

C 001 Long Leave Consolidation

A selection of questions from the topics we have been studying so far.

1. Complete the square on $x^2 - 3x - 1$. $(x - \frac{3}{2})^2 - \frac{13}{4}$
2. Complete the square on $2x^2 - 6x + 3$. $2(x - \frac{3}{2})^2 - \frac{3}{2}$
3. Complete the square on $-x^2 - 2x + 3$. $-(x + 1)^2 + 4$
4. Write down the coordinates of the vertex on $y = 2(x - 3)^2 - 9$. $(3, -9)$
5. Solve the hidden quadratic $x^4 + 2 = 3x^2$. $x = \pm 1$ or $x = \pm \sqrt{2}$
6. If $y = x^3 - 3x + 1$, find $\frac{dy}{dx}$. $\frac{dy}{dx} = 3x^2 - 3$
7. If $y = \frac{x^2 + 4x - 1}{x}$, find $\frac{dy}{dx}$. $\frac{dy}{dx} = 1 + x^{-2}$
8. If $y = \sqrt{x} \left(2x^4 - x^3 + \frac{1}{x^2} \right)$, find $\frac{dy}{dx}$. $\frac{dy}{dx} = 9x^{\frac{7}{2}} - \frac{7}{2}x^{\frac{5}{2}} - \frac{3}{2}x^{-\frac{5}{2}}$
9. Find the equation of the tangent to $y = x^3 - 5x^2 + 2x + 1$ when $x = 2$. $y = -6x + 5$
10. Find the equation of the normal to $y = \frac{3}{x}$ when $x = -2$ in the form $ax + by + c = 0$. $0 = 8x - 6y + 7$
11. Find the equation of the perpendicular bisector of $(2, -3)$ and $(8, -2)$ in the form $ax + by + c = 0$. $12x + 2y - 55 = 0$
12. Find the exact distance between $(3, 4)$ and $(-2, \frac{5}{3})$. $\frac{\sqrt{274}}{3}$
13. Find the centre and radius of the circle $x^2 + y^2 + 10x - 5y = 0$. $\text{centre} = (-5, \frac{5}{2}), \text{rad} = \frac{5\sqrt{5}}{2}$
14. Find the equation of the tangent to $x^2 + y^2 - 6x + 7 = 0$ at the point $(2, 1)$. $y = x - 1$
15. Find the exact coordinates of where $(x - 1)^2 + (y + 2)^2 = 10$ intersects the x -axis. $(1 \pm \sqrt{6}, 0)$
16. Write $2 \log_3 x + 3 \log_3 y - 4 \log_3 z$ as a single logarithm. $\log_3 \left(\frac{x^2 y^3}{z^4} \right)$
17. Solve $3 \times 5^{x-1} = 4^{x+1}$ to 5 significant figures. $x = 8.5018$
18. Solve $\log_2 \left(\frac{3x}{x-2} \right) = 3 - \log_2(x - 2)$. $x = \frac{8}{5}$
19. Solve $3 \sin(x + 50) = 1$ for $0 < x < 360$ to 1 decimal place. $x = 110.5$ or $x = 329.5$
20. If $\sin \theta = \frac{3}{7}$ and θ is obtuse, find the exact value of $\tan \theta$. $\tan \theta = -\frac{3\sqrt{10}}{20}$
21. Solve $5 = 6 \sin^2 \theta + \cos \theta$ for $0 < \theta < 2\pi$. $\theta = 1.911$ or $\theta = 4.373$ or $\theta = \frac{\pi}{3}$ or $\theta = \frac{5\pi}{3}$