Functions
Difficulty: Medium

Question Paper 1

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Functions
Paper	Paper 4
Difficulty	Medium
Booklet	Question Paper 1

Time allowed: **72 minutes**

Score: **/63**

Percentage: **/100**

Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

$f(x) = 3 - 2x$ $g(x) = \frac{4}{x}, x \neq 0$ $h(x) = 4^x$

(a) Find $f(5)$. [1]

(b) Find $gh(3)$. [2]

(c) Find $f^{-1}(x)$. [2]

(d) Show that $hf(x) = \frac{64}{16^x}$. [3]

(e) Find the value of x when $h(x) = g(0.5)$. [2]

$f(x) = 3x - 2$ $g(x) = x^2$ $h(x) = 3^x$

(a) Find $f(-3)$. [1]

(b) Find the value of x when $f(x) = 19$. [2]

(c) Find $fh(2)$. [2]

(d) Find $gf(x) + f(x) + x$.
Give your answer in its simplest form. [3]

(e) Find $f^{-1}(x)$. [2]

(a) $y = \frac{3}{x} + 2, \quad x \neq 0$

(i) Find the value of y when $x = -6$. [1]

(ii) Find x in terms of y. [3]

(b) $g(x) = 2 - x$ $h(x) = 2^x$

(i) Find g(5). [1]

(ii) Find hhh(2). [2]

(iii) Find x when $g(x) = h(3)$. [2]

(iv) Find x when $g^{-1}(x) = -1$. [1]

$f(x) = 2 - 3x$ $g(x) = 7x + 3$

(a) Find

(i) $f(-3)$, [1]

(ii) $g(2x)$. [1]

(b) Find $gf(x)$ in its simplest form. [2]

(c) Find x when $3f(x) = 7$. [3]

(d) Solve the equation.

$f(x + 4) - g(x) = 0$ [3]

$f(x) = 2x - 1$ $\quad$ $g(x) = \frac{1}{x}, \quad x \neq 0$ $\quad$ $h(x) = 2^x$

(a) Find h(3). [1]

(b) Find fg(0.5). [2]

(c) Find $f^{-1}(x)$. [2]

(d) Find ff(x), giving your answer in its simplest form. [2]

(e) Find $(f(x))^2 + 6$, giving your answer in its simplest form. [2]

(f) Simplify $hh^{-1}(x)$. [1]

(g) Which of the following statements is true?

$f^{-1}(x) = f(x)$
$g^{-1}(x) = g(x)$
$h^{-1}(x) = h(x)$

[1]

(h) Use two of the functions $f(x)$, $g(x)$ and $h(x)$ to find the composite function which is equal to $2^{x+1} - 1$.

[1]

$f(x) = 2x - 1$ $g(x) = x^2 + x$ $h(x) = \frac{2}{x}, x \neq 0$

(a) Find $ff(3)$. [2]

(b) Find $gf(x)$, giving your answer in its simplest form. [3]

(c) Find $f^{-1}(x)$. [2]

(d) Find $h(x) + h(x + 2)$, giving your answer as a single fraction. [4]

Functions
Difficulty: Medium

Question Paper 2

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Functions
Paper	Paper 4
Difficulty	Medium
Booklet	Question Paper 2

Time allowed: **82 minutes**

Score: **/71**

Percentage: **/100**

Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

$f(x) = 5x - 2$ $\quad$ $g(x) = \frac{7}{x - 3}, x \neq 3$ $\quad$ $h(x) = 2x^2 + 7x$

(a) Work out

(i) f(2), [1]

(ii) hg(17). [2]

(b) Solve $g(x) = x + 3$. [3]

(c) Solve $h(x) = 11$, showing all your working and giving your answers correct to 2 decimal places.

[5]

(d) Find $f^{-1}(x)$. [2]

(e) Solve $g^{-1}(x) = -0.5$. [1]

$f(x) = \frac{1}{x}, x \neq 0$ $\quad g(x) = 1 - x$ $\quad h(x) = x^2 + 1$

(a) Find $fg\left(\frac{1}{2}\right)$. [2]

(b) Find $g^{-1}(x)$, the inverse of $g(x)$. [1]

(c) Find $hg(x)$, giving your answer in its simplest form. [3]

(d) Find the value of x when $g(x) = 7$. [1]

(e) Solve the equation $h(x) = 3x$.
Show your working and give your answers correct to 2 decimal places. [4]

(f) A function $k(x)$ is its own inverse when $k^{-1}(x) = k(x)$.

For which of the functions $f(x)$, $g(x)$ and $h(x)$ is this true? [1]

$f(x) = 4 - 3x$ $\quad$ $g(x) = 3^{-x}$

(a) Find $f(2x)$ in terms of x. [1]

(b) Find $ff(x)$ in its simplest form. [2]

(c) Work out $gg(-1)$.
Give your answer as a fraction. [3]

(d) Find $f^{-1}(x)$, the inverse of $f(x)$. [2]

(e) Solve the equation $gf(x) = 1$. [3]

$f(x) = 4x + 3$ $\quad g(x) = \dfrac{7}{x+1}\ (x \neq -1)$ $\quad h(x) = x^2 + 5x$

(a) Work out

(i) h(–3), [1]

(ii) hg(13). [2]

(b) Find $f^{-1}(x)$. [2]

(c) (i) Solve the equation $f(x) = 23$. [2]

(ii) Solve the equation $h(x) = 7$.

Show all your working and give your answers correct to 2 decimal places. [5]

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

(a) Find the value of $hg(-2)$. [2]

(b) Find $g^{-1}(x)$. [2]

(c) Solve the equation $f(x) = 0$.
Show all your working and give your answers correct to 2 decimal places. [4]

(d) Find $fg(x)$. [3]
Give your answer in its simplest form.

(e) Solve the equation $h^{-1}(x) = 2$. [1]

$f(x) = 6 + x^2$ $g(x) = 4x - 1$

(a) Find

(i) g(3), [1]

(ii) f(–4). [1]

(b) Find the inverse function $g^{-1}(x)$. [2]

(c) Find fg(x) in its simplest form. [3]

(d) Solve the equation gg(x) = 3. [3]

Functions
Difficulty: Hard

Question Paper 1

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Functions
Paper	Paper 4
Difficulty	Hard
Booklet	Question Paper 1

Time allowed: **84 minutes**

Score: **/73**

Percentage: **/100**

Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

$f(x) = 2x + 1$ $g(x) = x^2 + 4$ $h(x) = 2^x$

(a) Solve the equation $f(x) = g(1)$. [2]

(b) Find the value of fh(3). [2]

(c) Find $f^{-1}(x)$. [2]

(d) Find $gf(x)$ in its simplest form. [3]

(e) Solve the equation $h^{-1}(x) = 0.5$. [1]

(f) $$\frac{1}{h(x)} = 2^{kx}$$

Write down the value of k. [1]

$f(x) = 5x + 7$ $\quad g(x) = \frac{4}{x - 3}, x \neq 3$

(a) Find

(i) $fg(1)$, [2]

(ii) $gf(x)$, [2]

(iii) $g^{-1}(x)$, [3]

(iv) $f^{-1}f(2)$. [1]

(b) $f(x) = g(x)$

(i) Show that $5x^2 - 8x - 25 = 0$. [3]

(ii) Solve $5x^2 - 8x - 25 = 0$.
Show all your working and give your answers correct to 2 decimal places. [4]

$f(x) = 2x + 5$ $g(x) = 2^x$ $h(x) = 7 - 3x$

(a) Find

(i) f(3), [1]

(ii) gg(3). [2]

(b) Find $f^{-1}(x)$. [2]

(c) Find fh(x), giving your answer in its simplest form. [2]

(d) Find the integer values of x which satisfy this inequality.

$$1 < f(x) \leqslant 9$$

[3]

$f(x) = 1 - 2x$ $\quad$ $g(x) = \frac{1}{x}, x \neq 0$ $\quad$ $h(x) = x^3 + 1$

(a) Find the value of

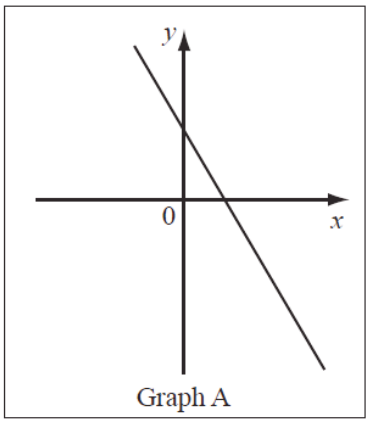
(i) gf(2), [2]

(ii) h(–2). [1]

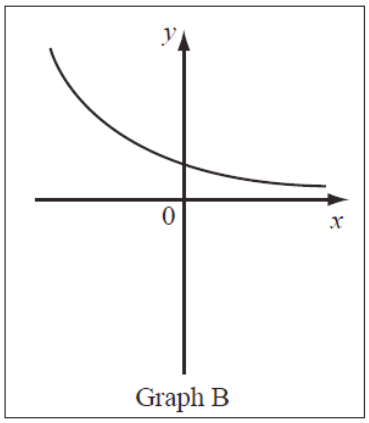
(b) Find fg(x).
Write your answer as a single fraction. [2]

(c) Find $h^{-1}(x)$, the inverse of h(x). [2]

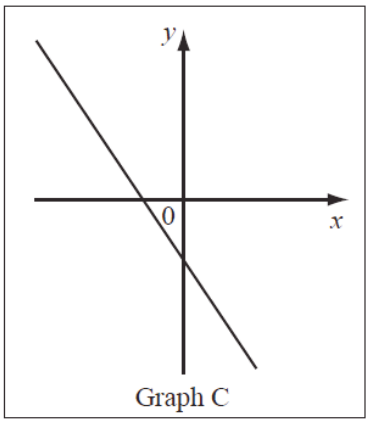
(d) Write down which of these sketches shows the graph of each of $y = f(x)$, $y = g(x)$ and $y = h(x)$.



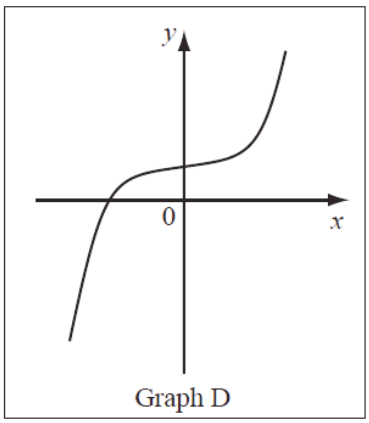
Graph A



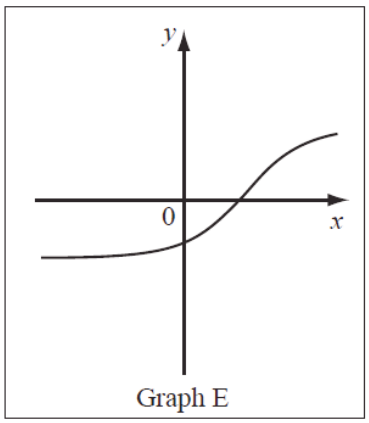
Graph B



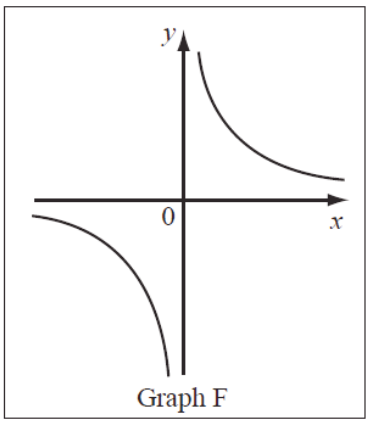
Graph C



Graph D



Graph E



Graph F

[3]

(e) $k(x) = x^5 - 3$

Solve the equation $k^{-1}(x) = 2$. [2]

$$f(x) = 4x - 2$$

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

$$h(x) = x^2 + 3$$

(a) (i) Find the value of hf(2). [2]

(ii) Write fg(x) in its simplest form. [2]

(b) Solve g(x) = 0.2. [2]

(c) Find the value of gg(3). [2]

(d) (i) Show that $f(x) = g(x)$ can be written as $4x^2 - 3x - 2 = 0$. [1]

(ii) Solve the equation $4x^2 - 3x - 2 = 0$.

Show all your working and give your answers correct to 2 decimal places. [4]

$f(x) = 3x + 1$ $g(x) = (x + 2)^2$

(a) Find the values of

(i) gf(2), [2]

(ii) ff(0.5). [2]

(b) Find $f^{-1}(x)$, the inverse of $f(x)$. [2]

(c) Find $fg(x)$.

Give your answer in its simplest form. [2]

(d) Solve the equation $x^2 + f(x) = 0$.

Show all your working and give your answers correct to 2 decimal places. [4]

Functions
Difficulty: Hard

Question Paper 2

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Functions
Paper	Paper 4
Difficulty	Hard
Booklet	Question Paper 2

Time allowed: **81 minutes**

Score: **/70**

Percentage: **/100**

Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

(a) $f(x) = 2x - 1$ $g(x) = x^2$

Work out

(i) f(2), [1]

(ii) g(−2), [1]

(iii) ff(x) in its simplest form, [2]

(iv) $f^{-1}(x)$, the inverse of f(x), [2]

(v) x when gf(x) = 4. [4]

(b) y is **inversely** proportional to x and $y = 8$ when $x = 2$.

Find,

(i) an equation connecting y and x, [2]

(ii) y when $x = \frac{1}{2}$. [1]

$f(x) = 2x - 1$ $g(x) = x^2 + 1$ $h(x) = 2^x$

(a) Find the value of

(i) $f\left(-\frac{1}{2}\right)$, [1]

(ii) g (-5) [1]

(iii) h (–3) . [1]

(b) Find the inverse function $f^{-1}(x)$. [2]

(c) $g(x) = z$.
Find x in terms of z. [2]

(d) Find $gf(x)$, in its simplest form. [2]

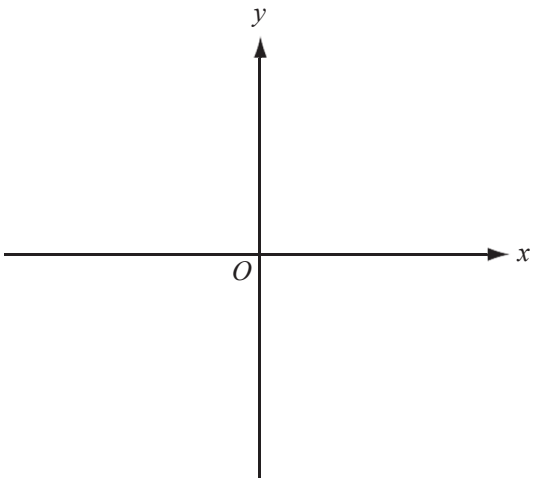
(e) $h(x) = 512$.
Find the value of x. [1]

(f) Solve the equation $2f(x) + g(x) = 0$, giving your answers correct to 2 decimal places. [5]

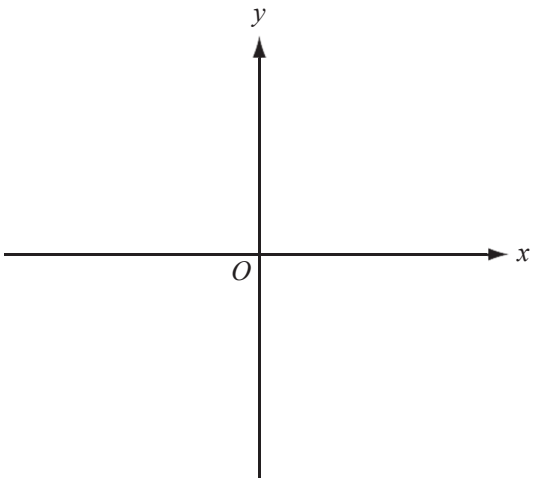
(g) Sketch the graph of

(i) $y = f(x)$,

(ii) $y = g(x)$.



(i) $y = f(x)$



(ii) $y = g(x)$ [3]

$f(x) = 2x - 1$, $g(x) = \frac{3}{x} + 1$, $h(x) = 2^x$.

(a) Find the value of fg(6). [1]

(b) Write, as a **single fraction**, gf(x) in terms of x. [3]

(c) Find $g^{-1}(x)$. [3]

(d) Find hh(3). [2]

(e) Find x when $h(x) = g\left(-\frac{24}{7}\right)$ [2]

Question 4

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$f(x) = x^2 - 4x + 3$ and $g(x) = 2x - 1$.

(a) Solve $f(x) = 0$. [2]

(b) Find $g^{-1}(x)$. [2]

(c) Solve $f(x) = g(x)$, giving your answers correct to 2 decimal places. [5]

(d) Find the value of $gf(-2)$. [2]

(e) Find $fg(x)$. Simplify your answer. [3]

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

(i) Solve the equation $f(x) = 7 - x$. [2]

(ii) Find $f^{-1}(x)$. [2]

(iii) Find the value of $gf(2) - fg(2)$. [3]

(iv) Find $fg(x)$. [1]

(b) $h(x) = x^x$.

(i) Find the value of $h(2)$. [1]

(ii) Find the value of $h(-3)$, giving your answer as a fraction. [1]

(iii) Find the value of $h(7.5)$, giving your answer in standard form. [2]

(iv) $h(-0.5)$ is not a real number. Explain why. [1]

(v) Find the integer value for which $h(x) = 3125$. [1]