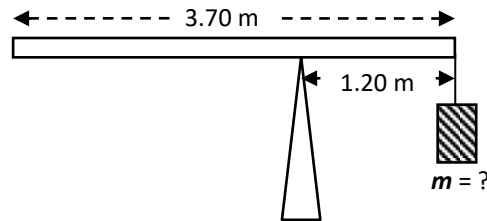*Lesson 2 Practice Assignment*
Torque, Perpendicular Forces and Equilibrium

1. A fulcrum is placed 1.20 m from the edge of a 3.70 m-long wooden uniform plank that weighs 1.90×10^2 N. A mass **m** is hung at the edge of the short end to balance it. How large must this mass be in order to balance the plank?

2. In the diagram to the right, the mass of the 2.80 m-long, horizontal uniform beam is 15.0 kg.

   a) What is the tension F_T in the cable that holds the beam and sign up?

   b) The cable can only handle a maximum tension force of 1.20×10^3 N before breaking. What is the heaviest weight that can be hung in place of the 54.0 kg sign without breaking the cable?
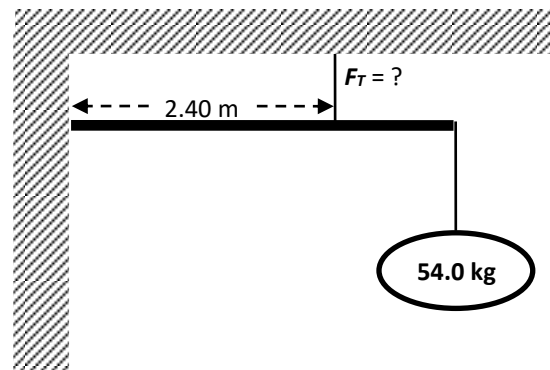
3. Two children are on opposite ends of an 8.50 m-long seesaw that is pivoted in the middle. One child weighs 325 N while the other weighs 237 N. A third child weighing 158 N attempts to hop on and balance the seesaw. How far from the fulcrum should she sit?
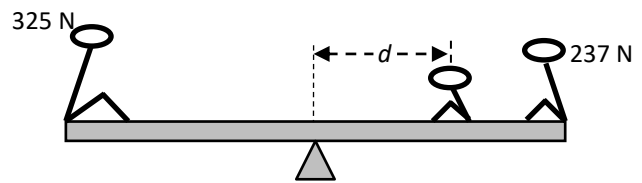
4. In the diagram to the right, the 3.00 m-long diving board that the swimmer is standing on has a uniform mass of 14.0 kg, and is attached with nails to supports **A** and **B**.

   If the swimmer's mass is 55.0 kg, what force acts at supports **A** and **B**?
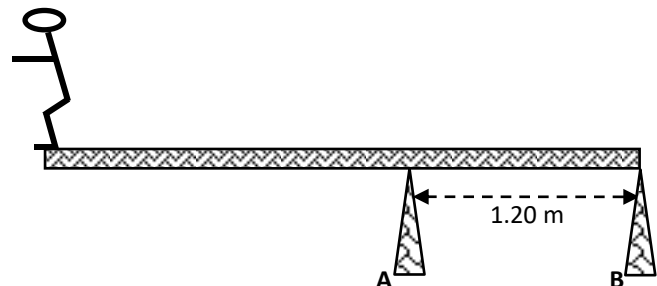
5. A student of mass 74.0 kg attempts to cross a fallen 36.0 m-long uniform log of mass 420 kg that *just* extends horizontally across a deep gorge. What he doesn't realize is that although the log is held up firmly on his side of the chasm, the other side is unstable, and can only withstand a force of 2.65×10^3 N before collapsing. Should the student attempt to cross this log? Explain using physics reasoning.

$F_{max} = 2.65 \times 10^3$ N
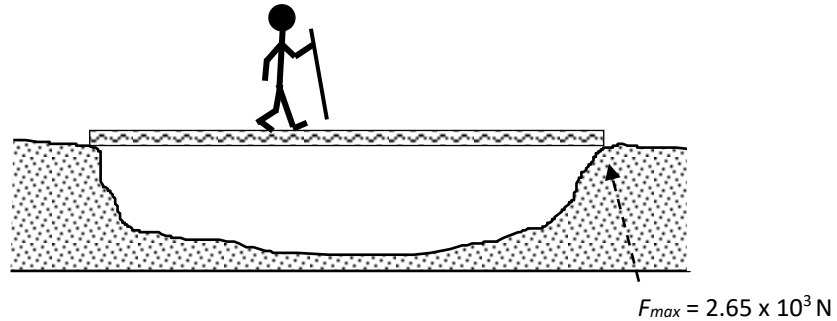
ANSWERS

1. $m = 10.5$ kg

2a) $F_t = 703$ N

2b) $F_g = 955$ N

3. $d = 2.37$ m

4. $F_A = 1.52 \times 10^3$ N up, $F_A = 843$ N down

5. $d = 29.4$ m is the maximum distance, < 36.0 m → don't cross