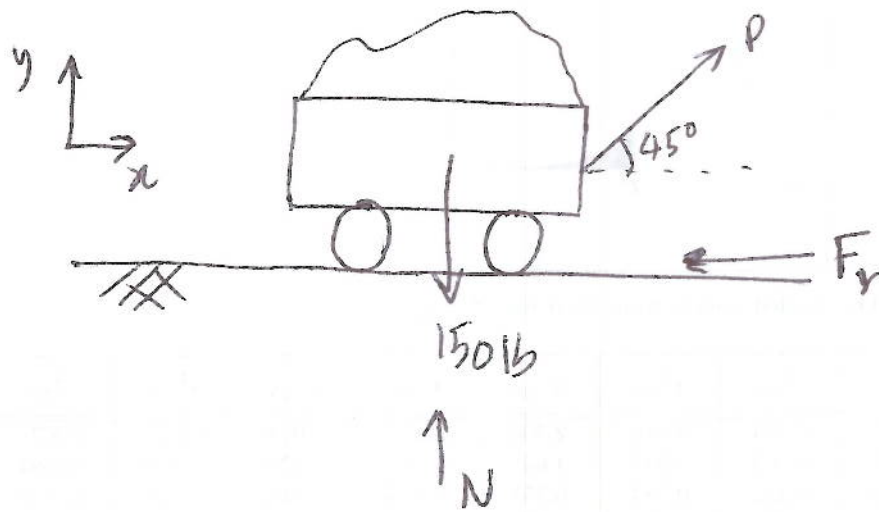


8-136



N is normal reaction, F_f is rolling friction force

$$\sum F_y = 0$$

$$P \sin 45 + N - 150 = 0$$

$$0.71P + N = 150 \quad \text{--- (1)}$$

$$\sum F_x = 0$$

$$P \cos 45 - F_f = 0$$

$$0.71P - F_f = 0 \quad \text{--- (2)}$$

now

$$F_r = \frac{wa}{\gamma} \neq$$

so

$$0.71 P - \frac{wa}{\gamma} = 0$$

$$0.71 P - \frac{150(0.03)}{3} = 0$$

$$\cancel{0.71 P} =$$

$$P = 2.11 \text{ lb.}$$

If necessary take moments. In this example taking moments was not necessary.

8-141

Here we have two rolling resistances. So we take the average as the rolling resistance overall

$$P = \frac{W a}{r}$$

$$P = \frac{W}{r} \frac{(a_1 + a_2)}{2} = \frac{1.2 \times 10^3 (9.81)}{15} \frac{(0.12 + 0.4)}{2}$$

$$P = 235 \text{ N}$$