Review for Unit 4
Forces and Newton's Laws of Motion Test

Terms to know:

- Force
- Contact Force
- Field Force
- Inertia
- Acceleration
- Mass
- Weight (F_g)
- Action-reaction forces

Concepts to Know:

- Know Newton's three laws of motion
  - Law of Inertia
  - Law of Acceleration (and its mathematical representation)
  - Law of Interactions
- Know what a force is and what it does to an object
- Know the two types of forces, be able to describe the differences and classify examples as either field or contact forces
- Understand the relationship between force, mass and acceleration

Be able to:

- Draw and label free-body diagrams and determine net force
- Calculate the net force
- Calculate force, mass, weight and acceleration
- Determine net force: $\Sigma F = ma$
- Weight/Force gravity: $F_g = mg$ ($g = +9.8$ m/s^2)
- Write net force equations

There will be multiple choice questions as well as force problems.
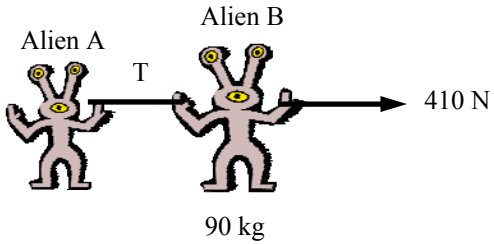
1. A car hits a guardrail and the passenger in the car is brought to rest with an acceleration of –241 m/s². What horizontal force acts on the passenger's upper torso, which has a mass of 31 kg?

FBD:

ΣF_x: [   ]

[   ]

2. While fishing at the coast I yanked a fish out of the water vertically with an acceleration of 4.2 m / s / s using a very light fishing line that had a "test" or maximum tension of 32 N. What was the mass of the fish?

FBD:

ΣF_y: [   ]

[   ]

3. Two aliens are accelerated horizontally at a rate of 2 m/s/s when a strange force of 410 N is applied to the rope as shown in the picture. If Alien B has a mass of 90 kg, what is the mass of Alien A?

FBD:

ΣF_x: [   ]

FBD:

ΣF_x: [   ]

Alien B
Alien A
T
410 N
90 kg

[   ]

4. The engine of a 1350 kg car provides a horizontal force of 4500 N. What is the car's acceleration?

FBD:

ΣF_x:

5. A horizontal force of 400 N is applied to a box containing patriotic gazelle costumes for the gazelles' "March for America". If the acceleration of the box is 5 m/s/s, what is the mass of the box?

FBD:

ΣF_x:

6,7. Two blocks are fastened to the ceiling of an elevator as shown. The acceleration of the system is 2.0 m/s^2.
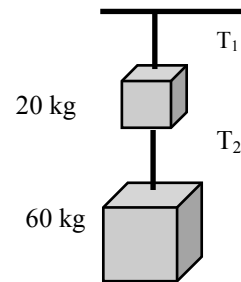
Find T1 and T2.

T_1

20 kg

T_2

60 kg

FBD:

ΣF_y:

FBD:

ΣF_y:

T1

T2