

May Revision Question-a-Day

<p>Answer each question, showing full reasoning.</p>	<p>1) Expand $(1 - 3x)^{\frac{1}{3}}$ up to the fourth non-zero term. Use this expansion to approximate $0.4^{\frac{1}{3}}$</p>	<p>2) Integrate $\int e^x \sin(x) dx$</p>	<p>3) Find the stationary points of the curve $y = 4x^3 + 5x^2 + 2x + 5$.</p>
<p>4) Use the Newton-Raphson method to find the first 3 approximations to the root of $y = xe^x - 3$ with $x_0 = 1.5$.</p>	<p>5) Rationalise $\frac{2 + \sqrt{3}}{4 - \sqrt{3}}$</p>	<p>6) Find the magnitude and direction (relative to the x-axis) of $5\mathbf{i} + 6\mathbf{j}$.</p>	<p>7) Sketch $y = 2x^2 - 5x - 3$ indicating all important features.</p>
<p>8) Evaluate $\frac{dy}{dx}$ for $y = \cos(x)$ at $x = \frac{\pi}{3}$.</p>	<p>9) Sketch $y = \operatorname{cosec}(x)$.</p>	<p>10) Integrate $y = \int \frac{4x}{\sqrt{2x^2 + 5}} dx$</p>	<p>11) Prove $\cos 2A = 2 \cos^2(A) - 1$</p>
<p>12) Find the cartesian form of the curve defined parametrically by $x = 2t + 1, y = \frac{1}{4t}$</p>	<p>13) Find an equation of the tangent to the circle $x^2 + y^2 = a^2$ at the point (h, k) on the circumference.</p>	<p>14) Differentiate wrt x, $y = \sin^2(x)\cos(x)$</p>	<p>15) Sketch the curve given by $x = a + 2a \cos(\theta), y = 2a \sin(\theta), 0 \leq \theta < 2\pi$.</p>
<p>16) Find the points of inflexion of $y = x^2 \exp(x)$.</p>	<p>17) Factorise completely $f(x) = x^3 - 6x^2 + 11x - 6$.</p>	<p>18) Prove that there are an infinite amount of prime numbers.</p>	<p>19) Differentiate from first principles $y = \cos(x)$.</p>
<p>20) Find $\frac{dy}{dx}$ for $2x^2y + 4xy^2 = 3x$</p>	<p>21) Find $f^{-1}(x)$ for $f(x) = 3x^2 - 5$.</p>	<p>22) Solve $5 - 2x = x + 3$.</p>	<p>23) Express in partial fractions $\frac{5x^2 + 16x + 18}{x(x + 3)^2}$.</p>
<p>24) Divide $8x^3 + 18x^2 + 9x + 5$ by $(2x + 1)$.</p>	<p>25) Use the trapezium rule with 4 strips to approximate the integral of $f(x) = e^{x^2} \sin(x)$ between $x = 0$ and $x = 2$.</p>	<p>26) A stone is projected vertically upwards with speed 4ms^{-1} from a point 1 m above the ground. Find the time taken to reach its highest point.</p>	<p>27) Differentiate $y = \frac{2x^2 + 4x + 1}{x + 3}$ using the quotient rule.</p>
<p>28) Let $X \sim B(12, 0.3)$, find $P(5 \leq x \leq 11)$</p>	<p>29) Simplify $\frac{3x^3 + 7x^2 - x - 3}{x^2 + 4x - 6}$</p>	<p>30) Let $f(x) = 3x + 2$ and $g(x) = 7x - 1$. Solve $fg(x) = gf(x)$</p>	<p>31) For two events A and B show $A' \cup B'$ on a Venn diagram.</p>