Functions: exam questions

10 questions · 26 marks · mark schemes at the end

Name _____ Date _____ Score / 26

- Calculators are allowed on both 4MA1 Higher papers (1H and 2H). Show your working: most marks are for method.
- Mark schemes start after the questions. M marks are for a correct method, A marks for an accurate answer that follows a correct method, and B marks for a correct result on its own.
- Online, with more practice: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/functions

1. **3 marks**

$f(x) = 3x - 5$

(a) Find $f(4)$. **(1)**

(b) Solve $f(x) = 13$. **(2)**

2. **2 marks**

$g(x) = x^2 + 1$ and $h(x) = 2x - 3$.

Find $gh(2)$.

3. **2 marks**

$g(x) = x^2 + 1$ and $h(x) = 2x - 3$.

Find $hg(x)$. Simplify your answer.

4. 2 marks

$$f(x) = \frac{2x + 1}{3}$$

Find $f^{-1}(x)$.

5. 4 marks

$$f(x) = \frac{1}{x - 4}$$

(a) State which value of x must be excluded from the domain of f. **(1)**

(b) Find $f^{-1}(x)$. **(3)**

6. 2 marks

$f(x) = x^2 - 6x + 10$, where x can be any number.

Find the range of f.

7. 3 marks

$f(x) = 5 - 2x$ and $g(x) = \frac{x}{2} + 1$.

Solve $fg(x) = x$.

8. 2 marks

$f(x) = \sqrt{x - 3}$

(a) Write down the domain of f. **(1)**

(b) Find $f(28)$. **(1)**

9. 4 marks

$f(x) = 2x + 1$ and $g(x) = x^2$.

Solve $fg(x) = gf(x)$.

10. 2 marks

$f(x) = x^3$

(a) Find $f^{-1}(-8)$. **(1)**

(b) Find $ff(2)$. **(1)**

Answers and worked solutions

Question 1 — 3 marks

(a)

B1 7

(b)

M1 $3x - 5 = 13$

A1 $x = 6$

Answer: (a) 7; (b) $x = 6$

Question 2 — 2 marks

M1 $h(2) = 1$

A1 $g(1) = 2$

Answer: 2

Question 3 — 2 marks

M1 $2(x^2 + 1) - 3$

A1 $2x^2 - 1$

Answer: $2x^2 - 1$

Question 4 — 2 marks

M1 $3y = 2x + 1$ (with x and y swapped at some stage)

A1 $f^{-1}(x) = \dfrac{3x - 1}{2}$

Answer: $f^{-1}(x) = \dfrac{3x - 1}{2}$

Question 5 — 4 marks

(a)

B1 $x = 4$

(b)

M1 $x = \dfrac{1}{y - 4}$

M1 $y - 4 = \dfrac{1}{x}$

A1 $f^{-1}(x) = 4 + \dfrac{1}{x}$

Answer: (a) 4; (b) $f^{-1}(x) = 4 + \dfrac{1}{x}$

Question 6 — 2 marks

M1 $(x - 3)^2 + 1$

A1 $f(x) \geqslant 1$

Answer: $f(x) \geqslant 1$

Question 7 — 3 marks

M1 $fg(x) = 5 - 2\left(\dfrac{x}{2} + 1\right)$

M1 $3 - x = x$

A1 $x = 1.5$

Answer: $x = 1.5$

Question 8 — 2 marks

(a)

B1 $x \geqslant 3$

(b)

B1 5

Answer: (a) $x \geqslant 3$; (b) 5

Question 9 — 4 marks

M1 $fg(x) = 2x^2 + 1$

M1 $gf(x) = (2x + 1)^2 = 4x^2 + 4x + 1$

M1 $2x^2 + 4x = 0$

A1 $x = 0$ or $x = -2$

Answer: $x = 0$ or $x = -2$

Question 10 — 2 marks

(a)

B1 -2

(b)

B1 512

Answer: (a) -2; (b) 512

Online, with every solution: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/functions
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