A lever has an efficiency of 95%. a) What work(w_i) is needed to lift a 45 kg mass 0.55 m? b) If 110 N of force are applied to the lever, how far is the effort force exerted? C) What is the AMA and IMA?

Feb 19-9:48 AM

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Eff. = 95%
W_i = ?
m_r = 45 kg
F_r = 440 N
d_r = 0.55 m

a) $Eff = \frac{W_o}{W_i} \times 100$

$W_i = W_o/Eff = (440\ N \times 0.55\ m)/.95 = 250\ J$

b) $W_i = F_e d_e$
$d_e = W_i/F_e = 250\ J/110\ N = 2.3\ m$

c) $AMA = F_r/F_e = 440\ N/110\ N = 4$
$IMA = d_e/d_r = 2.3\ m/0.55\ m = 4.2$

Feb 14-6:35 AM

A ramp is 10.9 m long and 4.1 m high.. a) What force is needed to slide a 55 kg box to the top if friction is ignored?…b) What is the IMA of the ramp?…c) What is the AMA if the efficiency is 79%?…d) What would the new F_e be with the efficiency of 79%?

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d_e = 10.9 m
d_r = 4.1 m
a) F_e = ?
m_r = 55 kg
F_r = 540 N
b) IMA = ?
c) AMA = ?
if Eff = 79%
d) F_e = ?
if Eff = 79%

a) $F_f = 0 \therefore W_i = W_o$
$F_e d_e = F_r d_r$
$F_e = F_r d_r/d_e = [540\ J(4.1\ m)]/10.9\ m$
$F_e = 203\ N$

b) $IMA = d_e/d_r = 10.9\ m/4.1\ m = 2.7$

c) $Eff = AMA/IMA \times 100$
$AMA = EFF(IMA) = .79(2.7) = 2.1$

d) $AMA = F_r/F_e$
$F_e = F_r/AMA = 540\ N/2.1 = 260\ N$

Feb 14-6:43 AM

A lever is 90% efficient. a) What work does the machine do if you pushed with 67 N of force through a distance of 1.3 m? b) What was the mass of the object lifted if it moved 0.87 m?… (during the event in #a) c) What is the AMA and IMA of the lever?

Eff = 90%
W_o = ?
if F_e = 67 N
d_e = 1.3 m
b) m_r = ?
d_e = 0.87 m
c) AMA = ?
IMA = ?

a) $Eff = \frac{W_o}{W_i} \times 100$

W_o = Eff (W_i) = .90(67 N x 1.3 m) = 78 J

b) $W_o = F_r d_r$
$F_r = W_o/d_r$ = 78 J/.87 m = 90. N
m = 9.2 kg

c) AMA = F_r/F_e = 90 N/67 N = 1.3
IMA = d_e/d_r = 1.3 m/.87 m = 1.5

Feb 19-9:46 AM

What speed is a 655 kg crate lifted at if 5.67 kW of power are consumed for a 67% efficient electric motor to turn the 86% efficient winch?

Feb 19-10:41 AM

What speed is a 655 kg crate lifted at if 5.67 kW of power are consumed for a 67% efficient electric motor to turn the 86% efficient winch?

v = ?
m_r = 655 kg
F_r = 6400 N
P = 5.67 kWE
Eff_1 = 67%
Eff_2 = 86%

Eff_T = 58%

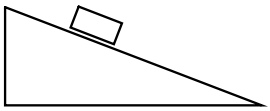
$Eff_t = Eff_1 \times Eff_2$

$P = W/t = Fv$
$v = P/F$

v = [5670 W(.58)]/6400 N = .51 m/s

Feb 14-7:14 AM

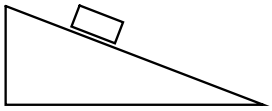
A ramp is 3.5 m long and 1.2 m high. What is its efficiency if 120 N of force are needed to slide a 26 kg box up the ramp at a constant velocity?



Feb 23-10:19 AM

A ramp is 3.5 m long and 1.2 m high. What is its efficiency if 120 N of force are needed to slide a 26 kg box up the ramp at a constant velocity?

d_e = 3.5 m
d_r = 1.2 m
Eff = ?
F_e = 120 N
m_r = 26 kg
F_r = 255 N



Eff = w_o / w_i x 100
Eff = F_r d_r / F_e d_e x 100

Eff =[255 N(1.2 m)]/[120 N(3.5 m)] x 100

Eff = 73%

Feb 23-10:20 AM