HIGHER

7.9 Inverse and Composite Functions: Test Pack

Total Marks

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Work out f(2) for f(x) = 3x + 1.

(Total for Question 1 is 1 mark)

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2 Let f(x) = x + 4 and g(x) = 3x.
Find (f o g)(2).

(Total for Question 2 is 2 marks)

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3 Given f(x) = 2x + 1 and g(x) = x^2, write down (f o g)(x) in simplified form.

(Total for Question 3 is 2 marks)

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4 Find the inverse function $f^{-1}(x)$ for f(x) = (x + 6)/4.

(Total for Question 4 is 2 marks)

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5 Let $f(x) = 2x + 3$.

(a) Find $f^{-1}(x)$. **(2)**

(b) Verify that $(f \circ f^{-1})(x) = x$. **(1)**

(Total for Question 5 is 3 marks)

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6 $f(x) = (x + 6)/4$. Work out $f^{-1}(7)$.

(Total for Question 6 is 2 marks)

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7 $f(x) = -2x + 4$ and $g(x) = -5x + 5$. Find $gf(x)$. Give your answer in its simplest form.

(Total for Question 7 is 3 marks)

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8 $f(x) = -5/(x - 3)$, x not equal to 3. Find the inverse function $f^{-1}(x)$.

(Total for Question 8 is 3 marks)

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9 $f(x) = (x + 8)^2$, $x \geq -8$. Find the inverse function $f^{-1}(x)$.

(Total for Question 9 is 3 marks)

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10 $f(x) = 3x + 4$ and $g(x) = 2x + 2$. Solve $fg(x) = 34$.

(Total for Question 10 is 3 marks)

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11 $f(x) = -3x + 2$ and $g(x) = -5x - 1$. Solve $fg(x) = 35$.

(Total for Question 11 is 3 marks)

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12 $f(x) = x^2 - 4$, $x \geq 0$. Find the inverse function $f^{-1}(x)$.

(Total for Question 12 is 3 marks)

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13 $f(x) = x^2 + 1$, $x \geq 0$. Find the inverse function $f^{-1}(x)$.

(Total for Question 13 is 3 marks)

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14 $f(x) = x^2 - 7$, $x \geq 0$. Find the inverse function $f^{-1}(x)$.

(Total for Question 14 is 3 marks)

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15 Show that the inverse of $f(x) = 5x - 8$ is $f^{-1}(x) = (x + 8)/5$. Give full working.

(Total for Question 15 is 3 marks)

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16 Let $f(x) = 3x - 4$.

(a) Find $f^{-1}(x)$. **(2)**

(b) Calculate $(f^{-1} \text{ o } f)(5)$. **(1)**

(Total for Question 16 is 3 marks)

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17 Let $f(x) = (2x + 1)/3$ and $g(x) = 3x - 1$.
Find $(f^{-1} \text{ o } g)(2)$.

(Total for Question 17 is 3 marks)

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Mark scheme · 7.9 Inverse and Composite Functions: Test Pack

Question 1

7 cao **B1**

Answer: 7

Question 2

substitute g(2)=3*2=6 and use f(6)=6+4 or equivalent method **M1**

10 cao **A1**

Answer: 10

Question 3

substitute $g(x)=x^2$ into f to get $2*(x^2)+1$ or equivalent **M1**

$2x^2 + 1$ cao **A1**

Answer: $2x^2 + 1$

Question 4

set y=(x+6)/4, swap x and y and solve for y or equivalent **M1**

$f^{-1}(x) = 4x - 6$ cao **A1**

Answer: $f^{-1}(x) = 4x - 6$

Question 5

(a) set y = 2x + 3, swap and solve or equivalent **M1**

(a) $f^{-1}(x) = (x - 3)/2$ cao **A1**

(a) Answer: $f^{-1}(x) = (x - 3)/2$

(b) $f(f^{-1}(x)) = x$ cao **B1**

(b) Answer: $f(f^{-1}(x)) = x$

Question 6

$7 = (x + 6)/4$ or finds $f^{-1}(x)$ **M1**

22 **A1**

Answer: 22

Question 7

substitutes f(x) into g **M1**

expands brackets **M1**

10x - 15 **A1**

Answer: 10x - 15

Question 8

writes y = f(x) and attempts to rearrange for x **M1**

correct rearrangement **M1**

-5/x + 3 oe **A1**

Answer: -5/x + 3

Question 9

writes y = f(x) and rearranges **M1**

takes the positive square root **M1**

$\sqrt{x}$ - 8 oe **A1**

Answer: $\sqrt{x}$ - 8

Question 10

fg(x) = 3(2x + 2) + 4 **M1**

6x + 10 = 34 and attempts to solve **M1**

x = 4 **A1**

Answer: x = 4

Question 11

fg(x) = -3(-5x - 1) + 2 **M1**

15x + 5 = 35 and attempts to solve **M1**

x = 2 **A1**

Answer: x = 2

Question 12

writes y = f(x) and rearranges **M1**

takes the positive square root **M1**

$\sqrt{x + 4}$ oe **A1**

Answer: $\sqrt{x + 4}$

Question 13

writes y = f(x) and rearranges **M1**

takes the positive square root **M1**

$\sqrt{x - 1}$ oe **A1**

Answer: $\sqrt{x - 1}$

Question 14

writes y = f(x) and rearranges **M1**

takes the positive square root **M1**

$\sqrt{x + 7}$ oe **A1**

Answer: $\sqrt{x + 7}$

Question 15

set y = 5x - 8 and swap x and y or equivalent **M1**

rearrange to get x = 5y - 8 then solve y = (x + 8)/5 **M1**

$f^{-1}(x) = (x + 8)/5$ cso **A1**

Answer: $f^{-1}(x) = (x + 8)/5$

Question 16

(a) set y = 3x - 4, swap and solve or equivalent **M1**

(a) $f^{-1}(x) = (x + 4)/3$ cao **A1**

(a) Answer: $f^{-1}(x) = (x + 4)/3$

(b) 5 cao **A1**

(b) Answer: 5

Question 17

find inverse: $f^{-1}(x) = (3x - 1)/2$ or equivalent **M1**

compute g(2) = 3*2 - 1 = 5 **M1**

$(f^{-1}$ o g)(2) = 7 cao **A1**

Answer: 7

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