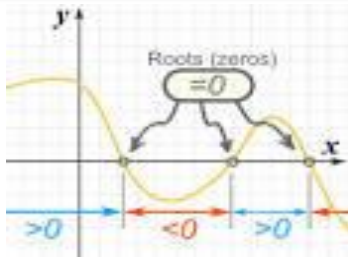


Goals



By the end of this week, you should be able to:

- recognise features of the graphs of $y = x^n$ for $n \in \mathbb{N}$, including shape, and behaviour as $x \rightarrow \infty$
- identify the coefficients and the degree of a polynomial
- expand quadratic and cubic polynomials from factors
- recognise features of the graphs of $y = x^3$, $y = a(x - b)^3 + c$ and $y = k(x - a)(x - b)(x - c)$, including shape, intercepts and behaviour as $x \rightarrow \infty$ and $x \rightarrow -\infty$
- factorise cubic polynomials in cases where a linear factor is easily obtained
- solve cubic equations using technology, and algebraically in cases where a linear factor is easily obtained

Theoretical components

Knowledge checklist:

- Polynomials - what are they?
- Terminology – degree, leading term, leading coefficient, constant term
- Polynomial algebra (+, -, x, ÷, evaluate)
- Polynomial long division and algebraic skills of factorising – to get polynomials into fully factorised forms so you can solve and identify the roots.
- Once you have found the roots, be able to identify their behaviour.
- From fully factorised form be able to sketch polynomials of degrees 3 and higher.

Videos:

Polynomial intro <https://youtu.be/Vm7H0VTllco>
Poly long division <https://youtu.be/l9PiXAbjnMQ>
Zeros of polynomials <https://youtu.be/f-xluUaAfw0>

Further reading

<https://www.mathsisfun.com/algebra/polynomial-s-division-long.html>

<https://www.khanacademy.org/math/algebra2/x2ec2f6f830c9fb89:poly-graphs/x2ec2f6f830c9fb89:poly-graphs-together/a/graphs-of-polynomials>

Practical components

Do the following questions:

Organise your solutions neatly in your exercise book.

You will require Chapter 3 of Maths Quest 11 Mathematical Methods (pdf – Google Classroom)

Ex 3B Long division of polynomials

- 1 (a, c, k), 5 (a, c)

Ex 3D The remainder and factor theorems

- 2 (a, b), 5, 6 (a, e)

Ex 3E Factorising polynomials

- 2 (a, d, g, j)

Ex 3G Solving polynomial equations

- 1-5 (any 2 from each)

Ex 3H Cubic graphs - intercept method

- 1-4 (any 2 from each), 5, 7

Ex 3I Quartic graphs - intercept method

- 1-2 (any 2), 8 (any 2)

Ex 3K Domain, range, maximums and minimums

- 1 (any 3), 5

Investigation

Week 12 – see following page.

Week 13 – work on your assignment

QFO

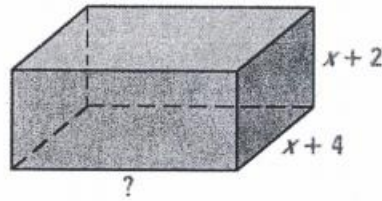
Quiz/Forum/Other

Your assignment is due on Monday week 14.

MM1 week 12 investigation

The volume of the rectangular box below has equation:

$$V = 2x^3 + 17x^2 + 46x + 40$$



which can be fully factorised as

$$V = (x + 2)(x + 4)(2x + 5)$$

When Sheldon attempted to find the unknown side ($2x + 5$) he got

$2x + 29 + \frac{-112x - 192}{x^2 + 6x + 8}$ as his answer. His calculations are shown below:

$$\begin{array}{r} \overline{2x + 29} \\ x^2 + 6x + 8 2x^3 + 17x^2 + 46x + 40 \\ \underline{- 2x^3 + 12x^2 + 16x} \\ 29x^2 + 62x + 40 \\ \underline{- 29x^2 + 174x + 232} \\ -112x - 192 \end{array}$$

Therefore, the unknown side is: $2x + 29 + \frac{-112x - 192}{x^2 + 6x + 8}$

a) Find the error in Sheldon's calculations.

b) Show the correct steps in the long division.