Statics Worksheet

1. A painting hangs from a single wire that is hanging from a nail on the wall. The wire holding the picture up makes an angle of 90.0^{o} at the nail (not usually the case – it is usually higher). If the painting has a mass of 12.6 kg, what is the tension in the wire? What could be done to reduce the tension in the wire? [87.3 N, decrease the angle between the wires]

2. A 0.20 kg bathing suit is hung by a clothespin in the center of a 6.0 m long clothesline that causes the line to sag 4.0 cm. What is the tension in the clothesline? (Hint: Draw a free body diagram of the point of the clothesline from which the bathing suit is hung from. Also, use the dimensions of the problem to find the angle for the tension forces.) [74 N]

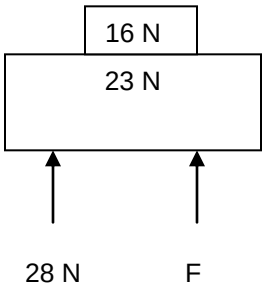
3. A child likes to hang on a tire tied to a tree branch. If the child and tire have a combined mass of 82.5 kg and are pulled back far enough to make an angle of 30.0^{o} with the vertical, what is the tension in the rope supporting her? (Do not worry about the fact that the horizontal forces will not balance. If it makes you feel better, assume someone is holding the child and tire there by applying a horizontal force.) [934 N]

4. While walking a tightrope, Harry had some good luck and some bad luck. The good luck was that just as the rope broke, he grabbed the broken ends. The bad luck was that the rope only makes an angle of 12.00^{o} with the horizontal. What force must Harry's arm supply to keep his 180.0 pound (what is this in kg?) body from disaster? [1926 N]

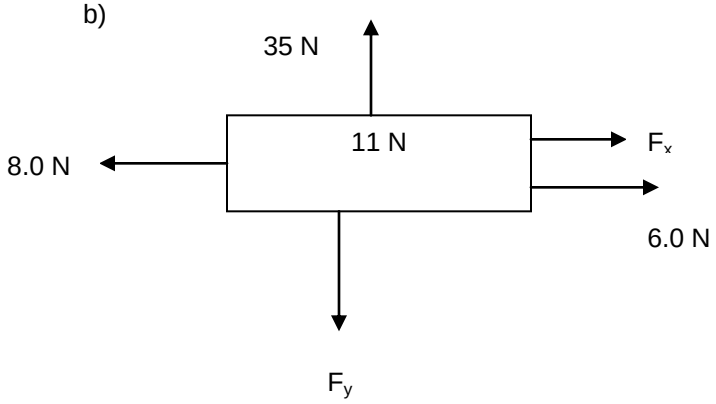
5. Fred hangs from a tree branch with both arms. If his mass is 72.0 kg and his arms make an angle of 50.0^{o}, what tension does each arm experience in supporting his body? [389 N]

6. Find the missing forces. [F=11 N; F_x=2 N, F_y=24 N]

a)



b)



7. Find the indicated angle θ and the magnitude of the missing force F. The ball has a weight of 8.00 lb. [32.8^{o}, 6.29 lb]