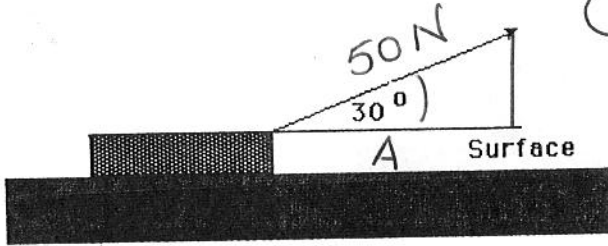Answer Key.

−F   d   θ

1. A force of 50 N on the block at the angle shown in the diagram. The block moves a horizontal distance of 3.0 m at a constant speed.

How much work is done by the effective force? **(129.9 J)**

50 N
30°
A   Surface

$F_{eff} = 43.3 N$

① $H \times \cos \theta = \dfrac{A}{H} \times H$

$50 N \cos 30° = A$

$F_{eff} = 43.3 N$

② $W = F \times d$
$= 43.3 N \times 3.0 m$
$W = 129.9 J$

not necessary bec not falling or lifting the obj

2. Calculate the work done by a 2.0 N force directed at a 30 °C angle to the vertical to move a 500 g box a horizontal distance of 400 cm across a floor at a constant speed. **(4.0 J)**

$\theta = 60°$

30°
F = 2.0 N
A
← Floor
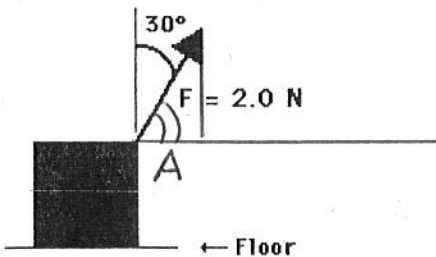
① $H \times \cos \theta = \dfrac{A}{H} \times H$

$(2.0 N)(\cos 60°) = 1 N$

② $W = F \times d$
$= 1 N \times 400 cm \times \dfrac{1 m}{100 cm}$

$W = 4 J$
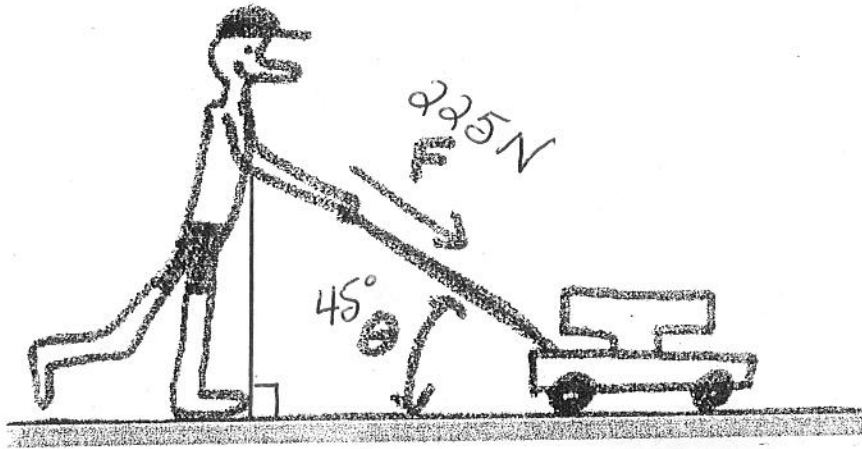
3. A boy (or duckboy?) is pushing a lawn mower with a force of 225 N at an angle of 45 ^{0} with respect to the ground. If he pushes the lawn mower for a total of 6000 ft at a constant speed, how much work did he do? (1 ft = 12 in and 1 in = 2.54 cm)
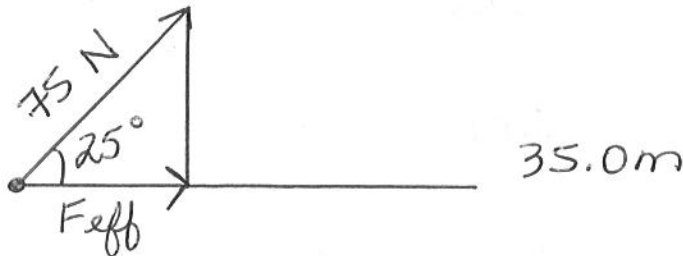
$$W = F \times d$$
$$= H \cos \theta \times d$$
$$= 225N \cos 45° \times 6000 ft \times \frac{1 in}{1 ft} \times \frac{2.54 cm}{1 in} \times \frac{1 m}{100 cm}$$
$$\boxed{W = 290\,960\,J}$$

4. A person pulls a toboggan for a distance of 35.0 m by pulling on a rope at an angle of 25.0 ° above the snow with a force of 75 N. The toboggan moves at a constant velocity. How much work is done? Sketch! before you solve!!

35.0 m

$$W = H \cos \theta \cdot d$$
$$= 75N \cos 25° \times 35.0 m$$
$$\boxed{W = 2379\,J}$$