Functions questions and answers

11 questions · Extended · 11 non-calculator · worked answers

Name _____ Date _____ Score _____

- Original questions in the style of the Cambridge 0580 papers, each labelled Core or Extended and calculator or non-calculator. Try every question before you look at the answers.
- Worked answers start after the questions. Questions with marks come from our 0580 practice bank (M method, A accuracy, B independent marks).
- Online, with more practice: igcsemathrevision.com/igcse-frontend/0580/functions-questions

Extended: for Papers 2 and 4

1. **Extended · non-calculator · easy**

$f(x) = 3x - 5$. Find
(a) $f(4)$
(b) $f(-2)$

2. **Extended · non-calculator · easy**

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

3. Extended · non-calculator · easy · 2 marks

$g(x) = x^2 - 6$.

(a) Find $g(-4)$.

(b) Solve $g(x) = 30$.

4. Extended · non-calculator · medium

$f(x) = 2x + 3$. Find $f^{-1}(x)$.

5. Extended · non-calculator · medium

$f(x) = 2x + 3$ and $g(x) = x^2$.

(a) Find $fg(2)$.

(b) Find $gf(x)$ in its expanded form.

6. Extended · non-calculator · medium

$h(x) = \frac{x+4}{3}$. Solve $h(x) = 5$.

7. Extended · non-calculator · medium · 2 marks

$f(x) = 7 - 3x$.

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

8. Extended · non-calculator · hard

$f(x) = \frac{1}{x-2}$.

(a) Which value of x must be excluded from the domain of f?

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

9. Extended · non-calculator · hard

$f(x) = x^2 - 1$ for $x \geq 0$. Write down the range of f.

10. Extended · non-calculator · hard

$f(x) = 3x + 1$. Solve $ff(x) = 22$.

11. **Extended · non-calculator · hard · 3 marks**

(a) $f(x) = (x-3)^2 + 2$ for all real values of x. Find the range of f.

(b) $h(x) = 5 - 2x$ for $0 \leq x \leq 4$. Find the range of h.

Answers and worked solutions

Question 1

Answer: (a) 7 (b) -11

1. (a) $3 \times 4 - 5 = 7$
2. (b) $3 \times (-2) - 5 = -11$

Question 2

Answer: 10

1. $(-3)^2 + 1 = 9 + 1 = 10$

Question 3 — 2 marks

Answer: (a) 10 (b) $x = 6$ or $x = -6$

B1 (a) 10

B1 (b) $x = 6$ or $x = -6$

Question 4

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

1. Write $y = 2x + 3$ and swap: $x = 2y + 3$.
2. $y = \frac{x-3}{2}$

Question 5

Answer: (a) 11 (b) $4x^2 + 12x + 9$

1. (a) $g(2) = 4$, then $f(4) = 11$.
2. (b) $gf(x) = (2x + 3)^2 = 4x^2 + 12x + 9$.

Question 6

Answer: $x = 11$

1. $\frac{x+4}{3} = 5$, so $x + 4 = 15$.

Question 7 — 2 marks

Answer: $f^{-1}(x) = \frac{7-x}{3}$

M1 $x = 7 - 3y$ or $y = \frac{7-x}{3}$ seen

A1 $\frac{7-x}{3}$

Question 8

Answer: (a) $x = 2$ (b) $f^{-1}(x) = \frac{1}{x} + 2$

1. (a) The denominator is 0 when $x = 2$.
2. (b) $x = \frac{1}{y-2}$, so $y - 2 = \frac{1}{x}$ and $y = \frac{1}{x} + 2$.

Question 9

Answer: $f(x) \geq -1$

1. For $x \geq 0$, x^2 takes every value from 0 upwards, so $x^2 - 1$ takes every value from -1 upwards.

Question 10

Answer: $x = 2$

1. $ff(x) = 3(3x + 1) + 1 = 9x + 4$
2. $9x + 4 = 22$, so $x = 2$.

Question 11 — 3 marks

Answer: (a) $f(x) \geq 2$ (b) $-3 \leq h(x) \leq 5$

B1 (a) $f(x) \geq 2$

M1 (b) $h(0) = 5$ and $h(4) = -3$

A1 $-3 \leq h(x) \leq 5$

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