

PAST EXAMINATION QUESTIONS

- Without using tables or calculators, write down the values of
 (a) $(\sqrt{5})^4$, (b) $\frac{\sqrt{18}}{\sqrt{2}}$, (c) $\frac{\sqrt{18}-\sqrt{2}}{\sqrt{2}}$, (d) $(\sqrt{8}-\sqrt{2})(2\sqrt{8}-\sqrt{2})$. (N54/P1A/1i)
- Find, without using tables or calculators, the value of $\frac{1}{\sqrt{7}-\sqrt{2}} - \frac{1}{\sqrt{7}+\sqrt{2}}$ taking $\sqrt{2}$ to be 1.414. (N54/P1A/1ii, N54/P1B/1ii)
- Express $\frac{2}{5-2\sqrt{3}} + \frac{1}{5+2\sqrt{3}}$ in the form of $a+b\sqrt{3}$. (N58/P1A/1i, N58/P1B/1i)
- (i) Express in its simplest surd form $\sqrt{112} - \sqrt{63} + \frac{224}{\sqrt{28}}$.
 (ii) If $\frac{\sqrt{7}-\sqrt{3}}{x} = \frac{x}{\sqrt{7}+\sqrt{3}}$, find the values of x . (N60/P1A/1i-ii, N60/P1B/1i-ii)
- Express $\frac{3\sqrt{2}-2\sqrt{3}}{3\sqrt{2}+2\sqrt{3}}$ in the form $a-b\sqrt{c}$. (N60/P2/6ii)
- Express $\frac{1+\sqrt{2}}{\sqrt{5}+\sqrt{3}} + \frac{1-\sqrt{2}}{\sqrt{5}-\sqrt{3}}$ in the form $a\sqrt{5} + b\sqrt{6}$. (J62/P1/5ii)
- Without using tables or calculators, evaluate $\frac{1}{(1-\sqrt{5})^2} + \frac{1}{(1+\sqrt{5})^2}$. (J63/P2/5ii)
- Find the exact value of the expression $\frac{\sqrt{5}+1}{\sqrt{5}+2} + \frac{\sqrt{5}-1}{\sqrt{5}-2}$. (N64/P2/5i)
- Using the fact that $(\sqrt{x} + \sqrt{y})^2 = x+y+2\sqrt{xy}$, or otherwise, determine the square root of $5 + \sqrt{24}$ without using tables or calculators. (N65/P1/8ii)
- Express $\frac{1+\sqrt{7}}{3-\sqrt{7}}$ in the form $M+N\sqrt{7}$, where M and N are whole numbers. (J66/P2/5ii)
- Without using tables or calculators, evaluate $\frac{1}{3-\sqrt{7}} + \frac{1}{3+\sqrt{7}}$. (J68/P2/5i)
- Express $\frac{4+\sqrt{2}}{2-\sqrt{2}}$ in the form $p + \sqrt{q}$, where p and q are integers. (J82/P1/11c)
- Without using tables or a calculator, find the value of $\frac{3}{\sqrt{2}-1} - \frac{6}{\sqrt{2}}$. (J83/P2/11c)
- The variable θ and t are related by the equation $\theta = \theta_0 e^{-kt}$, where θ_0 and k are constants.
 When $t = 30$, $\theta = \frac{1}{2}\theta_0$.
 (i) Show that the value of k , correct to 4 decimal places, is 0.0231. When $t = 40$, $\theta = 28$.
 (ii) Calculate the value of θ_0 .
 When $t = 50$, calculate
 (iii) θ ,
 (iv) $\frac{d\theta}{dt}$.
 Find the average rate of change of θ with respect to t over the interval $0 \leq t \leq 50$. (N2000/P2/3b)
- Given that $(a + \sqrt{5})(3 + b\sqrt{5}) = 26 + 11\sqrt{5}$, find the possible values of a and of b . (N01/P2/8a)
- A rectangle has sides of length $(2 + \sqrt{18})$ metres and $(5 - \frac{4}{\sqrt{2}})$ metres. Express, in the form $a + b\sqrt{2}$, where a and b are integers,
 (i) the value of A , where A square metres is the area of the rectangle,
 (ii) the value of D^2 , where D metres is the length of the diagonal of the rectangle. (J2002/P1/3)
- Given that $k = \frac{1}{\sqrt{3}}$ and that $p = \frac{1+k}{1-k}$, express in its simplest surd form
 (i) p , (ii) $p - \frac{1}{p}$. (N2002/P2/3)

- 0.5656
- $\frac{15}{13} + \frac{2}{13}\sqrt{3}$
- (i) $17\sqrt{7}$
(ii) ± 2
- $5 - 2\sqrt{6}$
- $\sqrt{5} - \sqrt{6}$
- $\frac{3}{4}$
- 6
- $\pm(\sqrt{2} + \sqrt{3})$
- $5 + 2\sqrt{7}$
- 3
- $5 + \sqrt{18}$
- 3
- (a) 0.0231
(correct to 4 dec)
(b) 70.5
(c) 22.2
(d) $\frac{d\theta}{dt} = 1.63e^{-0.0231t}$
- $a = 2, b = 4; a = 6\frac{2}{3}, b = 1$
- (i) $A = -z + 11\sqrt{2}$
(ii) $D^2 = 55 - 8\sqrt{2}$
- (i) $2 + \sqrt{3}$
(ii) $2\sqrt{3}$