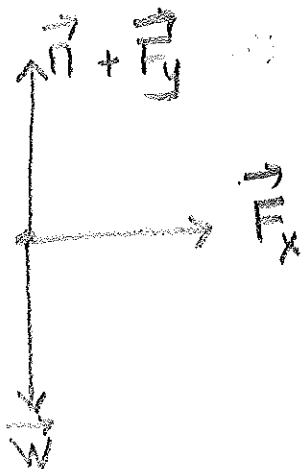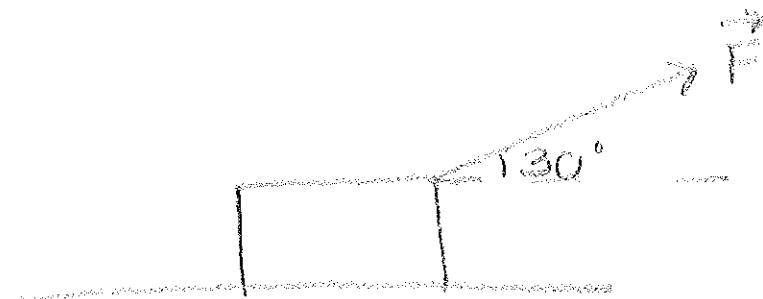**Closed book. No calculators are to be used for this quiz.**
Quiz duration: 10 minutes

Name: **Student ID:**   **Signature:**

A 28 kg suitcase is being pulled with constant speed by a handle that is at an angle of 30°
above the horizontal. If the normal force exerted on the suitcase is 180 N, what is the
force F applied to the handle? Take $g = 10 \ m/s^2$.

$$\sum F_x = m a_x$$

$$\sum F_y = m a_y = 0$$

$$n = mg - F\sin\theta$$

$$F_x = F\cos\theta$$

$$180N = n = (28\,kg)(10\,m/s^2) - F\sin 30°$$

$$F_y = F\sin\theta$$

$$F = \frac{100\,N}{\sin 30°} = \boxed{200\,N}$$
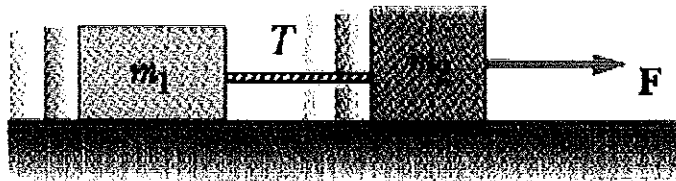
Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: Student ID: Signature:

Two masses, m_1 and m_2, situated on a frictionless, horizontal surface are connected by a massless string. A force, F, is exerted on one of the masses to the right. Determine the acceleration of the system and the tension, T, in the string.

$$\sum F_y = 0$$

$$\sum F_x = ma_x = ma$$

The acceleration of the system is the same for both masses.

To find a:

$$F = (m_1 + m_2)a$$

$$\boxed{a = \frac{F}{m_1 + m_2}}$$

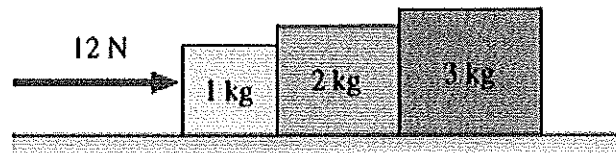To find T:

$$T = m_1 a = \boxed{\frac{m_1 F}{m_1 + m_2} = T}$$

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: **Student ID:**   **Signature:**

3 blocks of are lined up on a frictionless table, as shown in the figure below. A 12 N
force is applied to the leftmost block. What force does the middle block exert on the right
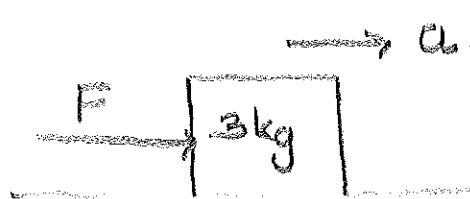one? Take g = 10 m/s^2.

First, we need to find acceleration of
the system:

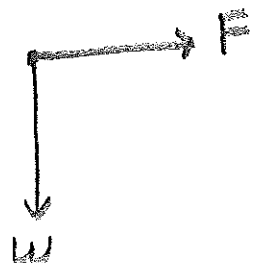$$\sum F_x = m a_x$$

$$12\,N = (1kg + 2kg + 3kg) \cdot a$$

$$\boxed{a = 2\,m/s^2}$$

$$\xrightarrow{} a = 2\,m/s^2$$

F: Force exerted by middle
block on the right
block

$$F = ma$$

$$F = (3kg)(2\,m/s^2) = 6\,N$$

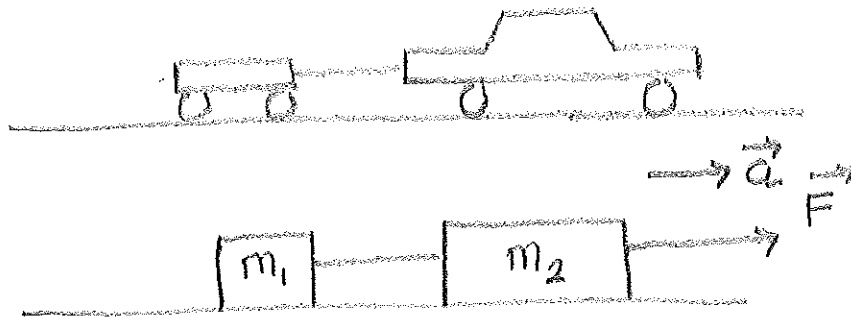**Closed book. No calculators are to be used for this quiz.**
Quiz duration: 10 minutes

Name: **Student ID:**   **Signature:**

Your 1000 kg car pulls a 250 kg trailer away from a stoplight with an acceleration of $2 \ m/s^2$. Find the force exerted by the engine. Take $g = 10 \ m/s^2$.

$$\sum F_x = ma_x$$

$$F = (m_1 + m_2) a$$

$$F = (1000 kg + 250 kg)(2 m/s^2)$$

$$\boxed{F = 2500 \ N}$$

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

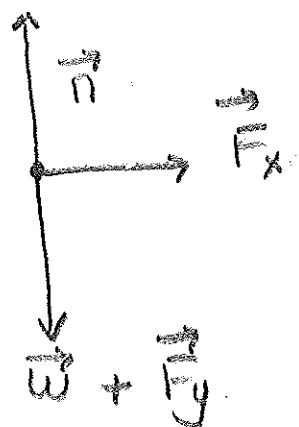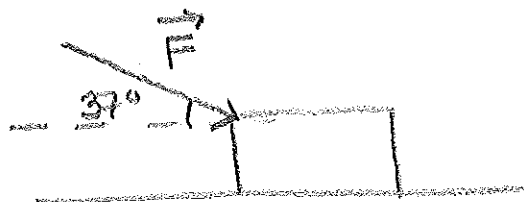**Name:**   **Student ID:**   **Signature:**

A gardener mows a lawn with an old-fashioned push mower. The handle of the mower makes an angle of 37° with the surface of the lawn. If a 200 N force is applied along the handle of the 10 kg mower, what is the normal force exerted by the lawn on the mower? Take $g = 10$ m/s^2.
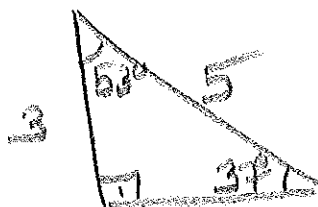
$$\sum \vec{F}_y = m\vec{a}_y = 0$$

$$\vec{w} + \vec{F}\sin\theta = \vec{n}$$

$$mg + F\sin\theta = n$$

$$(10\ kg)(\cdot 10\ m/s^2) + (200\ N)\sin 37 = n$$

$$\vec{w} + \vec{F}_y$$

$$F_x = F\cos\theta$$

$$F_y = F\sin\theta$$

$$100\ N + 120\ N = n$$

$$\boxed{n = 220\ N}$$