Cubics 1: Long Division : Answers

1) $\dfrac{x^3 + 2x^2 - 3x + 1}{x + 1}$

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

$\therefore$ Ans. = $x^2 + x - 4$, r 5

2) $\dfrac{x^3 - 3x^2 + 2x - 3}{x - 2}$

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

$\therefore$ Ans = $x^2 - x$, r -3

3) $\dfrac{x^3 - 5x^2 - 2x + 24}{x - 3}$

$$
\begin{array}{r|l}
x-3 & x^2 - 2x + 4 \\
\hline
 & x^3 - 5x^2 - 2x + 24 \\
 & -x^3 \pm 3x^2 \\
\hline
 & \quad -2x^2 - 2x \\
 & \quad \pm -2x^2 \mp 6x \\
\hline
 & \quad\quad 4x + 24 \\
 & \quad\quad -4x \pm 12 \\
\hline
 & \quad\quad\quad 36
\end{array}
$$

$\therefore$ Ans = $x^2 - 2x + 4$, r 36

4) $\frac{x^3+7x-1}{x+2}$

* Write $0x^2$!!!

$$
\begin{array}{r|l}
 & x^2-2x+11 \\
\hline
x+2 & x^3+0x^2+7x-1 \\
 & \underline{-x^3\mp 2x^2} \\
 & -2x^2+7x \\
 & \underline{\mp 2x^2\mp 4x} \\
 & 11x-1 \\
 & \underline{-11x\mp 22} \\
 & -23
\end{array}
$$

$\therefore$ Ans $= x^2-2x+11$, r -23

5) $\frac{x^3-3}{x-1}$

$$
\begin{array}{r|l}
 & x^2+x+1 \\
\hline
x-1 & x^3+0x^2+0x-3 \\
 & \underline{-x^3\pm x^2} \\
 & x^2+0x \\
 & \underline{-x^2\pm x} \\
 & x-3 \\
 & \underline{-x\pm 1} \\
 & -2
\end{array}
$$

$\therefore$ Ans $= x^2+x-1$, r -2

6) $\frac{2x^3+x^2-3x+2}{x+1}$

$$
\begin{array}{r|l}
 & 2x^2-x-2 \\
\hline
x+1 & 2x^3+x^2-3x+2 \\
 & \underline{-2x^3\mp 2x^2} \\
 & -x^2-3x \\
 & \underline{\mp x^2\mp x} \\
 & -2x+2 \\
 & \underline{\mp -2x\mp 2} \\
 & 4
\end{array}
$$

$\therefore$ Ans $= 2x^2-x-2$, r 4

7) $\dfrac{3x^3 - 4x^2 - 7}{x - 3}$

$$
\begin{array}{r|l}
x-3 & 3x^2 + 5x + 15 \\
\hline
 & 3x^3 - 4x^2 + 0x - 7 \\
 & -3x^3 \pm 9x^2 \\
\hline
 & \quad 5x^2 + 0x \\
 & \quad -5x^2 \pm 15x \\
\hline
 & \quad\quad 15x - 7 \\
 & \quad\quad -15x \pm 45 \\
\hline
 & \quad\quad\quad 38
\end{array}
$$

$\therefore$ Ans $= 3x^2 + 5x + 15$, r 38

8) $\dfrac{12x^3 + 19x^2 - 13x - 6}{x + 2}$

$$
\begin{array}{r|l}
x+2 & 12x^2 - 5x - 3 \\
\hline
 & 12x^3 + 19x^2 - 13x - 6 \\
 & -12x^3 \mp 24x^2 \\
\hline
 & \quad -5x^2 - 13x \\
 & \quad \mp 5x^2 \pm 10x \\
\hline
 & \quad\quad -3x - 6 \\
 & \quad\quad \mp 3x \pm 6 \\
\hline
 & \quad\quad\quad 0
\end{array}
$$

$\therefore$ Ans $= 12x^2 - 5x - 3$, r 0

ie. $x+2$ is a FACTOR of $12x^3 + 19x^2 - 13x - 6$

9) $\dfrac{12x^3 + 19x^2 - 13x - 6}{2x - 1}$

$$
\begin{array}{r|l}
2x-1 & 6x^2 + \frac{25}{2}x + \frac{1}{4} \\
\hline
 & 12x^3 + 19x^2 - 13x - 6 \\
 & -12x^3 \pm 6x^2 \\
\hline
 & \quad 25x^2 - 13x \\
 & \quad -\frac{25}{2}x^2 \pm \frac{25}{2}x \\
\hline
 & \quad\quad \frac{1}{2}x - 6 \\
 & \quad\quad -\frac{1}{2}x \pm \frac{1}{4} \\
\hline
 & \quad\quad\quad -\frac{23}{4}
\end{array}
$$

$\therefore$ Ans $= 6x^2 + \frac{25}{2}x + \frac{1}{4}$, r $-\frac{23}{4}$

10) $\dfrac{4x^3 - 7x + 3}{2x + 3}$

$$
\begin{array}{r|l}
 & 2x^2 - 6x + \frac{11}{2} \\
\hline
2x+3 & 4x^3 + 0x^2 - 7x + 3 \\
 & \underline{-4x^3 \mp 6x^2} \\
 & \quad -6x^2 - 7x \\
 & \quad \underline{\mp 6x^2 \mp 18x} \\
 & \qquad 11x + 3 \\
 & \qquad \underline{-11x \mp 33/2} \\
 & \qquad\quad -\frac{27}{2}
\end{array}
$$

∴

Ans = $2x^2 - 6x + \frac{11}{2}$, r $-\frac{27}{2}$