$

$= 98m^2+128n^2$

(iv) $(2.5p-1.5q)^2-(1.5p-2.5q)^2$

$\Rightarrow \{(2.5p)^2+(1.5q)^2-2\times 2.5p\times 1.5q\}-\{(1.5p)^2+(2.5q)^2-2\times 1.5p\times 2.5q\}$

$= (6.25p^2+2.25q^2-7.5pq)-(2.25p^2+6.25q^2-7.5pq)$

$= 6.25p^2+2.25q^2-7.5pq-2.25p^2-6.25q^2+7.5pq$

$= 4p^2-4q^2$

$= 4(p^2-q^2)$

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(v) $(m^2-n^2m)^2+2m^3n^2$

Sol $\{(m^2)^2-2\times m^2\times n^2m+(n^2m)^2\}+2m^3n^2$

$\Rightarrow m^4-2m^3n^2+m^2n^4+2m^3n^2$

$\Rightarrow m^4+m^2n^4$

$= m^2(m^2+n^4)$

Q.20 Show that

(i) $(3x+7)^2-84x=(3x-7)^2$

Solution: LHS $= (3x+7)^2-84x$

$= \{(3x)^2+2\times3x\times7+(7)^2\}-84x$

$= 9x^2+42x+49-84x$

$= 9x^2-42x+49$

RHS $(3x-7)^2=(3x)^2-2\times3x\times7+(7)^2$

$= 9x^2-42x+49$

$\therefore$ LHS = RHS

(ii) $(9a-5b)^2+180ab=(9a+5b)^2$

Sol: LHS $(9a-5b)^2+180ab$

$=\{(9a)^2-2\times9a\times5b+(5b)^2\}+180ab$

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$= 81a^2 - 90ab + 25b^2 + 180ab$

$= 81a^2 + 90ab + 25b^2$

RHS : $(9a+5b)^2$

$= (9a)^2 + 2 \times 9a \times 5b + (5b)^2$

$= 81a^2 + 90ab + 25b^2$

$\therefore$ LHS = RHS

(iii) $\left(\frac{4m}{3} - \frac{3n}{4}\right)^2 + 2mn = \frac{16m^2}{9} + \frac{9n^2}{16}$

Sol: LHS

$\left(\frac{4m}{3} - \frac{3n}{4}\right)^2 = \left\{\left(\frac{4m}{3}\right)^2 - 2 \times \frac{4m}{3} \times \frac{3n}{4} + \left(\frac{3n}{4}\right)^2\right\} + 2mn$

$= \frac{16}{9}m^2 - 2mn + \frac{9}{16}n^2 + 2mn$

$= \frac{16}{9}m^2 + \frac{9}{16}n^2$

$=$ RHS

(iv) $(4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$

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

$= (4pq + 3q + 4pq - 3q)(4pq + 3q - 4pq + 3q)$

$= 8pq \times 6q = 48pq^2$

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(v) $(a-b)(a+b)+(b-c)(b+c)+(c-a)(c+a)=0$

Sol: $\because (a-b)(a+b)+(b-c)(b+c)+(c-a)(c+a)$

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

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

$= 0+0+0$

$= 0 = RMS$

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