



## Exponential Equations Exam Questions Sheet 2

Q1.

In this question you should show all stages of your working. Solutions relying on calculator technology are not acceptable:

Given

$$\frac{9^{x-1}}{3^{y+2}} = 81$$

express  $y$  in terms of  $x$ , writing your answer in simplest form.

(Total for question = 3 marks)

Q2.

(a) Find, to 3 significant figures, the value of  $x$  for which  $5^x = 7$ .

(2)

(b) Solve the equation  $5^{2x} - 12(5^x) + 35 = 0$ .

(4)

(Total for question = 6 marks)

Q3.

(a) Sketch the graph of

$$y = 3^x, \quad x \in \mathbb{R}$$

showing the coordinates of any points at which the graph crosses the axes.

(2)

(b) Use algebra to solve the equation

$$3^{2x} - 9(3^x) + 18 = 0$$

giving your answers to 2 decimal places where appropriate.

(5)

(Total 7 marks)



**Q4.**

(a) Sketch the graph of  $y = 7^x$ , showing the coordinates of any points at which the graph crosses the axes.

(2)

(b) Solve the equation

$$7^{2x} - 4(7^x) + 3 = 0$$

giving your answers to 2 decimal places where appropriate.

(6)

**(Total 8 marks)**

**Q5.**

$$f(x) = -6x^3 - 7x^2 + 40x + 21$$

(a) Use the factor theorem to show that  $(x + 3)$  is a factor of  $f(x)$

(2)

(b) Factorise  $f(x)$  completely.

(4)

(c) Hence solve the equation

$$6(2^{3y}) + 7(2^{2y}) = 40(2^y) + 21$$

giving your answer to 2 decimal places.

(3)

**Total for question = 9 marks)**

**Q6.**

$$f(x) = 2x^3 - 5x^2 + ax + 18$$

where  $a$  is a constant.

Given that  $(x - 3)$  is a factor of  $f(x)$ ,

(a) show that  $a = -9$

(2)

(b) factorise  $f(x)$  completely.

(4)

Given that

$$g(y) = 2(3^{3y}) - 5(3^{2y}) - 9(3^y) + 18$$

(c) find the values of  $y$  that satisfy  $g(y) = 0$ , giving your answers to 2 decimal places where appropriate.

(3)

**(Total 7 marks)**

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