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) $\dfrac{5^3}{25^{x+2}}$

[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) $\dfrac{1}{9^{x+1}}$

[2 marks]

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

[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 $\dfrac{3x^2 + 12x + 9}{108x - 12x^3} = \dfrac{x + a}{bx(x + c)}$ 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) $16\,a^2 = 2\sqrt{a}$

[4 marks]

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

[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]