REVISITING VECTORS

- We've defined vectors as **quantities that have a magnitude and a direction**
  - Displacement, velocity, and acceleration
- Represent by an arrow whose **length represents magnitude** and **head represents direction**

- If we arbitrarily say this vector is 20 m/s to the right

- This vector is 60 m/s to the right

ADDING VECTORS

- **Resultant** is the vector sum of two or more component vectors
- There are 2 ways to add vectors to get the resultant

PARALLELOGRAM METHOD

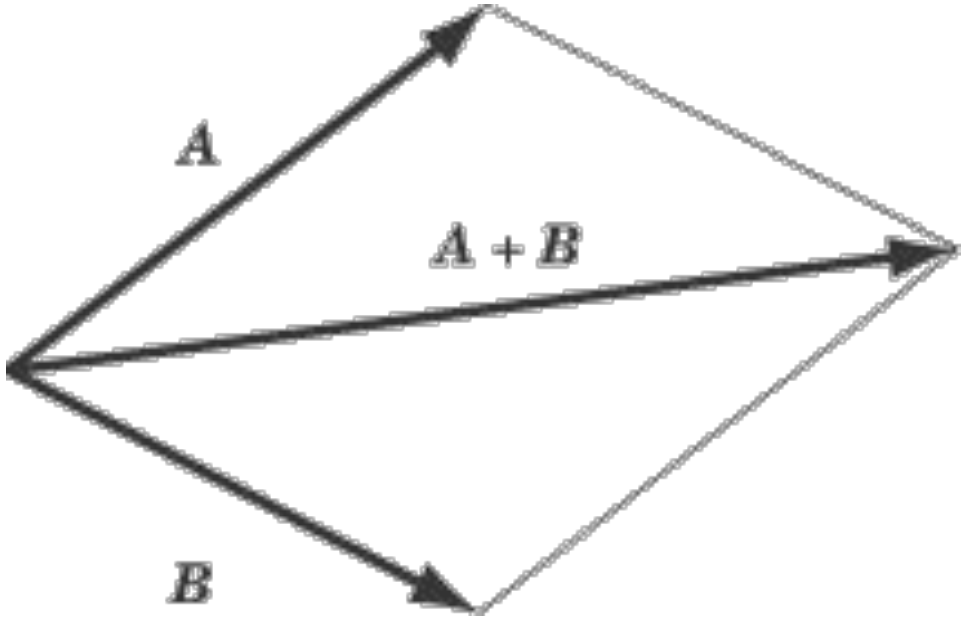
- 1) Draw vectors with tails touching

PARALLELOGRAM METHOD

- 2) Draw a parallelogram projection of the vector with dashed lines to form a rectangle

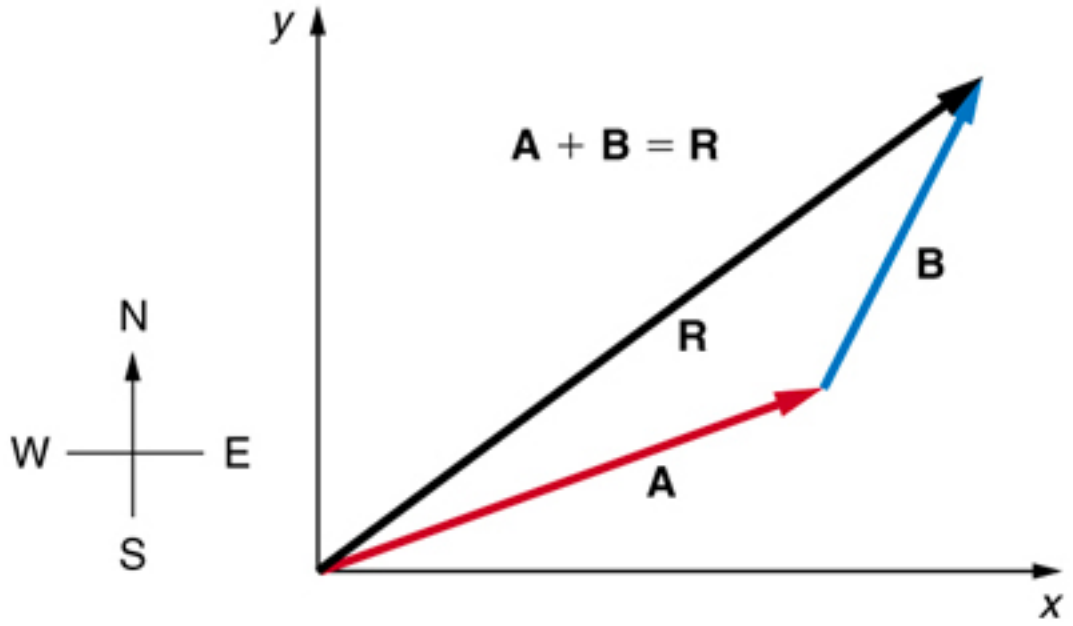
PARALLELOGRAM METHOD

- 3) Resultant is the diagonal from the point where the two tails touch to the opposite corner



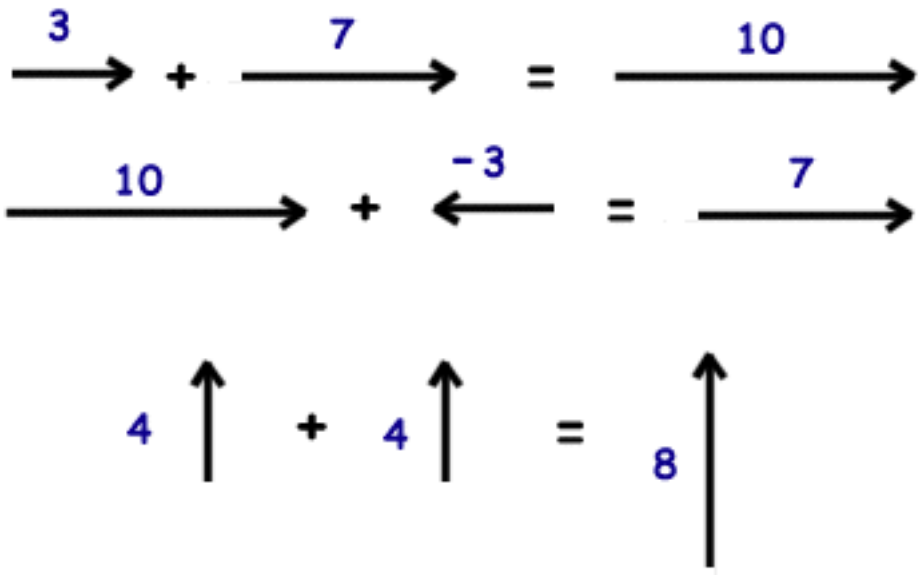
HEAD-TO-TAIL METHOD

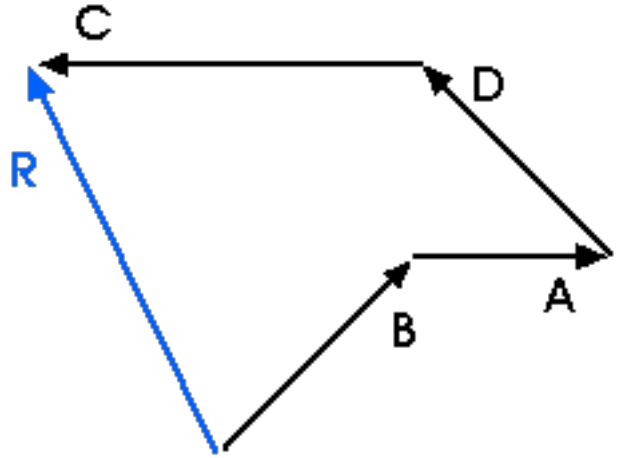
- 1) Draw the first vector
- 2) Connect the tail of the second to the head of the first
- 3) **Resultant is from the tail of the first to the head of the second**



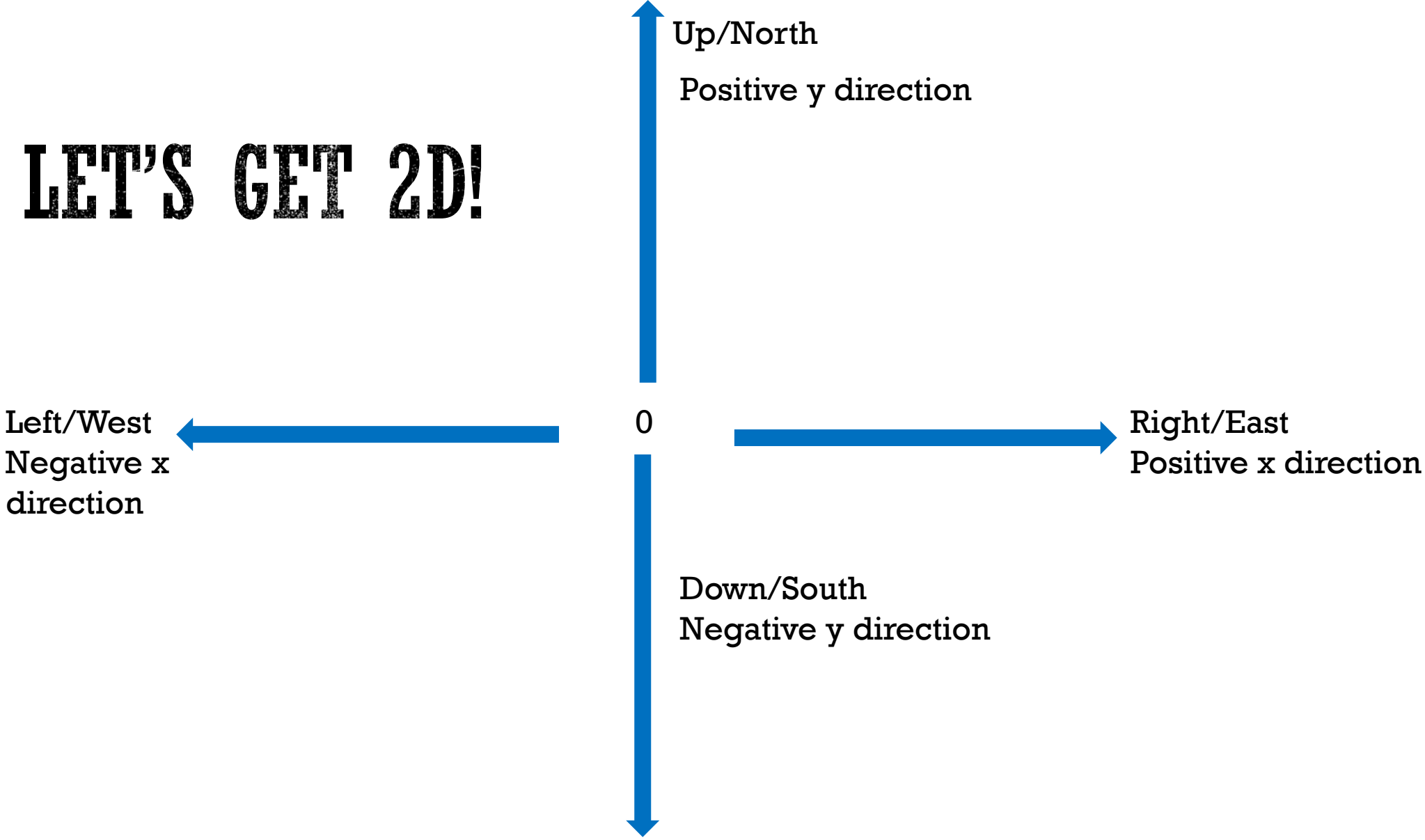
ORDER OF ADDITION DOESN'T MATTER!

ALSO WORKS IF YOU HAVE VECTORS POINTING IN THE SAME OR OPPOSITE DIRECTIONS, OR MORE THAN 2 VECTORS





LET'S GET 2D!


Up/North
Positive y direction
Left/West
Negative x direction
0
Right/East
Positive x direction
Down/South
Negative y direction

- A train is moving east at 12.0 m/s. A child is on the floor of the train pushing a toy car north across the train at 2.6 m/s. What is the resulting magnitude and direction of the velocity of the toy car?
  - 12.3 m/s, 12.2 degrees north of east