	TEAM: Team 8	
	Belgium	Lennert Lannoo Gérôme Werbrouck
Smartphone-accelerations into physics situations	Italy	Benedetta Campanini Giorgia Sensi
EXPERIMENT: tracking the velocity of a wheel.		

1. ORIENTATION

We will put a phone inside a car wheel and roll it off a hill. With the phyphox app we will measure the speed of the wheel. Then we will use a bigger wheel and do the same measurements. Then we will look which one goes faster.

1. **Research question:**

Does the velocity of a wheel depend on its size?

Sub-questions:

- What is the difference in angular velocity between wheels with different diameters?
- What is the difference in orbital velocity between wheels with different diameters?

2. **Hypothesis**

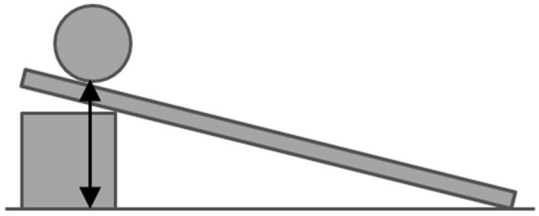
The bigger wheel will go faster than the smaller one because a bigger wheel covers more distance in one circular rotation, it will have a higher velocity than the smaller wheel. Therefore, the orbital velocity of the biggest wheel will be higher than the orbital velocity of

the smallest wheel. As the smaller wheel has to make more rotations to cover the same distance. The angular velocity of the bigger wheel will be larger than the angular velocity of the smaller wheel.

2. PREPARATION

1. **Material**:

- Wheels
- A slope
- Phone
- Duck-tape
- ruler



2. Method:

-measure the radius of the wheel.

-Put the phone in a wheel using duck-tape so it can't move.

- let it roll off a hill.

- it is easier to do this with a timed measurement: press on the three points in the right upper corner and press on timed measurement.

-Delayed start 5s and duration experiment 20s.
-Press on start button and Measure orbital velocity using Phyphox, we will use the Roll-movemont function of phypox to do this.

-Export the data.

-Calculate the angular verlocity.

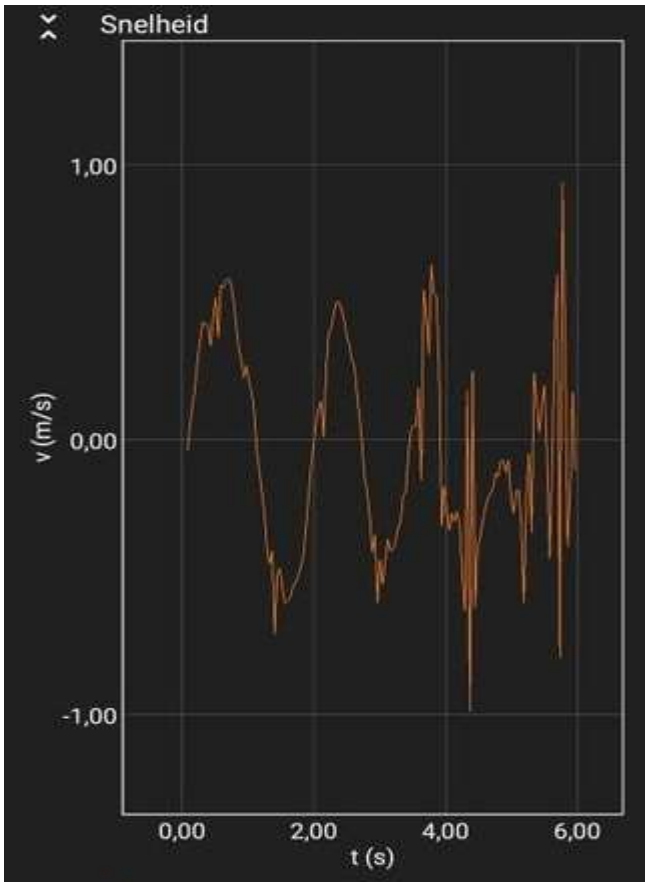
-Do this with multiple wheel sizes, with every wheel size three times.

3. DATA ANALYSIS and DISCUSSION

1. Observations and Measurements:

Wheel 1 radius 26.5 cm:

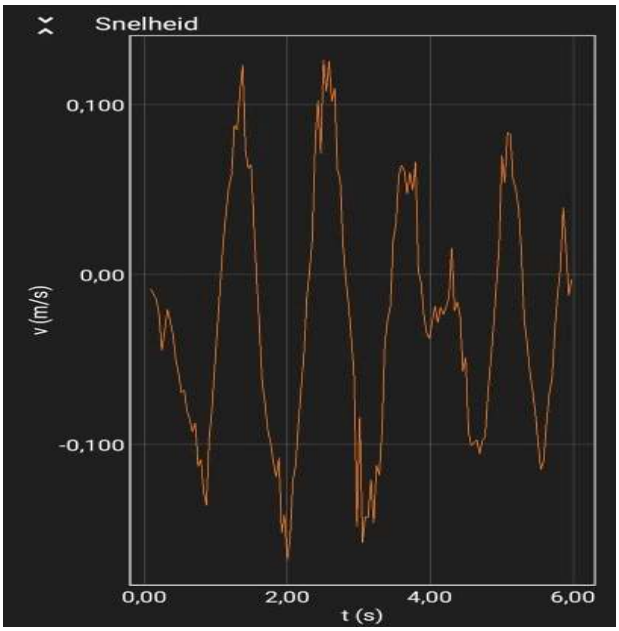
Measurement 1:



Measurement 2/3 were not accurate so we didn't use the results.

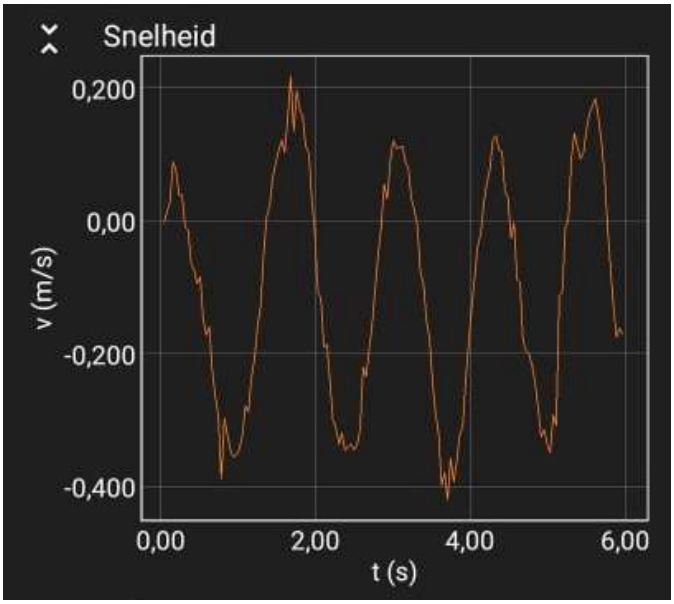
Wheel 2 radius 28 cm:

measurement 1:



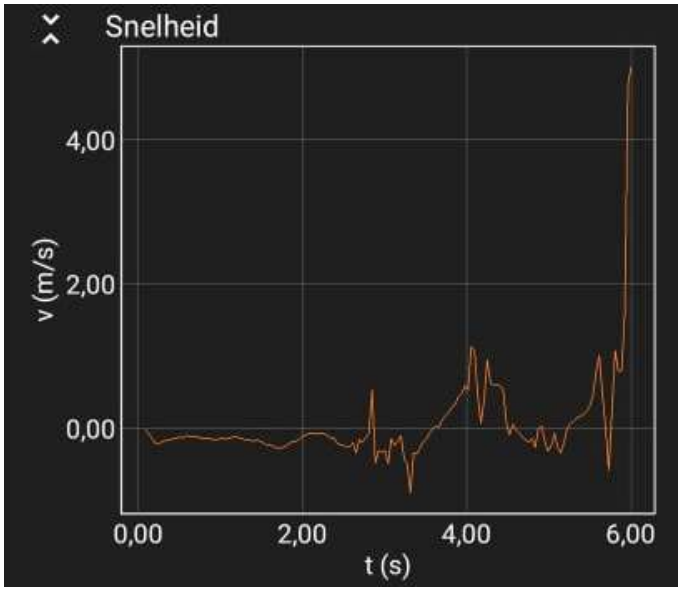
Measurement 2: This measurement is not accurate so we didn't conclude it.

Measurement 3:

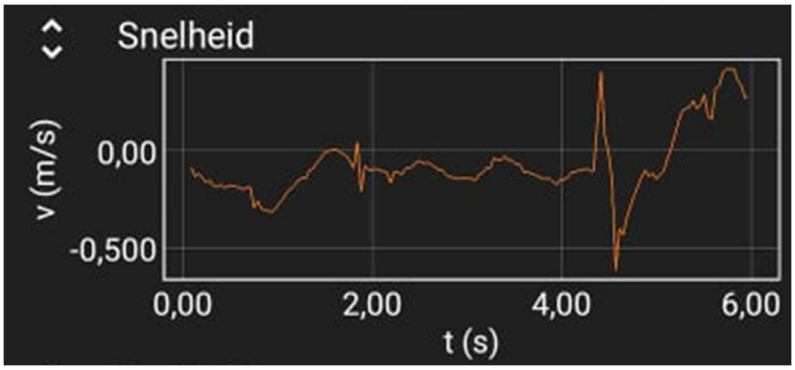


Wheel 3: radius: 25cm

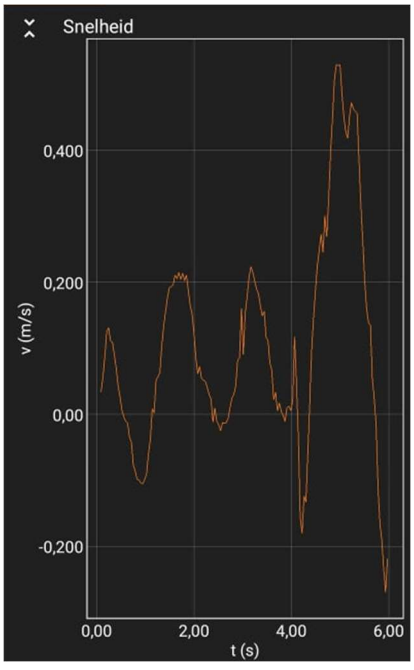
Measurement 1:

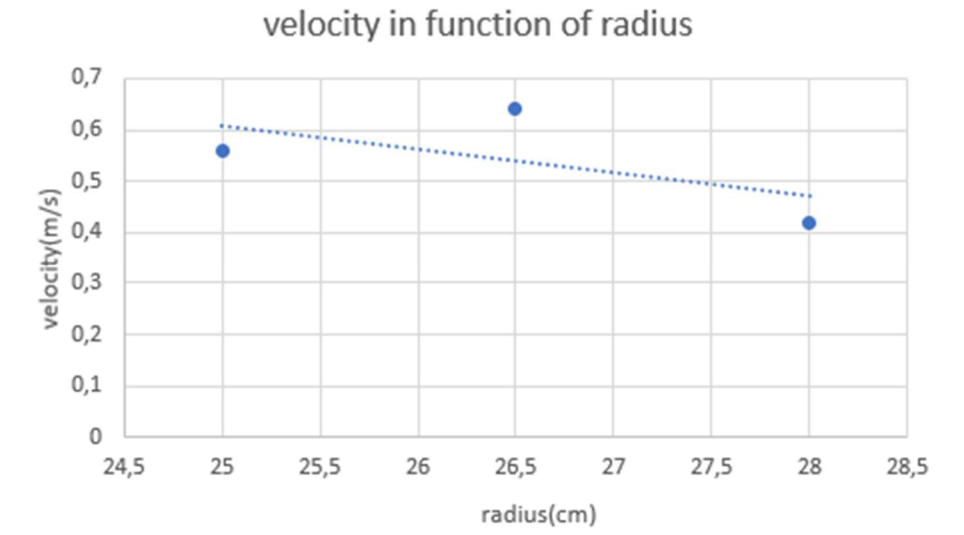


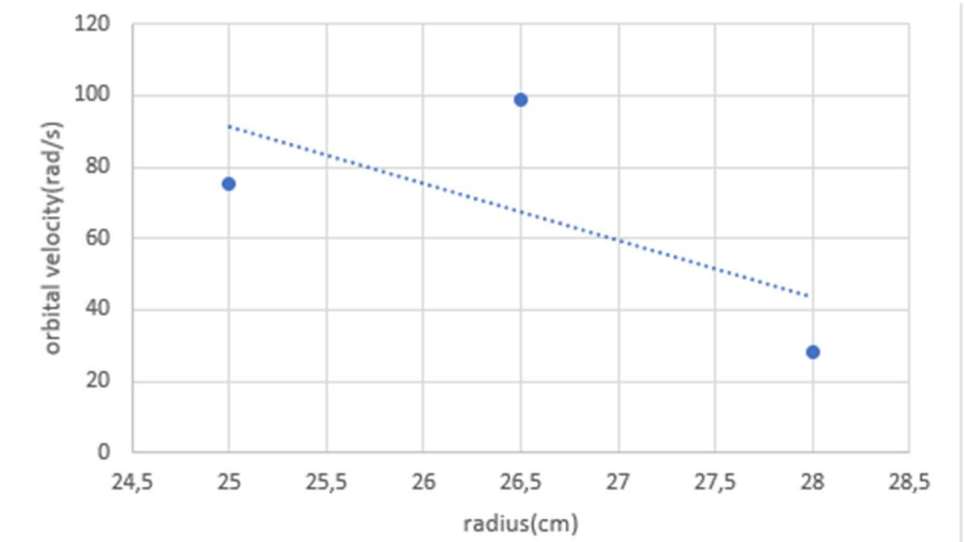
Measurement 2:

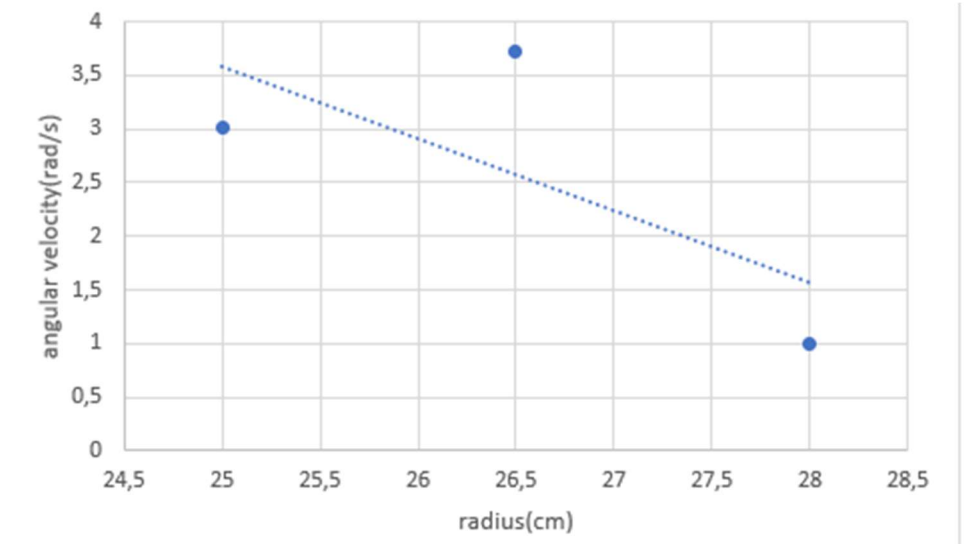


Measurement 3:









- The measurements that were used to discuss are those that we put in fluor.
- The highest speeds were used, that were measured correctly.

Discussion:

-The velocity of the second biggest wheel is higher then the smaller one but the biggest has a lower velocity then the both.

- The average angular velocity from the smallest wheel is 3,02 rad/s. The angular velocity from the seconds biggest wheel is 3,72 rad/s . The average angular velocity from the biggest wheel is: 1,00 rad/s.

- The formula for the orbital velocity is: v=w(angular velocity)* r.

The orbital velocity from the smallest wheel is 75,5 m/s. The orbital velocity of the second biggest wheel is 98,6 m/s, the orbital velocity of the biggest wheel is 28m/s

-The size of a tire doesn't affect the velocity, the mass affects it. The bigger the mass the higher the gravitational force on the wheel that makes it roll down the slope.

4. REFLECTION

1. **Conclusion**:

-The angular velocity is almost the same with the 2 smallest wheels but the largest wheel has the smallest angular velocity so we can conclude that the bigger the wheel the lower the angular velocity is. The angular velocity from the second biggest wheel is higher but this is because we only had one good measurement.

-The bigger the wheel the smaller the orbital velocity, we know this because the orbital velocity of the biggest wheel is way lower than the smaller wheels. We only have one measurement of the middle wheel so this could be not accurate.

2. **Comparison**

3. **Reflection:**

-The measurements are far from accurate, because the sensors in the phone are not good.

5. REFERENCES (if you zoom in you can see the results clearly)