

# REVISION (ADDITIONAL MATHEMATICS)

## CHAPTER 3: INDICES

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1. Given that  $5^x = \frac{25}{5^{3x}}$ , solve for the value of  $x$ . [3]

2. Given the equation  $(5^{x+1})^2 = 0.2\sqrt{5^x}$ .

(a) Use the laws of indices to show that it leads to  $2x - \frac{x}{2} = -3$ . [4]

(b) Hence, solve the equation. [2]

3. Simplify

$$\sqrt{48} - \frac{6}{\sqrt{3}}$$

expressing your answer in the form  $a\sqrt{3}$ , where  $a$  is an integer to be found. [2]

4. Solve the equation  $3^{6x-3} = 81$ .  
Write your answer as a rational number. [3]

5. Given that  $f(x) = x^2 - 10x + 23$ , [2]

(a) express  $f(x)$  in the form of  $(x + a)^2 + b$ , where  $a$  and  $b$  are constants to be found, [2]

(b) solve the exact solutions of  $x^2 - 10x + 23 = 0$ . [2]

(c) use in answer in part (b) to find the solution to the equation

$$y - 10y^{0.5} + 23 = 0,$$

writing your answer in the form of  $p + q\sqrt{r}$ , where  $p$ ,  $q$  and  $r$  are integers. [2]

6. Given that  $y = 2^x$ ,

(a) show that  $2^{2x+1} - 17(2^x) + 8 = 0$  can be written in the form  $2y^2 - 17y + 8 = 0$ , [2]

(b) hence, solve  $2^{2x+1} - 17(2^x) + 8 = 0$ . [4]

7.

(a) Simplify  $\sqrt{50} - \sqrt{18}$ , writing your answer in surds. [2]

(b) Hence or otherwise, simplify  $\frac{12\sqrt{3}}{\sqrt{50} - \sqrt{18}}$  giving your answer in  $b\sqrt{c}$  form. [3]

8. Simplify

(a)  $2(\sqrt{5})^2$  [1]

(b)  $\frac{\sqrt{2}}{2\sqrt{5} - 3\sqrt{2}}$  [4]

(c)  $\frac{7 + \sqrt{5}}{\sqrt{5} - 1}$  [3]

giving all your answers in surd form.

9. Solve by appropriate substitution:  $8(4^x) - 9(2^x) + 1 = 0$ . [4]

10. A rectangle  $R$  has a length of  $(1 + \sqrt{5})$  cm and an area of  $\sqrt{80}$  cm<sup>2</sup>.

Calculate the width of  $R$  in cm. Express your answer in the surd form. [4]