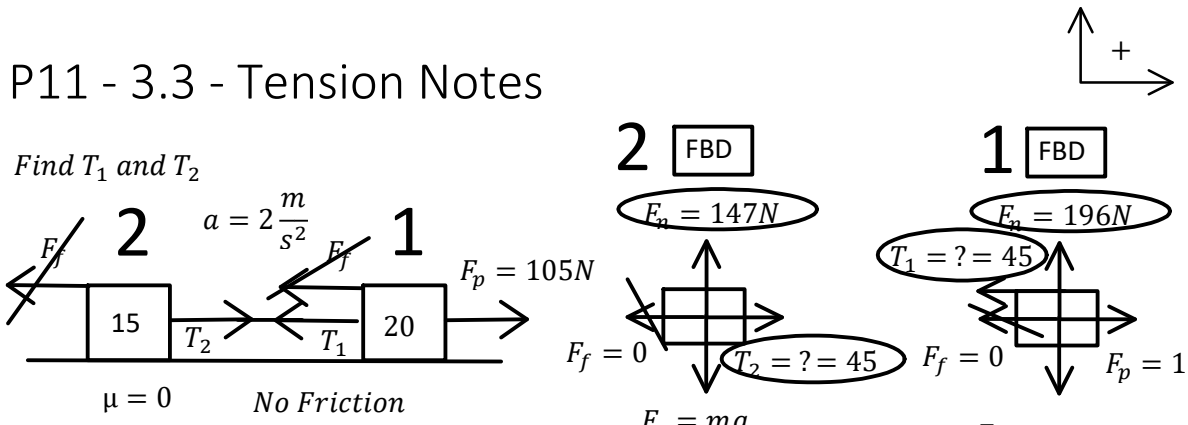
P11 - 3.3 - Tension Notes



System | *Mass of system*

$$F = ma$$
$$F - T_1 - F_f + T_2 - F_f = ma$$
$$105 - T_1 - F_f + T_2 - F_f = (15 + 20)a$$
$$105 = 35a$$
$$a = 3\frac{m}{s^2}$$

$T_1 = T_2$

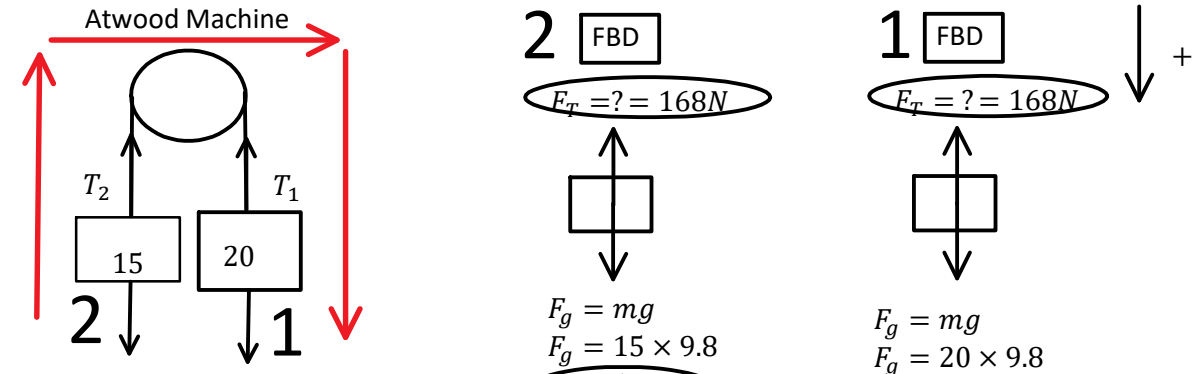
Mass 2

$$F = ma$$
$$T_2 - F_f = ma$$
$$T_2 - 0 = 15 \times 3$$
$$T_2 = 45\ N$$

Mass 1

$$F = ma$$
$$F - T_1 - F_f = ma$$
$$105 - T_1 - F_f = 20 \times 3$$
$$T_1 = 45\ N$$

Tension must be equal!



$$F = ma$$
$$Fg_1 - T_1 + T_2 - Fg_2 = ma$$
$$196 - T_1 + T_2 - 147 = (15 + 20)a$$
$$49 = 35a$$
$$a = 1.4\frac{m}{s^2}$$

Mass 2

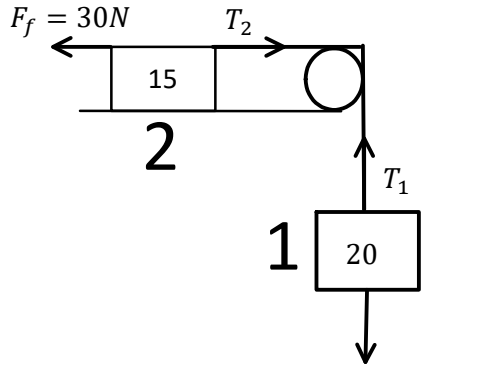
$$F = ma$$
$$T_2 - F_g = ma$$
$$T_2 = ma + F_g$$
$$T_2 = 15 \times 1.4 + 147$$
$$T_2 = 168\ N$$

Mass 1

$$F = ma$$
$$F_g - T_1 = ma$$
$$T_1 = F_g - ma$$
$$T_1 = 196 - 20 \times 1.4$$
$$T_1 = 168\ N$$

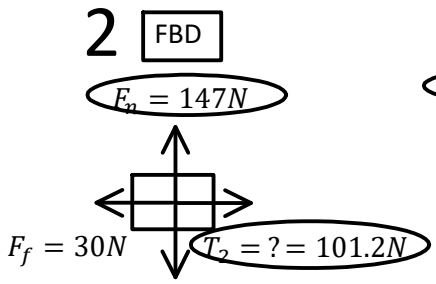
P11 - 3.3 - Tension Notes

Find T_1 *and* T_2



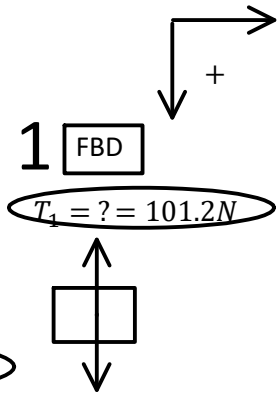
$F_g = mg$
$F_g = 20(9.8)$
$F_g = 196\ N$

$F = ma$
$F_g - T_1 + T_2 - F_f = ma$
$196 - 30 = (20 + 15)a$
$166 = 35a$
$a = 4.74 \frac{m}{s^2}$



Mass 2

$F = ma$
$T_2 - F_f = ma$
$T_2 = ma + F_f$
$T_2 = 15 \times 4.74 + 30$
$T_2 = 101.2\ N$



$F_g = mg$
$F_g = 20 \times 9.8$
$F_g = 196\ N$

Mass 1

$F = ma$
$F_g - T_1 = ma$
$T_1 = F_g - ma$
$T_1 = 196 - 20 \times 4.74$
$T_1 = 101.2\ N$