

Question#18433

A lever is used to lift a heavy load. When a 52 N force pushes the left end of the lever down 1.28 m, the load rises 0.23m.

4) If the lever is only 84% efficient, what is the work output?

5) If the lever is only 84% efficient, what would be the weight of the load it could lift with this output?

Solution:

Let:

$$F_1 = 52 \text{ N}$$

$$S_1 = 1.28 \text{ m}$$

$$S_2 = 0.23 \text{ m}$$

$$k = 84\% = 0.84$$

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$A(\text{output})$ —?

$F_2$ —? output weight

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According to the Law of the lever:

$$\frac{F_1}{F_2} = \frac{S_2}{S_1}$$

$$F_2 = \frac{F_1 S_1}{S_2}$$

Such as the lever is only 84% efficient:

$$F_2 = 0.84 \frac{F_1 S_1}{S_2} = 0.84 * \frac{52 * 1.28}{0.23} = 243.09 \text{ N}$$

$$A(\text{output}) = F_2 * S_2 = 243.09 * 0.23 = 55.91 \text{ J}$$

**Answer: the output work is 55.91 J, the weight of the load is 243.09 N**