Task #1

You apply a force of 549 N to push a refrigerator forward. The friction acting on the refrigerator is 493 N.

(a) Draw the Free-Body Diagram (♡)

(b) The mass of the refrigerator is 720 kg. Calculate the acceleration.
♠ ◇ ◇

Solution: F_{NET} = 56 N; 0.078 m/s^2

Task #2

A bucket in the a well is hoisted by a rope. The mass of the bucket is 5.5 kg.

(a) Calculate the force of gravity acting on the bucket.
♡ ♡ ♡

(b) Draw a Free-Body Diagram of the bucket. The tension on the rope is 71 N. (♠)

(c) Calculate the acceleration of the bucket
◇ ◇ ◇

Solution: F_G = 53.9 N; F_{NET} = 17.1 N; a = 3.11 m/s^2

Task #3

When the astronaut Neil Armstrong was fully suited up with all of his equipment, he had a weight (that is, force of gravity) on Earth of 1600 N.

(a) Calculate Neil Armstrong's mass
♠ ♠ ♠

(b) When Neil Armstrong walked on the moon, the acceleration of gravity was only g = 1.61 m/s^2. Calculate Neil's force of gravity on the moon
◇ ◇ ◇

(c) Calculate Neil Armstrong's mass on the moon (♡)

Solution: m = 163.27 kg; $F_{G_{moon}}$ = 262.86 N

Task #4

A certain elevator with mass 3200 kg is accelerating upward at a rate o 0.26 m/s^2.

(a) Calculate the net force
♠ ♠ ♠

(b) Calculate the force of gravity
♡ ♡ ♡

(c) The elevator is being lifted by cables. Draw the Free-Body Diagram. (♢)

(d) What must be the tension of the cables? (♢♡♠)

Solution: F_{NET} = 832 N; F_G = 31 360 N; F_T = 32 192 N

Task #5

A loaded semi truck has a mass of 36 000 kg It experiences 16 500 N of friction. Its acceleration is $0.12\,\mathrm{m/s^2}$.

(a) Calculate the net force acting on the truck.
♢ ♠ ♠

(b) Draw a Free-Body Diagram (♡)

(c) Calculate the force needed to be applied by the truck's engine. (♢♠♡)

Solution: F_{NET} = 4320 N; F_A = 20 820 N

Task #6 : *Challenge!*

A 25-kg box is pushed forward with an acceleration of of 4.56 $\mathrm{m/s^2}$. There are 152 N of friction. Draw a Free-Body Diagram and label the magnitude of all four foces acting on the box.

Solution: F_{NET} = 114 N; F_A = 266 N; F_f = 152 N; F_N = 242 N; F_G = 242 N;
