: TEAM: Team Orange

## 1. ORIENTATION

### 1.1. Research question:

What is the influence of the pressure of a ball on the rebound of that ball?

## Sub-questions:

Does a basketball rebound higher than a volleyball?

### 1.2. Hypothesis

The greater the pressure, the greater the rebound. We suppose that a basketball will have a bigger rebound than a volleyball.

## 2. PREPARATION

### 2.1. Material:

- A volleyball
- A basketball
- A pump with barometer
- A phone
- Tracker
- Tape
- Ruler


### 2.2. Method:

1. Place a bit of tape on a chosen height
2. Measure this height with the ruler
3. Let the ball fall from that height and film the total fall until the highest point of the rebound (do not chance the zoom or place of the camera). The pressure of the ball is 300 mbar
4. Film the rebound of the same volleyball from the same height after deflated with the pump to 200 mbar
5. Film the rebound of the same volleyball from the same height after deflated with the pump to 100 mbar
6. Now do the same with a basketball
7. All the made films are placed in Tracker and we analyze the rebounds and the difference between the rebounds (see the file 'gebruik tracker' on the Twinspace

## 3. DATA ANALYSIS and DISCUSSION

### 3.1. Observations and Measurements:

French experiment 1 - Analyze (by Belgium)

$x(t)=7.28 t^{3}-4.77 t^{2}-5.31 t+7.20$

$v(t)=-5.85 t^{3}-0.11 t^{2}+1.22 t-3.40$

## french experiment 2: analyze (by Belgium)


$x(t)=1.84 t+0.17$

$v(t)=-1.20 t+3.88$

Experiment from Italy analysed by French : ball 1 (volleyball)




Experiment from Italy analysed by French : ball 2


Pour trouver une courbe de tendance, glisser les colonnes sur l'axe horizontal (jaune) ou l'axe horizomtàh (éçilta)ble



Pour trouver une courbe de tendance, glisser les colonnes sur l'axe horizontal (jaune) ou l'axe horizomtan (éçilta)ble

## Experiment from Italy analysed by French : ball 3



Pour trouver une courbe de tendance, glisser les colonnes sur l'axe horizontal (jaune) ou l'axe horizomtach (éçilta)ble



Drag table columns to yellow (horizontal axis) or green (vertical axis) for curve fitting.

| mainers |  | $\mid \boldsymbol{\| c \|}$ |  |
| :---: | :---: | :---: | :---: |
| lines |  | $\checkmark$ |  |
| style |  | - |  |
| axis | horiz | vert |  |
| row | t | $\times$ |  |
| 0 | 0,000 | 2,171 | - |
| 1 | 3,333E-2 | 2,167 |  |
| 2 | 6,667E-2 | 2,130 |  |
| 3 | 0,100 | 2,093 |  |
| 4 | 0,133 | 2,057 |  |
| 5 | 0,167 | 1,992 |  |
| 6 | 0,200 | 1,943 |  |
| 7 | 0,233 | 1,837 |  |
| 8 | 0,267 | 1,739 |  |
| 9 | 0,300 | 1,654 |  |
| 10 | 0,333 | 1,523 |  |
| 11 | 0,367 | 1,401 |  |
| 12 | 0,400 | 1,271 |  |
| 13 | 0,433 | 1,136 |  |
| 14 | 0,467 | 0,969 |  |
| 15 | 0,500 | 0,819 |  |
| 16 | 0,533 | 0,656 |  |
| 17 | 0,567 | 0,472 |  |
| 18 | 0,600 | 0,281 |  |
| 19 | 0,633 | 9,771E-2 |  |
| 20 | 0,667 | 7,329E-2 |  |
| 21 | 0,700 | 0,224 |  |
| 22 | 0.733 | 0.358 | - |
| non-editable |  |  |  |

$x(t)=4.82 t^{3}-4.13 t^{2}-2.13 t+2.36$


### 3.2 Discussion

## a. Made by the Belgians

we discuss the results of the analysis of the French
We think the Italians used three times approximately the same ball, because the variable in front of the $t$ is thrice the same $(-1.3,-1.3,-1.3)$ by the $v(t)$ graphic. We think the reason for this is that the pressure was equal.
b. Mabe by the French

We discuss on the analysis made by the Italians on Belgian experiments. the curve pink is different from the curve green.
the formula is $\mathrm{v}(\mathrm{t})=4.07 \mathrm{t}^{2}-5.80 \mathrm{t}+2.68$

## REFLECTION

### 3.2. Conclusion:

3.3. Comparison of the results of the different countries
3.4. Reflection:

## 4. REFERENCES

File Modifica Schermo Aiuto

## massa_A

## Misura Analisi

|  |  | Costruttore di dati... | Ricarica | Aiuto |
| :---: | :---: | :---: | :---: | :---: |
| mamantaril |  | T | $\square$ |  |
| row | t | $\times$ | $y$ |  |
| 0 | 0,600 | 0,182 |  | 1,866 |
| 1 | 0,633 | 0,188 |  | 1,843 |
| 2 | 0,667 | 0,182 |  | 1,825 |
| 3 | 0,700 | 0,188 |  | 1,779 |
| 4 | 0,733 | 0,189 |  | 1,725 |
| 5 | 0,767 | 0,189 |  | 1,665 |
| 6 | 0,800 | 0,186 |  | 1,597 |
| 7 | 0,833 | 0,200 |  | 1,527 |
| 8 | 0,867 | 0,204 |  | 1,421 |
| 9 | 0,900 | 0,196 |  | 1,324 |
| 10 | 0,933 | 0,196 |  | 1,219 |
| 11 | 0,967 | 0,192 |  | 1,108 |
| 12 | 1,000 | 0,192 |  | 0,977 |
| 13 | 1,033 | 0,196 |  | 0,861 |
| 14 | 1,067 | 0,196 |  | 0,724 |
| 15 | 1,100 | 0,192 |  | 0,559 |
| 16 | 1,133 | 0,198 |  | 0,426 |
| 17 | 1,167 | 0,200 |  | 0,274 |
| 18 | 1,200 | 0,190 |  | 0,101 |



$$
x=A^{*} t+B \quad 4,624
$$

Strumento dati
File Modifica Schermo Aiuto


## $x=A^{*}+B \quad 2,785$

Strumento dati
File Modifica Schermo Aiuto


|  |  | Costruttore di dati... | Ricarica | Aiuto |
| :---: | :---: | :---: | :---: | :---: |
| mannataril |  | E | m |  |
| row | t | $\times$ | y |  |
| 0 | 0,233 | 1,861E-2 |  | 0,180 |
| 1 | 0,267 | 1,801E-2 |  | 0,177 |
| 2 | 0,300 | 1,861E-2 |  | 0,175 |
| 3 | 0,333 | 1,831E-2 |  | 0,173 |
| 4 | 0,367 | 1,831E-2 |  | 0,169 |
| 5 | 0,400 | 1,861E-2 |  | 0,164 |
| 6 | 0,433 | 1,801E-2 |  | 0,159 |
| 7 | 0,467 | 1,861E-2 |  | 0,152 |
| 8 | 0,500 | 1,891E-2 |  | 0,144 |
| 9 | 0,533 | 1,981E-2 |  | 0,135 |
| 10 | 0,567 | 1,981E-2 |  | 0,126 |
| 11 | 0,600 | 1,981E-2 |  | 0,116 |
| 12 | 0,633 | 2,071E-2 |  | 0,106 |
| 13 | 0,667 | 2,071E-2 |  | ,453E-2 |
| 14 | 0,700 | 2,041E-2 |  | 3,103E-2 |
| 15 | 0,733 | 2,131E-2 |  | ,752E-2 |
| 16 | 0,767 | 2,101E-2 |  | 5,372E-2 |
| 17 | 0,800 | 2,131E-2 |  | 3,841E-2 |
| 18 | 0,833 | 2,221E-2 |  | 2,401E-2 |
| 19 | 0,867 | 2,161E-2 |  | 9,303E-3 |

[^0]File Modifica Schermo Aiuto


|  |  | Costruttore di dati... | Ricarica | Aiuto |
| :---: | :---: | :---: | :---: | :---: |
| 4 mamantaril |  | m | T |  |
| row | t | $\times$ | y |  |
| 0 | 1,200 | 2,071E-2 |  | 0,191 |
| 1 | 1,233 | 1,967E-2 |  | 0,192 |
| 2 | 1,267 | 1,967E-2 |  | 0,189 |
| 3 | 1,300 | 1,933E-2 |  | 0,187 |
| 4 | 1,333 | 1,831E-2 |  | 0,184 |
| 5 | 1,367 | 1,865E-2 |  | 0,178 |
| 6 | 1,400 | 1,831E-2 |  | 0,176 |
| 7 | 1,433 | 1,831E-2 |  | 0,170 |
| 8 | 1,467 | 1,797E-2 |  | 0,161 |
| 9 | 1,500 | 1,831E-2 |  | 0,153 |
| 10 | 1,533 | 1,696E-2 |  | 0,142 |
| 11 | 1,567 | 1,662E-2 |  | 0,131 |
| 12 | 1,600 | 1,560E-2 |  | 0,121 |
| 13 | 1,633 | 1,662E-2 |  | 0,109 |
| 14 | 1,667 | 1,594E-2 |  | 9,700E-2 |
| 15 | 1,700 | 1,492E-2 |  | B,241E-2 |
| 16 | 1,733 | 1,458E-2 |  | 6,783E-2 |
| 17 | 1,767 | 1,357E-2 |  | 5,155E-2 |
| 18 | 1,800 | 1,255E-2 |  | 3,798E-2 |
| 19 | 1,833 | 1,289E-2 |  | 2,001E-2 |

$x=A^{*}+B \quad 1,876$


[^0]:    $x=A^{*}+B$
    1,659

