Dynamics --A person in an elevator

Measuring mass: a pan balance

• A balance scale

The mass measured here will be different from that measured on the moon?

true;
False.

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If the unknown mass differs from the known masses, the beam will rotate about the pivot.



Weight and apparent weight

• What is weight and how do we measure it.

(a)

Spring scales

(b)





Weight of a person in an elevator



Q2. your weight measured in an elevator

If the elevator is accelerating upward with a=9.8m/s. On a spring scale, the reading of the weight of a person of 50kg is

- 1) 50kg;
- 2) 100kg;
- 3) 150kg;
- 4) 0kg.



Q3

If cables holding the elevator are broken, the reading of his weight is

- 1) 50kg;
- 2) 100kg;
- 3) 0kg;
- 4) Not able to measure.



Weightlessness or "normal-force-less-ness"

A person on an object which free falls (like in an elevator with broken cables or in a car which jumps off the big bump on the road) moves with exactly the same acceleration as that object. Therefore there will be no normal forces acting and the person experiences "weightless".

NASA "0-gravity" flights.





Acceleration in the two dimensional movement



The independence of the motion along different orthogonal directions

• We can apply the Second Newton's Law separately for each axis.

- Q4. Two balls are dropped from the same height. Ball A has a horizontal initial velocity v, ball B starts from rest. Which one will hit the floor first (assume no drag here):
- 1. Ball A.
- 2. Ball B.
- 3. They will hit the floor simultaneously.
- 4. Which one will hit first depends on v.



Q5

Horizontally, ball A is

- 1) Accelerating with a=9.8m/s^2;
- 2) de-accelerating with a=9.8m/s^2;
- 3) Moving with a constant velocity.

