Exercise 2B

Question 14:

2 and -2 are two polynomials

$x^4 + x^3 - 34x^2 - 4x + 120$

$\therefore (x-2)(x+2) = x^2 - 4$ will divide the given polynomial completely.

Dividing $x^4 + x^3 - 34x^2 - 4x + 120$ by $x^2 - 4$

$$
\begin{array}{r}
x^2 + x - 30 \\
x^2 - 4 \overline{)\, x^4 + x^3 - 34x^2 - 4x + 120} \\
\underline{x^4 \qquad - 4x^2} \\
\quad - \qquad + \\
\hline
x^3 - 30x^2 - 4x + 120 \\
\underline{x^3 \qquad - 4x} \\
\quad - \qquad + \\
\hline
-30x^2 \qquad +120 \\
\underline{-30x^2 \qquad +120} \\
\quad + \qquad\quad - \\
\hline
0
\end{array}
$$

$\therefore$ Quotient $q(x) = x^2 + x - 30$

$= x^2 + 6x - 5x - 30$

$= x(x+6) - 5(x+6)$

$= (x+6)(x-5)$

For finding zeros of q(x), q(x) = 0

(x + 6)(x − 5) = 0, x = -6 or 5

Other zeros of given polynomial are -6 and 5

So zeros of given polynomial are 2, -2, -6 and 5

Question 15:

$\sqrt{3}$ and $-\sqrt{3}$ are the zeros of polynomial

$x^4 + x^3 - 23x^2 - 3x + 60$

$\therefore (x - \sqrt{3})(x + \sqrt{3}) = x^2 - 3$ will divide the given polynomial completely

Dividing $x^4 + x^3 - 23x^2 - 3x + 60$ by $x^2 - 3$

$$
\begin{array}{r|l}
x^2 - 3 & x^2 + x - 20 \\
\hline
 & x^4 + x^3 - 23x^2 - 3x + 60 \\
 & x^4 \quad\quad - 3x^2 \\
 & - \quad\quad + \\
\hline
 & x^3 - 20x^2 - 3x + 60 \\
 & x^3 \quad\quad - 3x \\
 & - \quad\quad + \\
\hline
 & -20x^2 \quad\quad + 60 \\
 & -20x^2 \quad\quad + 60 \\
 & + \quad\quad - \\
\hline
 & 0
\end{array}
$$

Quotient $q(x) = x^2 + x - 20 = x^2 + 5x - 4x - 20$

$= x(x + 5) - 4(x + 5)$

$= (x + 5)(x - 4)$

Other zeros of the given polynomial are the zeros of q(x)

$\therefore q(x) = 0 \Rightarrow (x + 5)(x - 4) = 0$

Or $x = -5$ or 4

Hence the zeros of given polynomial are $\sqrt{3}, -\sqrt{3}, -5, 4$

********** END **********