## Warmup 2/ (\# of characters in

## "Valentine's Day") Created by Mr. Lischwe INSIDE YOUR DESK SHOULD BE:

- No regular whiteboards
- ONE Graphing Sheet
- ONE Marker/ONE Eraser (PUT EXTRAS BACK)

By moving just ONE matchstick, create a true equation! There are three separate methods that can work. Can you find them all? (None of the methods involve creating a sign!)


## p. $457(1-7,9)$

$11 \triangle A B C$ with vertices $A(1,2), B(3,1)$, and $C(3,4)$ translated 2 units left and 1 unit up $A^{\prime}(-1,3), B^{\prime}(1,2), C^{\prime}(1,5)$
2. rectangle $J K L M$ with vertices $J(-3,2)$, $K(3,5), L(4,3)$, and $M(-2,0)$ translated 1 unit right and 4 units down

$$
J^{\prime}(-2,-2), K^{\prime}(4,1), L^{\prime}(5,-1), M^{\prime}(-1,-4)
$$

Triangle $P Q R$ has vertices $P(0,0), Q(5,-2)$, and $R(-3,6)$. Find the vertices of $P^{\prime} \mathbf{Q}^{\prime} \boldsymbol{R}^{\prime}$ after each translation. (Example 2)
3. 6 units right and 5 units up $P^{\prime}(6,5), Q^{\prime}(11,3), R^{\prime}(3,11)$
4. 8 units left and 1 unit down $P^{\prime}(-8,-1), Q^{\prime}(-3,-3), R^{\prime}(-11,5)$

Use the image of the race car at the right. (Example 3)
5. Use translation notation to describe the translation from
point $A$ to point $B$. $(x-3, y-3)$
6. Use translation notation to describe the translation from point $B$ to point $C .(x-2, y-4)$


17 Quadrilateral $K L M N$ has vertices $K(-2,-2), L(1,1), M(0,4)$, and $N(-3,5)$. It is first translated by $(x+2, y-1)$ and then translated by $(x-3, y+4)$. When a figure is translated twice, a double prime symbol is used. Find the coordinates of quadrilateral $K^{\prime \prime} L^{\prime \prime} M^{\prime \prime} N^{\prime \prime}$ after both translations.

$$
K^{\prime \prime}(-3,1), L^{\prime \prime}(0,4), M^{\prime \prime}(-1,7), N^{\prime \prime}(-4,8)
$$

9. (MP) Reason Inductively A figure is translated by $(x-5, y+7)$, then by $(x+5, y-7)$. Without graphing, what is the final position of the figure? Explain your reasoning to a classmate. the same as the original position of the figure; Sample answer: Since $\mathbf{- 5}$ and 5 are opposites, and -7 and 7 are opposites, the translations cancel each other out.

## What kind of transformation is this?

$$
(x-2, y+4)
$$

A translation of 2 units left and 4 units up

I. The preimage points are $(-2,3)$ and $(1,3)$ and the image points are $(-6,6)$ and $(-3,6)$. Describe the translation in words. (Which directions? How far?) (You can use your graphing sheet to help, but if you can figure it out without it, go for it)
2. Write the translation from \#I in coordinate notation.


- What was the translation? Write it in coordinate notation.
$\cdot(x, y+4)$


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## Transformations

## Today's Objectives:

- Reflect figures across the $x$ - and $y$-axis on a coordinate plane


## How can we draw a reflection?

- VOLUNTEER to come up to the board and draw the image of the triangle? You may use any tools you would like to help you be as exact as you can.



## How about this one?



Advice on visualizing reflections
-***TURN YOUR PAPER SO THE LINE OF REFLECTION IS STRAIGHT UP AND DOWN!!!***

- It will be much easier to see how the reflection will go.


## Reflections on the Coordinate Plane

- Draw a triangle with vertices $\mathrm{F}(4, \mathrm{I}), \mathrm{B}(4,5)$, and I $(6, I)$.
- REFLECT $\Delta F B I$ over the x-axis.
- YOUR NEW COORDINATES SHOULD BE: F'(4, - I); B'(4, -5); I'(6, - I)



## Reflections on the Coordinate Plane

- Erase your image, but keep the original triangle: F (4, I), B (4, 5), and I $(6, I)$.
- Now reflect $\Delta F B I$ over the $y$-axis.
- YOUR NEW COORDINATES SHOULD BE: F'(-4, I ); B'(-4, 5); I'(-6, I )



## Reflection Strategy

- Count spaces from each vertex to the line of reflection, then count the same number of spaces on the other side


# Do not reflect over the wrong axis. (This is a VERY common mistake) 

One helpful strategy is to trace a line over the axis. This will be a visual reminder of which axis to use.

## Reflections on the Coordinate Plane

- Draw parallelogram MATH: M(-5,5);A(-6, 7); T(-I, 5); H(-2, 7)
- First reflect the parallelogram over the $x$ axis, then reflect the image of that over the $\mathbf{y}$-axis.
- YOUR NEW COORDINATES SHOULD BE: M"(5, -5);A"(6, -7);T"(I, -5); H"(2, -7)



## Reflections on the Coordinate Plane

- Draw $\boldsymbol{\Delta F U N}: \mathbf{F}(\mathbf{3}, 4) ; \mathbf{U}(5,-2) ; \mathbf{N}(\mathbf{7}, 4)$
- Reflect the triangle over the x -axis.
- YOUR NEW COORDINATES SHOULD BE: F'(3, -4); ' ${ }^{\prime}(5,2) ; \mathbf{N}^{\prime}(7,-4)$



## Homework

-p. 465 (I - 7), p. $468(20,2 \mathrm{I})$

