Section 2.9 The factor theorem

6. Show that $(2x - 1)$ is a factor of $2x^3 + 7x^2 + 2x - 3$.

> Remember...
>
> If $(x - a)$ is a factor
>
> $f(a) = 0$

if $(2x-1)$ is a factor

then $f\left(\frac{1}{2}\right) = 0$

check: $f\left(\frac{1}{2}\right) = 2\left(\frac{1}{2}\right)^3 + 7\left(\frac{1}{2}\right)^2 + 2\left(\frac{1}{2}\right) - 3$

$= \frac{2}{8} + \frac{7}{4} + 1 - 3$

$= \frac{1}{4} + \frac{7}{4} - 2 = 0$ ✓

15. Factorise fully $x^3 - x^2 - 14x + 24$.
Hence solve the equation $x^3 - x^2 - 14x + 24 = 0$.

$f(1) = (1)^3 - (1)^2 - 14(1) + 24 \neq 0$

$f(2) = (2)^3 - (2)^2 - 14(2) + 24 = 0$

So $(x-2)$ is a factor

> Remember...
>
> If $f(a) = 0$
>
> then $(x - a)$ is a factor

DIVIDE

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

FACTORISE

$x^2 + x - 12$

$(x - 3)(x + 4)$

FACTORS ARE:

$(x-2)(x-3)(x+4)$

SOLUTIONS ARE

$x=2$, $x=3$, $x=-4$