

Trials II Practice

A selection of questions from the topics found hard in the 2008 trials paper.

- Given that $x + 2$ is a factor of $x^3 + x^2 + ax - 3$, find the value of a . $a = -\frac{7}{2}$
- The first term of a geometric sequence is 2 and the common ratio is 4. Find
 - the tenth term. 524288
 - the sum of the first 11 terms. 2796202
- You are given that $y = x^3 - 3x^2 + 1$.
 - Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$. $\frac{dy}{dx} = 3x^2 - 6x, \frac{d^2y}{dx^2} = 6x - 6$
 - Find the coordinates of the two stationary points. (0, 1) or (2, -3)
 - Determine the nature of the stationary points. (0, 1) max, (2, -3) min.
- Solve the equation $3 + \log_2 z = \log_2(z + 10)$. $z = \frac{10}{7}$
- Solve the equation $2 = 2 \sin x + 3 \cos^2 x$ for $0^\circ < x < 360^\circ$. $x = 90$ or $x = 199.5$ or $x = 340.5$
- Solve the equation $2 \sin \theta = 3 \cos \theta$ for $-180^\circ < \theta < 360^\circ$. $\theta = -123.7$ or $\theta = 56.3$ or $\theta = 236.3$
- Find the first three terms in the expansion of $(1 - 3x)^9$. $1 - 27x + 324x^2 + \dots$
 - Hence find the x^2 term in the expansion of $(3 + 4x)(1 - 3x)^9$. 864
- Solve $2^{2x} + 63 = 16 \times 2^x$, giving your answers to three significant figures. $x = 2.81$ or $x = 3.17$
- The cost £ C for manufacturing n kg of product is given by $C = 2n + \frac{200}{n}$.
 - Find the value of n for which C is minimised. $n = 10$
 - Find the minimum cost. $C = 40$
- A circle has centre $(-2, 3)$ and passes through $P = (1, -4)$.
 - Draw a sketch(!)
 - Find the radius of the circle. $r = \sqrt{58}$
 - Find the equation of the circle. $(x + 2)^2 + (y - 3)^2 = 58$
 - Find the equation of the tangent to the circle at P in the form $ax + by + c = 0$ where a , b and c are integers. $0 = 3x - 7y - 31$
- Factorise $x^3 + 6x^2 - x - 30$. $(x - 2)(x + 3)(x + 5)$
 - Hence solve $x^3 + 6x^2 - x - 30 = 0$. $x = 2$ or $x = -3$ or $x = -5$
- A geometric sequence has first term 8 and second term 7.
 - Find the common ratio r as a decimal. 0.875
 - Find the sum of the first five terms. 31.17 (2dp)
 - Find the smallest n such that $S_n > 63.9$. 49