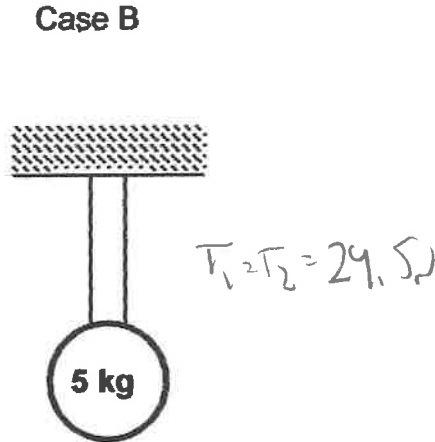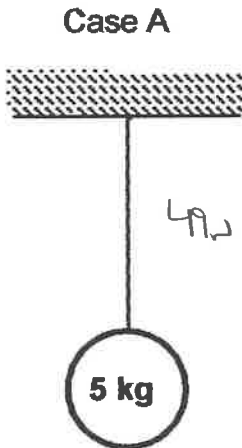*Answers* F5
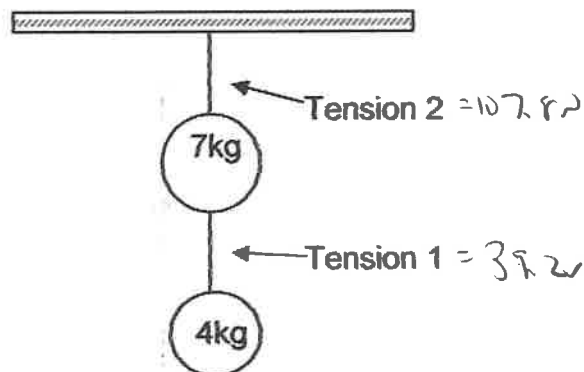
Force diagrams with calculations

For each of the problems below, first, <u>draw a force diagram</u> of each object then solve the problem.
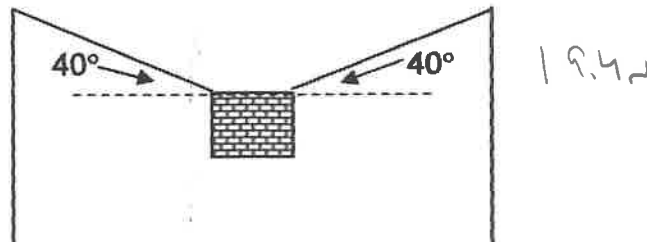
1. Determine the tension in each of the cables in case A and case B.

Case A   Case B

49,

5 kg $T_1 = T_2 = 24.5 J$

5 kg

2. Determine the tension in each cable.

Tension 2 $= 107.8 J$

7kg

Tension 1 $= 39.2 J$

4kg

3. If the object hung from the cable has a weight of 25 N, what is the tension in the cable?

40°   40°   19.4 J
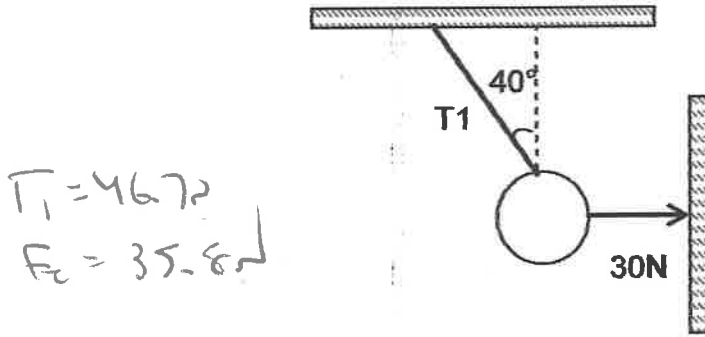
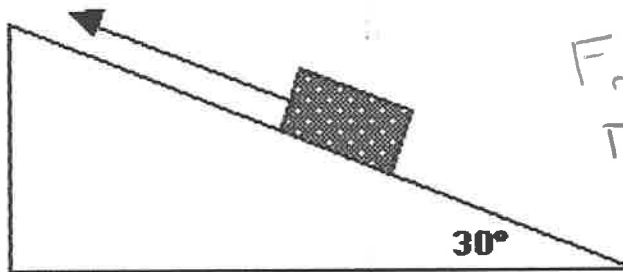If the angles were 5° instead of 40°, what would the tension be?

143.4 J

4. The cable at right exerts a 30 N force. Determine the weight of the ball and the tension in the cable.

$T_1 = 46.7?$

$F_g = 35.8N$

40°

T1

30N

5. The box on the frictionless ramp is held at rest by the tension force. The weight of the box is 100 N. Find the normal force and the force of tension.

$F_N = 86W$

$T_1 = 5aN$

30°

What would be the value of the tension force if the angle were increased to 45°?
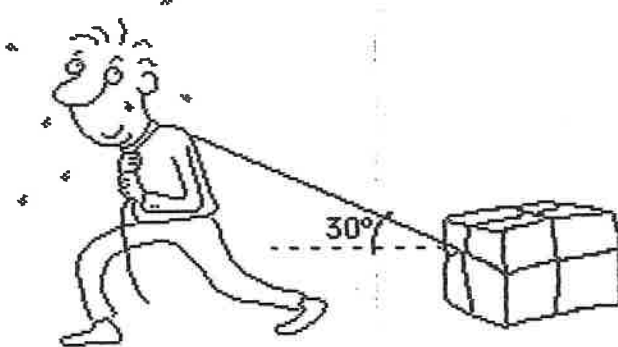
$T_1 = 70.7?$

6. In the system below the pulley and ramp are frictionless and the block is in static equilibrium. What is the **mass** of the block on the ramp?
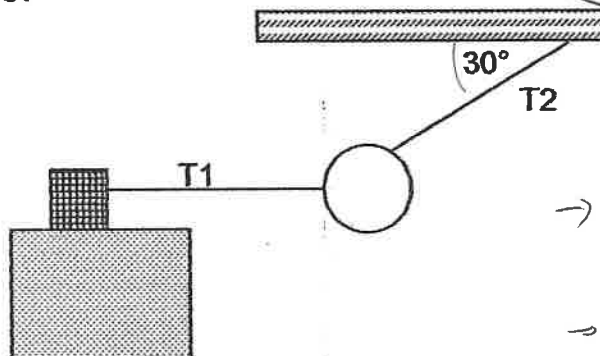
$35.6kg$ $(349.5?)$

35°
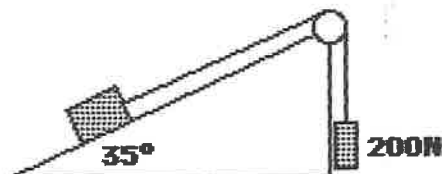
200N

7. A man pulls a 50 kg box *at constant speed* across the floor. He applies a 200 N force at an angle of 30°.
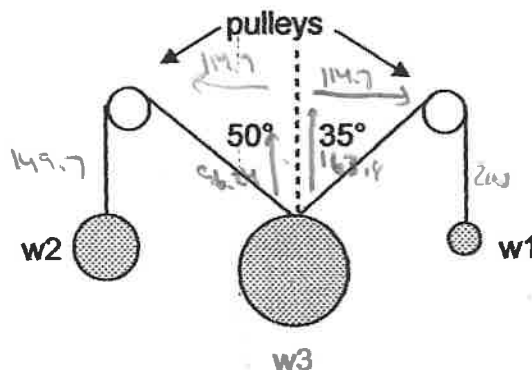

a. What is the value of the normal force? 390N

b. What is the value of the frictional force opposing the motion?

173.2N

8. The system below is at rest. If the ball weighs 8.0 N, what are the tensions in the ropes?

30°
T2

T1

→ $T_1 = 13.9$ N

→ $T_2 = 16.0$ N

9. In the system below the pulleys are frictionless and the system hangs at static equilibrium. If w_1, the weight of the object on the right, is 200 N, what are the values of w_2 and w_3?

pulleys

50° 35°

w2   w1

w3

$W_2 = 149.8$ N

$W_3 = 260.1$ N

96.24
+ 163.5

$\sin 50 = \frac{114.7}{14}$ $\tan 5 = \frac{114.7}{A}$

96.24