HIGHER

2.2 Functions: Composite and Inverse Functions: 30-minute Pack

Total Marks

EDEXCEL 4MA1 · Calculator allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 $g(x) = x^2 + 2$
$h(x) = -3x - 2$
Find $gh(2)$.

(Total for Question 1 is 3 marks)

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2 $f(x) = 5x + 4$
(a) Find $f^{-1}(x)$.
(b) Solve $f(x) = f^{-1}(x)$.

(Total for Question 2 is 4 marks)

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3 $f(x) = 3x + 1$
$g(x) = x^2 + 5$
Solve $fg(x) = 19$.

(Total for Question 3 is 4 marks)

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4 $f(x) = -3x + 1$
$g(x) = 3x - 4$
Find $fg(x)$. Give your answer in its simplest form.

(Total for Question 4 is 3 marks)

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5 $g(x) = -x - 7$
$h(x) = -2x - 4$
Find $gh(-3)$.

(Total for Question 5 is 3 marks)

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6 $f(x) = 2x + 1$
(a) Find $f^{-1}(x)$.
(b) Solve $f(x) = f^{-1}(x)$.

(Total for Question 6 is 4 marks)

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7 Find the inverse of the function $g(x) = (x - 4)/2$ by swapping variables and rearranging, for the function g named here. Give $g^{-1}(x)$ in simplest form.

(Total for Question 7 is 3 marks)

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Mark scheme · 2.2 Functions: Composite and Inverse Functions: 30-minute Pack

Question 1

h(2) = -8	**M1**
g(-8)	**M1**
gh(2) = 66	**A1**

Answer: gh(2) = 66

Question 2

y = 5x + 4 and rearranges for x	**M1**
$f^{-1}(x) = (x - 4)/5$	**A1**
sets $5x + 4 = (x - 4)/5$	**M1**
x = -1	**A1**

Answer: (a) $f^{-1}(x) = (x - 4)/5$; (b) x = -1

Question 3

$fg(x) = 3x^2 + 16$	**M1**
rearranges $3x^2 + 16 = 19$ to $3x^2 - 3 = 0$ or isolates the squared term	**M1**
takes both square roots or factorises	**M1**
x = -1 or x = 1	**A1**

Answer: x = -1 or x = 1

Question 4

substitutes the inner function into the outer: f(g(x)) = f(3x - 4)	**M1**
expands brackets and collects like terms	**M1**
fg(x) = -9x + 13 cao	**A1**

Answer: fg(x) = -9x + 13

Question 5

h(-3) = 2	**M1**
g(2)	**M1**
gh(-3) = -9	**A1**

Answer: gh(-3) = -9

Question 6

y = 2x + 1 and rearranges for x	**M1**
$f^{-1}(x) = (x - 1)/2$	**A1**
sets $2x + 1 = (x - 1)/2$	**M1**
x = -1	**A1**

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

Question 7

starts with y = (x - 4)/2 and swaps x and y to x = (y - 4)/2 or equivalent	**M1**
rearranges to y = 2x + 4	**M1**
$g^{-1}(x) = 2x + 4$ cao	**A1**

Answer: $g^{-1}(x) = 2x + 4$

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