Vectors

Vector versus Scalar

- A **vector** has a size and a direction
- Example – 20 m/s due North
- A **scalar** has only a size - no direction
- Example – 20 m/s

Scalars

- A quantity that can be specified from its size only with units
- No direction needed
- Examples are speed and distance
- Represented by italics; $s = 2.4$ m/s

Vectors

- A quantity with both magnitude and direction.
- Examples are velocity and displacement.
- Represented by boldface; **v** = 2.4 m/s to the north

Pythagorean Theorem

- If two vectors are at a 90^0 angle, use the Pythagorean Theorem to find the resultant vector.
- $C^2 = a^2 + b^2$

- A pirate walks 45 m north, then 7.5 m east. What is his displacement?
- Use Pythagorean theorem since it is a 90 degree angle.

Greg ran 8 miles east. He turned a corner and ran 6 miles north. Calculate his total displacement from the start.

- ○ 14 miles northeast
- ○ 48 miles southeast
- ○ 2 miles southeast
- ○ 10 miles northeast

Adding Vectors

- Vectors can be added graphically.
- When adding two or more vectors, the answer is called the resultant.
- Vectors can be moved as long as they don't change direction or length.
- Draw vectors using head to tail method.

Olympic Controversy

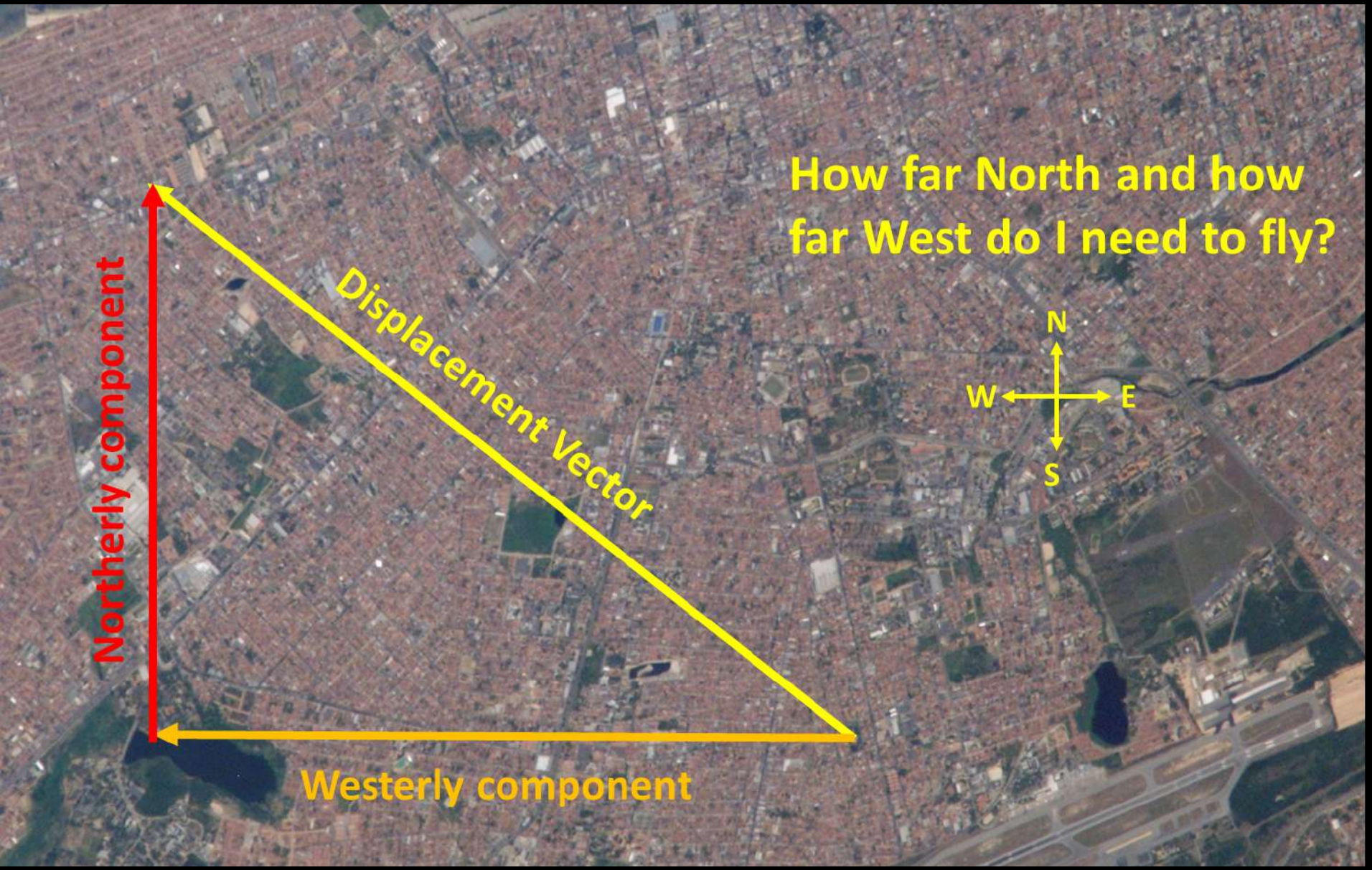
Believe it or not, there was a controversy at the 2016 Rio Olympics

… a controversy involving – linear motion!

The water on one side of the Olympic pool had a very small current running through it. The closer a swimmer was to lane 8, the stronger this current.

Add Vectors if going in same direction as current = faster speed

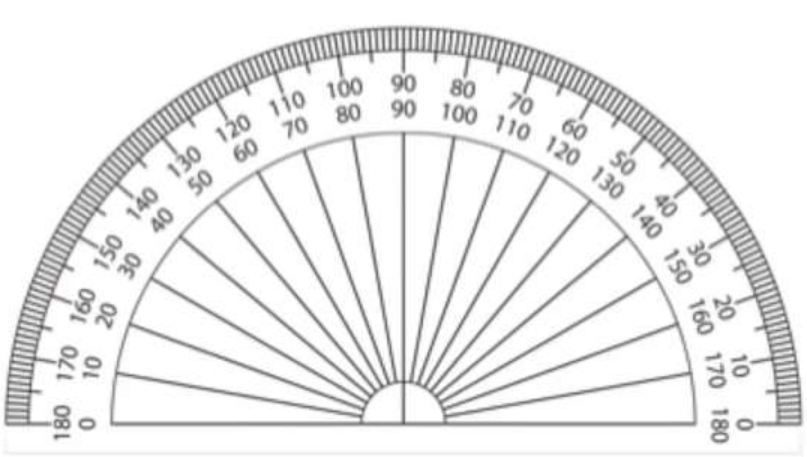
Subtract Vectors if going against current = slower speed

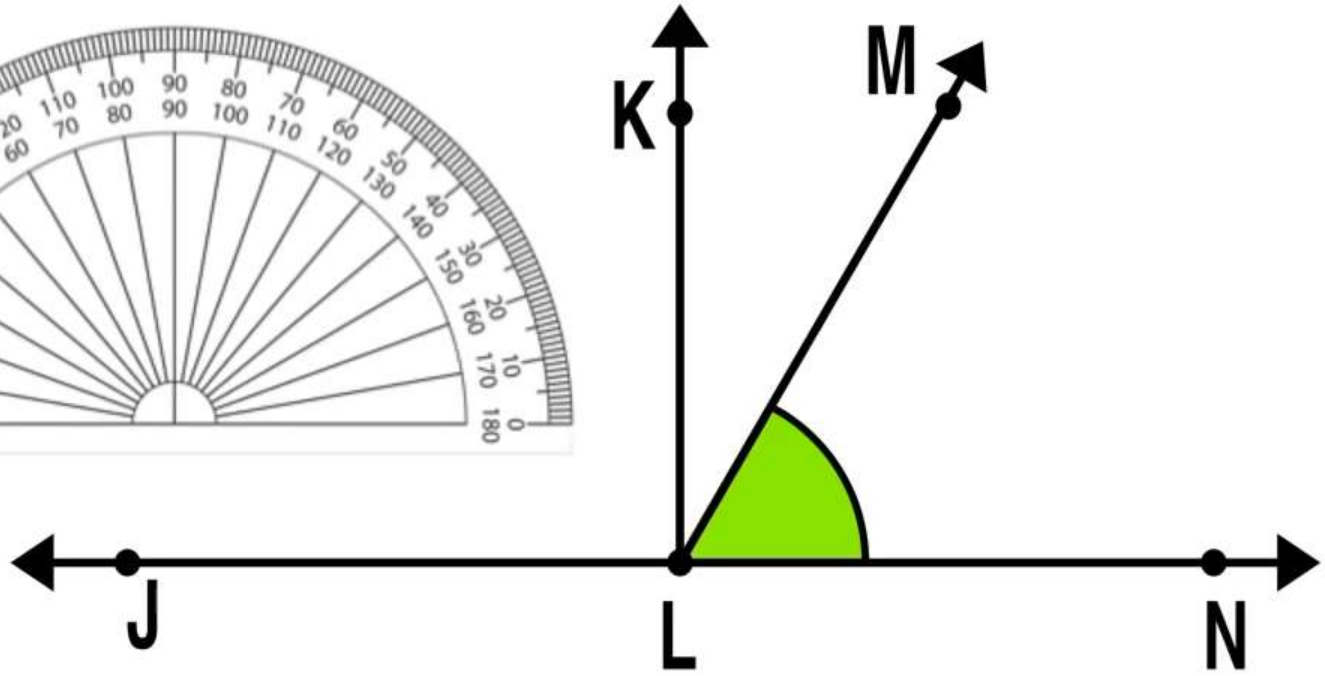

How far North and how far West do I need to fly?
N
W
E
S
Displacement Vector
Northerly component
Westerly component

How to use a Protractor

4th Grade Mathematics

What is the measure of angle **MLN?**





Scaling

- You can't draw 75 miles on a piece of paper so you change it to 7.5 cm.
- But what you do to one number you have to do to the others. For example:
- 75 miles = 7.5 cm
- 12 miles = 1.2 cm
- Then you have to UNDO it at the end of the problem – so you measure 4.5 cm and the answer is???