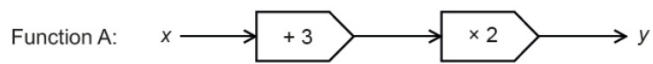


## **A65/66/67/68/69 Functions**

OCR

14 Here is a function.

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(a) Complete the table of values for **function A**.

A7

$x$	$y$
-5	
	11

[2]

Here is another function.

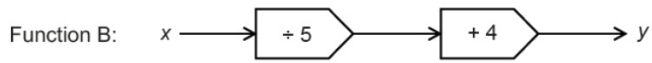
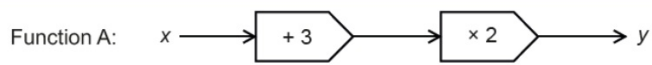


(b) Find the inverse function of **function B**.

A66

[2]

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(c) Here is a composite function.

A67

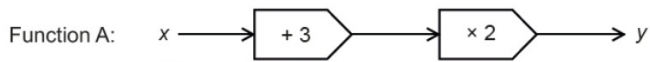


Find an expression for  $m$  in terms of  $p$ .  
Give your answer in its simplest form.

(c)  $m = \dots\dots\dots$  [4]

14 Here is a function.

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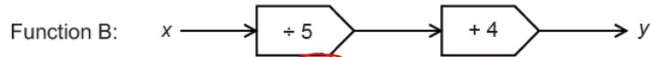
(a) Complete the table of values for function A.  $-5$   $\boxed{-3}$   $\boxed{\div 2}$   $\leftarrow$   $\parallel$

A7

x	y
-5	-4
2.5	11

[2]

Here is another function.

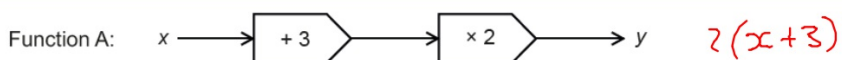


(b) Find the inverse function of function B.  $\boxed{\times 5}$   $\boxed{-4}$   $\leftarrow$

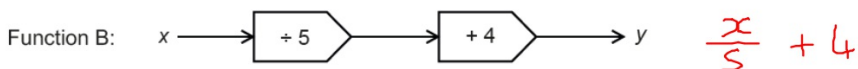
A66 opposite

$$y = 5(x - 4) \checkmark$$

[2]

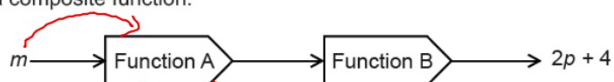


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(c) Here is a composite function.

A67



Find an expression for  $m$  in terms of  $p$ .  
Give your answer in its simplest form.

$$\frac{2(m+3)}{5} + 4 = 2p + 4$$

$$\Rightarrow \frac{2m+6}{5} = 2p$$

$$\Rightarrow 2m+6 = 10p$$

$$\left. \begin{array}{l} 2m = 10p - 6 \\ m = 5p - 3 \end{array} \right\}$$

(c)  $m = \dots 5p - 3 \dots$  [4]

12 (a) A sequence is defined using this term-to-term rule.

A65

$$u_{n+1} = \sqrt{2u_n + 15}$$

If  $u_1 = 5$ , find  $u_2$ .

(a) ..... [1]

(b) Another sequence is defined using this term-to-term rule,

A40  
A65

$$u_{n+1} = ku_n + r$$

where  $k$  and  $r$  are constants.

Given that  $u_2 = 41$ ,  $u_3 = 206$  and  $u_4 = 1031$ , find the value of  $k$  and the value of  $r$ .

(b)  $k = \dots\dots\dots$

$r = \dots\dots\dots$  [5]



12 (a) A sequence is defined using this term-to-term rule.

A6S

$$u_{n+1} = \sqrt{2u_n + 15}$$

If  $u_1 = 5$ , find  $u_2$ .

$$\sqrt{2(5) + 15}$$

$$\sqrt{10 + 15}$$

$$\sqrt{25}$$

$$(a) \dots = 5 \checkmark$$

[1]

(b) Another sequence is defined using this term-to-term rule,

A40  
A65

$$u_{n+1} = ku_n + r$$

where  $k$  and  $r$  are constants.

Given that  $u_2 = 41$ ,  $u_3 = 206$  and  $u_4 = 1031$ , find the value of  $k$  and the value of  $r$ .

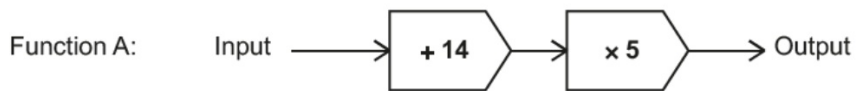
$$\begin{array}{r}
 \text{SSS} \\
 206 = 41k + r \\
 - 1031 = 206k + r \\
 \hline
 825 = 165k \\
 \frac{825}{165} = k \\
 5 = k
 \end{array}$$

$$\begin{array}{r}
 206 = 41k + r \\
 206 = 41(5) + r \\
 206 = 205 + r
 \end{array}$$

(b)  $k = \underline{5}$   
 $r = \underline{1}$  ✓ [5]

17 Here is a function.

Abb



(a) The **output** of function A is  $x$ .

Write an algebraic expression, in terms of  $x$ , for the input of function A.

(a) ..... [2]

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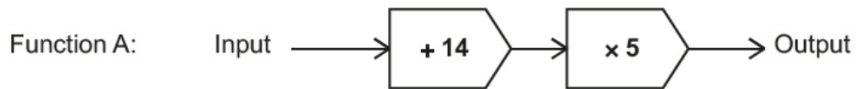
**(b)** A number,  $k$ , is put into function A.  
The output is also  $k$ .

Find the value of  $k$ .

**(b)**  $k = \dots\dots\dots$  [3]

17 Here is a function.

Abb



(a) The **output** of function A is  $x$ .



Write an algebraic expression, in terms of  $x$ , for the input of function A.

$$\frac{x}{5} - 14 \checkmark$$

(a) ..... [2]

- (b) A number,  $k$ , is put into function A.  
The output is also  $k$ .

Find the value of  $k$ .



$$5(k+14) = k \quad k \quad k$$

$$5k + 70 = k$$

$$5k - k = -70$$

$$4k = -70$$

$$k = \frac{-70}{4} = -\frac{35}{2}$$

$$(b) k = -\frac{35}{2} \text{ or } -17.5 \quad [3]$$

11 Here are two functions.

A7  
A67



Composite function C is shown below.



(a) The output from function C is 54.

Work out the input.

(a) ..... [2]

11 Here are two functions.



Composite function C is shown below.



(b) The input to function C is  $x$ .

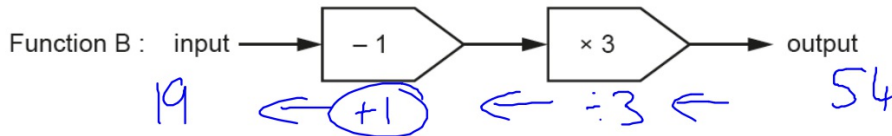
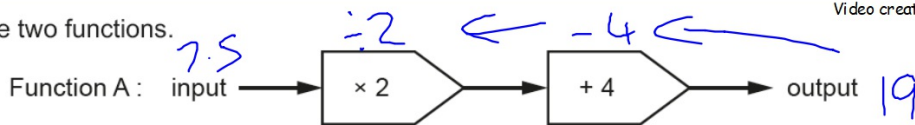
Find an expression, in terms of  $x$ , for the output from function C.

(b) ..... [2]

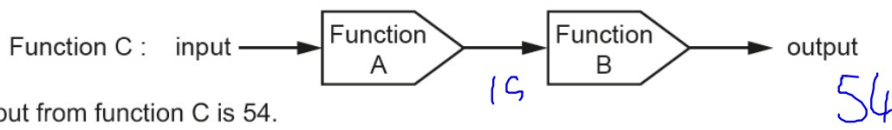


11 Here are two functions.

A7  
A67



Composite function C is shown below.

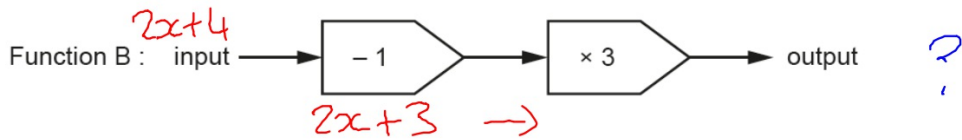
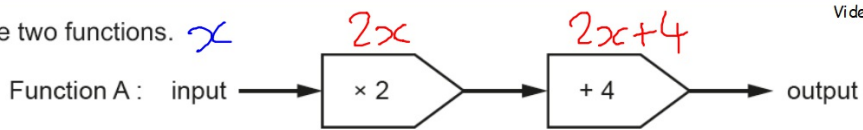


(a) The output from function C is 54.

Work out the input.

(a) ..... 7.5 ✓ ..... [2]

11 Here are two functions.  $x$



Composite function C is shown below.



(b) The input to function C is  $x$ .

Find an expression, in terms of  $x$ , for the output from function C.

*Handwritten answer:  $3(2x+3)$  or  $6x+9$  ✓*

(b) ..... [2]

EDEXCEL

10 The function  $f$  is such that

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$$f(x) = 4x - 1$$

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

$$f^{-1}(x) = \dots\dots\dots$$

(2)

The function  $g$  is such that

$$g(x) = kx^2 \text{ where } k \text{ is a constant.}$$

Given that  $fg(2) = 12$

(b) work out the value of  $k$

$$k = \dots\dots\dots$$

(2)

$$f(x) = 4x - 1$$

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

↙  
Inverse

$$x \rightarrow (x4) \rightarrow (-1)$$
$$\div 4 \leftarrow (+1) \leftarrow$$

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

(2)

The function  $g$  is such that

$$g(x) = kx^2 \text{ where } k \text{ is a constant.}$$

Given that  $fg(2) = 12$

(b) work out the value of  $k$

$$f(g(2))$$

$$f(k4) = 4(4k) - 1$$
$$= 16k - 1$$

$$16k - 1 = 12$$
$$16k = 13$$
$$k = \frac{13}{16}$$

$$k = \frac{13}{16}$$

(2)

**18**  $f(x) = 3x^2 - 2x - 8$

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Express  $f(x + 2)$  in the form  $ax^2 + bx$

.....  
**(Total for Question 18 is 3 marks)**

---

18  $f(x) = 3x^2 - 2x - 8$

Express  $f(x+2)$  in the form  $ax^2 + bx$

$$3(x+2)^2 - 2(x+2) - 8$$

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

$$3(x+2)(x+2)$$

$$x^2 + 2x + 2x + 4$$

$$3(x^2 + 4x + 4)$$

$$= 3x^2 + 12x + 12$$

$$3x^2 + 12x + 12 - 2x - 4 - 8$$

$$3x^2 + 10x$$

$$3x^2 + 10x$$

(Total for Question 18 is 3 marks)

9 The functions  $f$  and  $g$  are such that

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$$f(x) = 3(x - 4) \text{ and } g(x) = \frac{x}{5} + 1$$

(a) Find the value of  $f(10)$

.....  
(1)

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

$g^{-1}(x) =$  .....  
(2)



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(c) Show that  $ff(x) = 9x - 48$

(2)

---

**(Total for Question 9 is 5 marks)**

9 The functions  $f$  and  $g$  are such that

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$$f(x) = 3(x - 4) \text{ and } g(x) = \frac{x}{5} + 1$$

(a) Find the value of  $f(10)$

$$10 \rightarrow 3(x-4) \dots 3(10-4) \\ 3(6) \quad \underline{18} \\ (1)$$

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

INVERSE       $g(x) = \frac{x}{5} + 1$        $x \rightarrow \textcircled{\div 5} \rightarrow \textcircled{+1} \rightarrow$   
 $\leftarrow \textcircled{\times 5} \leftarrow \textcircled{-1} \leftarrow x$

$$g^{-1}(x) = \underline{5(x-1)} \\ (2)$$

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(c) Show that  $ff(x) = 9x - 48$

$$f(x) = 3(x-4)$$

$$ff(x) = 3(x-4)$$

$$= 3 \left[ \overbrace{3(x-4)} - 4 \right]$$

$$= 3 \left[ 3x - 12 - 4 \right]$$

$$= 3 \left( 3x - 16 \right)$$

$$= 9x - 48 \checkmark$$

(2)

---

(Total for Question 9 is 5 marks)

20 For all values of  $x$

$$f(x) = 2x - 3 \quad \text{and} \quad g(x) = x^2 + 2$$

(a) Find  $g(-4)$

.....  
(1)

(b) Show that  $gf(x) = 4x^2 - 12x + 11$

(2)

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

.....  
(4)

---

**(Total for Question 20 is 7 marks)**

20 For all values of  $x$

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$$f(x) = 2x - 3 \quad \text{and} \quad g(x) = x^2 + 2$$

(a) Find  $g(-4)$

$$\begin{aligned} & -4x - 4 \\ & = 16 \end{aligned}$$
$$-4^2 + 2$$

$$\begin{array}{r} 18 \\ \hline \end{array} \quad (1)$$

(b) Show that  $gf(x) = 4x^2 - 12x + 11$

$$\begin{aligned} & g(f(x)) \\ & (2x-3)^2 \\ & (2x-3)(2x-3) \\ & 4x^2 - 6x - 6x + 9 \\ & 4x^2 - 12x + 9 \end{aligned}$$

$$\begin{aligned} g(x) &= x^2 + 2 \\ f(x) &= 2x - 3 \\ & (2x-3)^2 + 2 \\ & 4x^2 - 12x + 9 + 2 \\ & 4x^2 - 12x + 11 \end{aligned}$$

(2)

(c) Solve  $fg(x) = gf(x) \rightarrow 4x^2 - 12x + 11$

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

$f(x) = 2x - 3$

$f(g(x)) \dots g(x) = x^2 + 2$

$2x^2 + 1 = 4x^2 - 12x + 11$

$0 = 4x^2 - 2x^2 - 12x + 11 - 1$

$0 = 2x^2 - 12x + 10$

$0 = x^2 - 6x + 5 \quad -5 \quad -1$

$0 = (x - 5)(x - 1)$

$x = 5$  or  $x = 1$

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

$2x^2 + 4 - 3$

$2x^2 + 1$

$x = 5$  or  $x = 1$

✓  
(4)

(Total for Question 20 is 7 marks)

**21**  $f$  and  $g$  are functions such that

$$f(x) = 3x^2 \quad \text{and} \quad g(x) = \frac{1}{x-2}$$

Find  $gf(4)$ .

Give your answer as a fraction.

.....  
(Total for Question 21 is 2 marks)



21 f and g are functions such that

Find  $gf(4)$ .  
Give your answer as a fraction.

$$f(x) = 3x^2 \quad \text{and} \quad g(x) = \frac{1}{x-2}$$

$$gf(4)$$

$$\begin{aligned} & 3(4)^2 \\ &= 3(16) \\ &= 48 \end{aligned}$$

$$g(48)$$

$$\frac{1}{48-2}$$

$$\frac{1}{46} \checkmark$$

(Total for Question 21 is 2 marks)

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

- (a) Work out  $f(5)$   
Give your answer as a fraction.

.....  
(2)

- (b) Write down a value of  $x$  for which  $f(x)$  is not defined.

.....  
(1)

Given that  $f(x) = 4$

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(c) find the possible values of  $x$ .

Give your answer in the form  $\frac{p \pm \sqrt{q}}{r}$  where  $p$ ,  $q$  and  $r$  are positive integers.

.....  
(5)

(Total for Question 21 is 8 marks)

$$21 \quad f(x) = \frac{1}{x+2} + \frac{1}{x-3}$$

- (a) Work out  $f(5)$   
Give your answer as a fraction.

$$\frac{1}{5+2} + \frac{1}{5-3} \quad \dots \quad \frac{1}{7} + \frac{1}{2}$$

$$\frac{2}{14} + \frac{7}{14} \quad \frac{9}{14}$$


---

(2)

- (b) Write down a value of  $x$  for which  $f(x)$  is not defined.

$$\frac{1}{x+2} + \frac{1}{x-3}$$

$\swarrow$  -2       $\searrow$  +3

$\swarrow$  maths error       $\rightarrow$  ÷ by 0

---

-2 or 3 ✓ (1)

Given that  $f(x) = 4$

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(c) find the possible values of  $x$ .

Give your answer in the form  $\frac{p \pm \sqrt{q}}{r}$  where  $p, q$  and  $r$  are positive integers.

$$\frac{1}{x+2} + \frac{1}{x-3} = \frac{4}{1}$$

$$\frac{1(x-3)}{(x+2)(x-3)} + \frac{1(x+2)}{(x+2)(x-3)} = \frac{4(x+2)(x-3)}{1(x+2)(x-3)}$$

$$x-3 + x+2 = 4x^2 - 4x - 24$$

$$0 = 4x^2 - 4x - 24 - x + 3 - x - 2$$

$$0 = 4x^2 - 6x - 23$$

$$4(x+2)(x-3)$$
$$x^2 - 3x + 2x - 6$$
$$4(x^2 - 1x - 6)$$
$$4x^2 - 4x - 24$$

$$\rightarrow 4x^2 - 6x - 23 = 0$$

$$a = 4 \quad \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$b = -6$$

$$c = -23$$

$$4ac \quad \frac{6 \pm \sqrt{36 - (-368)}}{8}$$

$$4 \times 4 \times -23$$

$$-368 \quad \frac{6 \pm \sqrt{404}}{8}$$

$$= \frac{3 \pm \sqrt{101}}{4}$$

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21  $f(x) = x^3$   
 $g(x) = 4x - 1$

(a) Find  $fg(2)$

.....  
(2)

$h(x) = fg(x)$

(b) Find an expression for  $h^{-1}(x)$

$h^{-1}(x) =$  .....  
(3)

(Total for Question 21 is 5 marks)

21  $f(x) = x^3$   
 $g(x) = 4x - 1$

(a) Find  $fg(2)$

$$g(2) \rightarrow 4x - 1$$

$$\begin{array}{l} \nearrow \\ 8 - 1 \\ = 7 \end{array}$$

$$f(7) \rightarrow x^3$$

$$7^3 = 343$$

(2)

$h(x) = \underline{fg(x)}$

(b) Find an expression for  $h^{-1}(x)$

$$h(x) = (4x - 1)^3$$

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

$$\rightarrow x \rightarrow (x4) \rightarrow (-1) \rightarrow x^{\frac{3}{}}$$

$$\therefore 4 \leftarrow (+1) \leftarrow \sqrt[3]{x} \leftarrow x$$

$$h^{-1}(x) = \frac{\sqrt[3]{x} + 1}{4}$$

(3)

(Total for Question 21 is 5 marks)

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22 The functions  $f$  and  $g$  are such that

$$f(x) = 5x + 3 \quad g(x) = ax + b \quad \text{where } a \text{ and } b \text{ are constants.}$$

$$g(3) = 20 \quad \text{and} \quad f^{-1}(33) = g(1)$$

Find the value of  $a$  and the value of  $b$ .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

**(Total for Question 22 is 5 marks)**

---



22 The functions  $f$  and  $g$  are such that

$$f(x) = 5x + 3 \quad g(x) = ax + b$$

where  $a$  and  $b$  are constants.

$$g(3) = 20 \quad \text{and} \quad f^{-1}(33) = g(1)$$

Find the value of  $a$  and the value of  $b$ .

$$\begin{array}{r} 3a \\ - 1a \\ \hline a3 + b = 20 \\ - a1 + b = 6 \\ \hline 2a = 14 \\ a = 7 \end{array}$$

$$\begin{array}{l} 3a + b = 20 \\ 21 + (-1) = 20 \end{array}$$

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

$$x \rightarrow (x5) \rightarrow (+3) \\ \leftarrow (-3) \leftarrow (-5) \leftarrow x$$

$$f^{-1}(x) = \frac{x-3}{5}$$

$$\begin{aligned} f^{-1}(x) &= \frac{33-3}{5} \\ &= \frac{30}{5} = 6 \end{aligned}$$

$$a = 7$$

$$b = -1$$

(Total for Question 22 is 5 marks)

**11** f and g are functions such that

$$f(x) = \frac{2}{x^2} \quad \text{and} \quad g(x) = 4x^3$$

(a) Find  $f(-5)$

Ans

.....  
(1)

11 f and g are functions such that

$$f(x) = \frac{2}{x^2} \quad \text{and} \quad g(x) = 4x^3$$

(b) Find  $fg(1)$

167

.....  
(2)

11 f and g are functions such that

$$f(x) = \frac{2}{x^2} \quad \text{and} \quad g(x) = 4x^3$$

(a) Find  $f(-5)$

Ans

$$\frac{2}{(-5)^2} = \frac{2}{25} \quad \frac{2}{25} \quad \text{(1)}$$

$$-5 \times -5 = 25$$

11 f and g are functions such that

$$f(x) = \frac{2}{x^2} \quad \text{and} \quad g(x) = 4x^3$$

$$g(1) = 4(1)^3 = 4$$

(b) Find  $fg$  (1)

A67

$$f(x) = \frac{2}{x^2} = \frac{2}{4^2} = \frac{2}{16} = \frac{1}{8}$$

$$\frac{1}{8}$$

(2)

**19** For all values of  $x$

$$f(x) = (x + 1)^2 \quad \text{and} \quad g(x) = 2(x - 1)$$

(a) Show that  $gf(x) = 2x(x + 2)$

**A67**

(2)

For all values of  $x$

$$f(x) = (x + 1)^2 \quad \text{and} \quad g(x) = 2(x - 1)$$

(b) Find  $g^{-1}(7)$

**A65**

**A66**

19 For all values of  $x$

$$f(x) = (x+1)^2 \quad \text{and} \quad g(x) = 2(x-1)$$

(a) Show that  $gf(x) = 2x(x+2)$

A67

$$(x+1)(x+1)$$

$$x^2 + 2x + 1$$

$$2 \left[ (x+1)^2 - 1 \right]$$

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

$$2(x^2 + 2x)$$

(2)

$$2x^2 + 4x \dots 2x(x+2) \checkmark$$



For all values of  $x$ 

$$f(x) = (x + 1)^2 \quad \text{and} \quad g(x) = 2(x - 1)$$

(b) Find  $g^{-1}(7)$ 

A65

A66

$$g(x) = 2(x-1)$$

$$x \rightarrow [-1] \rightarrow [x2]$$

$$[+1] \leftarrow [ :2 ] \leftarrow x$$

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

$$= \frac{7}{2} + 1$$

$$3.5 + 1$$

$$4.5 \checkmark$$

(2)

**10**  $f(x) = 4\sin x^\circ$

(a) Find  $f(23)$

Give your answer correct to 3 significant figures.

**A65**

.....  
**(1)**

$$g(x) = 2x - 3$$

(b) Find  $fg(34)$

Give your answer correct to 3 significant figures.

**A67**

$$h(x) = (x + 4)^2$$

Ivan needs to solve the following equation  $h(x) = 25$

He writes

$$(x + 4)^2 = 25$$

$$x + 4 = 5$$

$$x = 1$$

This is not fully correct.

(c) Explain why.

**10**  $f(x) = 4\sin x^\circ$

(a) Find  $f(23)$

Give your answer correct to 3 significant figures.

**A65**

$$4 \sin 23^\circ$$

$$\underline{1.56}$$

✓

$$g(x) = 2x - 3$$

(b) Find  $fg(34)$

Give your answer correct to 3 significant figures.

A67

$$g(x) = 2x - 3$$

$$g(34) = 2(34) - 3$$

$$= 68 - 3$$

$$= 65$$

$$f(x) = 4 \sin x$$

$$= 4 \times \sin 65$$

=

$$3.63$$

(2)



$$h(x) = (x + 4)^2$$

Ivan needs to solve the following equation  $h(x) = 25$

He writes

$$\begin{aligned} (x + 4)^2 &= 25 & \longrightarrow & (x + 4)^2 = 25 \\ x + 4 &= 5 \\ x &= 1 \end{aligned}$$

This is not fully correct.

(c) Explain why.

Forgot about  
the -5 ✓

$$x + 4 = 5 \text{ or } -5 \checkmark$$

AQA



27 (a)  $h(x) = \sqrt[3]{x}$  for all values of  $x$

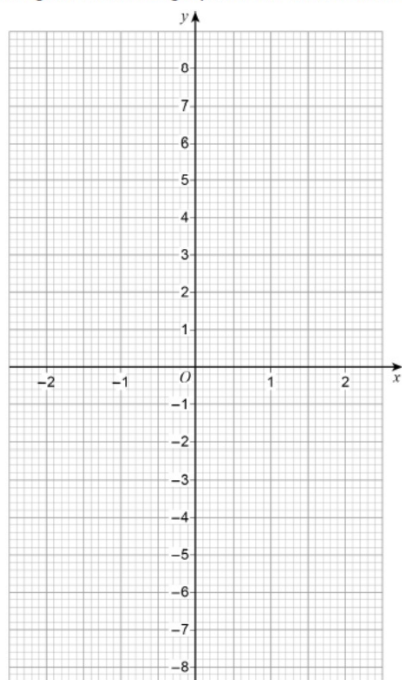
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A37

A66

On the grid, draw the graph of the inverse function  $y = h^{-1}(x)$  for  $-2 \leq x \leq 2$

[2 marks]



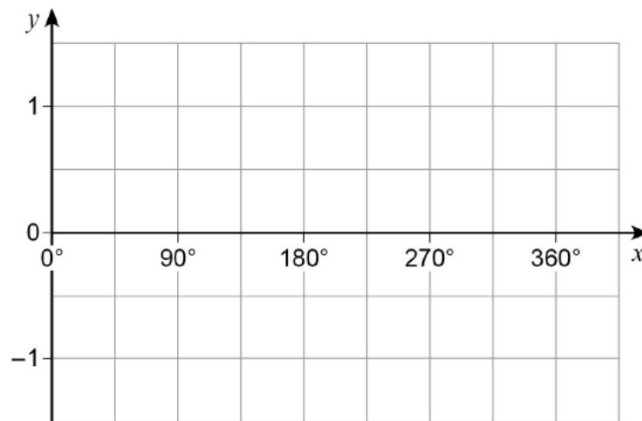
27 (b) For all values of  $x$

A67  $f(x) = \sin x$

A77  $g(x) = x + 90$

On the grid, draw the graph of the composite function  $y = fg(x)$  for  $0^\circ \leq x \leq 360^\circ$

[2 marks]

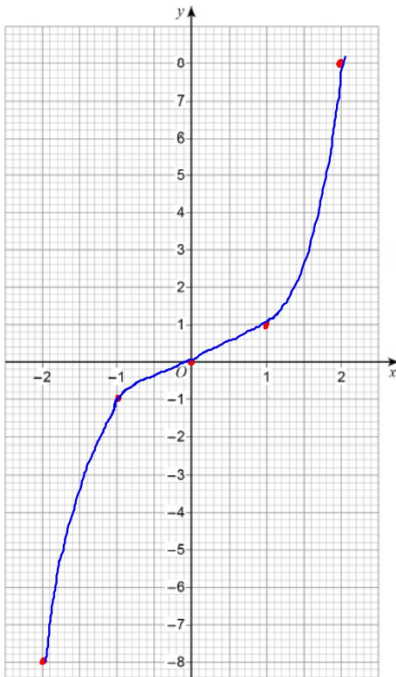


27 (a)  $h(x) = \sqrt[3]{x}$  for all values of  $x$

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A37  
A66

On the grid, draw the graph of the inverse function  $y = h^{-1}(x)$  for  $-2 \leq x \leq 2$



[2 marks]

Handwritten notes and a table:

$y = x^3$  (with a red arrow pointing to the table)

$\sqrt[3]{x}$  (with a red arrow pointing to the word "inverse")

$x$	-2	-1	0	1	2
$y$	-8	-1	0	1	8

$-|x-|x-1$

27 (b) For all values of  $x$

A67  $f(x) = \sin x$   
 A77  $g(x) = x + 90$

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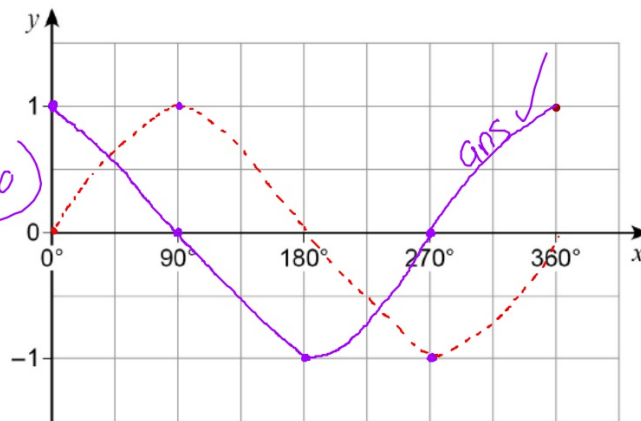
$f(x) = \sin x$

On the grid, draw the graph of the composite function  $y = fg(x)$  for  $0^\circ \leq x \leq 360^\circ$

[2 marks]

$y = \sin x$   
 Red

$y = \sin(x + 90)$   
 Ans ✓



$\sin(x + 90)$   
 left  $90^\circ$

**16**  $f(x) = x^2 - x^3$

**A65** Circle the value of  $f(-3)$

**[1 mark]**

18

-18

36

-36

16

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

A65

Circle the value of  $f(-3)$

[1 mark]

18

-18

36

-36

$$(-3)^2 - (-3)^3$$

$$9 - (-27) \dots 9 + 27 = 36$$

$$-3^2 = -3 \times -3 = 9$$

$$-3^3 = -3 \times -3 \times -3 = -27$$

30  $f(x) = \frac{x}{3} + 4$  for all values of  $x$ .

A51  $g(x) = 6x^2 + 3$  for all values of  $x$ .

A67

Work out  $fg(x)$ .

Give your answer in the form  $ax^2 + b$  where  $a$  and  $b$  are integers.

[2 marks]

Answer \_\_\_\_\_

30

$f(x) = \frac{x}{3} + 4$  for all values of  $x$ .

A51  
A67

$g(x) = 6x^2 + 3$  for all values of  $x$ .

Work out  $fg(x)$ .

Give your answer in the form  $ax^2 + b$  where  $a$  and  $b$  are integers.

[2 marks]

$$\frac{6x^2 + 3}{3} + 4 \rightarrow 2x^2 + 1 + 4$$
$$\frac{\cancel{3}(2x^2 + 1)}{\cancel{3}} + 4$$

Answer            $2x^2 + 5$            ✓



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28  $f(x) = 5 - x$  and  $g(x) = 3x + 7$

28 (a) Simplify  $f(2x) + g(x - 1)$

**[3 marks]**

**A65**

Answer \_\_\_\_\_

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**28**       $f(x) = 5 - x$       and       $g(x) = 3x + 7$

**28 (b)**      Solve       $g^{-1}(x) = 2x$

**[3 marks]**

A66  
A68

$x =$  \_\_\_\_\_

28  $f(x) = 5 - x$  and  $g(x) = 3x + 7$

28 (a) Simplify  $f(2x) + g(x - 1)$

[3 marks]

A65

$$5 - 2x + 3(x - 1) + 7$$

$$5 - 2x + (3x - 3 + 7)$$

$$5 - 2x + (3x + 4)$$

Answer 9 + 1x ✓

28  $f(x) = 5 - x$  and  $g(x) = 3x + 7$

28 (b) Solve  $g^{-1}(x) = 2x$

[3 marks]

A66

A68

$$g(x): x \rightarrow \textcircled{\times 3} \rightarrow +7$$

$$g(x) \quad \frac{x-7}{3}$$

$$\frac{x-7}{3} = 2x$$

$$x-7 = 6x$$

$$-7 = 6x - x$$

$$-7 = 5x$$

$$\frac{-7}{5} = x$$

$$x = \underline{\underline{\frac{-7}{5} \checkmark}}$$

26

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

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

A67

Work out  $fg(x)$

Give your answer in the form  $a + bx^n$  where  $a$ ,  $b$  and  $n$  are integers.

**[3 marks]**

Answer \_\_\_\_\_

26

$$f(x) = \frac{x}{x+2} \quad g(x) = x^2 - 2$$

A67

Work out  $fg(x)$ Give your answer in the form  $a + bx^n$  where  $a$ ,  $b$  and  $n$  are integers.**[3 marks]**

$$\begin{aligned} & -2 \\ & x \\ & = \frac{1}{x^2} \end{aligned}$$

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

$$\begin{aligned} & \frac{2}{x^2} \\ & = 2x^{-2} \end{aligned}$$

Answer

$$\underline{1 - 2x^{-2}}$$

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26

$$f(x) = \frac{2x+3}{x-4}$$

A64

A66

Work out  $f^{-1}(x)$

**[4 marks]**

Answer \_\_\_\_\_

26

$$f(x) = \frac{2x+3}{x-4}$$

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A64

A66

Work out  $f^{-1}(x)$

Pretend

$$f(x) = 2x + 1$$

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

$$y = 2x + 1$$

$$x \rightarrow (x-1) \rightarrow +1 \rightarrow y$$

$$x = \frac{y-1}{2}$$

$$y = \frac{2x+3}{x-4}$$

$$y(x-4) = 2x+3$$

$$yx - 4y = 2x + 3$$

$$yx - 2x = 4y + 3$$

$$x(y-2) = 4y + 3$$

$$x = \frac{4y+3}{y-2}$$

[4 marks]

$$\frac{4x+3}{x-2}$$

Answer

$$\frac{4x+3}{x-2}$$