# 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:

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

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:

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

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:

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

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:

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

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:

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

Q15

**Answer :**

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

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

Q16

**Answer :**

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

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

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 $x$.

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

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

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

∴ 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 $(2l+2b)$.

$$\text{Perimeter} = 2\left(5x^2-3y^2\right)+2\left(x^2+2xy\right)$$
$$=10x^2-6y^2+2x^2+4xy$$

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

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 $2p^2+3p+5$.

# 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:

$$\begin{aligned}&(3y-8)\times(5y-1)\\&=3y(5y-1)-8(5y-1)\\&=15y^2-3y-40y+8\\&=15y^2-43y+8\end{aligned}$$

Q5

**Answer :**

By horizontal method:

$$\begin{aligned}&(7x+2y)\times(x+4y)\\&=7x(x+4y)+2y(x+4y)\\&=7x^2+28xy+2xy+8y^2\\&=7x^2+30xy+8y^2\end{aligned}$$

Q6

**Answer :**

By horizontal method:

$$\begin{aligned}&(9x+5y)\times(4x+3y)\\&9x(4x+3y)+5y(4x+3y)\\&=36x^2+27xy+20xy+15y^2\\&=36x^2+47xy+15y^2\end{aligned}$$

Q7

**Answer :**

By horizontal method:

$$\begin{aligned}&(3m-4n)\times(2m-3n)\\&=3m(2m-3n)-4n(2m-3n)\\&=6m^2-9mn-8mn+12n^2\\&=6m^2-17mn+12n^2\end{aligned}$$

Q8

**Answer :**

By horizontal method:

$$\begin{aligned}&(x^2-a^2)\times(x-a)\\&=x^2(x-a)-a^2(x-a)\\&=x^3-ax^2-a^2x+a^3\end{aligned}$$

i.e $(x^3+a^3)-ax(x-a)$

Q9

**Answer :**

By horizontal method:

$$\begin{aligned}&(x^2-y^2)\times(x+2y)\\&=x^2(x+2y)-y^2(x+2y)\\&=x^3+2x^2y-xy^2-2y^3\\&i.e(x^3-2y^3)+xy(2x-y)\end{aligned}$$

Q10

**Answer :**

By horizontal method:

$$\left(3p^2+q^2\right)\times\left(2p^2-3q^2\right)$$
$$=3p^2\left(2p^2-3q^2\right)+q^2\left(2p^2-3q^2\right)$$
$$=6p^4-9p^2q^2+2p^2q^2-3q^4$$
$$i.e6p^4-7p^2q^2-3q^4$$

Q11

**Answer :**

By horizontal method:

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

Q12

**Answer :**

By horizontal method:

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

Q13

**Answer :**

By horizontal method:

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

Q14

**Answer :**

By horizontal method:

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

Q15

**Answer :**

By horizontal method:

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

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:

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

# 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 $2xy$

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

Therefore, the quotient is $4xy - 3y + 5xy^2$.

(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 $-2x^2$

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

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

Q3

**Answer :**

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

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

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

Q4

**Answer :**

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

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

Q5

**Answer :**

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

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

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

**Answer :**

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

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

Q7

**Answer :**

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

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

Q8

**Answer :**

$$
\begin{array}{l}
2x-5\overline{)\,6x^2-31x+47\,}\,(3x-8 \\
\qquad\quad 6x^2-15x \\
\qquad\quad - \qquad + \\
\hline
\qquad\qquad -16x+47 \\
\qquad\qquad -16x+40 \\
\qquad\qquad + \qquad - \\
\hline
\qquad\qquad\qquad 7 \\
\hline
\end{array}
$$

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

Q9

**Answer :**

$$
\begin{array}{l}
2x+3\overline{)\,2x^3+x^2-5x-2\,}\,(x^2-x-1 \\
\qquad\quad 2x^3+3x^2 \\
\qquad\quad - \qquad - \\
\hline
\qquad\qquad -2x^2-5x \\
\qquad\qquad -2x^2-5x \\
\qquad\qquad + \qquad + \\
\hline
\qquad\qquad\qquad -2x-2 \\
\qquad\qquad\qquad -2x-3 \\
\qquad\qquad\qquad + \quad + \\
\hline
\qquad\qquad\qquad\qquad 1 \\
\hline
\end{array}
$$

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

Q10

**Answer :**

$$
\begin{array}{l}
x+1\overline{)\,x^3+1\,}\,(x^2-x+1 \\
\qquad\; x^3 \quad + x^2 \\
\qquad\; - \qquad - \\
\hline
\qquad\quad -x^2+1 \\
\qquad\quad -x^2 \quad -x \\
\qquad\quad + \qquad + \\
\hline
\qquad\qquad x+1 \\
\qquad\qquad x+1 \\
\qquad\qquad - \; - \\
\hline
\qquad\qquad\; 0 \\
\hline
\end{array}
$$

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

Q11

**Answer :**

$$
\begin{array}{l}
x^2+x+1\overline{)\,x^4-2x^3+2x^2+x+4\,}\,(x^2-3x+4 \\
\qquad\qquad\quad x^4+x^3+x^2 \\
\qquad\qquad\quad - \quad - \quad - \\
\hline
\qquad\qquad\qquad\qquad -3x^3+x^2+x \\
\qquad\qquad\qquad\qquad -3x^3-3x^2-3x \\
\qquad\qquad\qquad\qquad + \qquad + \qquad + \\
\hline
\qquad\qquad\qquad\qquad\qquad 4x^2+4x+4 \\
\qquad\qquad\qquad\qquad\qquad 4x^2+4x+4 \\
\qquad\qquad\qquad\qquad\qquad - \qquad - \qquad - \\
\hline
\qquad\qquad\qquad\qquad\qquad\qquad \times \\
\hline
\end{array}
$$

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

Q12

**Answer :**

$$
\begin{array}{l}
x^2-5x+6\overline{)\,x^3-6x^2+11x-6\,}\,(x-1 \\
\qquad\qquad\quad x^3-5x^2+6x \\
\qquad\qquad\quad - \quad + \quad - \\
\hline
\qquad\qquad\qquad -1x^2+5x-6 \\
\qquad\qquad\qquad -1x^2+5x-6 \\
\qquad\qquad\qquad + \quad - \quad + \\
\hline
\qquad\qquad\qquad\qquad \times \\
\hline
\end{array}
$$

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

Q13

**Answer :**

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

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

Q14

**Answer :**

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

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

Q15

**Answer :**

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

Therefore, the quotient is ( $4x^2$+ 3*x* -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:

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

(ii) We have:

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

(iii) We have:

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

(iv) We have:

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

(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:

$\left(\frac{5}{6}a^2+2\right)\left(\frac{5}{6}a^2+2\right)$

$=\left(\frac{5}{6}a^2+2\right)^2$

$=\left(\frac{5}{6}a^2\right)^2+(2)^2+2\times\frac{5}{6}a^2\times 2 \qquad \left[\text{using } \left(a+b\right)^2=a^2+b^2+2ab\right]$

$=\frac{25}{36}a^4+4+\frac{10}{3}a^2$

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:

$\left(\frac{3}{4}x-\frac{5}{6}y\right)\left(\frac{3}{4}x-\frac{5}{6}y\right)$

$=\left(\frac{3}{4}x-\frac{5}{6}y\right)^2$

$=\left(\frac{3}{4}x\right)^2-2\times\frac{3}{4}x\times\frac{5}{6}y+\left(\frac{5}{6}y\right)^2 \qquad \left[\text{using } \left(a-b\right)^2=a^2-2ab+b^2\right]$

$=\frac{9}{16}x^2-\frac{15}{12}xy+\frac{25}{36}y^2$

(iv) We have:

$\left(x-\frac{3}{x}\right)\left(x-\frac{3}{x}\right)$

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

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

$=x^2-6+\frac{9}{x^2}$

(v) We have:

$\left(\frac{1}{3}x^2-9\right)\left(\frac{1}{3}x^2-9\right)$

$=\left(\frac{1}{3}x^2-9\right)^2$

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

$=\frac{1}{9}x^4-6x^2+81$

(vi) We have:

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

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:

$$\left(8a+3b\right)^2$$
$$=(8a)^2+2\times8a\times3b+(3b)^2$$
$$=64a^2+48ab+9b^2$$

(ii)We have:

$$\left(7x+2y\right)^2$$
$$=(7x)^2+2\times7x\times2y+(2y)^2$$
$$=49x^2+28xy+4y^2$$

(iii) We have :

$$\left(5x+11\right)^2$$
$$=(5x)^2+2\times5x\times11+(11)^2$$
$$=25x^2+110x+121$$

(iv) We have:

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

(v) We have:

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

(vi) We have:

$$\left(9x-10\right)^2$$
$$(9x)^2-2\times9x\times10+(10)^2$$
$$=81x^2-180x+100$$

(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:

$$\left(3m-\frac{4}{5}n\right)^2$$
$$=(3m)^2-2\times3m\times\frac{4}{5}n+\left(\frac{4}{5}n\right)^2$$
$$=9m^2-\frac{24mn}{5}+\frac{16}{25}n^2$$

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:

$$\left(\frac{4x}{5}-\frac{5y}{3}\right)\left(\frac{4x}{5}+\frac{5y}{3}\right)$$
$$=\frac{16x^2}{25}-\frac{25y^2}{9} \qquad \left[\text{using } \left(a+b\right)\left(a-b\right)=a^2-b^2\right)\right]$$

(vii) We have:

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

(viii) We have:

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

(ix) We have:

$$\left(2a+\frac{3}{b}\right)\left(2a-\frac{3}{b}\right)$$
$$=4a^2-\frac{9}{b^2} \qquad \left[\text{using } \left(a+b\right)\left(a-b\right)=a^2-b^2\right]$$

Q5

**Answer :**

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

(i)

$$(54)^2$$
$$=\left(50+4\right)^2$$
$$=(50)^2+2\times50\times4+(4)^2$$
$$=2500+400+16$$
$$=2916$$

(ii)

$$(82)^2$$
$$=\left(80+2\right)^2$$
$$=(80)^2+2\times80\times2+(2)^2$$
$$=6400+320+4$$
$$=6724$$

(iii)

$$(103)^2$$
$$=\left(100+3\right)^2$$
$$=(100)^2+2\times100\times3+(3)^2$$
$$=10000+600+9$$
$$=10609$$

(iv)

$$(704)^2$$
$$=\left(700+4\right)^2$$
$$=(700)^2+2\times700\times4+(4)^2$$
$$=490000+5600+16$$
$$=495616$$

Q6

**Answer :**

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

(i)

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

(ii)

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

(iii)

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

(iv)

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

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)

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

(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 :**

$$(9x^2+24x+16)$$
$$\textit{Given, } x=12$$
$$\Rightarrow (3x)^2+2(3x)(4)+(4)^2$$
$$\Rightarrow (3x+4)^2$$
$$\Rightarrow (3(12)+4)^2$$
$$\Rightarrow (36+4)^2$$
$$\Rightarrow (40)^2=1600$$

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

Q9

**Answer :**

$$(64x^2+81y^2+144xy)$$
$$\textit{Given}:$$
$$x=11$$
$$y=\frac{4}{3}$$
$$\Rightarrow (8x)^2+(9y)^2+2(8x)(9y)$$
$$\Rightarrow (8x+9y)^2$$
$$\Rightarrow \left(8\left(11\right)+9\left(\frac{4}{3}\right)\right)^2$$
$$\Rightarrow (88+12)^2$$
$$\Rightarrow (100)^2$$
$$\Rightarrow 10000$$

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 :**

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

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

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

$\Rightarrow (x^2)^2 - (1^2)^2$ $\quad$ [according to the formula $a^2 - b^2 = (a+b)(a-b)$]

$\Rightarrow x^4 - 1.$

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

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

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

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

$\Rightarrow (x^2)^2 - (9)^2$ $\quad$ [according to the formula $a^2 - b^2 = (a+b)(a-b)$]

$\Rightarrow x^4 - 81$

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

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

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

[according to the formula $a^2 - b^2 = (a+b)(a-b)$]

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

$\Rightarrow (9x^2)^2 - (4y^2)^2$ $\quad$ [according to the formula $a^2 - b^2 = (a+b)(a-b)$]

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

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

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

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

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

$\Rightarrow (4p^2)^2 - (9)^2$ $\quad$ [according to the formula $a^2 - b^2 = (a+b)(a-b)$]

$\Rightarrow 16p^4 - 81.$

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 $x^2+y^2\ is\ 67$.

# Operations On Algebraic Expressions
# Ex 6E

Q1

**Answer :**

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

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

Q2

**Answer :**

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

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

Q3

**Answer :**

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

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

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

$\Rightarrow x^2 - 3x + 5x - 15$

$\Rightarrow x^2 + 2x - 15$

Q4

**Answer :**

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

$$
\begin{aligned}
&(2x+3)(3x-1) \\
&\Rightarrow (2x)(3x-1)+(3)(3x-1) \\
&\Rightarrow 6x^2-2x\ +9x-3 \\
&\Rightarrow 6x^2+7x-3
\end{aligned}
$$

Q5

**Answer :**

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

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

Q6

**Answer :**

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

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

Q7

**Answer :**

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

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

Q8

**Answer :**

(c) $-4ab^2$

$$
\begin{aligned}
&8a^2b^3 \div (-2ab) \\
&\Rightarrow \left(\tfrac{8}{-2}\right)\left(a^{2-1}\right)\left(b^{3-1}\right) \\
&\Rightarrow -4ab^2
\end{aligned}
$$

Q9

**Answer :**

(b) $(2x + 1)$

$$
\begin{array}{r|l}
x+1 & 2x^2+3x+1 \ \big( \ \mathbf{2x+1} \\
 & 2x^2+2x \\
 & \underline{-\quad\ -\quad} \\
 & \qquad +1x+1 \\
 & \qquad +1x+1 \\
 & \qquad \underline{-\quad\ -} \\
 & \qquad\quad \times
\end{array}
$$

Q10

**Answer :**

(a) $(x-2)$

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

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

$\left(4x^2 + 20x + 25\right)$
$\Rightarrow (2x)^2 + 2(2x)(5) + (5)^2$
$\Rightarrow (2x + 5)^2$
$\Rightarrow (2(10) + 5)^2$
$\Rightarrow (20 + 5)^2$
$\Rightarrow (25)^2$
$\Rightarrow 625$