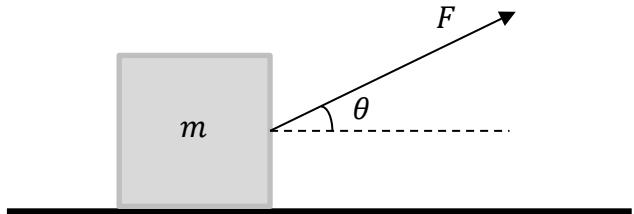Problem 1.

A block with mass m is on a smooth horizontal surface. The block is pulled by a constant force, F, which is at angle θ to the horizontal. We consider a moving system.

a) Make a force diagram of the block.
b) Determine the acceleration of the block.
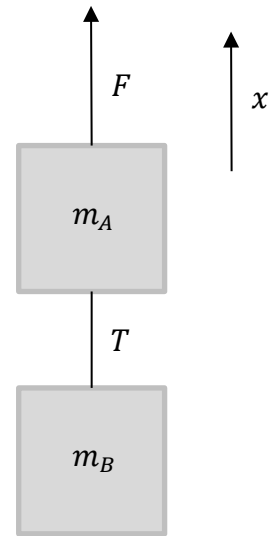c) Determine an expression for the normal force on the block.

Problem 2.

Two blocks with mass m_A and m_B are connected by a rope. The block with mass m_A is pulled upwards by a vertical force, F.

a) Determine the acceleration of the blocks.
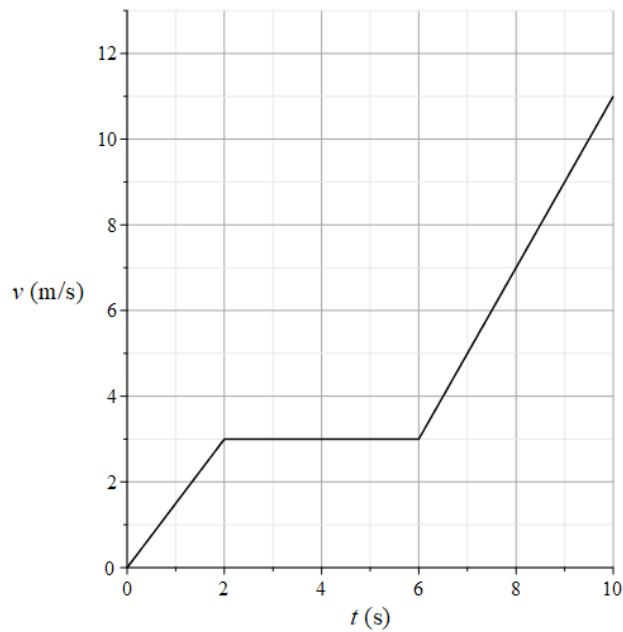b) Find an expression for the tension, T.

Let $F = 30.0$ N, $m_A = 3.00$ kg and $m_B = 2.00$ kg.

c) What is the acceleration of the blocks? What does this mean?

Problem 3.

A particle with mass 2.0 kg moves in a straight line. The figure shows the speed of the particle as a function of time.

a) What is the maximum value of the sum of the forces on the particle? When does the sum of the forces have this value?
b) When is the sum of the forces on the particle equal to zero?
c) What is the sum of the forces on the particle at the time $t = 1.4$ s?

Problem 4.

A person with mass M is standing on the ground. The person lifts a
barbell with total mass $2m$, such that it accelerates upwards with
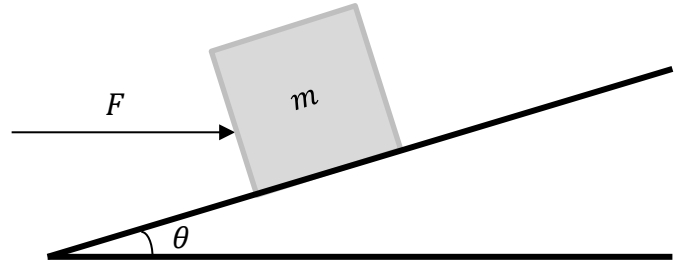acceleration a. The person's arms can be viewed as massless.
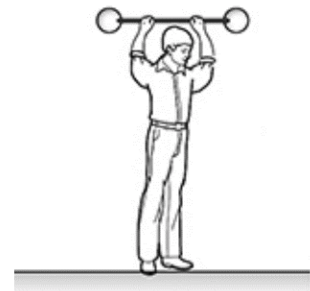
What is the normal force on the person from the floor?

A) $n = Mg$
B) $n = (M + m)g$
C) $n = (M + 2m)g$
D) $n = Mg + ma$
E) $n = Mg + 2ma$
F) $n = Mg + 2m(a + g)$
G) $n = (M + 2m)(a + g)$
H) Do not know

Problem 5.

A block with mass m is on a smooth slope.
The block is pushed by a constant
horizontal force, F. The slope is at angle θ
to the horizontal. We consider a moving
system.

a) Draw a force diagram of the block.
b) Determine the acceleration of the block.
c) Find an expression for the normal force on the block.

Problem 6.

Three blocks with masses m_A, m_B, m_C are pulled accross a smooth surface by a horizontal force, F.
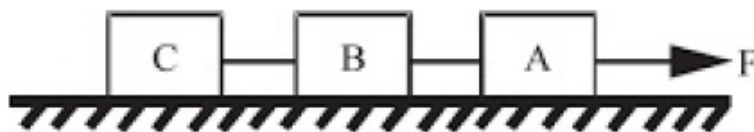
a) Determine the acceleration, a, of the blocks.
b) Determine the tension, T_{BC}, acting on block B and C.
c) Determine the tension, T_{AB}, acting on block A and B.

Problem 7.

A light block is resting on a heavy block. The heavy block is on a rough horizontal surface. The heavy block is being pushed by a constant, horizontal force. The two blocks move to the right with a constant speed without moving relative to each other.
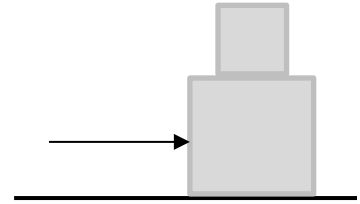
a) Draw a force diagram for each of the two blocks.

Now the pushing force is increased such that the system accelerates towards the right. There is still no relative movement between the blocks.

b) Draw force diagrams for both blocks.