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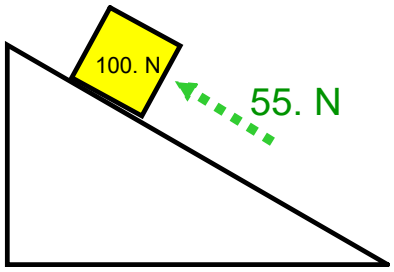

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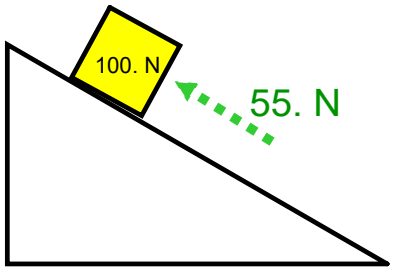

AMA = 100. N/55. N = 1.8
IMA = 6.0 m/2.5 m = 2.4
W_o = 100 N x 2.5 m = 250 J
W_i = 55. N x 6.0 m = 330 J
Eff = 2/2.5 x 100 = 75 %

A first class lever has a 12 kg mass at one end and a 40 N force applied to the other end. If the 12 kg mass goes up .50 m, what is d_e? The efficiency is 93%

W_i
W_o
AMA
IMA

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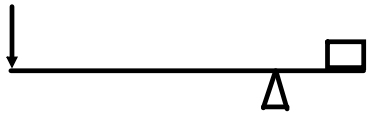


m = 12 kg
F_r = 118 N
F_e = 40 N
d_r = .50 m
d_e = ?
Eff = 93%

Eff = W_o /W_i x 100

W_i = W_o/Eff

$F_e d_e = (F_r d_r)/eff$

$d_e = (F_r d_r)/(eff\ F_e)$

d_e = (118N x .5m)/(.93 x 40N)

d_e = 1.58

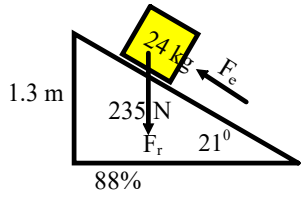
$W_o = F_r d_r$ = 118 N(.5m) = 59J
$W_i = F_e d_e$ = 40N(1.58m) = 63J
AMA = F_r/F_e = 118N/40N = 2.95
IMA = d_e/d_r = 1.58m/.5m = 3.16

W_i
W_o
AMA
IMA

A ramp is 1.3 m high and is at a 21 degree angle. What is the effort force needed to move 24 kg mass up the ramp if the efficiency is 88%?

W_i
W_o
AMA
IMA

A ramp is 1.3 m high and is at a 21 degree angle. What is the effort force needed to move 24 kg mass up the ramp if the efficiency is 88%? What is μ? - think v_c



$d_e = 1.3 \text{ m}/\text{Sin } 21^0 = 3.6 \text{ m}$

$\text{Eff} = W_o/W_i \times 100$

$F_e = (F_r d_r)/(\text{eff} \times d_e)$

$F_e = (235 \text{ N} \times 1.3 \text{ m})/(.88 \times 3.6 \text{ m})$

$F_e = 96 \text{ N}$

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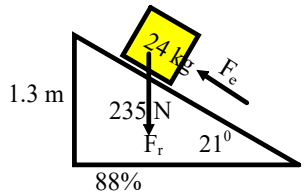

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$F_p = \sin 21^0(235\text{N}) = -84 \text{ N}$

$F_N = \cos 21^0(235\text{N}) = 220 \text{ N}$

$F_p + F_f + F_a = 0$

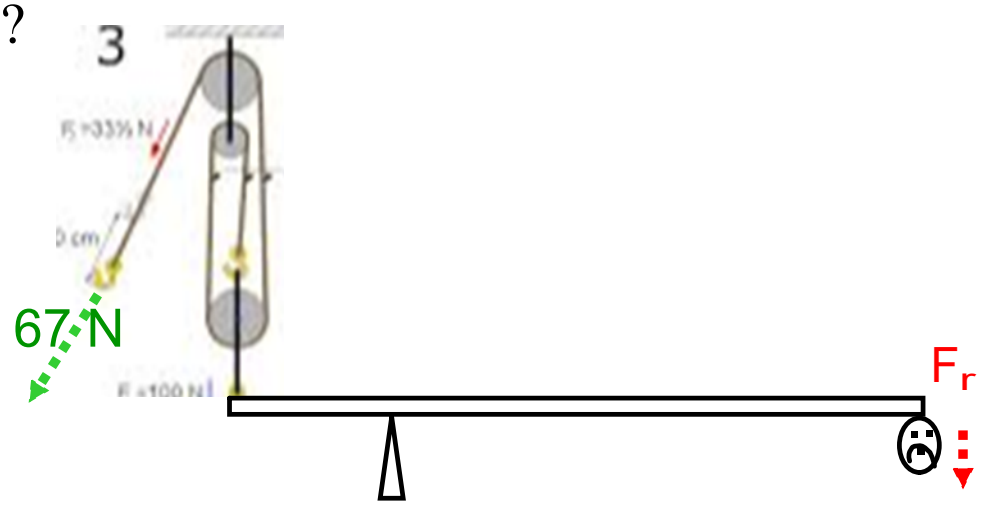
$F_f = -F_p - F_a$

$F_f = -(-84 \text{ N}) - (96 \text{ N})$

$F_f = -12 \text{ N}$

$\mu = F_f/F_N = -12 \text{ N}/220 \text{ N} = .055$

A 90% efficient pulley with an IMA of 3 and an d_e of 3.0 m activates a 95% efficient first class lever that has a d_r of 4.0 m. What is the output force of the lever if the input force on the pulley is 67 N?



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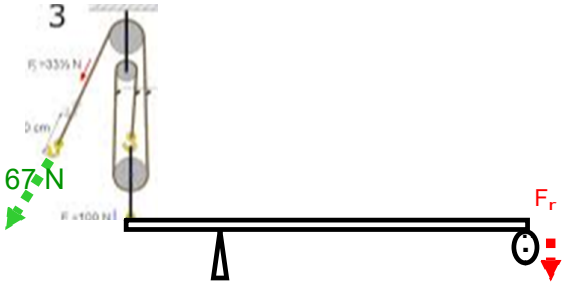

$Eff_t = .9 \times .95 = 86\%$

$Eff = W_o/W_i \times 100$
$F_r = (Eff\ W_i)/d_r$

$F_r = (.86 \times 67N \times 3m)/4m$
$F_r = 43N$

A ramp is 1.3 m high and is at a 21 degree angle. What is the effort force needed to move 24 kg mass up the ramp if μ is .33? What is its efficiency?

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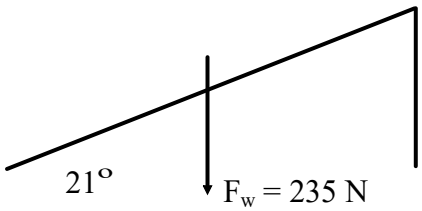

$\sin 21^0 = 1.3\ m/d_e$

$d_e = 3.6$ m

$F_N' = \cos 21(235\ N) = 219\ N$

$F_p = \sin 21(235\ N) = 84\ N$

$F_f = .33\ (219\ N) = 72\ N$

$F_e = F_p + F_f = 84\ N + 72\ N = 156\ N$

$Eff = F_r d_r / F_e d_e$

$Eff = 235\ N(1.3\ m)/156\ N(3.6\ m)$

$Eff = 54\%$