

# Problem No 22

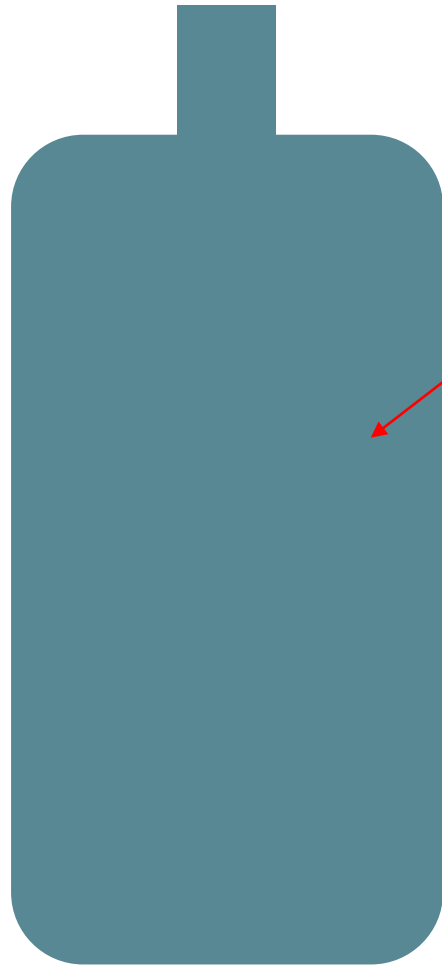


# Problem

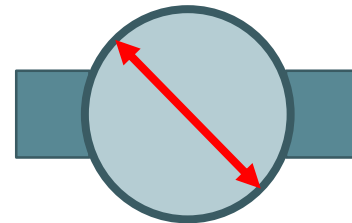
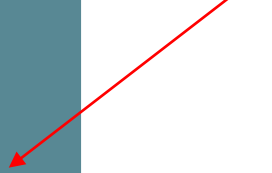
- Compare several methods to empty a bottle of water and indicate the fastest method



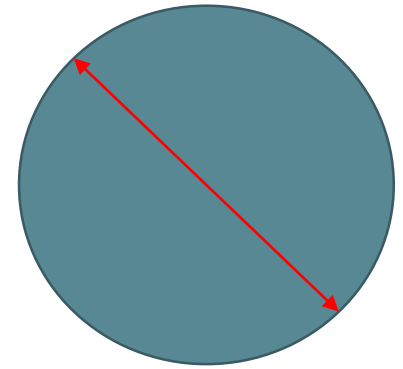
# Standard bottle



$V=0,5 \text{ l}$



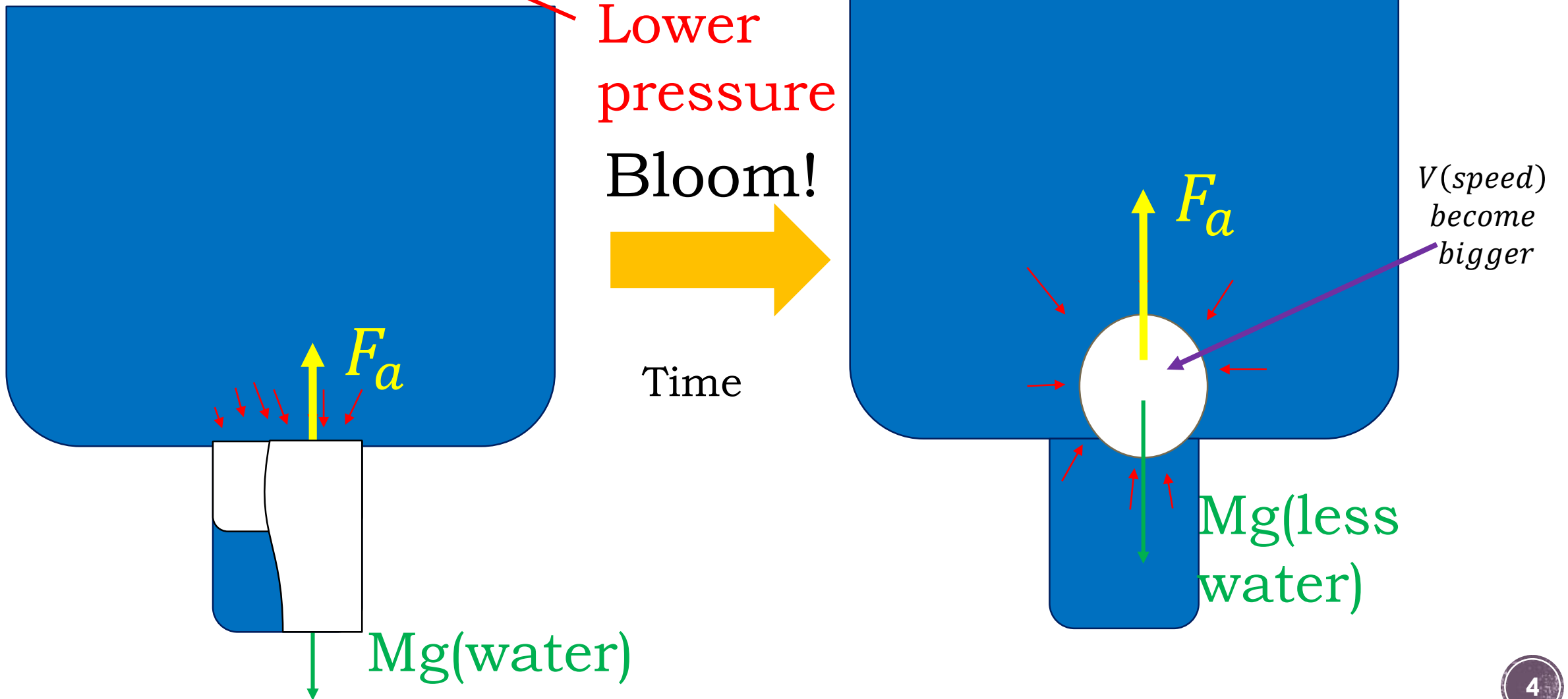
1,9 cm



6 cm

Time:  $8 \pm 0,2 \text{ sec.}$

# What is happened?



# Parameters

- Create other way to air bubble
- Change the diameter of neck of a bottle
- Create the hole in the bottom



# Other way



# Experiment



$$d_1 = 0,4 \text{ cm}$$

$$d_2 = 1 \text{ cm}$$

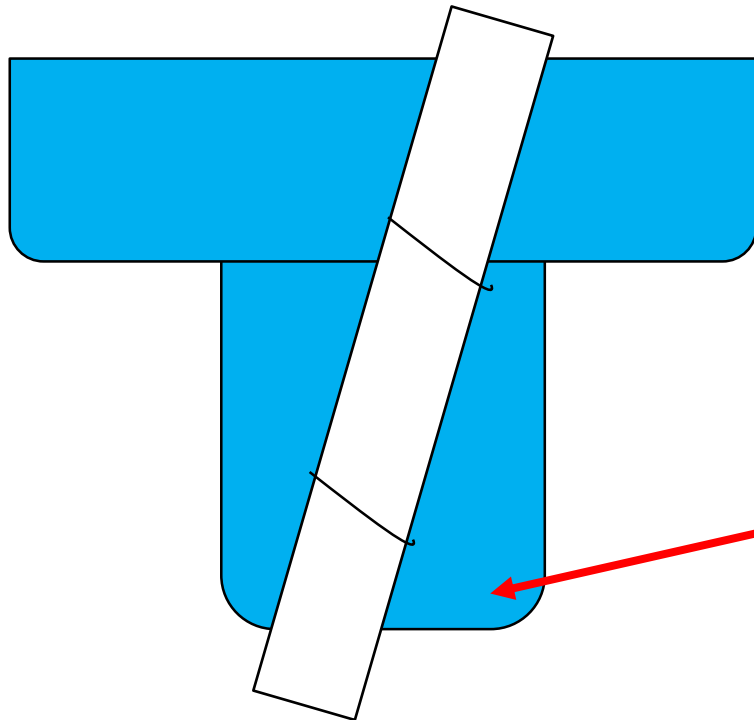
$$d_3 = 1,8 \text{ cm}$$

(neck of a  
bottle)

# Tubes

- $D_1 = 0,4$  cm
- Time:  $4 \pm 0.06$  sec

- $D_1 = 1$  cm
- Time:  $4,5 \pm 0.1$  sec



Bigger  
way out  
for water



# Neck

- Standard one
- $D_1 = 1,8 \text{ cm}$
- $T = 8 \pm 0,02 \text{ cm}$
- Bigger one
- $D_2 = 6 \text{ cm}$
- $T = 2 \pm 0,04 \text{ cm}$

# Hole



We can't create a  
hole



# Other methods

Create a vortex in the bottle  
Temperature

# Conclusion

To make faster empty we  
should make bigger exit  
square.

Or should create other  
method



**Thanks for you attention! Be happy!**