Four Maths Questions at Different Levels – Question Set 11

Easy higher tier GCSE

Simplify fully $\dfrac{x^5 - 4x^3}{3x - 6}$

AQA GCSE, Nov 2018, Paper 2

Harder higher tier GCSE

Make q the subject of the formula

$$x = \frac{p - q}{pq}$$

An old GCSE paper from way back

Something interesting

Find all six solutions to the following equations

$$(x^2 - 5x + 5)^{(x^2 - 11x + 30)} = 1$$

$$(x^2 - 7x + 11)^{(x^2 - 13x + 42)} = 1$$

And five solutions to this one, but why only five?

$$(x^2 - 7x + 11)^{(x^2 - 1)} = 1$$

(@mathsjem)

A Level

$\mathrm{p}(x) = 30x^3 - 7x^2 - 7x + 2$

Prove that $(2x + 1)$ is a factor of $\mathrm{p}(x)$

Factorise $\mathrm{p}(x)$ completely.

Prove that there are no real solutions to the equation

$$\frac{30\sec^2 x + 2\cos x}{7} = \sec x + 1$$

AQA, Paper 1, June 2018

Answers at www.colmanweb/easter2020

Four Maths Questions at Different Levels – Answers Set 11

Easy higher tier GCSE

Simplify fully $\dfrac{x^5 - 4x^3}{3x - 6}$

$\frac{x^3(x+2)}{3}$ or $\frac{x^4+2x^3}{3}$

AQA GCSE, Nov 2018, Paper 2

Harder higher tier GCSE

Make q the subject of the formula

$$x = \frac{p - q}{pq}$$

$q = \frac{p}{px+1}$

An old GCSE paper from way back

Something interesting

Find all six solutions to the following equations

$$(x^2 - 5x + 5)^{(x^2-11x+30)} = 1$$

$x = 1, 2, 3, 4, 5, 6$

$$(x^2 - 7x + 11)^{(x^2-13x+42)} = 1$$

$x = 2, 3, 4, 5, 6, 7$

And five solutions to this one, but why only five?

$$(x^2 - 7x + 11)^{(x^2-1)} = 1$$

$x = \pm 1, 2, 3, 5$

(a solution of 4 is tempting but if the base is -1 then the index can't be odd)

(@mathsjem)

A Level

$\mathrm{p}(x) = 30x^3 - 7x^2 - 7x + 2$

Prove that $(2x + 1)$ is a factor of $\mathrm{p}(x)$

Factorise $\mathrm{p}(x)$ completely. $(2x + 1)(5x - 2)(3x - 1)$

Prove that there are no real solutions to the equation

$$\frac{30\sec^2 x + 2\cos x}{7} = \sec x + 1$$

AQA, Paper 1, June 2018