جامعة جدة
University of Jeddah
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PHYS 101

Ch. 4

Newton's Laws of Motion

Physics Department

Newton's First Law

Example 1:

سرعة ثابتة

A car travels east at constant velocity. The net force on the car is:

Solution:

$\Sigma F = 0$

(C) constant velocity

(A) greater than zero
(B) less than zero
(C) zero
(D) 9.8 N

Newton's First Law

(2)

Example 2:

A 3 kg box is moving with a constant speed. The net force on the box is:

Solution:

Constant speed

$\Sigma F = 0$

(D)

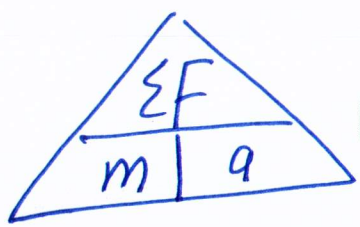
(A) 245.1 N
(B) 190.2 N
(C) 31.5 N
(D) zero

Newton's Second Law (3)

Example 3:

Two forces are applied to an object of mass 18.25 kg. One force is 27.5 N to the north and the other is 24.0 N to the west. The magnitude of the acceleration of the object is:

Solution:



(D)

(A) 5.0 m/s²
(B) 4.0 m/s²
(C) 3.0 m/s²
(D) 2.0 m/s²

$F_1 = 27.5\,j$ شمال

$F_2 = -24\,i$ الغرب

$m = 18.25$ kg

$$a = \frac{\Sigma F}{m} = \frac{F_1 + F_2}{m} = \frac{-24\,i + 27.5\,j}{18.25}$$

$$a = -1.32\,i + 1.5\,j$$

$$|a| = \sqrt{1.32^2 + 1.5^2} = 2$$

Newton's Second Law

Example 4:

Three forces act on a particle in which it moves with constant speed, if $\overrightarrow{F_1} = (-8\hat{i})\text{N}$ and $\overrightarrow{F_2} = (-10\hat{j})\text{N}$. Then $\overrightarrow{F_3}$ is:

* constant speed سرعة ثابتة

Solution:

(A) $8\hat{i} + 10\hat{j}$

(B) $8\hat{i}$

(C) $-8\hat{i} - 10\hat{j}$

(D) $10\hat{j}$

(A)

$$\Sigma F = 0$$

$$F_1 + F_2 + F_3 = 0$$

$$-8i - 10j + F_3 = 0$$

$$F_3 = 8i + 10j$$ (A)

Mass and Weight

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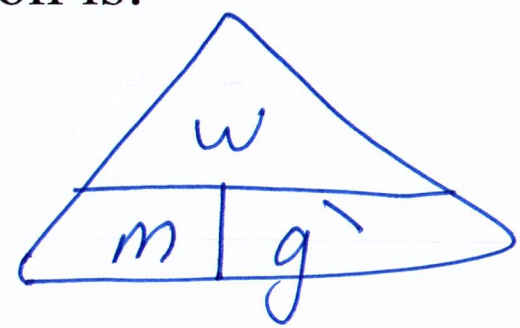
Example 5:

A 60 kg person weighs 100N on the moon. The acceleration of gravity on the moon is:

Solution:

(B)



(A) zero
(B) 1.67 m/s^2
(C) 4.9 m/s^2
(D) 9.8 m/s^2

$$g' = \frac{w}{m}$$

$$g' = \frac{100}{60} = 1.67 \ m/s^2$$

(B)

Mass and Weight

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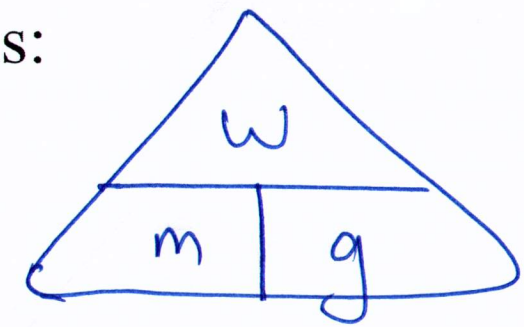
Example 6:

A man of mass 50 kg. His weight is:

Solution:

(A) 490 N
(B) 98 N
(C) 50 N
(D) zero



(A)

$$W = mg$$

$$W = 50 \times 9.8$$

$$= 490 \quad N$$

A