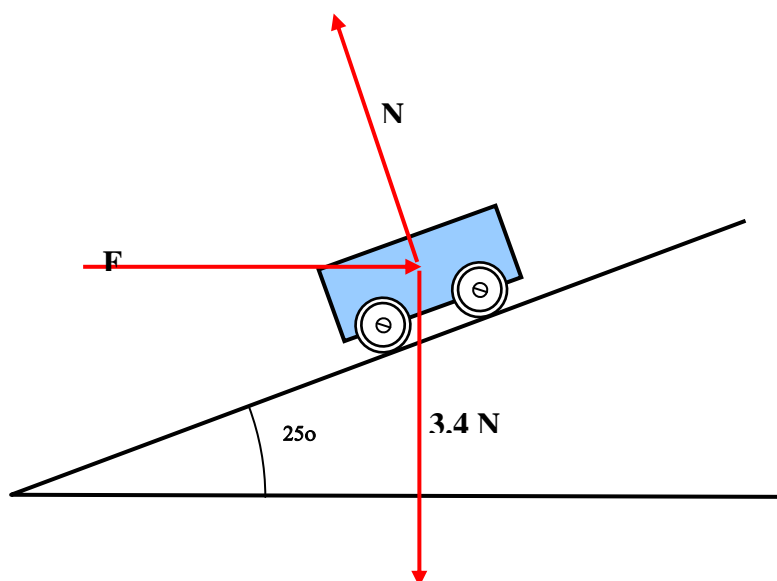


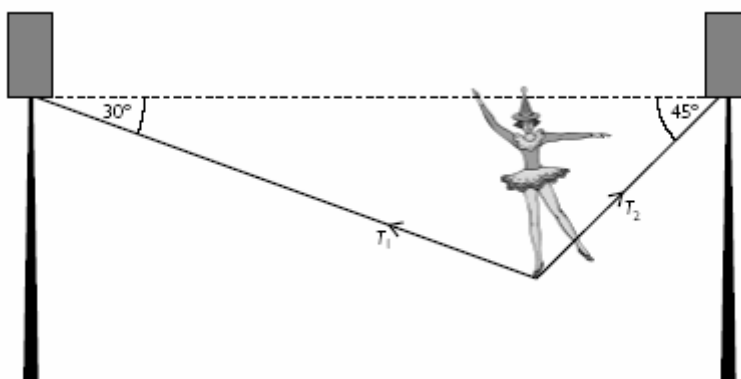
TAP 202- 5: questions on forces and equilibrium

- 1 The weight of the trolley in the diagram is 3.4 N. The trolley is not moving.



Calculate

- (a) the normal reaction, N , and
(b) the horizontal force, F .
- 2 The diagram below shows a circus performer in a high-wire act.



- (a) The total mass of the performer plus props is 76.5 kg. Using a scale of 1 cm to 100 N, draw a vector triangle to show the forces acting on the performer.
- (b) Use your diagram to find the tensions T_1 and T_2 in the cable.
- (c) A member of the audience is worried that the cable might break, and thinks that this would be less likely to happen if the cable were shorter so that it did not sag so much.

Explain, with the aid of a diagram, whether this would really reduce the tension in the cable.

Answers and worked solutions

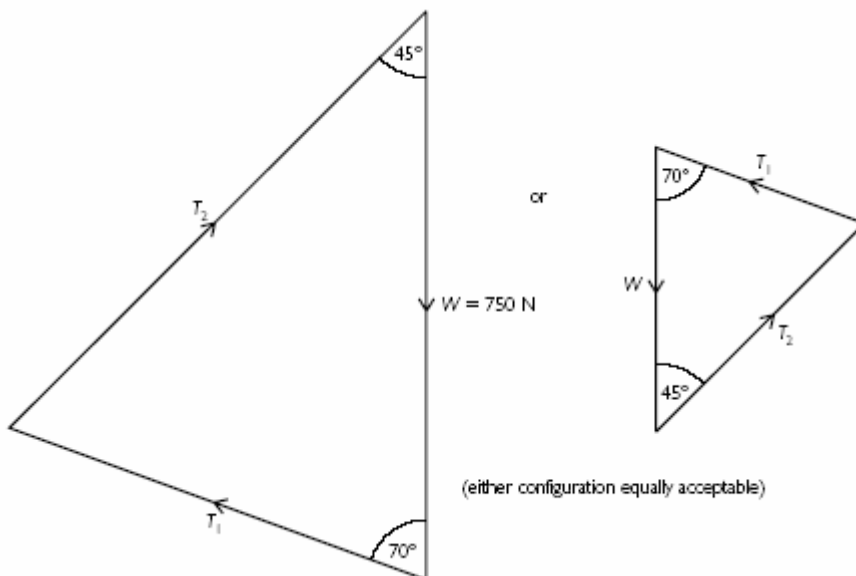
1

(a) $N = 3.4 / \cos 25^\circ = 3.75 \text{ N}$

(b) $F = N \cos 65^\circ = 1.59 \text{ N}$

2 (a) $W = mg = 76.5 \text{ kg} \times 9.81 \text{ N kg}^{-1} = 750 \text{ N}$

Scale diagram:

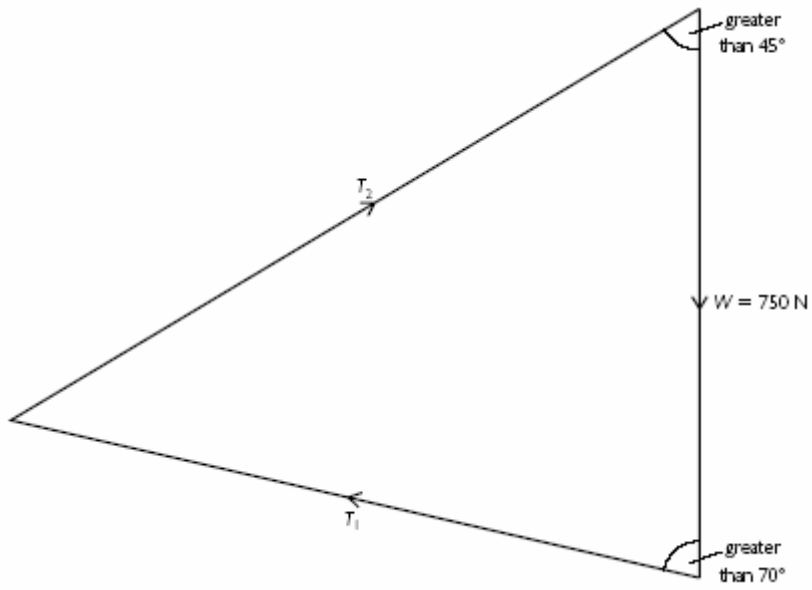


b) $T_1 = 590 \text{ N}, T_2 = 780 \text{ N}$

(Calculated values are $T_1 = 585 \text{ N}, T_2 = 778 \text{ N}$. Allow $\pm 15 \text{ N}$ measured from diagram, i.e. $\pm 1.5 \text{ mm}$.)

(c) The 'vertical' side of the triangle of forces must still be 750 N but the other two sides

will now be longer than before so tension will be increased not reduced



External references

Question 2: This activity is taken from Salters Horners Advanced Physics, AS, Section Higher, Faster, Stronger, HFS Additional sheets 12 and 13