Inverse Functions - Worksheet

Skill

Group A - Inverse functions of linear expressions

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

1) $f(x) = 6x + 5$

2) $f(x) = 6x - 3$

3) $f(x) = 7x - 7$

4) $f(x) = 7x - 4$

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

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

7) $f(x) = 5x + 2$

8) $f(x) = 3x + 7$

9) $f(x) = 6x - 9$

10) $f(x) = 4x + 7$

11) $f(x) = 3x - 6$

12) $f(x) = 8x + 8$

Group B - Inverse functions with powers and roots

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

1) $f(x) = \sqrt{\frac{x-4}{3}}$

2) $f(x) = \sqrt{\frac{x-2}{6}}$

3) $f(x) = \sqrt{\frac{x+7}{3}}$

4) $f(x) = \sqrt{\frac{x-5}{2}}$

5) $f(x) = \frac{\sqrt{x+5}}{5}$

6) $f(x) = \frac{\sqrt{x-9}}{3}$

7) $f(x) = \frac{\sqrt{x+4}}{7}$

8) $f(x) = \frac{\sqrt{x+3}}{2}$

9) $f(x) = (x - 7)^3$

10) $f(x) = (x + 7)^3$

11) $f(x) = (x + 6)^3$

12) $f(x) = (x - 6)^3$

Group C - Inverse functions with fractions

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

1) $f(x) = \frac{5x-8}{4}$

2) $f(x) = \frac{6x-3}{7}$

3) $f(x) = \frac{8x+9}{7}$

4) $f(x) = \frac{7x-4}{9}$

5) $f(x) = \frac{8x-3}{6}$

6) $f(x) = \frac{x}{4} + 5$

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

8) $f(x) = \frac{x}{5} - 4$

9) $f(x) = \frac{x}{8} + 8$

10) $f(x) = \frac{3x-7}{x+5}$

11) $f(x) = \frac{4x+7}{2x+8}$

12) $f(x) = \frac{5x+4}{6x-14}$

Inverse Functions - Worksheet

Applied

1) **(a)** Given that $f(x) = 2x + 4$ find $f^{-1}(x)$.

(b) Given that $g(x) = 3x - 5$ find $g^{-1}(x)$.

(c) Solve $f^{-1}(x) = g^{-1}(x)$.

2) **(a)** Given that $f(x) = x + 6$ find $f^{-1}(5)$.

(b) Given that $g(x) = 2x - 5$ find $g^{-1}(5)$.

(c) Calculate $g^{-1}(5) - f^{-1}(5)$

(d) Calculate $g^{-1}(5) + f^{-1}(5)$

3) **(a)** Given that $g(x) = 6x - 7$, find $g^{-1}(x)$.

(b) Find $g^{-1}(-2)$

4) A function is given by $f(x) = 4x + 5$.
Complete the table below.

Input	Answer
$f^{-1}(2)$	$-\frac{3}{4}$
$f^{-1}(3)$	
$f^{-1}(-2)$	
	$\frac{1}{2}$
$f^{-1}(a)$	

Inverse Functions - Worksheet

1) Given that $f(x) = x - 8$, find

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

.....

(1)

(b) $f^{-1}(4)$

.....

(2)

(3 marks)

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2) Given that $f(x) = \frac{x+8}{5}$, find

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

.....

(2)

(b) $f^{-1}(10)$

.....

(2)

(4 marks)

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3) Functions f and g are defined by $f(x) = 3x + 5$ and $g(x) = 2x + 4$.

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

.....

(2)

Inverse Functions - Worksheet

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

.....

(2)

(c) Find the value of x when $f^{-1}(x) = g^{-1}(x)$.

.....

(3)

(7 marks)

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4) **(a)** The function f is such that $f(x) = 4x - 7$.

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

.....

(2)

(b) Solve $f^{-1}(x) = 15$.

.....

(3)

(5 marks)

Inverse Functions - Answers

	Question	Answer
	Skill Questions	
Group A	Find $f^{-1}(x)$:	
	1) $f(x) = 6x + 5$	**1)** $f^{-1}(x) = \frac{x-5}{6}$
	2) $f(x) = 6x - 3$	**2)** $f^{-1}(x) = \frac{x+3}{6}$
	3) $f(x) = 7x - 7$	**3)** $f^{-1}(x) = \frac{x+7}{7}$
	4) $f(x) = 7x - 4$	**4)** $f^{-1}(x) = \frac{x+4}{7}$
	5) $f(x) = 3x + 2$	**5)** $f^{-1}(x) = \frac{x-2}{3}$
	6) $f(x) = 4x - 3$	**6)** $f^{-1}(x) = \frac{x+3}{4}$
	7) $f(x) = 5x + 2$	**7)** $f^{-1}(x) = \frac{x-2}{5}$
	8) $f(x) = 3x + 7$	**8)** $f^{-1}(x) = \frac{x-7}{3}$
	9) $f(x) = 6x - 9$	**9)** $f^{-1}(x) = \frac{x+9}{6}$
	10) $f(x) = 4x + 7$	**10)** $f^{-1}(x) = \frac{x-7}{4}$
	11) $f(x) = 3x - 6$	**11)** $f^{-1}(x) = \frac{x+6}{3}$
	12) $f(x) = 8x + 8$	**12)** $f^{-1}(x) = \frac{x-8}{8}$

Inverse Functions - Answers

Group B	Find $f^{-1}(x)$:	
	1) $f(x) = \sqrt{\frac{x-4}{3}}$	**1)** $f^{-1}(x) = 3x^2 + 4$
	2) $f(x) = \sqrt{\frac{x-2}{6}}$	**2)** $f^{-1}(x) = 6x^2 + 2$
	3) $f(x) = \sqrt{\frac{x+7}{3}}$	**3)** $f^{-1}(x) = 3x^2 - 7$
	4) $f(x) = \sqrt{\frac{x-5}{2}}$	**4)** $f^{-1}(x) = 2x^2 + 5$
	5) $f(x) = \frac{\sqrt{x+5}}{5}$	**5)** $f^{-1}(x) = 25x^2 - 5$
	6) $f(x) = \frac{\sqrt{x-9}}{3}$	**6)** $f^{-1}(x) = 9x^2 + 9$
	7) $f(x) = \frac{\sqrt{x+4}}{7}$	**7)** $f^{-1}(x) = 49x^2 - 4$
	8) $f(x) = \frac{\sqrt{x+3}}{2}$	**8)** $f^{-1}(x) = 4x^2 - 3$
	9) $f(x) = (x - 7)^3$	**9)** $f^{-1}(x) = \sqrt[3]{x} + 7$
	10) $f(x) = (x + 7)^3$	**10)** $f^{-1}(x) = \sqrt[3]{x} - 7$
	11) $f(x) = (x + 6)^3$	**11)** $f^{-1}(x) = \sqrt[3]{x} - 6$
	12) $f(x) = (x - 6)^3$	**12)** $f^{-1}(x) = \sqrt[3]{x} + 6$

Inverse Functions - Answers

Group C	Find $f^{-1}(x)$:	
	1) $f(x) = \frac{5x-8}{4}$	**1)** $f^{-1}(x) = \frac{4x+8}{5}$
	2) $f(x) = \frac{6x-3}{7}$	**2)** $f^{-1}(x) = \frac{7x+3}{6}$
	3) $f(x) = \frac{8x+9}{7}$	**3)** $f^{-1}(x) = \frac{7x-9}{8}$
	4) $f(x) = \frac{7x-4}{9}$	**4)** $f^{-1}(x) = \frac{9x+4}{7}$
	5) $f(x) = \frac{8x-3}{6}$	**5)** $f^{-1}(x) = \frac{6x+3}{8}$
	6) $f(x) = \frac{x}{4} + 5$	**6)** $f^{-1}(x) = 4(x - 5) = 4x - 20$
	7) $f(x) = \frac{x}{3} + 4$	**7)** $f^{-1}(x) = 3(x - 4) = 3x - 12$
	8) $f(x) = \frac{x}{5} - 4$	**8)** $f^{-1}(x) = 5(x + 4) = 5x + 20$
	9) $f(x) = \frac{x}{8} + 8$	**9)** $f^{-1}(x) = 8(x - 8)$
	10) $f(x) = \frac{3x-7}{x+5}$	**10)** $f^{-1}(x) = \frac{-7-5x}{x-3}$ **or** $\frac{7+5x}{3-x}$
	11) $f(x) = \frac{4x+7}{2x+8}$	**11)** $f^{-1}(x) = \frac{7-8x}{2x-4}$
	12) $f(x) = \frac{5x+4}{6x-14}$	**12)** $f^{-1}(x) = \frac{4+14x}{6x-5}$

Inverse Functions - Answers

<table>
<tr><th></th><th>Question</th><th>Answer</th></tr>
<tr><td></td><td>Applied Questions</td><td></td></tr>
<tr><td>1)</td><td>a) Given that $f(x) = 2x + 4$ find $f^{-1}(x)$.
b) Given that $g(x) = 3x - 5$ find $g^{-1}(x)$.
c) Solve $f^{-1}(x) = g^{-1}(x)$.</td><td>a) $f^{-1}(x) = \frac{x-4}{2}$
b) $g^{-1}(x) = \frac{x+5}{3}$
c) $x = 22$</td></tr>
<tr><td>2)</td><td>a) Given that $f(x) = x + 6$ find $f^{-1}(5)$.
b) Given that $g(x) = 2x - 5$ find $g^{-1}(5)$.
c) Calculate $g^{-1}(5) - f^{-1}(5)$
d) Calculate $g^{-1}(5) + f^{-1}(5)$</td><td>a) $f^{-1}(5) = -1$
b) $g^{-1}(5) = 5$
c) $5 -- 1 = 6$
d) $5 +- 1 = 4$</td></tr>
<tr><td>3)</td><td>a) Given that $g(x) = 6x - 7$, find $g^{-1}(x)$.
b) Find $g^{-1}(-2)$</td><td>a) $g^{-1}(x) = \frac{x+7}{6}$
b) $g^{-1}(-2) = \frac{-2+7}{6} = \frac{5}{6}$</td></tr>
<tr><td>4)</td><td>A function is given by $f(x) = 4x + 5$.
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<tr><td>$f^{-1}(a)$</td><td>$\frac{a-5}{4}$</td></tr>
</table></td></tr>
</table>

Inverse Functions - Answers

	Question	Answer	
	Exam Questions		
1) (a)	Given that $f(x) = x - 8$. Find $f^{-1}(x)$	**(a)** $f^{-1}(x) = x + 8$	**(1)**
(b)	Find $f^{-1}(4)$	**(b)** $4 + 8$ 12	**(1)** **(1)**
2) (a)	Given that $f(x) = \frac{x+8}{5}$. Find $f^{-1}(x)$	**(a)** $5x$ **seen** $f^{-1}(x) = 5x - 8$	**(1)** **(1)**
(b)	Find $f^{-1}(10)$	**(b)** $5 \times 10 - 8$ 42	**(1)** **(1)**
3) (a)	Functions f and g are defined by $f(x) = 3x + 5$ and $g(x) = 2x + 4$. Find $f^{-1}(x)$	**(a)** $x - 5$ **seen** $f^{-1}(x) = \frac{x-5}{3}$	**(1)** **(1)**
(b)	Find $g^{-1}(x)$	**(b)** $x - 4 = 2y$ oe $g^{-1}(x) = \frac{x-4}{2}$	**(1)** **(1)**
(c)	Find the value of x when $f^{-1}(x) = g^{-1}(x)$.	**(c)** $\frac{x-5}{3} = \frac{x-4}{2}$ $2(x - 5) = 3(x - 4)$ $2x - 10 = 3x - 12$ $x = 2$	**(1)** **(1)** **(1)**
4) (a)	The function f is such that $f(x) = 4x - 7$. Find $f^{-1}(x)$.	**(a)** $x + 7$ **seen** $f^{-1}(x) = \frac{x+7}{4}$	**(1)** **(1)**
(b)	Solve $f^{-1}(x) = 15$.	**(b)** $\frac{x+7}{4} = 15$ $x + 7 = 60$ $x = 53$	**(1)** **(1)** **(1)**