RS Aggarwal Solutions Class 8 Mathematics

Operations On Algebraic Expressions

Ex 6A

Q1

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and adding column-wise, we get:

$$\begin{array}{r} 8ab \\ -5ab \\ 3ab \\ -ab \\ \hline 5ab \end{array}$$

Q2

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and adding column-wise, we get:

$$\begin{array}{r} 7x \\ -3x \\ 5x \\ -x \\ -2x \\ \hline 6x \end{array}$$

Q3

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and adding column-wise, we get:

$$\begin{array}{r} 3a - 4b + 4c \\ 2a + 3b - 8c \\ a - 6b + c \\ \hline 6a - 7b - 3c \end{array}$$

Q4

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and adding column-wise, we get:

$$\begin{array}{r} 5x - 8y + 2z \\ -2x - 4y + 3z \\ -x + 6y - z \\ 3x - 3y - 2z \\ \hline 5x - 9y + 2z \end{array}$$

Q5

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and adding column-wise, we get:

$$\begin{array}{r} 6ax - 2by + 3cz \\ -11ax + 6by - cz \\ -2ax - 3by + 10cz \\ \hline -7ax + by + 12cz \end{array}$$

Q6

Answer :

On arranging the terms of the given expressions in the descending powers of x and adding column-wise:

$$\begin{array}{r} 2x^3 - 9x^2 + 0x + 8 \\ 0x^3 + 3x^2 - 6x - 5 \\ 7x^3 + 0x^2 - 10x + 1 \\ -4x^3 - 5x^2 + 2x + 3 \\ \hline 5x^3 - 11x^2 - 14x + 7 \end{array}$$

Q7

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and adding column-wise:

$$\begin{array}{r} 6p + 4q - r + 3 \\ -5p + 0q + 2r - 6 \\ -7p + 11q + 2r - 1 \\ 0p + 2q - 3r + 4 \\ \hline -6p + 17q + 0r + 0 \end{array}$$

$$= -6p + 17q$$

Q8

Answer :

On arranging the terms of the given expressions in the descending powers of x and adding column-wise:

$$\begin{array}{r} 4x^2 + 4y^2 - 7xy - 3 \\ x^2 + 6y^2 - 8xy + 0 \\ 2x^2 - 5y^2 - 2xy + 6 \\ \hline 7x^2 + 5y^2 - 17xy + 3 \end{array}$$

Q9

Answer :

On arranging the terms of the given expressions in the descending powers of x and subtracting:

$$\begin{array}{r} -5a^2b \\ 3a^2b \\ - \\ \hline -8a^2b \end{array}$$

Q10

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and subtracting column-wise:

$$\begin{array}{r} 6pq \\ -8pq \\ + \\ \hline 14pq \end{array}$$

Q11

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and subtracting column-wise:

$$\begin{array}{r} -8abc \\ -2abc \\ + \\ \hline -6abc \end{array}$$

Q12

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and subtracting column-wise:

$$\begin{array}{r} -11p \\ -16p \\ + \\ \hline 5p \end{array}$$

Q13

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and subtracting column-wise:

$$\begin{array}{rrrr} 3a & -4b & -c & +6 \\ 2a & -5b & +2c & -9 \\ - & + & - & + \\ \hline a & +b & -3c & +15 \end{array}$$

Q14

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and subtracting column-wise:

$$\begin{array}{rrrr} p & -2q & -5r & -8 \\ -6p & +q & +3r & +8 \\ + & - & - & - \\ \hline 7p & -3q & -8r & -16 \end{array}$$

Q15

Answer :

On arranging the terms of the given expressions in the descending powers of x and subtracting column-wise:

$$\begin{array}{r} 3x^3 - x^2 + 2x - 4 \\ x^3 + 3x^2 - 5x + 4 \\ - \quad - \quad + \quad - \\ \hline 2x^3 - 4x^2 + 7x - 8 \end{array}$$

Q16

Answer :

Arranging the terms of the given expressions in the descending powers of x and subtracting column-wise:

$$\begin{array}{r} 4y^4 - 2y^3 - 6y^2 - y + 5 \\ 5y^4 - 3y^3 + 2y^2 + y - 1 \\ - \quad + \quad - \quad - \quad + \\ \hline -y^4 + y^3 - 8y^2 - 2y + 6 \end{array}$$

Q17

Answer :

Writing the terms of the given expressions (in the same order) in the form of rows with like terms below each other and subtracting column-wise:

$$\begin{array}{r} 3p^2 - 4q^2 - 5r^2 - 6 \\ 4p^2 + 5q^2 - 6r^2 + 7 \\ - \quad - \quad + \quad - \\ \hline -p^2 - 9q^2 + r^2 - 13 \end{array}$$

Q18

Answer :

Let the required number be x.

$$\left(3a^2 - 6ab - 3b^2 - 1\right) - x = 4a^2 - 7ab - 4b^2 + 1$$

$$\left(3a^2 - 6ab - 3b^2 - 1\right) - \left(4a^2 - 7ab - 4b^2 + 1\right) = x$$

$$\begin{array}{r} 3a^2 - 6ab - 3b^2 - 1 \\ 4a^2 - 7ab - 4b^2 + 1 \\ - \quad + \quad + \quad - \\ \hline -a^2 + ab + b^2 - 2 \end{array}$$

$\therefore$ Required number = $-a^2 + ab + b^2 - 2$

Q19

Answer :

Sides of the rectangle are l and b.

$l = 5x^2 - 3y^2$

$b = x^2 + 2xy$

Perimeter of the rectangle is $(2l + 2b)$.

$$\text{Perimeter} = 2\left(5x^2 - 3y^2\right) + 2\left(x^2 + 2xy\right)$$

$$= 10x^2 - 6y^2 + 2x^2 + 4xy$$

$$\begin{array}{r} 10x^2 - 6y^2 \\ 2x^2 \quad + 4xy \\ \hline 12x^2 - 6y^2 + 4xy \end{array}$$

Hence, the perimeter of the rectangle is $12x^2 - 6y^2 + 4xy$.

Q20

Answer :

Let a, b *and* c be the three sides of the triangle.

$\therefore$ Perimeter of the triangle $=(a+b+c)$

Given perimeter of the triangle = $6p^2-4p+9$
One side (a) = p^2-2p+1
Other side (b) = $3p^2-5p+3$
Perimeter = $(a+b+c)$

$$(6p^2-4p+9)=(p^2-2p+1)+(3p^2-5p+3)+c$$
$$6p^2-4p+9-p^2+2p-1-3p^2+5p-3=c$$
$$(6p^2-p^2-3p^2)+(-4p+2p+5p)+(9-1-3)=c$$
$$2p^2+3p+5 \ = \ c$$

Thus, the third side is $2p^2+3p+5$.

RS Aggarwal Solutions Class 8 Mathematics
Operations On Algebraic Expressions
Ex 6B

Q1

Answer :

By horizontal method:

$$(5x+7)\times(3x+4)$$
$$=5x(3x+4)+7(3x+4)$$
$$=15x^2+20x+21x+28$$
$$=15x^2+41x+28$$

Q2

Answer :

By horizontal method:

$$(4x+9)\times(x-6)$$
$$=4x(x-6)+9(x-6)$$
$$=4x^2-24x+9x-54$$
$$=4x^2-15x-54$$

Q3

Answer :

By horizontal method:

$$(2x+5)\times(4x-3)$$
$$=2x(4x-3)+5(4x-3)$$
$$=8x^2-6x+20x-15$$
$$=8x^2+14x-15$$

Q4

Answer :

By horizontal method:

$$(3y-8)\times(5y-1)$$
$$=3y(5y-1)-8(5y-1)$$
$$=15y^2-3y-40y+8$$
$$=15y^2-43y+8$$

Q5

Answer :

By horizontal method:

$$(7x+2y)\times(x+4y)$$
$$=7x(x+4y)+2y(x+4y)$$
$$=7x^2+28xy+2xy+8y^2$$
$$=7x^2+30xy+8y^2$$

Q6

Answer :

By horizontal method:

$$(9x+5y)\times(4x+3y)$$
$$9x(4x+3y)+5y(4x+3y)$$
$$=36x^2+27xy+20xy+15y^2$$
$$=36x^2+47xy+15y^2$$

Q7

Answer :

By horizontal method:

$$(3m-4n)\times(2m-3n)$$
$$=3m(2m-3n)-4n(2m-3n)$$
$$=6m^2-9mn-8mn+12n^2$$
$$=6m^2-17mn+12n^2$$

Q8

Answer :

By horizontal method:

$$(x^2-a^2)\times(x-a)$$
$$=x^2(x-a)-a^2(x-a)$$
$$=x^3-ax^2-a^2x+a^3$$
i.e $(x^3+a^3)-ax(x-a)$

Q9

Answer :

By horizontal method:

$$(x^2-y^2)\times(x+2y)$$
$$=x^2(x+2y)-y^2(x+2y)$$
$$=x^3+2x^2y-xy^2-2y^3$$
$$i.e(x^3-2y^3)+xy(2x-y)$$

Q10

Answer :

By horizontal method:

$$(3p^2+q^2)\times(2p^2-3q^2)$$
$$=3p^2(2p^2-3q^2)+q^2(2p^2-3q^2)$$
$$=6p^4-9p^2q^2+2p^2q^2-3q^4$$
$$i.e 6p^4-7p^2q^2-3q^4$$

Q11

Answer :

By horizontal method:

$$(2x^2-5y^2)\times(x^2+3y^2)$$
$$=2x^2(x^2+3y^2)-5y^2(x^2+3y^2)$$
$$=2x^4+6x^2y^2-5x^2y^2-15y^4$$
$$=2x^4+x^2y^2-15y^4$$

Q12

Answer :

By horizontal method:

$$(x^3-y^3)\times(x^2+y^2)$$
$$=x^3(x^2+y^2)-y^3(x^2+y^2)$$
$$=x^5+x^3y^2-x^2y^3-y^5$$
$$=(x^5-y^5)+x^2y^2(x-y)$$

Q13

Answer :

By horizontal method:

$$(x^4+y^4)\times(x^2-y^2)$$
$$=x^4(x^2-y^2)+y^4(x^2-y^2)$$
$$=x^6-x^4y^2+y^4x^2-y^6$$
$$=(x^6-y^6)-x^2y^2(x^2-y^2)$$

Q14

Answer :

By horizontal method:

$$\left(x^4+\frac{1}{x^4}\right)\times\left(x+\tfrac{1}{x}\right)$$
$$=x^4\left(x+\tfrac{1}{x}\right)+\tfrac{1}{x^4}\left(x+\tfrac{1}{x}\right)$$
$$=x^5+x^3+\tfrac{1}{x^3}+\tfrac{1}{x^5}$$
$$i.e\ x^3\left(x^2+1\right)+\tfrac{1}{x^3}\left(1+\frac{1}{x^2}\right)$$

Q15

Answer :

By horizontal method:

$$(x^2-3x+7)\times(2x+3)$$
$$=2x(x^2-3x+7)+3(x^2-3x+7)$$
$$=2x^3-6x^2+14x+3x^2-9x+21$$
$$=2x^3-3x^2+5x+21$$

Q16

Answer :

By horizontal method:

$$(3x^2+5x-9)\times(3x-5)$$
$$=3x(3x^2+5x-9)-5(3x^2+5x-9)$$
$$=9x^3+15x^2-27x-15x^2-25x+45$$
$$=9x^3-52x+45$$

Q17

Answer :

By horizontal method:

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

Q18

Answer :

By horizontal method:

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

Q19

Answer :

By horizontal method:

$$(x^3-2x^2+5)\times(4x-1)$$
$$=4x(x^3-2x^2+5)-1(x^3-2x^2+5)$$
$$=4x^4-8x^3+20x-x^3+2x^2-5$$
$$=4x^4-9x^3+2x^2+20x-5$$

Q20

Answer :

By horizontal method:

$$(9x^2-x+15)\times(x^2-3)$$
$$=x^2(9x^2-x+15)-3(9x^2-x+15)$$
$$=9x^4-x^3+15x^2-27x^2+3x-45$$
$$=9x^4-x^3-12x^2+3x-45$$

Q21

Answer :

By horizontal method:

$$(x^2-5x+8)\times(x^2+2)$$
$$=x^2(x^2-5x+8)+2(x^2-5x+8)$$
$$=x^4-5x^3+8x^2+2x^2-10x+16$$
$$=x^4-5x^3+10x^2-10x+16$$

Q22

Answer :

By horizontal method:

$$(x^3-5x^2+3x+1)\times(x^2-3)$$
$$=x^2(x^3-5x^2+3x+1)-3(x^3-5x^2+3x+1)$$
$$=x^5-5x^4+3x^3+x^2-3x^3+15x^2-9x-3$$
$$=x^5-5x^4+16x^2-9x-3$$

Q23

Answer :

By horizontal method:

$$(3x+2y-4)\times(x-y+2)$$
$$x(3x+2y-4)-y(3x+2y-4)+2(3x+2y-4)$$
$$=3x^2+2xy-4x-3xy-2y^2+4y+6x+4y-8$$
$$=3x^2-2y^2-xy+2x+8y-8$$

Q24

Answer :

By horizontal method:

$$(x^2-5x+8)\times(x^2+2x-3)$$
$$=x^2(x^2-5x+8)+2x(x^2-5x+8)-3(x^2-5x+8)$$
$$=x^4-5x^3+8x^2+2x^3-10x^2+16x-3x^2+15x-24$$
$$=x^4-3x^3-5x^2+31x-24$$

Q25

Answer :

By horizontal method:

$$(2x^2+3x-7)\times(3x^2-5x+4)$$
$$=2x^2(3x^2-5x+4)+3x(3x^2-5x+4)-7(3x^2-5x+4)$$
$$=6x^4-10x^3+8x^2+9x^3-15x^2+12x-21x^2+35x-28$$
$$=6x^4-x^3-28x^2+47x-28$$

Q26

Answer :

By horizontal method:

$$(9x^2-x+15)\times(x^2-x-1)$$
$$=x^2(9x^2-x+15)-x(9x^2-x+15)-1(9x^2-x+15)$$
$$=9x^4-x^3+15x^2-9x^3+x^2-15x-9x^2+x-15$$
$$=9x^4-10x^3+7x^2-14x-15$$

RS Aggarwal Solutions Class 8 Mathematics

Operations On Algebraic Expressions

Ex 6C

Q1

Answer :

(i) $24x^2y^3$ *by* $3xy$

$$\frac{24x^2y^3}{3xy}$$
$$\Rightarrow \left(\frac{24}{3}\right)(x^{2-1})(y^{3-1})$$
$$\Rightarrow 8xy^2.$$

Therefore, the quotient is $8xy^2$.

(ii) $36xyz^2$ *by* $-9xz$

$$\frac{36xyz^2}{-9xz}$$
$$\Rightarrow \left(\frac{36}{-9}\right)(x^{1-1})(y^{1-0})(z^{2-1})$$
$$\Rightarrow -4yz$$

Therefore, the quotient is $-4yz$.

(iii)

$$-72x^2y^2z \text{ by } -12xyz$$
$$\frac{-72x^2y^2z}{-12xyz}$$
$$\Rightarrow \left(\frac{-72}{-12}\right)(x^{2-1})(y^{2-1})(z^{1-1})$$
$$\Rightarrow 6xy$$

Therefore, the quotient is $6xy$.

(iv) $-56mnp^2$ by $7mnp$

$$\frac{-56mnp^2}{7mnp}$$
$$\Rightarrow \left(\frac{-56}{7}\right)(m^{1-1})(n^{1-1})(p^{2-1})$$
$$\Rightarrow -8p$$

Therefore, the quotient is $-8p$.

Q2

Answer :

(i) $5m^3 - 30m^2 + 45m$ by $5m$

$$\left(5m^3 - 30m^2 + 45m\right) \div 5m$$
$$\Rightarrow \frac{5m^3}{5m} - \frac{30m^2}{5m} + \frac{45m}{5m}$$
$$\Rightarrow m^2 - 6m + 9$$

Therefore, the quotient is $m^2 - 6m + 9$.

(ii) $8x^2y^2 - 6xy^2 + 10x^2y^3$ by $2xy$

$$\left(8x^2y^2 - 6xy^2 + 10x^2y^3\right) \div 2xy$$
$$\Rightarrow \frac{8x^2y^2}{2xy} - \frac{6xy^2}{2xy} + \frac{10x^2y^3}{2xy}$$
$$\Rightarrow 4xy - 3y + 5xy^2$$

(iii) $9x^2y - 6xy + 12xy^2$ by $-3xy$

$$\left(9x^2y - 6xy + 12xy^2\right) \div -3xy$$
$$\Rightarrow \frac{9x^2y}{-3xy} - \frac{6xy}{-3xy} + \frac{12xy^2}{-3xy}$$
$$\Rightarrow -3x + 2 - 4y$$

Therefore, the quotient is $-3x + 2 - 4y$.

(iv) $12x^4 + 8x^3 - 6x^2$ by $-2x^2$

Q3

Answer :

$$\left(12x^4 + 8x^3 - 6x^2\right) \div -2x^2 \quad {}^{2}\text{-}4x+3^{2}$$
$$\Rightarrow \frac{12x^4}{-2x^2} + \frac{8x^3}{-2x^2} - \frac{6x^2}{-2x^2}$$
$$\Rightarrow -6x$$

$(x^2 - 4x + 4) \div (x - 2)$

$$\begin{array}{r|l} x-2 \;\overline{)\; x^2-4x+4\;} & x-2 \\ \quad x^2-2x & \\ \hline \quad -2x+4 & \\ \quad -2x+4 & \\ \hline \quad \times & \end{array}$$

Therefore the quotient is $-6x^2 - 4x + 3$.

Therefore, the quotient is $(x - 2)$ and the remainder is 0.

Q4

Answer :

$$\begin{array}{r|l} x+2 \;\overline{)\; x^2-4\;} & x-2 \\ \quad x^2+2x & \\ \hline \quad -2x-4 & \\ \quad -2x-4 & \\ \hline \quad \times & \end{array}$$

Therefore, the quotient is $x-2$ and the remainder is 0.

Q5

Answer :

$(x^2 + 12x + 35)$ by $(x + 7)$

$$\begin{array}{r|l} x+7 \;\overline{)\; x^2+12x+35\;} & x+5 \\ \quad x^2+7x & \\ \hline \quad 5x+35 & \\ \quad 5x+35 & \\ \hline \quad \times & \end{array}$$

Therefore, the quotient is $(x + 5)$ and the remainder is 0.

Answer :

$$\begin{array}{r|l} 3x+2 \;\overline{)\; 15x^2+x-6\;} & 5x-3 \\ \quad 15x^2+10x & \\ \hline \quad -9x-6 & \\ \quad -9x-6 & \\ \hline \quad \times & \end{array}$$

Therefore, the quotient is $(5x - 3)$ and the remainder is 0.

Q7

Answer :

$$\begin{array}{r|l} 7x-9 \;\overline{)\; 14x^2-53x+45\;} & 2x-5 \\ \quad 14x^2-18x & \\ \hline \quad -35x+45 & \\ \quad -35x+45 & \\ \hline \quad \times & \end{array}$$

Therefore, the quotient is $(2x - 5)$ and the remainder is 0.

Answer :

$$
\begin{array}{r|l}
2x-5 \;\overline{)\; 6x^2-31x+47 \;}\; & 3x-8 \\
\underline{-\quad +} & \\
\quad -16x+47 & \\
\quad \underline{-16x+40} & \\
\quad\quad \underline{+\quad -} & \\
\quad\quad\quad 7 &
\end{array}
$$

Therefore, the quotient is $(3x - 8)$ and the remainder is 7.

Q9

Answer :

$$
\begin{array}{r|l}
2x+3 \;\overline{)\; 2x^3+x^2-5x-2 \;}\; & x^2-x-1 \\
\underline{2x^3+3x^2\quad} & \\
\quad -2x^2-5x & \\
\quad \underline{-2x^2-5x} & \\
\quad\quad -2x-2 & \\
\quad\quad \underline{-2x-3} & \\
\quad\quad\quad 1 &
\end{array}
$$

Therefore, the quotient is $(x^2 - x - 1)$ and the remainder is 1.

Q10

Answer :

$$
\begin{array}{r|l}
x+1 \;\overline{)\; x^3+1 \;}\; & x^2-x+1 \\
\underline{x^3+x^2\quad} & \\
\quad -x^2+1 & \\
\quad \underline{-x^2-x} & \\
\quad\quad x+1 & \\
\quad\quad \underline{x+1} & \\
\quad\quad\quad 0 &
\end{array}
$$

Therefore, the quotient is x^2-x+1 and the remainder is 0.

Q11

Answer :

$$
\begin{array}{r|l}
x^2+x+1 \;\overline{)\; x^4-2x^3+2x^2+x+4 \;}\; & x^2-3x+4 \\
\underline{x^4+x^3+x^2\quad} & \\
\quad -3x^3+x^2+x & \\
\quad \underline{-3x^3-3x^2-3x} & \\
\quad\quad 4x^2+4x+4 & \\
\quad\quad \underline{4x^2+4x+4} & \\
\quad\quad\quad \times &
\end{array}
$$

Therefore, the quotient is (x^2 - 3x + 4) and remainder is 0.

Q12

Answer :

$$
\begin{array}{r|l}
x^2-5x+6 \;\overline{)\; x^3-6x^2+11x-6 \;}\; & x-1 \\
\underline{x^3-5x^2+6x\quad} & \\
\quad -1x^2+5x-6 & \\
\quad \underline{-1x^2+5x-6} & \\
\quad\quad \times &
\end{array}
$$

Therefore, the quotient is (x-1) and the remainder is 0.

Q13

Answer :

$$
\begin{array}{r|l}
x^2-3x+4 \;\overline{)\; 5x^3-12x^2+12x+13 \;} & 5x+3 \\
\quad x^3-15x^2+20x & \\
\hline
\quad 3x^2-8x+13 & \\
\quad 3x^2-9x+12 & \\
\hline
\quad x+1 &
\end{array}
$$

Therefore, the quotient is (5x+ 3) and the remainder is (x + 1).

Q14

Answer :

$$
\begin{array}{r|l}
2x^2-3x+5 \;\overline{)\; 2x^3-5x^2+8x-5 \;} & x-1 \\
\quad 2x^3-3x^2+5x & \\
\hline
\quad -2x^2+3x-5 & \\
\quad -2x^2+3x-5 & \\
\hline
\quad \times &
\end{array}
$$

Therefore, the quotient is (x-1) and the remainder is 0.

Q15

Answer :

$$
\begin{array}{r|l}
2x^2+x-1 \;\overline{)\; 8x^4+10x^3-5x^2-4x+1 \;} & 4x^2+3x-2 \\
\quad 8x^4+\;4x^3-4x^2 & \\
\hline
\quad 6x^3-\;x^2-4x+1 & \\
\quad 6x^3+3x^2-3x & \\
\hline
\quad -4x^2-\;x+1 & \\
\quad -4x^2-2x+2 & \\
\hline
\quad x-1 &
\end{array}
$$

Therefore, the quotient is ($4x^2$+ 3x -2) and the remainder is (x-1).

Operations On Algebraic Expressions
Ex 6D

1. $(a + b)^2 = a^2 + 2ab + b^2 = (-a - b)^2$
2. $(a - b)^2 = a^2 - 2ab + b^2$
3. $(a - b)(a + b) = a^2 - b^2$
4. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
5. $(a + b - c)^2 = a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$
6. $(a - b + c)^2 = a^2 + b^2 + c^2 - 2ab - 2bc + 2ca$
7. $(-a + b + c)^2 = a^2 + b^2 + c^2 - 2ab + 2bc - 2ca$
8. $(a - b - c)^2 = a^2 + b^2 + c^2 - 2ab + 2bc - 2ca$
9. $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
10. $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$
11. $a^3 + b^3 = (a + b)^3 - 3ab(a + b)$
    $= (a + b)(a^2 - ab + b^2)$
12. $a^3 - b^3 = (a - b)^3 + 3ab(a - b)$
    $= (a - b)(a^2 + ab + b^2)$
13. $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$
    if $a + b + c = 0$ then $a^3 + b^3 + c^3 = 3abc$

Q1

Answer :

(i) We have:

$$(x+6)(x+6)$$
$$=(x+6)^2$$
$$=x^2+6^2+2\times x\times 6 \qquad \left[\text{using } (a+b)^2=a^2+b^2+2ab\right]$$
$$=x^2+36+12x$$

(ii) We have:

$$(4x+5y)(4x+5y)$$
$$=(4x+5y)^2$$
$$=(4x)^2+(5y)^2+2\times 4x\times 5y \qquad \left[\text{using } (a+b)^2=a^2+b^2+2ab\right]$$
$$=16x^2+25y^2+40xy$$

(iii) We have:

$$(7a+9b)(7a+9b)$$
$$=(7a+9b)^2$$
$$=(7a)^2+(9b)^2+2\times 7a\times 9b \qquad \left[\text{using } (a+b)^2=a^2+b^2+2ab\right]$$
$$=49a^2+81b^2+126ab$$

(iv) We have:

$$\left(\tfrac{2}{3}x+\tfrac{4}{5}y\right)\left(\tfrac{2}{3}x+\tfrac{4}{5}y\right)$$
$$=\left(\tfrac{2}{3}x+\tfrac{4}{5}y\right)^2$$
$$=\left(\tfrac{2}{3}x\right)^2+\left(\tfrac{4}{5}y\right)^2+2\times\tfrac{2}{3}x\times\tfrac{4}{5}y \qquad \left[\text{using } (a+b)^2=a^2+b^2+2ab\right]$$
$$=\tfrac{4}{9}x^2+\tfrac{16}{25}y^2+\tfrac{16}{15}xy$$

(v) We have:

$$\left(x^2+7\right)\left(x^2+7\right)$$
$$=\left(x^2+7\right)^2$$
$$=\left(x^2\right)^2+7^2+2\times x^2\times 7 \qquad \left[\text{using } \left(a+b\right)^2=a^2+b^2+2ab\right]$$
$$=x^4+49+14x^2$$

(vi) We have:

$$\left(\tfrac{5}{6}a^2+2\right)\left(\tfrac{5}{6}a^2+2\right)$$
$$=\left(\tfrac{5}{6}a^2+2\right)^2$$
$$=\left(\tfrac{5}{6}a^2\right)^2+(2)^2+2\times\tfrac{5}{6}a^2\times 2 \qquad \left[\text{using } \left(a+b\right)^2=a^2+b^2+2ab\right]$$
$$=\tfrac{25}{36}a^4+4+\tfrac{10}{3}a^2$$

Q2

Answer :

(i) We have:

$$\left(x-4\right)\left(x-4\right)$$
$$=\left(x-4\right)^2$$
$$=x^2-2\times x\times 4+4^2 \qquad \left[\text{using } \left(a-b\right)^2=a^2-2ab+b^2\right]$$
$$=x^2-8x+16$$

(ii) We have:

$$\left(2x-3y\right)\left(2x-3y\right)$$
$$=\left(2x-3y\right)^2$$
$$=(2x)^2-2\times 2x\times 3y+(3y)^2 \qquad \left[\text{using } \left(a-b\right)^2=a^2-2ab+b^2\right]$$
$$=4x^2-12xy+9y^2$$

(iii) We have:

$$\left(\tfrac{3}{4}x-\tfrac{5}{6}y\right)\left(\tfrac{3}{4}x-\tfrac{5}{6}y\right)$$
$$=\left(\tfrac{3}{4}x-\tfrac{5}{6}y\right)^2$$
$$=\left(\tfrac{3}{4}x\right)^2-2\times\tfrac{3}{4}x\times\tfrac{5}{6}y+\left(\tfrac{5}{6}y\right)^2 \qquad \left[\text{using } \left(a-b\right)^2=a^2-2ab+b^2\right]$$
$$=\tfrac{9}{16}x^2-\tfrac{15}{12}xy+\tfrac{25}{36}y^2$$

(iv) We have:

$$\left(x-\tfrac{3}{x}\right)\left(x-\tfrac{3}{x}\right)$$
$$=\left(x-\tfrac{3}{x}\right)^2$$
$$=(x)^2-2\times x\times\tfrac{3}{x}+\left(\tfrac{3}{x}\right)^2 \qquad \left[\text{using } \left(a-b\right)^2=a^2-2ab+b^2\right]$$
$$=x^2-6+\tfrac{9}{x^2}$$

(v) We have:

$$\left(\tfrac{1}{3}x^2-9\right)\left(\tfrac{1}{3}x^2-9\right)$$
$$=\left(\tfrac{1}{3}x^2-9\right)^2$$
$$=\left(\tfrac{1}{3}x^2\right)^2-2\times\tfrac{1}{3}x^2\times 9+(9)^2 \qquad \left[\text{using } \left(a-b\right)^2=a^2-2ab+b^2\right]$$
$$=\tfrac{1}{9}x^4-6x^2+81$$

(vi) We have:

$$\left(\tfrac{1}{2}y^2-\tfrac{1}{3}y\right)\left(\tfrac{1}{2}y^2-\tfrac{1}{3}y\right)$$
$$=\left(\tfrac{1}{2}y^2-\tfrac{1}{3}y\right)^2$$
$$=\left(\tfrac{1}{2}y^2\right)^2-2\times\tfrac{1}{2}y^2\times\tfrac{1}{3}y+\left(\tfrac{1}{3}y\right)^2 \qquad \left[\text{using } \left(a-b\right)^2=a^2-2ab+b^2\right]$$
$$=\tfrac{1}{4}y^4-\tfrac{1}{3}y^3+\tfrac{1}{9}y^2$$

Q3

Answer :

We shall use the identities $(a+b)^2=a^2+b^2+2ab$ and $(a-b)^2=a^2+b^2-2ab$.

(i) We have:

$$\left(8a+3b\right)^2$$
$$=(8a)^2+2\times 8a\times 3b+(3b)^2$$
$$=64a^2+48ab+9b^2$$

(ii)We have:

$$\left(7x+2y\right)^2$$
$$=(7x)^2+2\times 7x\times 2y+(2y)^2$$
$$=49x^2+28xy+4y^2$$

(iii) We have :

$$\left(5x+11\right)^2$$
$$=(5x)^2+2\times 5x\times 11+(11)^2$$
$$=25x^2+110x+121$$

(iv) We have:

$$\left(\frac{a}{2}+\frac{2}{a}\right)^2$$
$$=\left(\tfrac{a}{2}\right)^2+2\times\tfrac{a}{2}\times\tfrac{2}{a}+\left(\tfrac{2}{a}\right)^2$$
$$=\tfrac{a^2}{4}+2+\tfrac{4}{a^2}$$

(v) We have:

$$\left(\frac{3x}{4}+\frac{2y}{9}\right)^2$$
$$=\left(\tfrac{3x}{4}\right)^2+2\times\tfrac{3x}{4}\times\tfrac{2y}{9}+\left(\tfrac{2y}{9}\right)^2$$
$$=\tfrac{9x^2}{16}+\tfrac{1}{3}xy+\tfrac{4y^2}{81}$$

(vi) We have:

$$\left(9x-10\right)^2$$
$$(9x)^2-2\times 9x\times 10+(10)^2$$
$$=81x^2-180x+100$$

(vii) We have:

$$\left(x^2y - yz^2\right)^2$$

$$\left(x^2y\right)^2 - 2 \times x^2y \times yz^2 + \left(yz^2\right)^2$$

$$= x^4y^2 - 2x^2y^2z^2 + y^2z^4$$

(viii) We have:

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

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

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

(ix) We have:

$$\left(3m - \frac{4}{5}n\right)^2$$

$$= (3m)^2 - 2 \times 3m \times \frac{4}{5}n + \left(\frac{4}{5}n\right)^2$$

$$= 9m^2 - \frac{24mn}{5} + \frac{16}{25}n^2$$

Q4

Answer :

(i) We have:

$$\left(x+3\right)\left(x-3\right)$$

$$= x^2 - 9 \qquad \left[\text{using } \left(a+b\right)\left(a-b\right) = a^2 - b^2\right]$$

(ii) We have:

$$\left(2x+5\right)\left(2x-5\right)$$

$$= 4x^2 - 25 \qquad \left[\text{using } \left(a+b\right)\left(a-b\right) = a^2 - b^2\right]$$

(iii) We have:

$$\left(8+x\right)\left(8-x\right)$$

$$= 64 - x^2 \qquad \left[\text{using } \left(a+b\right)\left(a-b\right) = a^2 - b^2\right]$$

(iv) We have:

$$\left(7x+11y\right)\left(7x-11y\right)$$

$$= 49x^2 - 121y^2 \qquad \left[\text{using } \left(a+b\right)\left(a-b\right) = a^2 - b^2\right]$$

(v) We have:

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

$$= 25x^4 - \frac{9}{16}y^4 \qquad \left[\text{using } \left(a+b\right)\left(a-b\right) = a^2 - b^2\right]$$

(vi) We have:

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

$$= \frac{16x^2}{25} - \frac{25y^2}{9} \qquad \left[\text{using } \left(a+b\right)\left(a-b\right) = a^2 - b^2\right)\Big]$$

(vii) We have:

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

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

(viii) We have:

$\left(\frac{1}{x}+\frac{1}{y}\right)\left(\frac{1}{x}-\frac{1}{y}\right)$

$=\frac{1}{x^2}-\frac{1}{y^2}$ $\quad\left[\text{using } (a+b)(a-b)=a^2-b^2\right]$

(ix) We have:

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

$=4a^2-\frac{9}{b^2}$ $\quad\left[\text{using } (a+b)(a-b)=a^2-b^2\right]$

Q5

Answer :

We shall use the identity $(a+b)^2=a^2+b^2+2ab$.

(i)

$(54)^2$

$=\left(50+4\right)^2$

$=(50)^2+2\times 50\times 4+(4)^2$

$=2500+400+16$

$=2916$

(ii)

$(82)^2$

$=\left(80+2\right)^2$

$=(80)^2+2\times 80\times 2+(2)^2$

$=6400+320+4$

$=6724$

(iii)

$(103)^2$

$=\left(100+3\right)^2$

$=(100)^2+2\times 100\times 3+(3)^2$

$=10000+600+9$

$=10609$

(iv)

$(704)^2$

$=\left(700+4\right)^2$

$=(700)^2+2\times 700\times 4+(4)^2$

$=490000+5600+16$

$=495616$

Q6

Answer :

We shall use the identity $(a-b)^2 = a^2 + b^2 - 2ab$.

(i)

$$(69)^2$$
$$= (70-1)^2$$
$$= (70)^2 - 2 \times 70 \times 1 + 1$$
$$= 4900 - 140 + 1$$
$$= 4761$$

(ii)

$$(78)^2$$
$$= (80-2)^2$$
$$= (80)^2 - 2 \times 80 \times 2 + 4$$
$$= 6400 - 320 + 4$$
$$= 6084$$

(iii)

$$(197)^2$$
$$= (200-3)^2$$
$$= (200)^2 - 2 \times 200 \times 3 + 9$$
$$= 40000 - 1200 + 9$$
$$= 38809$$

(iv)

$$(999)^2$$
$$= (1000-1)^2$$
$$= (1000)^2 - 2 \times 1000 \times 1 + 1$$
$$= 1000000 - 2000 + 1$$
$$= 998001$$

Q7

Answer :

We shall use the identity $(a-b)(a+b) = a^2 - b^2$.

(i)

$$(82)^2 - (18)^2$$
$$= (82-18)(82+18)$$
$$= (64)(100)$$
$$= 6400$$

(ii)

$$(128)^2 - (72)^2$$
$$= (128-72)(128+72)$$
$$= (56)(200)$$
$$= 11200$$

(iii)

$$197 \times 203$$
$$= (200-3)(200+3)$$
$$= (200)^2 - (3)^2$$
$$= 40000 - 9$$
$$= 39991$$

(iv)

$$\frac{198\times198-102\times102}{96}$$

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

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

$$=\frac{(96)(300)}{96}$$

$$=300$$

(v)

$$(14.7\times15.3)$$

$$=(15-0.3)\times(15+0.3)$$

$$=(15)^2-(0.3)^2$$

$$=225-0.09$$

$$=224.91$$

(vi)

$$(8.63)^2-(1.37)^2$$

$$=(8.63-1.37)(8.63+1.37)$$

$$=(7.26)(10)$$

$$=72.6$$

Q8

Answer :

$$(9x^2+24x+16)$$

$$Given,\ x=12$$

$$\Rightarrow(3x)^2+2(3x)(4)+(4)^2$$

$$\Rightarrow(3x+4)^2$$

$$\Rightarrow(3(12)+4)^2$$

$$\Rightarrow(36+4)^2$$

$$\Rightarrow(40)^2=1600$$

Therefore, the value of the expression ($9x^2 + 24x + 16$), when $x = 12$, is 1600.

Q9

Answer :

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

$$Given:$$

$$x=11$$

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

$$\Rightarrow(8x)^2+(9y)^2+2(8x)(9y)$$

$$\Rightarrow(8x+9y)^2$$

$$\Rightarrow\left(8\left(11\right)+9\left(\frac{4}{3}\right)\right)^2$$

$$\Rightarrow(88+12)^2$$

$$\Rightarrow(100)^2$$

$$\Rightarrow10000$$

Therefore, the value of the expression ($64x^2 + 81y^2 + 144xy$), when $x = 11$ and $y = \frac{4}{3}$, is 10000.

Q10

Answer :

$(36x^2 + 25y^2 - 60xy)$

$\Rightarrow x = \frac{2}{3}, y = \frac{1}{5}$

$= (6x)^2 + (5y)^2 - 2(6x)(5y)$

$= (6x - 5y)^2$

$= \left(6\left(\frac{2}{3}\right) - 5\left(\frac{1}{5}\right)\right)^2$

$= (4 - 1)^2$

$= (3)^2$

$\Rightarrow 9$

Q11

Answer :

$\left(i\right)\ \left(x + \frac{1}{x}\right) = 4$

Squaring both the sides :

$\Rightarrow \left(x + \frac{1}{x}\right)^2 = (4)^2$

$\Rightarrow \left(x^2 + \frac{1}{x^2} + 2(x)\left(\frac{1}{x}\right)\right) = 16$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) + 2 = 16$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 16 - 2$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 14$

Therefore, the value of $x^2 + \frac{1}{x^2}$ is 14.

$\left(x^2 + \frac{1}{x^2}\right) = 14$

Squaring both the sides :

$\Rightarrow \left(x^4 + \frac{1}{x^4} + 2(x^2)\left(\frac{1}{x^2}\right)\right) = (14)^2$

$\Rightarrow \left(x^4 + \frac{1}{x^4}\right) + 2 = 196$

$\Rightarrow \left(x^4 + \frac{1}{x^4}\right) = 196 - 2$

$\Rightarrow \left(x^4 + \frac{1}{x^4}\right) = 194$

Therefore, the value of $x^4 + \frac{1}{x^4}$ is 194.

Q12

Answer :

$\left(i\right)\ \left(x - \frac{1}{x}\right) = 5$

$\Rightarrow$ Squaring both the sides :

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

$\Rightarrow \left(x^2 + \frac{1}{x^2} - 2(x)\left(\frac{1}{x}\right)\right) = 25$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) - 2 = 25$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 25 + 2$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 27$

Therefore, the value of $\left(x^2 + \frac{1}{x^2}\right)$ is 27.

$\left(x^2 + \frac{1}{x^2}\right) = 27$

$\Rightarrow$ Squaring both the sides :

$\Rightarrow \left(x^4 + \frac{1}{x^4} - 2(x^2)\left(\frac{1}{x^2}\right)\right) = (27)^2$

$\Rightarrow \left(x^4 + \frac{1}{x^4}\right) - 2 = 729$

$\Rightarrow \left(x^4 + \frac{1}{x^4}\right) = 729 + 2$

$\Rightarrow \left(x^4 + \frac{1}{x^4}\right) = 731$

Therefore, the value of $\left(x^4 + \frac{1}{x^4}\right)$ is 731.

Q13

Answer :

$(i)\ (x+1)(x-1)(x^2+1)$

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

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

$\Rightarrow (x^2)^2 - (1^2)^2$ $\left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow x^4 - 1.$

Therefore, the product of $(x+1)(x-1)(x^2+1)$ is $x^4 - 1$.

$(ii)\ (x-3)(x+3)(x^2+9)$

$\Rightarrow \left((x)^2 - (3)^2\right)(x^2+9)$ $\left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow (x^2-9)(x^2+9)$

$\Rightarrow (x^2)^2 - (9)^2$ $\left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow x^4 - 81$

Therefore, the product of $(x-3)(x+3)(x^2+9)$ is $x^4 - 81$.

(iii) $(3x-2y)(3x+2y)(9x^2+4y^2)$

$\Rightarrow \left((3x)^2 - (2y)^2\right)(9x^2+4y^2)$

$\left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow (9x^2 - 4y^2)(9x^2+4y^2)$

$\Rightarrow (9x^2)^2 - (4y^2)^2$ $\left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow 81x^4 - 16y^4.$

Therefore, the product of $(3x-2y)(3x+2y)(9x^2+4y^2)$ is $81x^4 - 16y^4$.

(iv) $(2p+3)(2p-3)(4p^2+9)$

$\Rightarrow \left((2p)^2 - (3)^2\right)(4p^2+9)$ $\left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow (4p^2-9)(4p^2+9)$

$\Rightarrow (4p^2)^2 - (9)^2$ $\left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow 16p^4 - 81.$

Therefore, the product of $(2p+3)(2p-3)(4p^2+9)$ is $16p^4 - 81$.

Q14

Answer :

$x + y = 12$

On squaring both the sides :

$\Rightarrow (x+y)^2 = (12)^2$

$\Rightarrow x^2 + y^2 + 2xy = 144$

$\Rightarrow x^2 + y^2 = 144 - 2xy$

Given :

$xy = 14$

$\Rightarrow x^2 + y^2 = 144 - 2(14)$

$\Rightarrow x^2 + y^2 = 144 - 28$

$\Rightarrow x^2 + y^2 = 116$

Therefore, the value of $x^2 + y^2$ is 116.

Q15

Answer :

$x - y = 7$

$\Rightarrow$ On squaring both the sides :

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

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

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

Given :

$xy = 9$

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

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

$\Rightarrow x^2 + y^2 = 67.$

Therefore, the value of $x^2 + y^2$ *is* 67.

RS Aggarwal Solutions Class 8 Mathematics

Operations On Algebraic Expressions

Ex 6E

Q1

Answer :

(c) $(-6a + 17b)$

$$\begin{array}{r} 6a + 4b - c + 3 \\ + 2b - 3c + 4 \\ -7a + 11b + 2c - 1 \\ -5a + 2c - 6 \\ \hline -6a + 17b + 0c + 0 \end{array}$$

Q2

Answer :

(d) $(3p^2 + 5q - 9r^3 + 7)$

$$\begin{array}{r} 7p^2 + 3q - 2r^3 + 4 \\ 4p^2 - 2q + 7r^3 - 3 \\ - \quad + \quad - \quad + \\ \hline 3p^2 + 5q - 9r^3 + 7 \end{array}$$

Q3

Answer :

(d) $x^2 + 2x - 15$

$$\begin{aligned} &(x+5)(x-3) \\ &\Rightarrow (x)(x-3) + (5)(x-3) \\ &\Rightarrow x^2 - 3x + 5x - 15 \\ &\Rightarrow x^2 + 2x - 15 \end{aligned}$$

Q4

Answer :

(b) $(6x^2 + 7x - 3)$

$(2x+3)(3x-1)$
$\Rightarrow (2x)(3x-1)+(3)(3x-1)$
$\Rightarrow 6x^2 - 2x + 9x - 3$
$\Rightarrow 6x^2 + 7x - 3$

Q5

Answer :

(c) $(x^2 + 8x + 16)$

$(x+4)(x+4)$
$\Rightarrow (x+4)^2$ $\left(\text{according to the formula } (a+b)^2 = a^2 + 2ab + b^2\right)$
$\Rightarrow (x^2) + 2(x)(4) + (4)^2$
$\Rightarrow x^2 + 8x + 16$

Q6

Answer :

(d) $(x^2 - 12x + 36)$

$(x-6)(x-6)$
$\Rightarrow (x-6)^2$ $\left(\text{according to the formula } (a-b)^2 = a^2 - 2ab + b^2\right)$
$\Rightarrow (x^2) - 2(x)(6) + (6)^2$
$\Rightarrow x^2 - 12x + 36$

Q7

Answer :

(b) $(4x^2 - 25)$

$(2x+5)(2x-5)$
$\Rightarrow (2x)^2 - (5)^2$ $\left(\text{according to the formula } (a+b)(a-b) = a^2 - b^2\right)$
$\Rightarrow 4x^2 - 25$

Q8

Answer :

(c) $-4ab^2$

$8a^2b^3 \div (-2ab)$
$\Rightarrow \left(\frac{8}{-2}\right)(a^{2-1})\left(b^{3-1}\right)$
$\Rightarrow -4ab^2$

Q9

Answer :

(b) $(2x + 1)$

$$
\begin{array}{r|l}
x+1 \;\overline{)\; 2x^2+3x+1} & \boldsymbol{2x+1} \\
\underline{2x^2+2x} & \\
\quad - \quad - & \\
\hline
\quad\quad +1x+1 & \\
\quad\quad +1x+1 & \\
\quad\quad - \quad - & \\
\hline
\quad\quad\quad \times &
\end{array}
$$

Q10

Answer :

(a) $(x - 2)$

$$
\begin{array}{r|l}
x^2 - 4x + 4 & x - 2 \\
x^2 - 2x & \\
\hline
-2x + 4 & \\
-2x + 4 & \\
\hline
\times &
\end{array}
$$

Q11

Answer :

(c) $(a^4 - 1)$

$(i)\ (a+1)(a-1)(a^2+1)$

$\Rightarrow \left((a)^2 - (1)^2\right)(a^2+1) \quad \left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow (a^2-1)(a^2+1)$

$\Rightarrow (a^2)^2 - \left(1^2\right)^2 \quad \left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow a^4 - 1$

Q12

Answer :

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

$\left(\frac{1}{x} + \frac{1}{y}\right)\left(\frac{1}{x} - \frac{1}{y}\right)$

$\Rightarrow$ *According to the formula* $(a+b)(a-b) = (a)^2 - (b)^2$:

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

Q13

Answer :

(c) 23

$\left(x + \frac{1}{x}\right) = 5$

$\Rightarrow$ *Squaring both the sides* :

$\Rightarrow \left(x + \frac{1}{x}\right)^2 = (5)^2$

$\Rightarrow \left(x^2 + \frac{1}{x^2} + 2(x)\left(\frac{1}{x}\right)\right) = 25$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) + 2 = 25$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 25 - 2$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 23$

Q14

Answer :

(b) 38

$\left(x - \frac{1}{x}\right) = 6$

$\Rightarrow$ *Squaring both the sides* :

$\Rightarrow \left(x - \frac{1}{x}\right)^2 = (6)^2$

$\Rightarrow \left(x^2 + \frac{1}{x^2} - 2(x)\left(\frac{1}{x}\right)\right) = 36$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) - 2 = 36$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 36 + 2$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 38$

Q15

Answer :

(c) 6400

$(82)^2 - (18)^2$ [using the identity $(a-b)(a+b)=a^2-b^2$]

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

$= (100)(64)$

$= 6400$

Q16

Answer :

(a) 39991

$(197) \times (203)$ [using the identity $(a+b)(a-b) = a^2 - b^2$]

$\Rightarrow (200 - 3)(200 + 3)$

$\Rightarrow (200)^2 - (3)^2$

$\Rightarrow 40000 - 9$

$\Rightarrow 39991$

Q17

Answer :

(b) 116

$(a+b) = 12$

$\Rightarrow$ *Squaring both the sides* :

$\Rightarrow (a+b)^2 = (12)^2$

$\Rightarrow \left(a^2 + b^2 + 2ab\right) = 144$

$\Rightarrow \left(a^2 + b^2\right) = 144 - 2ab$

$\Rightarrow \left(a^2 + b^2\right) = 144 - 2(14)$

$\Rightarrow \left(a^2 + b^2\right) = 144 - 28$

$\Rightarrow \left(a^2 + b^2\right) = 116$

Q18

Answer :

(a) 67

$(a-b) = 7$

$\Rightarrow$ Squaring both the sides :

$\Rightarrow (a-b)^2 = (7)^2$

$\Rightarrow \left(a^2 + b^2 - 2ab\right) = 49$

$\Rightarrow \left(a^2 + b^2\right) = 49 + 2ab$

$\Rightarrow \left(a^2 + b^2\right) = 49 + 2(9)$

$\Rightarrow \left(a^2 + b^2\right) = 49 + 18$

$\Rightarrow \left(a^2 + b^2\right) = 67$

Q19 **Answer :**

(c) 625

$(4x^2 + 20x + 25)$

$\Rightarrow (2x)^2 + 2(2x)(5) + (5)^2$

$\Rightarrow (2x + 5)^2$

$\Rightarrow (2(10) + 5)^2$

$\Rightarrow (20 + 5)^2$

$\Rightarrow (25)^2$