Determining the rule for the graph of a polynomial (4G)

Wednesday, 28 February 2018 6:05 pm

Work to be completed by the end of teaching:

Determining rules	4G	2,4,6,8

RECAP

To date, we have been looking at factorising and solving polynomials using the range of tools available to us:

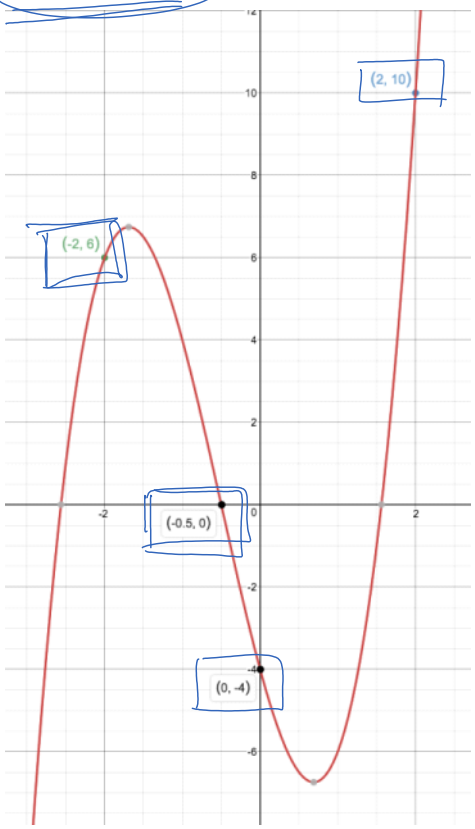
- Quadratic formula
- T Method
- Cross Method
- Completing the Square
- Polynomial Division
- Synthetic Division
- Rational Root Theorem!!!!

We have also looked at the ideas behind determining the rule for the graph of quadratics, hyperbolas and trunci.
This is where they give us a graph, or a number of co-ordinates and ask us to find the equation of the curve.
The equation can take different forms ... which is why the question will normally give us the general form they are looking for.

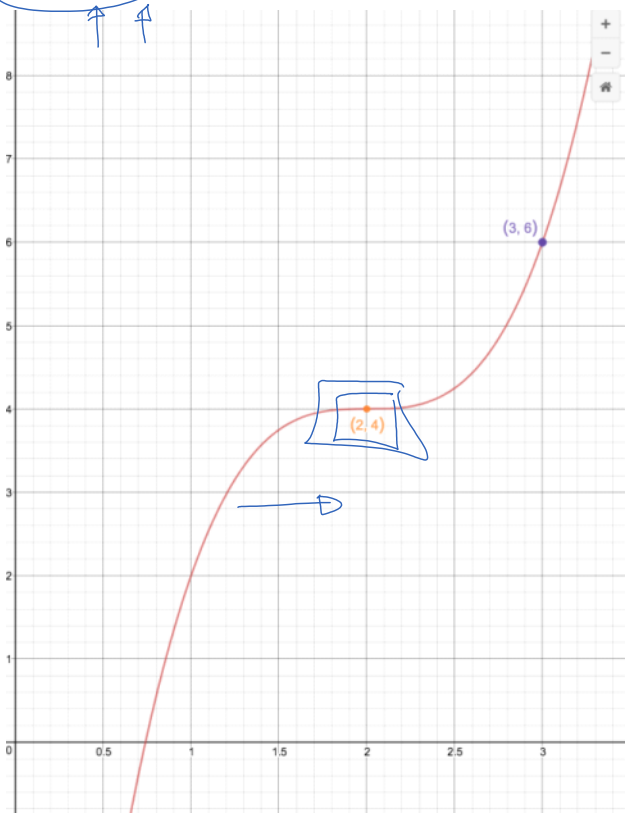
Determining the rule for the graph of a cubic

The equation of a cubic can be written in a number of forms:

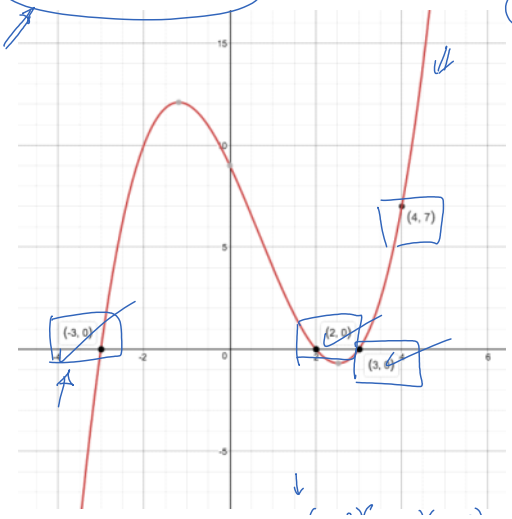
$y = ax^3 + bx^2 + cx + d$



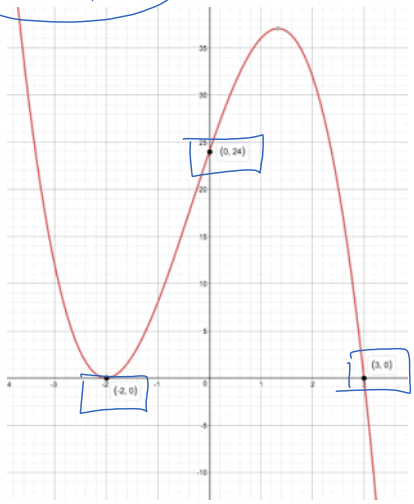
$y = a(x-b)^3 + c$



$y = a(x-b)(x-c)(x-d)$



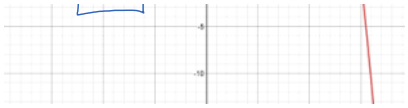
$y = a(x-b)(x-c)^2$





$y = a(x+3)(x-2)(x-3)$

$7 = a(4+3)(4-2)(4-3)$



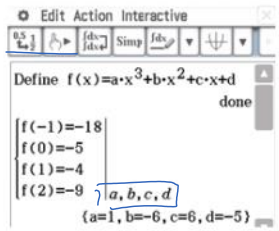
Or something more funky like $y = ax^3 + bx$ or any similar form!

Using your CAS to find coefficients when cubic is given in the form: $y = ax^3 + bx^2 + cx + d$

– Using the Casio ClassPad

- Open the main screen and define the function $f(x) = ax^3 + bx^2 + cx + d$ using the Var keyboard.
- Tap the simultaneous equations icon three times.
- Enter $f(-1) = -18$, $f(0) = -5$, $f(1) = -4$ and $f(2) = -9$ as the simultaneous equations to be solved, with variables a, b, c, d. Tap EXE.

Note:
The function name f must be selected from the abc keyboard.



$y = f(x)$ (x, y)

$f(1) = y$ $(x, f(x))$

Worked example:

For the cubic function with rule $f(x) = ax^3 + bx^2 + cx + d$, it is known that the points with coordinates $(-1, 14)$, $(0, 5)$, $(1, 0)$ and $(2, -19)$ lie on the graph of the cubic. Find the values of a, b, c and d.

$f(x) = a \cdot x^3 + b \cdot x^2 + c \cdot x + d$

$y =$

$(-1, 14)$ $f(-1) = 14$ (4)

① Defined :

② $f(-1) = 14$, $f(0) = 5$, $f(1) = 0$, $f(2) = -19$ a, b, c, d