8th Maths

Excercise 5.2

1. Add

(i) $1+2x+3x^2$, $3x-4-2x^2$, x^2-5x+4

$$\begin{array}{rrrr} 3x^2 & + 2x & +1 & \\ -2x^2 & + 3x & -4 & \\ x^2 & - 5x & +4 & \\ \hline 2x^2 & & +1 & \end{array}$$

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(iii) $a^3-2a^2b+b^3$, $4a^3+2ab^2+6a^2b$, $2b^3-5a^3-4a^3b$

$$\begin{array}{rrrr} a^3 & -2a^2b & +b^3 & \\ 4a^3 & +6a^2b & & +2ab^2 \\ -4a^3b-5a^3 & & +2b^3 & \\ \hline -4a^3b & +4a^2b & +3b^3 & +2ab^2 \end{array}$$

2. Subtract P from Q when

(i) $Q = 4x^4 + x^3 + 2x^2 - x + 1$

$P = \pm 3x^4 \pm 5x^3 \pm 2x^2 \mp x$

$Q-P = x^4 - 4x^3 \qquad +1$

(ii) $Q = 3x + 2y - 4z + 1$

$P = \pm 2x \pm 3y \mp 4z \pm 1$

$x - y$

Ex 5.2

3. Find value of $x - 2y + 3z$

$x = 2a^2 - a^3 + 3a + 4$

$y = 2a^3 - 3a^2 + 2 - 2a$

$z = a^4 + 3a^3 - 6 - 5a^2$

$x - 2y + 3z = 2a^2 - a^3 + 3a + 4 - 2(2a^3 - 3a^2 + 2 - 2a) + 3(a^4 + 3a^3 - 6 - 5a^2)$

$= 2a^2 - a^3 + 3a + 4 - 4a^3 + 6a^2 - 4 + 4a + 3a^4 + 9a^3 - 18 - 15a^2$

$= 3a^4 - a^3 - 4a^3 + 9a^3 + 2a^2 + 6a^2 - 15a^2 + 3a + 4a + 4 - 4 - 18$

$= 3a^4 + 4a^3 - 7a^2 + 7a - 18$

4. The sum of Two polynomial is $x^2 + 2x - y^2$. if one polynomial is $x^2 - 2xy + 3$. Then find the other.

Sum of Two polynomial $= x^2 + 2x - y^2$

one polynomial $= x^2 - 2xy + 3$

Second polynomial $= (x^2 + 2x - y^2) - (x^2 - 2xy + 3)$

$= x^2 - x^2 + 2x + 2xy - y^2 - 3$

$= 2x + 2xy - y^2 - 3$

Ex 5.2

5. Subtract $4x+6-2x^2$ from the sum of x^3+x^2-2x and $2x^3+3x-7$.

According to the condition

$$= \{(x^3+x^2-2x)+(2x^3+3x-7)\}-(4x+6-2x^2)$$

$$=(x^3+x^2-2x+2x^3+3x-7)-(4x+6-2x^2)$$

$$=x^3+x^2-2x+2x^3+3x-7-4x-6+2x^2$$

$$=x^3+2x^3+x^2+2x^2-2x+3x-4x-7-6$$

$$=3x^3+3x^2-3x-13$$

6. Find the product

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

$$\begin{array}{r} x^2-3x+9 \\ x+3 \\ \hline x^3-3x^2+9x \\ +3x^2-9x+27 \\ \hline x^3 \qquad\qquad +27 \end{array}$$

(ii) $(3x^2-7x+5)(4x^2-2x+1)$

$$\begin{array}{r} 3x^2-7x+5 \\ 4x^2-2x+1 \\ \hline 12x^4-28x^3+20x^2 \\ -6x^3+14x^2-10x \\ +3x^2-7x+5 \\ \hline 12x^4-34x^3+37x^2-17x+5 \end{array}$$

Ex 5.2

(iii) $(a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

$= a(a^2+b^2+c^2-ab-bc-ca) + b(a^2+b^2+c^2-ab-bc-ca)$
$+ c(a^2+b^2+c^2-ab-bc-ca)$

$= a^3+ab^2+ac^2-a^2b-abc-ca^2+a^2b+b^3+bc^2$
$-ab^2-b^2c-abc+ca^2+b^2c+c^3-abc-bc^2-c^2a$

$= a^3+b^3+c^3-3abc$

7. If $P=x^2-yz$, $Q=y^2-xz$ and $R=z^2-xy$ then find PQ, QR, PR and PQR

$PQ = (x^2-yz)(y^2-xz)$

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

$= x^2y^2 - x^3z - y^3z + xyz^2$

$QR = (y^2-xz)(z^2-xy)$

$= y^2(z^2-xy) - xz(z^2-xy)$

$= y^2z^2 - xy^3 - xz^3 + x^2yz$

$PR = (x^2-yz)(z^2-xy)$

$= x^2(z^2-xy) - yz(z^2-xy)$

$= x^2z^2 - x^3y - yz^3 + xy^2z$

Ex 5.2

$PQR = (x^2 - yz)(y^2 - xz)(z^2 - xy)$

$= (x^2 - yz)(y^2z^2 - xy^3 - xz^3 + x^2yz)$

$= x^2y^2z^2 - x^3y^3 - x^3z^3 + x^4yz - y^3z^3 + xy^4z$

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

$= -x^3y^3 - x^3z^3 + x^4yz - y^3z^3 + xy^4z + xyz^4$

8. Simplify

(i) $(x^2 + x - 6) \div (x - 2)$

$x + 3$

$x - 2$	$x^2 + x - 6$
	$\pm x^2 \mp 2x$
	$3x - 6$
	$\pm 3x \mp 6$
	0

$(x^2 + x - 6) \div (x - 2) = x + 3$

(ii) $(x^3 - 19x - 30) \div (x + 3)$

$x^2 - 3x - 10$

$x + 3$	$x^3 - 19x - 30$
	$\pm x^3 \qquad \pm 3x^2$
	$-3x^2 - 19x - 30$
	$\mp 3x^2 \mp 9x$
	$-10x - 30$
	$\mp 10x \mp 30$
	0

$(x^3 - 19x - 30) \div (x + 3) = x^2 - 3x - 10$

Ex 5.2

(iii) $(x^5 - y^5) \div (x - y)$

$$x^4 + x^3y + x^2y^2 + xy^3 + y^4$$

$$\begin{array}{l|l} x - y & x^5 - y^5 \\ & \pm x^5 \mp x^4y \\ \hline & x^4y - y^5 \\ & \pm x^4y \mp x^3y^2 \\ \hline & x^3y^2 - y^5 \\ & \pm x^3y^2 \mp x^2y^3 \\ \hline & x^2y^3 - y^5 \\ & \pm x^2y^3 \mp xy^4 \\ \hline & xy^4 - y^5 \\ & \pm xy^4 \mp y^5 \\ \hline & 0 \end{array}$$

$$(x^5 - y^5) \div (x - y) = x^4 + x^3y + x^2y^2 + xy^3 + y^4$$

(iv) $(x^3 + x^2 - 14x - 24) \div (x + 2)$

$$x^2 - x - 12$$

$$\begin{array}{l|l} x + 2 & x^3 + x^2 - 14x - 24 \\ & \pm x^2 \pm 2x^2 \\ \hline & -x^2 - 14x - 24 \\ & -x^2 \mp 2x \\ \hline & -12x - 24 \\ & \mp 12x \mp 24 \\ \hline & 0 \end{array}$$

$$(x^3 + x^2 - 14x - 24) \div (x + 2) = x^2 - x - 12$$

Ex 5.2

(v) $(16a^5 + 4a^3 - 4a^2 + 3a - 1) \div (4a^2 - 2a + 1)$

$$
\begin{array}{l|l}
4a^2 - 2a + 1 & 4a^3 + 2a^2 + a - 1 \\
\hline
 & 16a^5 + 4a^3 - 4a^2 + 3a - 1 \\
 & \pm 16a^5 \pm 4a^3 \mp 8a^4 \\
\hline
 & 8a^4 - 4a^2 + 3a - 1 \\
 & + 8a^4 \pm 2a^2 \mp 4a^3 \\
\hline
 & 4a^3 - 6a^2 + 3a - 1 \\
 & 4a^3 \mp 2a^2 \pm a \\
\hline
 & -4a^2 + 2a - 1 \\
 & \mp 4a^2 \pm 2a \mp 1 \\
\hline
 & 0
\end{array}
$$

$(16a^5 + 4a^3 - 4a^2 + 3a - 1) \div (4a^2 - 2a + 1) = 4a^3 + 2a^2 + a - 1$

(vi) $(x^4 - 3x^2y^2 + y^4) \div (x^2 + xy - y^2)$

$$
\begin{array}{l|l}
x^2 + xy - y^2 & x^2 - xy - y^2 \\
\hline
 & x^4 - 3x^2y^2 + y^4 \\
 & \pm x^4 \mp x^2y^2 \pm x^3y \\
\hline
 & -x^3y - 2x^2y^2 + y^4 \\
 & \mp x^3y \mp x^2y^2 \pm xy^3 \\
\hline
 & -x^2y^2 - xy^3 + y^4 \\
 & \mp x^2y^2 \mp xy^3 \pm y^4 \\
\hline
 & 0
\end{array}
$$

$(x^4 - 3x^2y^2 + y^4) \div (x^2 + xy - y^2) = x^2 - xy - y^2$

Ex 5.2

9. What should be added to $4x^3 - 10x^2 + 12x + 6$, so that it becomes exactly divisible by $2x+1$?

$$2x^2 - 4x + 8$$

$$2x+1 \;\overline{)\; 4x^3 - 10x^2 + 12x + 6}$$

$$\pm 4x^3 \mp 2x^2$$

$$-8x^2 + 12x + 6$$

$$\mp 8x^2 \mp 4x$$

$$16x + 6$$

$$\pm 16x \pm 8$$

$$-2$$

$-2 + 2 = 0$

2 will be added.

10. The product of two polynomial is $6y^3 - 11y^2 + 6y - 1$. if one polynomial is $3y^2 - 4y + 1$, then find other polynomial.

$$2y - 1$$

$$3y^2 - 4y + 1 \;\overline{)\; 6y^3 - 11y^2 + 6y - 1}$$

$$\pm 6y^3 \mp 8y^2 \pm 2y$$

$$-3y^2 + 4y - 1$$

$$\mp 3y^2 \pm 4y \mp 1$$

$$0$$

second polynomial $= 2y - 1$

Ex 5.2

11. For what value of p the second polynomial $3x^3 - 7x^2 - 9x + p$ becomes exactly divisible by $x-3$?

$$3x^2 + 2x - 3$$

$$x-3 \;\overline{)\; 3x^3 - 7x^2 - 9x + p}$$

$$\pm 3x^3 \mp 9x^2$$

$$2x^2 - 9x + p$$

$$\pm 2x^2 \mp 6x$$

$$-3x + p$$

$$\mp 3x \pm 9$$

$$R = p - 9$$

Remainder must be zero

$$p - 9 = 0$$

$$p = 9$$