Level 2 Further Maths

Factor Theorem

Ensure you have: Pencil or pen, a calculator

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

www.corbettmaths.com/more/further-maths/
1. Use factor theorem to show that $(x - 1)$ is a factor of $x^3 - 3x^2 - 13x + 15$

2. Use factor theorem to show that $(x - 3)$ is a factor of $x^3 - 10x^2 + 21x$

3. Use factor theorem to show that $(x + 4)$ is a factor of $x^3 + 4x^2 - 3x - 12$
4. Use factor theorem to show that $(2x - 1)$ is a factor of $2x^3 + 7x^2 + 2x - 3$

5. $f(x) = 4x^3 + 5x^2 - 23x - 6$
   Use the factor theorem to show that $(4x + 1)$ is a factor of $f(x)$

6. Use the factor theorem to show that $(x + 5)$ is not a factor of $x^3 - 12x^2 + 47x - 35$
7. (a) Use the factor theorem to show that $(x - 1)$ is a factor of $x^3 - x^2 - 4x + 4$

(b) Hence, factorise fully $x^3 - x^2 - 4x + 4$

..............................................

(3)
8. (a) Use the factor theorem to show that \((x - 2)\) is a factor of \(x^3 - 9x^2 + 20x - 12\)

(b) Hence, factorise fully \(x^3 - 9x^2 + 20x - 12\)
9. (a) Use the factor theorem to show that \((x + 4)\) is a factor of \(2x^3 + 5x^2 - 14x - 8\)

(b) Hence, factorise fully \(2x^3 + 5x^2 - 14x - 8\)

\[\text{---} \quad (1)\text{---} \]

\[\text{---} \quad (4)\text{---} \]
10. (a) Use the factor theorem to show that \((2x - 3)\) is a factor of \(2x^3 + x^2 - 12x + 9\)

(b) Hence, factorise fully \(2x^3 + x^2 - 12x + 9\)
11. (a) Use the factor theorem to show that $(x - 2)$ and $(x + 5)$ are factors of $x^3 + 2x^2 - 13x + 10$

(b) Use the factor theorem to show that $(x - 2)$ and $(x + 5)$ are also factors of $x^3 + 11x^2 + 14x - 80$

(c) Hence, simplify fully

$$\frac{x^3 + 2x^2 - 13x + 10}{x^3 + 11x^2 + 14x - 80}$$
12. (a) Show that \((x + 3)\) is a factor of \(x^3 + 3x^2 - 49x - 147\)

\[(2)\]

(b) Hence, or otherwise, find all the solutions of \(x^3 + 3x^2 - 49x - 147 = 0\)

\[(4)\]
13. Factorise fully \( x^3 - 6x^2 + 11x - 6 \)

14. \((x - 5)\) is a factor of \( x^3 - x^2 - 32x + a \)

Work out the value of \( a \)

\[
\begin{align*}
a &= \text{...............}
\end{align*}
\]
14. \((x + 4)\) is a factor of \(x^3 + 11x^2 + ax - 72\)

Work out the value of \(a\)

\[a = \text{.........................}\]

(3)

15. Given \((x - 1)\) is a factor of \(3x^3 - 15x^2 + ax + a\)

Find the value of \(a\)

\[a = \text{.........................}\]

(4)
16. \((x + a)\) is a factor of \(x^3 - 7x^2 + ax + 20a\)

(a) Show that \(a = 2\)

(b) Solve \(x^3 - 7x^2 + 2x + 40 = 0\)
17. Below is the graph of $y = 5x^3 + 23x^2 - 40x + 12$

Find the coordinates of the points $a$ and $b$, where the graph of $y = 5x^3 + 23x^2 - 40x + 12$ crosses the x-axis.
18. Solve \[ x^3 - 19x^2 + 103x - 165 = 0 \]