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A LEVEL MATHS

(7) Mappings and Functions

WORKING AT D/E

(1) $f(x) = x^2 - 3,\ x \in R,\ x > 0$
(a) **Write down** the domain of the function $f(x)$
(b) Sketch the graph of $y = f(x)$.
(c) Hence, state the range of $f(x)$.
(d) What type of mapping is $f(x)$?
Pick one of the 4 choices given below:

Not a function 1-2-1	A Function, Many to one
Not a function, Many to Many	A Function, 1-2-1

(e) Given that $f(a) = 22$, find the value of a and explain why there is only one possible value of a.

(2) $f:(x) \to 3x - 1,\ x \in R$
(a) Write down the range of $f(x)$
(b) Find the value of p such that $f(p) = -13$

(3) $g(x) = \begin{cases} x^2, & 0 \le x \le 2 \\ x + 2, & 2 < x < 10 \end{cases}$

(a) Sketch the graph of $y = g(x)$
(b) Find the range of $g(x)$
(c) Solve the equation of $g(x) = 1$

WORKING AT B/C

(1) $h(x) = e^x - 6,\ x \in R$
(a) Sketch the graph of $y = h(x)$ showing the exact values where the curve meets the coordinate axes and write down the equation of the asymptote.
(b) Write down the range of $h(x)$
(c) Given that $h(a) = 2$, find the exact value of a.
(d) Sketch the graph of $y = |h(x)|$ stating its range.

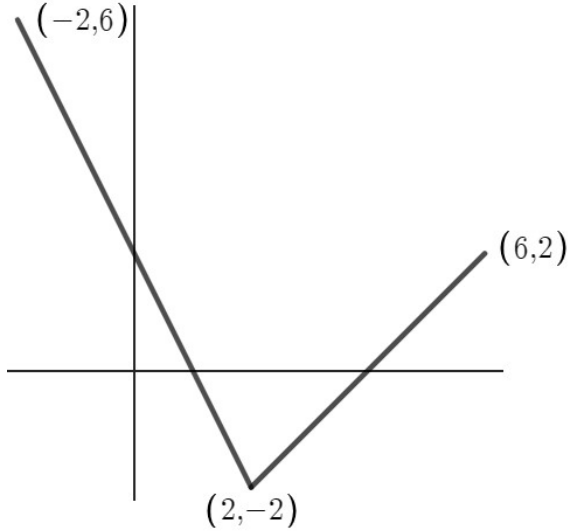
(2) $f(x) = x^2 - 2x + 10, x \in R$
(a) Write $f(x)$ in the form $(x + p)^2 + q$
(b) Sketch the graph of $y = f(x)$
(c) Explain why $f(x)$ is not a 1-2-1 function.
(d) Find a suitable domain that makes $f(x)$ a 1-2-1 function.
Doris choses the domain $0 > x$ for $f(x)$,
(e) Using Doris's domain, solve the equation $f(x) = 45$.
(f) Explain why the graph of $y = f(x)$ and the graph of $y = |f(x)|$ look the same.

(3) $g(x) = \frac{4}{x^2},\ 1 < x < 4$
(a) Sketch the graph of $y = g(x)$
(b) Find the range of $g(x)$
(c) Explain why $g(x) \neq \frac{37}{4}$

WORKING AT A*/A

(1) $f(x) = 2x^3 + 3x^2 - 12x,\ -3 \le x \le 1$
(a) Find the coordinate of any stationary points on the graph of $y = f(x)$.
(b) Hence, find the range of $f(x)$.
(c) Find the exact solutions to the equation $f(x) = 0$
(d) The equation $f(x) + a = 0$ where a is a constant, has no solutions. Find the possible set of values of a.

(2) The function $h(x)$ is shown below.



$h(x)$ is linear and piecewise.
(a) Write a possible expression for the function $h(x)$ including the domain.
(b) Write down the range of $h(x)$
(c) Find $h(2)$
(c) Solve the equation $h(x) = 1$

(3) Find the range of $m(x) = 12 - e^x,\ -1 < x < 4$ giving your answer in exact form.