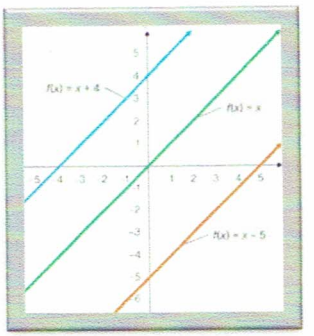
Transformation Rules for Functions MATCHING GAME



STANDARD: TEKS A.3(E) Determine the effects on the graph of the parent function $f(x) = x$ when $f(x)$ is replaced by $af(x), f(x) + d, f(x - c)$ for specific values of a, b, c, d.

CCSS.MATH.CONTENT.HSF.BF.B.3 Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs.

PLAYERS: 1-4

MATERIALS:

- 1 set of Transformation Rule Cards
- Answer Key for Game & Worksheets
- Linear Equation Worksheets
- Clickers or noise makers, one per pair or per player

DIRECTIONS:

1. It takes 3 cards to make a set. A FUNCTION NOTATION CARD, a TYPE OF TRANSFORMATION CARD, and a CHANGE TO THE COORDINATE POINT CARD.
2. Arrange the smaller set of cards face down in one array AND the longer set of cards face down in another array so that student pairs can reach them.
3. Have a pair of students each turn over 1 card and determine if the two cards are a match.
4. If the cards are a match, then they keep the cards. The player may then turn over one of the CHANGE TO THE COORDINATE POINT CARDS to find a match.
5. Two matching cards make a pair and the players may keep the cards, but until ALL THREE cards are found, they matching pair may be stolen by another set of players.
6. Players may "steal" a pair by "clicking" and telling how they know they have a 3-card match.
7. If there is no match, then play continues with the next pair of students.
8. Once a card is turned over, it remains face up until it is matched with at least one other card.
9. Continue with the remaining cards.

Vertical translation ***up d*** units	$f(x) + d$
Vertical translation ***down d*** units	$f(x) - d$
Horizontal translation ***left c*** units	$f(x + c)$
Horizontal translation ***right c*** units	$f(x - c)$
Reflection over the ***x-axis***	$-f(x)$

Vertical ***stretch*** for $\boldsymbol{\lvert a \rvert > 1}$	$af(x)$
Vertical ***compression*** for $\boldsymbol{0 < \lvert a \rvert < 1}$	$af(x)$
Horizontal ***compression*** for $\boldsymbol{\lvert b \rvert < 1}$	$f(bx)$
Horizontal ***stretch*** for $\boldsymbol{0 < \lvert b \rvert < 1}$	$f(bx)$
Reflection over the ***y-axis***	$f(-x)$

$$(x, y) \rightarrow (x, y + d)$$

$$(x, y) \rightarrow (x, y - d)$$

$$(x, y) \rightarrow (x - c, y)$$

$$(x, y) \rightarrow (x, -y)$$

$$(x, y) \rightarrow (-x, y)$$

$$(x, y) \rightarrow (x, ay)$$

$$(x, y) \rightarrow (x, ay)$$

$$(x, y) \rightarrow (\frac{x}{b}, y)$$

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Transformation Rules for Functions ANSWER KEY

Transformation Rules for Functions		
Function Notation	Type of Transformation	Change to Coordinate Point
$f(x) + d$	Vertical translation up d units	$(x, y) \rightarrow (x, y + d)$
$f(x) - d$	Vertical translation down d units	$(x, y) \rightarrow (x, y - d)$
$f(x + c)$	Horizontal translation left c units	$(x, y) \rightarrow (x - c, y)$
$f(x - c)$	Horizontal translation right c units	$(x, y) \rightarrow (x + c, y)$
$-f(x)$	Reflection over x-axis	$(x, y) \rightarrow (x, -y)$
$f(-x)$	Reflection over y-axis	$(x, y) \rightarrow (-x, y)$
$af(x)$	Vertical stretch for $\lvert a \rvert > 1$	$(x, y) \rightarrow (x, ay)$
	Vertical compression for $0 < \lvert a \rvert < 1$	
$f(bx)$	Horizontal compression for $\lvert b \rvert > 1$	$(x, y) \rightarrow \left(\frac{x}{b}, y\right)$
	Horizontal stretch for $0 < \lvert b \rvert < 1$	

Name

ROTATION

Transformation Rules for Functions

1. **(a) Use the table to determine the function rule for $f(x)$.**
(b) Let $g(x)$ be a vertical stretch of $f(x)$ by a factor of 2.

x	0	3	6
f(x)	5	11	17

(a) f(x) = _____x + _____

(b) Rule: _____

(c) g(x) = _____

2. **Let $f(x)=3x-2$. Use the given function to describe the listed transformations. Then, write the equation of the transformed function.**

a. $2f(x)$

b. $f(x)-7$

c. $f(x+2)$

d. $-3f(x)$

3. **Write an equation for the given transformation.**

a. down 5, rotated by factor of $-\frac{3}{4}$

b. up $\frac{1}{2}$, stretched by a factor of $\frac{5}{4}$

c. up 10, compressed by a factor of $\frac{5}{6}$, reflected

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