6-7 Inverse Relations and Functions **Algebra 2** **THOMPSON**

To get INVERSE: switch x and y then solve for y. y is f(x) $f^{-1}(x)$ is the inverse

1. Find the inverse of the function. Is the inverse a function?

$f(x) = 9x - 5$

$x = 9y - 5$ switch x and y and move -5 to the left

$x + 5 = 9y$ divide by 9

$\frac{x+5}{9} = f^{-1}(x)$

Is the inverse a function?

- [x] Yes
- [ ] No

2) Find the inverse of the function. Is the inverse a function?

$y = 6x - 5$

$x = 6y - 5$ switch x and y and move -5 to the left

$x + 5 = 6y$ divide by 6

$\frac{x+5}{6} = f^{-1}(x)$

Is the inverse a function?

- [x] Yes
- [ ] No

3) Find the inverse of the function. Is the inverse a function?

$f(x) = (x + 6)^2$

$x = (y + 6)^2$ switch x and y

then take square of left

$\pm\sqrt{x} = y + 6$ move 6 to the left

$\pm\sqrt{x} - 6 = f^{-1}(x)$

Choose the correct answer for the inverse below.

- [ ] A. $f^{-1}(x) = \pm\sqrt{x - 6}$
- [ ] B. $f^{-1}(x) = \sqrt{x} + 6$
- [x] C. $f^{-1}(x) = \pm\sqrt{x} - 6$
- [ ] D. $f^{-1}(x) = x^2 - 6$

Is the inverse a function?

not a function because has square root

- [ ] Yes
- [x] No

4) Find the inverse of the function. Is the inverse a function?

$y = 8x - 7$

$x = 8y - 7$ switch x and y and move -7 to the left

$x + 7 = 8y$ divide by 8

$\frac{x+7}{8} = f^{-1}(x)$

Is the inverse a function?

- (•) Yes
- ( ) No

5) Find the inverse of the function. Is the inverse a function?

$y = 6x - 1$

$x = 6y - 1$ switch x and y and move -1 to the left

$x + 1 = 6y$ divide by 6

$\frac{x+1}{6} = f^{-1}(x)$

Is the inverse a function?

- (•) Yes
- ( ) No

6) Graph the relation and its inverse.

$y = 2x + 2$

Use the graphing tool to graph the lines.

Click on the graph tool

Plot 2 on y axis (0,2)

then up 2, right 1 (1,4)

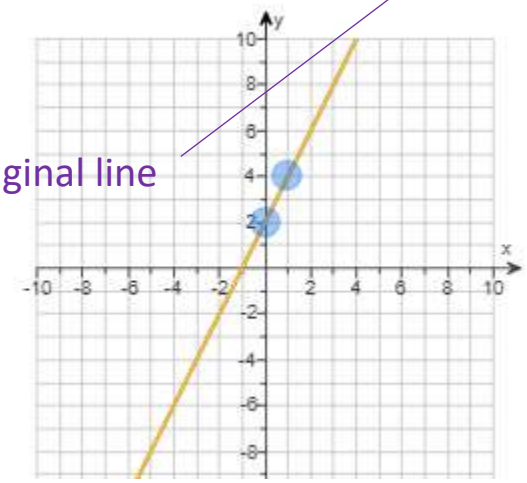
then plot inverse line

Switch x and y from original points: (2,0) (4,1)

click save and check

Plot original line

click on line



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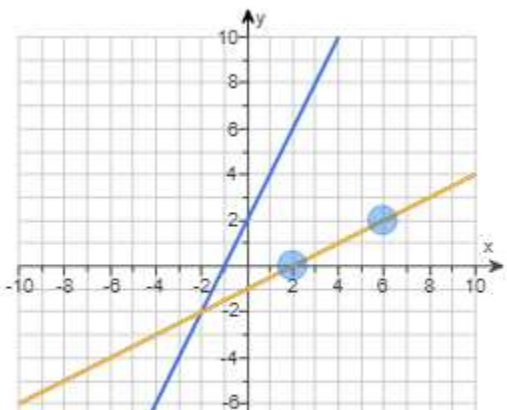
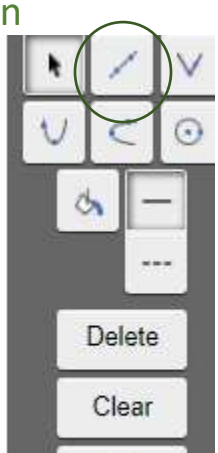




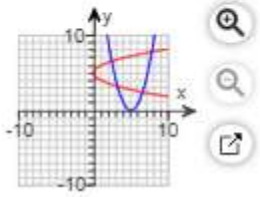
7) Graph the relation and its inverse.

$y = (x - 5)^2$

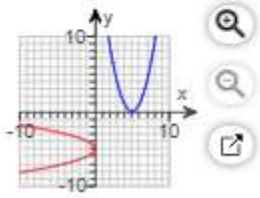
Original in blue-shifted right 5, red graph shifted up 5 (opposite)

Choose the correct graph of the relation (blue) and its inverse (red) below.

A.



B.



8) What is f(2) for the function $f(x) = 3x + 9$?

plug 2 in for x $\rightarrow 3(2) + 9 = 15$

9) Given the function h described by $h(x) = x + 16$, find each of the following.

$h(0) =$ 0 + 16 = 16

$h(-6) =$ -6 + 16 = 10

$h(-12) =$ -12 + 16 = 4

$h(18) =$ 18 + 16 = 34

$h(x + 16)$ (x+16) + 16 = x + 32

10) Given the function g described by $g(x) = 3x$, find each of the following.

(a) $g(-1)$ 3(-1) = -3
(b) $g(19)$ 3(19) = 57
(c) $g(24)$ 3(24) = 72

11) Given the function $h(r) = 3r + 5$, find each of the following.

$h(6) =$ $3(6) + 5 = 23$

$h(-8) =$ $3(-8) + 5 = -19$

$h(6.3) =$ $3(6.3) + 5 = 23.9$

12) Find the indicated outputs for $f(x) = 5x^2 - 2x$.

$f(0) =$ $5(0)^2 - 2(0) = 0$

$f(-1) =$ $5(-1)^2 - 2(-1) = 7$

$f(2) =$ $5(2)^2 - 2(2) = 16$

13) Find the function values for $f(x) = x^3$.

a) $f(0)$ **b)** $f(-1)$
c) $f(4)$ **d)** $f(10)$
e) $f(-3)$ **f)** $f(-5a)$

a) $f(0) =$ $(0)^3 = 0$

b) $f(-1) =$ $(-1)^3 = -1$

c) $f(4) =$ $(4)^3 = 64$

d) $f(10) =$ $(10)^3 = 1000$

e) $f(-3) =$ $(-3)^3 = -27$

f) $f(-5a) =$ $(-5a)^3 = -125a^3$

14) Given the function f described by $f(d) = -5d + 6$, find the following.

$f(d + 11)$ $-5(d+11) + 6$

$-5d - 55 + 6 = -5d - 49$

15) Given the function f described by $f(d) = -3d + 6$, find the following.

$f(5d + 1)$ $-3(5d+1) + 6$

$-15d - 3 + 6 = -15d + 3$

16) Given the function h described by $h(x) = x + 7$, find each of the following

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$h(0) =$ $(0) + 7 = 7$

$h(-3) =$ $(-3) + 7 = 4$

$h(-11) =$ $(-11) + 7 = -4$

$h(14) =$ $(14) + 7 = 21$

$h(x + 11) =$ $(x+11) + 7 = x + 18$

17) Given the function g described by $g(x) = 7x$, find each of the following.

$g(-18) =$ $7(-18) = -126$

$g(15) =$ $7(15) = 105$

$g(32) =$ $7(32) = 224$

18) Given the function $g(s) = 7s + 5$, find each of the following.

$g(10) =$ $7(10) + 5 = 75$

$g(-1) =$ $7(-1) + 5 = -2$

$g(6.8) =$ $7(6.8) + 5 = 52.6$

19) Find the indicated outputs for $f(x) = 2x^2 - 2x$.

$f(0) =$ $2(0)^2 - 2(0) = 0$

$f(-1) =$ $2(-1)^2 - 2(-1) = 4$

$f(2) =$ $2(2)^2 - 2(2) = 4$

20) Given the function f described by $f(c) = -5c + 6$, find the following.

$f(c + 18)$ $-5(c+18) + 6$

$-5c - 90 + 6 = -5d - 86$

21) Find the inverse of the function. Is the inverse a function?

$f(x) = 8x - 3$ $x = 8y - 3$ switch x and y and move -3 to the left

$x + 3 = 8y$ divide by 8

$\frac{x+3}{8} = f^{-1}(x)$

Is the inverse a function?

- [x] Yes
- [ ] No

22) Find the inverse of the function. Is the inverse a function?

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

$x = (y + 2)^2$ switch x and y

then take square of left

$\pm\sqrt{x} = y + 2$ move 6 to the left

$\pm\sqrt{x} - 2 = f^{-1}(x)$

Choose the correct answer for the inverse below.

- [ ] A. $f^{-1}(x) = \sqrt{x} + 2$
- [ ] B. $f^{-1}(x) = \pm\sqrt{x - 2}$
- [ ] C. $f^{-1}(x) = x^2 - 2$
- [x] D. $f^{-1}(x) = \pm\sqrt{x} - 2$

not a function because has square root

Is the inverse a function?

- [x] No
- [ ] Yes

22) Find the inverse of the function. Is the inverse a function?

$y = 4x - 8$ $x = 4y - 8$ switch x and y and move -8 to the left

$x + 8 = 4y$ divide by 4

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

$y = \frac{x+8}{4}$ (Simplify your answer.)

Is the inverse a function?

- (★) Yes
- ( ) No

24) Graph the relation and its inverse.

$y = 2x - 4$

Plot original line

Click on the graph tool

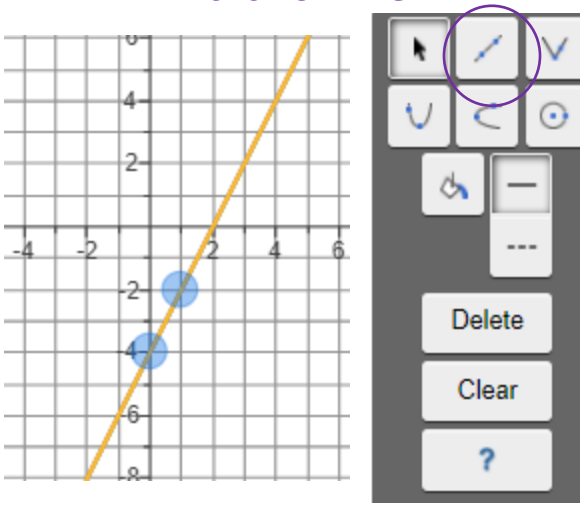
Plot -4 on y axis (0,-4)
then up 2, right 1 (1,-2)

then plot inverse line

Switch x and y from original points: (-4,0) (-2,1)

click save and check

click on line



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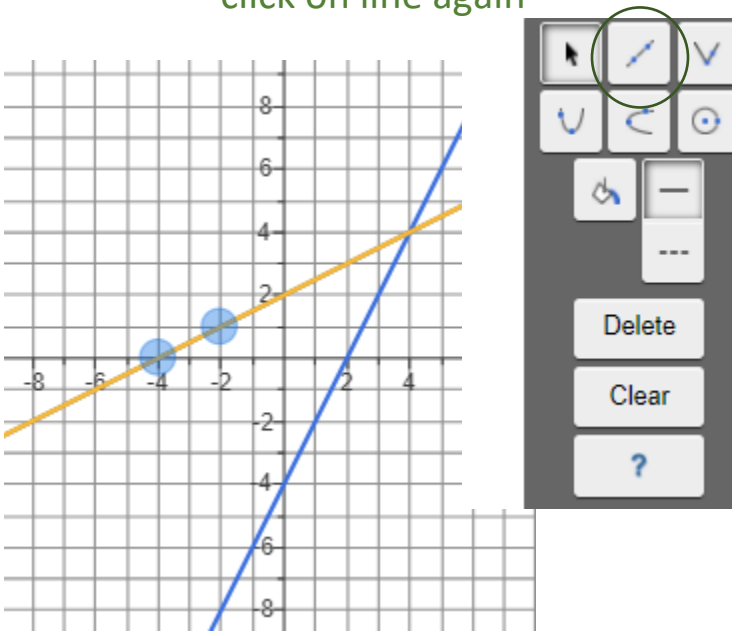

25) Graph the relation and its inverse.

$y = (x - 4)^2$ Original in blue-shifted right 4, red graph shifted up 4 (opposite)

Choose the correct graph of the relation (blue) and its inverse (red) below.