# Dynamics Test
FT Dynamics (20)

Directions: This was going to be a test, now it will be practice. The solutions will be posted online; included in these solutions will be an explanation of a grading criteria so you could "self-grade." You may print this if you would like, or solve the problems from "On-Screen" on other paper. I would recommend that you write out your solutions as though you are taking a test. If you have questions, you may photo graph or scan your solution and send to me via email so I can see what you are doing and offer feedback.
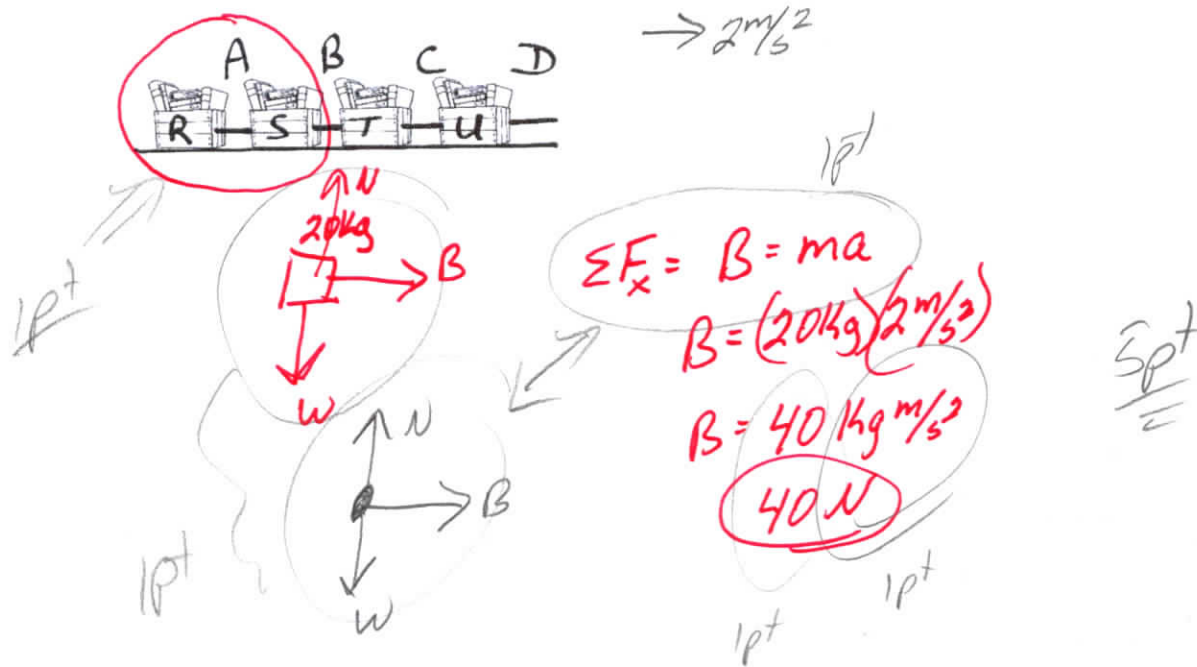
1) What is the mass of a 5 kg object?

5 kg
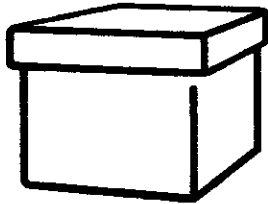
2) The 4 boxes shown are being accelerated to the right at 2 m/s². Each box has a mass of 10 kg.
    Determine the tension in string "B".

$\rightarrow 2 m/s^2$

A B C D

R—S—T—u

↑N

20kg

$\square \rightarrow B$

↓W

↑N

$\rightarrow B$

↓W

$\Sigma F_x = B = ma$

$B = (20kg)(2 m/s^2)$

$B = 40\ kg\ m/s^2$

40 N

1pt

1pt

1pt

1pt

1pt

5pt

3) The 2 boxes shown (combined mass of 5 kg) are in an elevator accelerating upward at 2 m/s^2. Determine the force exerted on the boxes (at the bottom on Box A) by the floor.
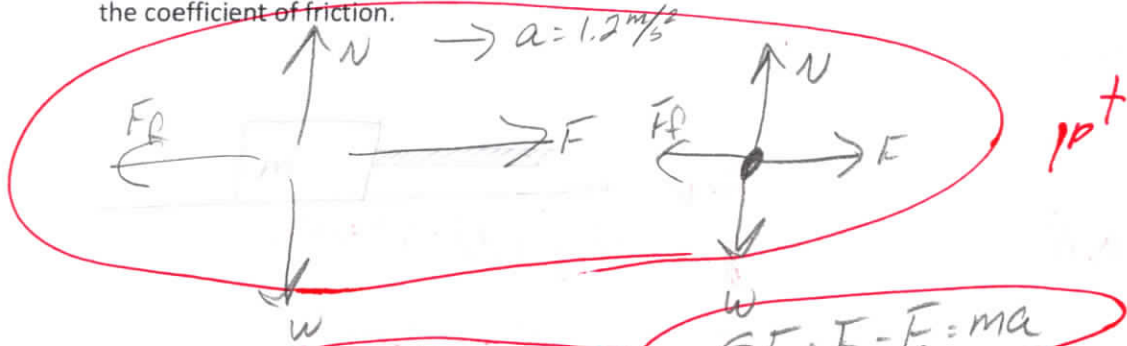
Box A

$2 m/s^2$

$\Sigma F_y = N - W = ma$

$N = ma + W$

$N = ma + mg$

$N = m(a + g)$

$N = (5 kg)(2 m/s^2 + 9.8 m/s^2)$

$N = 59 N$

normal   newton

4) A 15kg box is being pulled, accelerating at 1.2m/s^2 to the right with a force of 85N. Determine the coefficient of friction.

$\rightarrow a = 1.2 \text{m/s}^2$

1pt

$$\Sigma F_y = N - W = ma$$

$$N - W = 0$$

$$N = W$$

$$N = mg$$

$$\Sigma F_x = F - F_p = ma$$

1pt

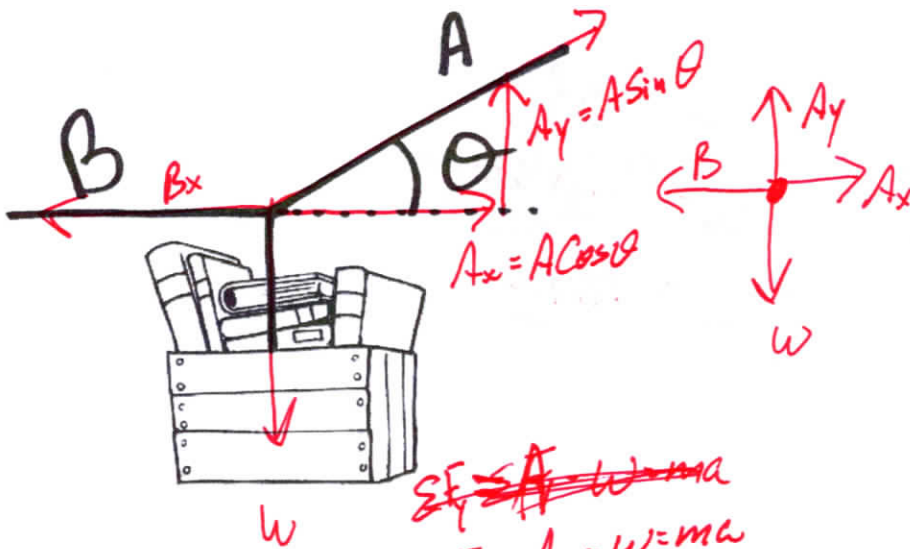$$F - ma = F_p$$

$$F - ma = \mu N$$

$$F - ma = \mu mg$$

1pt

$$\frac{F - ma}{mg} = \mu$$

$$\frac{85N - (15kg)(1.2 \text{m/s}^2)}{(15kg)(9.8 \text{m/s}^2)} = 1.37$$

1pt 1pt

.46

5) The box in the diagram below has a mass of 12 kg. The angle indicated is 70 degrees.   Assume string "B" is in the negative x-direction, and the dotted line is in the positive X-direction. Find the tension in both string "A" and string "B".

$A_y = A\sin\theta$

$A_x = A\cos\theta$

$\Sigma F_y = A_y - w = ma$

$A\sin\theta - mg = 0$

$A\sin\theta = mg$

$A = \dfrac{mg}{\sin\theta}$

$A = \dfrac{(12kg)(9.8m/s^2)}{\sin 70°}$

$A = \boxed{125N}$

$\Sigma F_x = A_x - B = 0$

$A\cos\theta - B = 0$

$A\cos\theta = B$

$125N\cos 70 = B$

$125N\cos 70 = 42.8N$

$\boxed{B = 42.8N}$

6) Determine the weight of a 3 kg object

$$W = mg$$

$$W = (3 \text{ kg})(9.8 \text{ m/s}^2)$$

$$W = 29.4 \text{ N}$$