



Maths-it Podcast A2-01

A2 Core Revision

Functions

Topics

Definition of a function – Domain and range – Composite functions – Inverse functions
The modulus function – Transformations on the graphs of functions

Questions

1. The functions f , g and h are defined as follows,

$$\begin{aligned} f(x) &= x^4 & x \in \mathbf{R} \\ g(x) &= \sqrt{x} & x \in \mathbf{R}, x \geq 0 \\ h(x) &= 3x - 2 & x \in \mathbf{R} \end{aligned}$$

Find each of the following functions, stating the domain and range for each.

- (a) $fg(x)$
- (b) $gf(x)$
- (c) $gh(x)$
- (d) $g^{-1}(x)$
- (e) $gh^{-1}(x)$
- (f) $(hf)^{-1}(x)$

(Total 18 marks)

2. The functions f and g are defined by,

$$\begin{aligned} f(x) &= \frac{1}{x-2} & x \in \mathbf{R}, x \neq 2 \\ g(x) &= 4 + x^2 & x \in \mathbf{R} \end{aligned}$$

- (a) find the range of g . (2)
- (b) The inverse of f is f^{-1} .
 - (i) Find $f^{-1}(x)$. (3)
 - (ii) State the range of f^{-1} . (1)
- (c) The composite function gf is denoted by h .
 - (i) Find $h(x)$, simplifying your answer. (2)
 - (ii) State the greatest possible domain of h . (1)

(Total 9 marks)

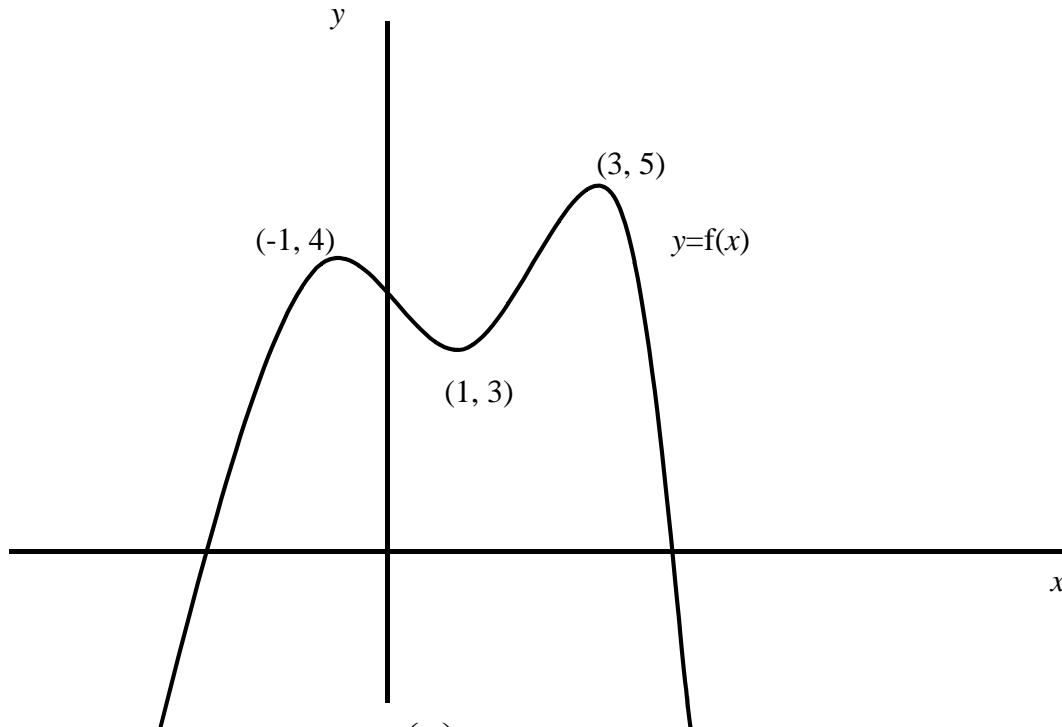


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3. The function $f(x)$ is defined for all real values of x .
The diagram below shows the graph of $y=f(x)$.



- (a) Sketch the graph of $y = f\left(\frac{x}{2}\right) - 3$, labelling the coordinates of the stationary points. (4)
- (b) Explain why the function f does not have an inverse. (1)
- (Total 5 marks)**
4. (a) Sketch the graph of $y = |(x-3)^2 - 4|$ (2)
- (b) Solve the equation $x-3 = |(x-3)^2 - 4|$ (4)
- (Total 6 marks)**
5. Describe a sequence of two geometrical transformations that maps the graph of $\sin x$ onto the graph of $2\sin\left(x + \frac{\pi}{3}\right)$ (4)
- (Total 4 marks)**