**6.** The function f is defined by

f: 
$$x \mapsto \frac{3-2x}{x-5}$$
,  $x \in \mathbb{R}$ ,  $x \neq 5$ 

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

**(3)** 

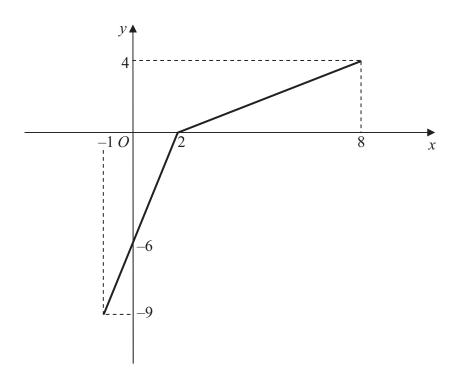


Figure 2

The function g has domain  $-1 \le x \le 8$ , and is linear from (-1, -9) to (2, 0) and from (2, 0) to (8, 4). Figure 2 shows a sketch of the graph of y = g(x).

(b) Write down the range of g.

**(1)** 

(c) Find gg(2).

**(2)** 

(d) Find fg(8).

**(2)** 

- (e) On separate diagrams, sketch the graph with equation
  - (i) y = |g(x)|,
  - (ii)  $y = g^{-1}(x)$ .

Show on each sketch the coordinates of each point at which the graph meets or cuts the axes.

**(4)** 

(f) State the domain of the inverse function  $g^{-1}$ .

**(1)** 

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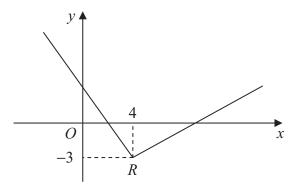


Figure 1

Figure 1 shows part of the graph of y = f(x),  $x \in \mathbb{R}$ .

The graph consists of two line segments that meet at the point R(4,-3), as shown in Figure 1.

Sketch, on separate diagrams, the graphs of

(a) 
$$y = 2f(x+4)$$
, (3)

(b) 
$$y = |f(-x)|$$
. (3)

On each diagram, show the coordinates of the point corresponding to R.

**4.** The function f is defined by

$$f: x \mapsto 4 - \ln(x+2), \quad x \in \mathbb{R}, \ x \geqslant -1$$

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

(3)

(b) Find the domain of  $f^{-1}$ .

(1)

The function g is defined by

$$g: x \mapsto e^{x^2} - 2, \quad x \in \mathbb{R}$$

(c) Find fg(x), giving your answer in its simplest form.

(3)

(d) Find the range of fg.

(1)



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blank

2.

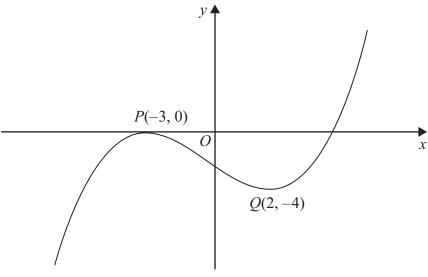


Figure 1

Figure 1 shows the graph of equation y = f(x).

The points P(-3, 0) and Q(2, -4) are stationary points on the graph.

Sketch, on separate diagrams, the graphs of

(a) 
$$y = 3f(x+2)$$

(3)

(b) 
$$y = |f(x)|$$

**(3)** 

On each diagram, show the coordinates of any stationary points.

7. The function f is defined by

$$f: x \mapsto \frac{3(x+1)}{2x^2+7x-4} - \frac{1}{x+4}, \quad x \in \mathbb{R}, x > \frac{1}{2}$$

(a) Show that  $f(x) = \frac{1}{2x-1}$ 

(4)

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

**(3)** 

(c) Find the domain of f<sup>-1</sup>

**(1)** 

$$g(x) = \ln(x+1)$$

(d) Find the solution of  $fg(x) = \frac{1}{7}$ , giving your answer in terms of e.

(4)

Question 7 continued	blank

4.

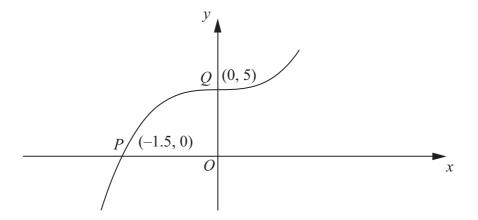


Figure 2

Figure 2 shows part of the curve with equation y = f(x)The curve passes through the points P(-1.5, 0) and Q(0, 5) as shown.

On separate diagrams, sketch the curve with equation

(a) 
$$y = |\mathbf{f}(x)|$$

(b) 
$$y = f(|x|)$$
 (2)

(c) 
$$y = 2f(3x)$$
 (3)

Indicate clearly on each sketch the coordinates of the points at which the curve crosses or meets the axes.

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Question 4 continued	

**6.** The functions f and g are defined by

$$f: x \mapsto e^x + 2, \quad x \in \mathbb{R}$$

$$g: x \mapsto \ln x$$
,  $x > 0$ 

(a) State the range of f.

**(1)** 

(b) Find fg(x), giving your answer in its simplest form.

**(2)** 

(c) Find the exact value of x for which f(2x+3) = 6

**(4)** 

(d) Find  $f^{-1}$ , the inverse function of f, stating its domain.

(3)

(e) On the same axes sketch the curves with equation y = f(x) and  $y = f^{-1}(x)$ , giving the coordinates of all the points where the curves cross the axes.

**(4)** 

Question 6 continued	bl

**3.** 

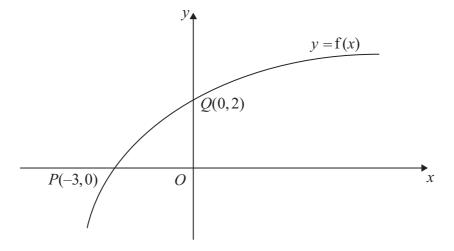


Figure 1

Figure 1 shows part of the curve with equation  $y = f(x), x \in \mathbb{R}$ .

The curve passes through the points Q(0,2) and P(-3,0) as shown.

(a) Find the value of ff(-3).

**(2)** 

On separate diagrams, sketch the curve with equation

(b) 
$$y = f^{-1}(x)$$
,

**(2)** 

(c) 
$$y = f(|x|) - 2$$
,

**(2)** 

(d) 
$$y = 2f\left(\frac{1}{2}x\right)$$
.

**(3)** 

Indicate clearly on each sketch the coordinates of the points at which the curve crosses or meets the axes.

	Leave blank
Question 3 continued	



2. Given that

$$f(x) = \ln x, \quad x > 0$$

sketch on separate axes the graphs of

- (i) y = f(x),
- (ii) y = |f(x)|,
- (iii) y = -f(x 4).

Show, on each diagram, the point where the graph meets or crosses the x-axis. In each case, state the equation of the asymptote.

**(7)** 

The function f has domain  $-2 \le x \le 6$  and is linear from (-2, 10) to (2, 0) and from (2, 0)to (6, 4). A sketch of the graph of y = f(x) is shown in Figure 1.

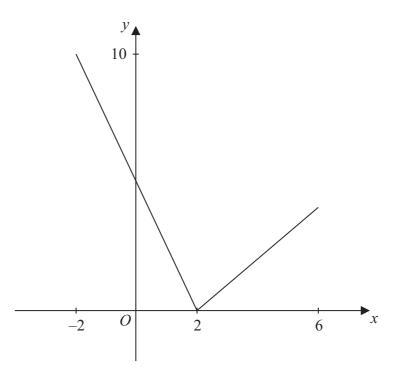


Figure 1

(a) Write down the range of f.

**(1)** 

(b) Find ff(0).

**(2)** 

The function g is defined by

$$g: x \to \frac{4+3x}{5-x}, \quad x \in \mathbb{R}, \quad x \neq 5$$

(c) Find  $g^{-1}(x)$ 

**(3)** 

(d) Solve the equation gf(x) = 16

**(5)**