

## Lesson 4

## A-Level Pure Mathematics : Year 1 Progress Test Revision

### 4.1 Example

Given that  $y = 5^x$ , express each of the following in terms of  $y$ .  
Write each expression in its simplest form.

(i)  $5^{4x}$

[ 1 mark ]

(ii)  $5^{x-2}$

[ 1 mark ]

(iii)  $5^{-\frac{x}{2}}$

[ 2 marks ]

(iv)  $125^x$

[ 1 mark ]

(v)  $\frac{5^3}{25^{x+2}}$

[ 3 marks ]

## 4.2 Revision Exercise

*Any solution based entirely on graphical  
or numerical methods is not acceptable*

Marks Available : 35

### Question 1

Given that  $y = 3^x$ , express each of the following in terms of  $y$ .  
Write each expression in its simplest form.

(i)  $3^{0.5x}$

[ 1 mark ]

(ii)  $3^{1+2x}$

[ 1 mark ]

(iii)  $3^{-3x}$

[ 2 marks ]

(iv)  $\frac{1}{9^{x+1}}$

[ 2 marks ]

(v)  $\frac{1^x}{27^{2x}}$

[ 2 marks ]

**Question 2**

$$f(x) = x^2 + 6x - 41$$

- (i) Express  $f(x)$  in the form  $(x + a)^2 + b$ , where  $a$  and  $b$  are constants to be found.

[ 2 marks ]

- (ii) Hence or otherwise, find the exact solutions to the equation,

$$x^2 + 6x - 41 = 0$$

Write your answer in the form  $p \pm q\sqrt{r}$ , where  $p, q$  and  $r$  are integers

[ 3 marks ]

**Question 3**

Given that  $\frac{3x^2 + 12x + 9}{108x - 12x^3} = \frac{x + a}{bx(x + c)}$  where  $a, b$  and  $c$  are constants,

work out the values of  $a, b$  and  $c$ .

[ 4 marks ]

**Question 4**

*A-Level Examination Question from June 2022, Paper 1, Q2 (Edexcel)*

$$f(x) = (x + 4)(x^2 - 3x + k) - 42$$

Given that  $(x + 2)$  is a factor of  $f(x)$ , find the value of  $k$

[ 3 marks ]

**Question 5**

*AS-Level Examination Question from November 2021, Paper 1, Q2 (Edexcel)*

Given,

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

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

[ 3 marks ]

**Question 6**

*AS-Level Examination Question from May 2019, Paper 1, Q2*

Find, using algebra, all real solutions to the equation,

(i)  $16a^2 = 2\sqrt{a}$

[ 4 marks ]

(ii)  $b^4 + 7b^2 - 18 = 0$

[ 4 marks ]

**Question 7**

The curve with equation  $y = 3 \times 2^x$  meets the curve with equation  $y = 28 - 2^{x-1}$  at the point  $P$ . Find, using algebra, the coordinates of  $P$ .

**[ 4 marks ]**

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Teachers may obtain detailed worked solutions to the exercises by email from [mhh@shrewsbury.org.uk](mailto:mhh@shrewsbury.org.uk)