

**Answers Experiments contest PF 5**

**1. A person is reading a text standing 5 meters away from him.**

**The same person now reads the text through a mirror also 5 meters away from him.**

*In the mirror he can read the text:*

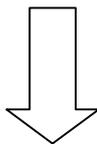
- A. even good
- B. less well**

With a plane mirror one has a symmetrical image. It means that the image is at the same distance behind the mirror. So the person standing at 5 meters from the mirror sees the image at 10 meters. And what is farther away you see less well.

**2. Two magnets North faced to South are lying on a scale ( $m = 320$  g). Now the same magnets, North faced to North, are on the scale.**

*What is now the weight?*

- A.  $m = 320$  g**
- B.  $m = < 320$  g
- C.  $m = > 320$  g



When A is placed over B with opposite poles facing each other, the magnets attract each other. The platform balance is in equilibrium.

When A is placed over B with like poles facing each other, A is repelled. Also, equilibrium in the platform balance is restored because there is neither mass nor force that is added to or subtracted from the system (A, B and C).

Consider Fig.1 where opposite poles of A and B are facing each other. The forces acting on the system are shown by means of arrows.

Forces acting on A, B and C

$Mg$  = weight of C

$2mg$  = weight of A and B

$N$  = normal counterforce from the pan

Where

$$N = (M+2m)g$$

Now, consider Fig.2 where A and B have like poles facing each other. The arrows shown are the forces acting on A, B and C. Forces on A

$mg$  = weight of A

$F$  = repulsive force from B

$$= mg$$

Forces on B and C

$(M + m)g$  = weight of C and B

$F$  = downward force of A on B

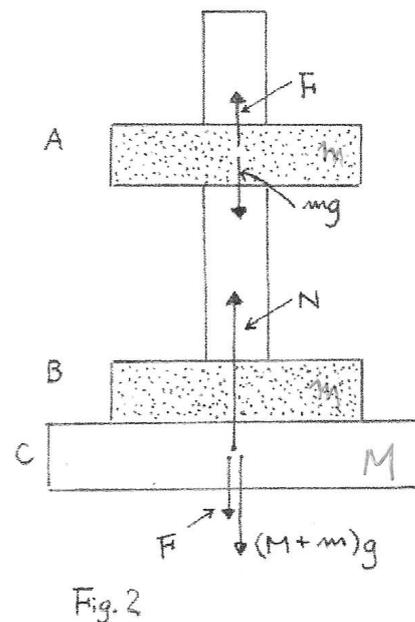
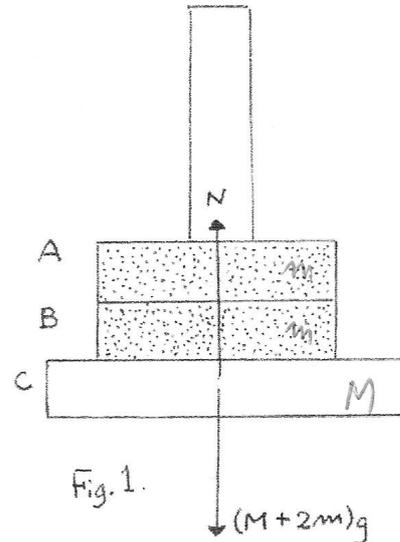
$N$  = normal counterforce from the pan

Where

$$N = (M + m)g + F$$

$$= (M + 2m)g$$

Since the forces acting on the system in both cases (opposite poles facing each other and like poles facing each other), they registered the same reading on the platform balance.



- 3. We perform two watercress sowings. The first half is rinsed, placed on cotton and sprayed with water. The other half is rinsed, placed on cotton under which there is a piece of apple flesh and is also sprinkled with water.**

*What's going on there after 5 days for the second half?*

- A. The seeds normally germinate
- B. The seeds germinate and grow more

### C. The seeds do not germinate

Il existe une hormone végétale qui s'appelle l'acide abscissique. C'est une hormone de dormance (comme ça les graines ne poussent pas à la mauvaise saison).

Cette hormone se trouve sur les graines mais aussi dans la chaire des fruits.

Si on lave les graines (comme le ferait la pluie au printemps), l'hormone disparaît et il y a levée de dormance. Donc les graines de la première boîte commencent à pousser.

Comme les graines de la deuxième boîte sont en contact avec les hormones de la chaire de la pomme, elles ne germent (poussent) pas!

#### 4. A balloon filled with air is placed in a closed jar filled with CO<sub>2</sub>.

*What will happen to the balloon after a while?*

- A. balloon keeps his size
- B. balloon will become bigger**
- C. balloon will become smaller

This unexpected result appears depending on the high permeability of CO<sub>2</sub> through latex. Rather than relying on holes for diffusion, the CO<sub>2</sub> absorbs into latex, migrates to the outer surface, and then out-gases into the external environment.

#### 5. A small balance with at one side a big styrofoam ball and at the other side a small counterweight is in equilibrium and standing under the bell jar of a vacuum pump. *What will happen if we make the bell jar vacuum?*

- A. the styrofoam ball is going down**
- B. the counterweight is going down
- C. the balance stays in equilibrium

When the system is in equilibrium in the air there is a greater upwards force on the Styrofoam due to the greater volume ( $F_A = \rho g V$ ) of the Styrofoam.

So if the air is taken away it effect less upwards force on the Styrofoam.

**Name:**

**Answers: 1. .... 2. .... 3. .... 4. .... 5. .... PW**