

Topic 25 Indices and surds (Pre-TT) [48]

N.B. All questions are non-calculator except question 8.

1.

(a) Find the value of $36^{\frac{1}{2}}$ (1)

(b) Simplify $2^{-2} \times 81^{\frac{1}{4}}$ (3)
(Total 4 marks)

2.

(a) Evaluate $16^{\frac{1}{4}} \times 5^{-2} \times 36^0$
You must show your working. (4)

(b) Write $64^{-\frac{2}{3}}$ as a fraction. (2)
(Total 6 marks)

3.

Simplify fully $\frac{(6 - \sqrt{5})(6 + \sqrt{5})}{\sqrt{31}}$
You must show your working. (Total 3 marks)

4.

(a) Write $27^{-\frac{2}{3}}$ in the form $\frac{1}{n}$ where n is an integer. (2)

(b) Simplify $\frac{10}{\sqrt{5}}$ by rationalising the denominator.
Give your answer in its simplest form. (2)

(c) Show that $\frac{\sqrt{125} - \sqrt{45}}{\sqrt{125} + \sqrt{45}} = \frac{1}{4}$ (3)
(Total 7 marks)

5. Show that $\frac{5+2\sqrt{3}}{2+\sqrt{3}}$ can be written as $a + b\sqrt{3}$ where a and b are to be found. (Total 5 marks)

6.

(a) Rationalise the denominator of $\frac{18}{\sqrt{3}}$ and simplify your answer fully. (2)

(b) Show that $100^{\frac{1}{4}}$ lies between 3 and 4. (2)
(Total 4 marks)

7.

(a) (i) Find the value of x in $4^x = \frac{1}{16}$

(1)

(ii) Find the value of y in $8^y = 2$

(1)

(b) Write down the value of $27^{\frac{2}{3}}$

(2)

(Total 4 marks)

8.

The value of a car £ V is given by

$$V = 20000 \times 0.9^t$$

where t is the age of the car in complete years.

(a) Write down the value of V when $t = 0$.

(b) What is the value of V when $t = 3$?

(c) After how many complete years will the car's value drop below £10 000?

(Total 5 marks)

9.

(a) Find the value of $\sqrt[3]{8 \times 10^6}$

(b) Find the value of $144^{\frac{1}{2}} \times 64^{-\frac{1}{3}}$

(c) Solve $3^{2x} = \frac{1}{81}$

(Total 5 marks)

10.

(a) Write down the value of $64^{\frac{1}{2}}$

(b) Find the value of $\left(\frac{8}{125}\right)^{-\frac{2}{3}}$

(Total 3 marks)

11.

Show that $\frac{1}{1 + \frac{1}{\sqrt{2}}}$ can be written as $2 - \sqrt{2}$

(Total 2 marks)