



7.9D Inverse and Composite Functions: Fluency and Exam Drill

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 50 minutes

Total Marks

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)

- 2 Work out $g(3)$ for $g(x) = x^2 - 1$.

(Total for Question 2 is 1 mark)

- 3 Work out $h(0)$ for $h(x) = 4x - 5$.

(Total for Question 3 is 1 mark)

- 4 Work out $f(-2)$ for $f(x) = 2x^2$.

(Total for Question 4 is 1 mark)

- 5 Let $f(x) = x + 4$ and $g(x) = 3x$.
Find $(f \circ g)(2)$.

(Total for Question 5 is 2 marks)

- 6** Let $f(x) = x^2$ and $g(x) = x + 1$.
Find $(g \circ f)(3)$.

(Total for Question 6 is 2 marks)

- 7** Given $f(x) = 2x + 1$ and $g(x) = x^2$, write down $(f \circ g)(x)$ in simplified form.

(Total for Question 7 is 2 marks)

- 8** Let $f(x) = x - 5$ and $g(x) = 3x + 2$.

(a) Find $(g \circ f)(x)$.

(b) Find $(f \circ g)(x)$.

(a) Find $(g \circ f)(x)$.

(2)

(b) Find $(f \circ g)(x)$.

(2)

(Total for Question 8 is 4 marks)

- 9** Find the inverse function $f^{-1}(x)$ for $f(x) = 3x + 4$. Give the inverse in terms of x .

(Total for Question 9 is 2 marks)

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

(Total for Question 10 is 2 marks)

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

(Total for Question 11 is 3 marks)

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

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

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

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

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

(Total for Question 12 is 3 marks)

13 Find the inverse function $f^{-1}(x)$ for $f(x) = (x - 1)/(x + 2)$. Give the answer in simplified form and state any restriction on x for f^{-1} .

(Total for Question 13 is 4 marks)

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

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

(b) Calculate $(f^{-1} \circ f)(5)$.

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

(2)

(b) Calculate $(f^{-1} \circ f)(5)$.

(1)

(Total for Question 14 is 3 marks)

15 Let $f(x) = 4x - 7$ and $g(x) = x^2$.

Solve $(f \circ g)(x) = 17$. Give all real solutions.

(Total for Question 15 is 2 marks)

16 Let $f(x) = (2x + 1)/3$ and $g(x) = 3x - 1$.

Find $(f^{-1} \circ g)(2)$.

(Total for Question 16 is 3 marks)

Mark scheme · 7.9D Inverse and Composite Functions: Fluency and Exam Drill

Question 1

- **B1** 7 cao
- **Answer:** 7

Question 2

- **B1** 8 cao
- **Answer:** 8

Question 3

- **B1** -5 cao
- **Answer:** -5

Question 4

- **B1** 8 cao
- **Answer:** 8

Question 5

- **M1** substitute $g(2)=3 \times 2=6$ and use $f(6)=6+4$ or equivalent method
- **A1** 10 cao
- **Answer:** 10

Question 6

- **M1** compute $f(3)=9$ then $g(9)=9+1$ or equivalent
- **A1** 10 cao
- **Answer:** 10

Question 7

- **M1** substitute $g(x)=x^2$ into f to get $2 \times (x^2)+1$ or equivalent
- **A1** $2x^2 + 1$ cao
- **Answer:** $2x^2 + 1$

Question 8

- (a) **M1** substitute $f(x)$ into g : $g(f(x))=3(x-5)+2$ or equivalent
- (a) **A1** $3x - 13$ cao
- (a) **Answer:** $3x - 13$
- (b) **M1** substitute $g(x)$ into f : $f(g(x))=(3x+2)-5$ or equivalent
- (b) **A1** $3x - 3$ cao
- (b) **Answer:** $3x - 3$

Question 9

- **M1** method: set $y=3x+4$, swap x and y and solve for y or equivalent
- **A1** $f^{-1}(x) = (x - 4)/3$ cao
- **Answer:** $f^{-1}(x) = (x - 4)/3$

Question 10

- **M1** set $y=(x+6)/4$, swap x and y and solve for y or equivalent
- **A1** $f^{-1}(x) = 4x - 6$ cao
- **Answer:** $f^{-1}(x) = 4x - 6$

Question 11

- **M1** set $y = 5x - 8$ and swap x and y or equivalent
- **M1** rearrange to get $x = 5y - 8$ then solve $y = (x + 8)/5$
- **A1** $f^{-1}(x) = (x + 8)/5$ cso
- **Answer:** $f^{-1}(x) = (x + 8)/5$

Question 12

- (a) **M1** set $y = 2x + 3$, swap and solve or equivalent
- (a) **A1** $f^{-1}(x) = (x - 3)/2$ cao
- (a) **Answer:** $f^{-1}(x) = (x - 3)/2$
- (b) **B1** $f(f^{-1}(x)) = x$ cao
- (b) **Answer:** $f(f^{-1}(x)) = x$

Question 13

- **M1** set $y = (x - 1)/(x + 2)$ and multiply both sides by $(x + 2)$ or equivalent
- **M1** rearrange to get terms with x and y on correct sides, e.g. $yx + 2y = x - 1$
- **M1** isolate x : $x(y - 1) = -(1 + 2y)$ and solve for x
- **A1** $f^{-1}(x) = (1 + 2x)/(1 - x)$ cao; $x \neq 1$ stated
- **Answer:** $f^{-1}(x) = (1 + 2x)/(1 - x)$; restriction $x \neq 1$

Question 14

- (a) **M1** set $y = 3x - 4$, swap and solve or equivalent
- (a) **A1** $f^{-1}(x) = (x + 4)/3$ cao
- (a) **Answer:** $f^{-1}(x) = (x + 4)/3$
- (b) **A1** 5 cao
- (b) **Answer:** 5

Question 15

- **M1** form equation $4x^2 - 7 = 17$ and solve to $x^2 = 6$ or equivalent
- **A1** $x = \pm\sqrt{6}$ cao
- **Answer:** $x = \pm\sqrt{6}$

Question 16

- **M1** find inverse: $f^{-1}(x) = (3x - 1)/2$ or equivalent
- **M1** compute $g(2) = 3 \cdot 2 - 1 = 5$
- **A1** $(f^{-1} \circ g)(2) = 7$ cao
- **Answer:** 7