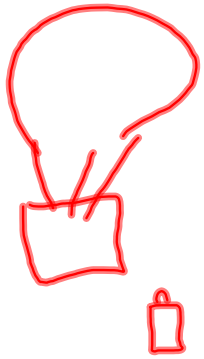
51)

$\Delta x = 1000m$

$90\% = F_f$

$m = 30kg$



$PE = 30kg(1000m)(9.81)$

$PE = 294,300J$

$KE = (294,300J).1$

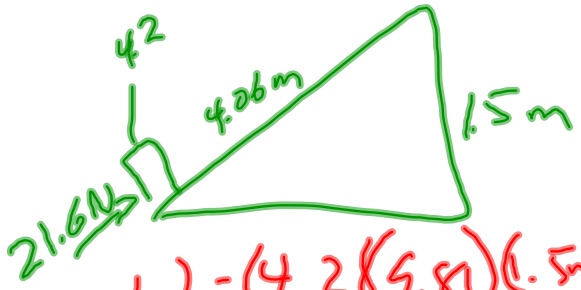
$KE = 29430J = \frac{1}{2}(30)v^2$

$v = 44m/s$

52)

4.2kg

4.06 m



$W = (4.2)(9.81)(1.5m)$

$W = 61.8\,J$

$W = F\Delta x$

$21.6(4.06) = 87.7\,J - 61.8\,J = 25.9\,J$

87.7 J

30%

$W_f = mgh + \frac{1}{2}mv^2$

$W_f = 4.2(9.81)(1.5) - \frac{1}{2}(4.2)(6.46)^2$

53)

$m = 5\,kg$

$V_f =$

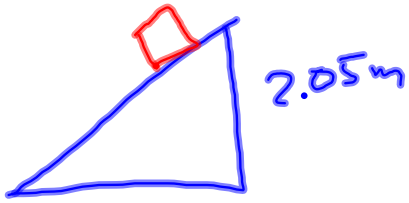
$PE = 5(2.05)(9.81)$

$PE = 100\,J$

$100\,J(.9) = KE$

$90\,J = \frac{1}{2}(5)v^2$

$V = 6\,m/s$



$F = .1(PE)$

56) $108\,hp \times \frac{743}{1\,hp} =$

210 hp

640 hp

80.6 kW

157. kW

477 kW

57) $80\text{hp} \times \frac{743}{1\text{hp}} = 59440$

$$\frac{59440}{300\text{W}} =$$

199 Batteries

58)

4.21kg

.17m

86400sec

$P = \frac{W}{t}$

$PE = \frac{mgdx}{t}$

$\frac{4.21(.17)(5.81)}{86400sec}$

8×10^{-5} W

8 μW

=

59)

$m = 110 kg$

$\Delta x = 7.3 m$

$t = 7.2 sec$

$P = 200 W$

?

$$P = \frac{W}{t} = \frac{F \Delta x}{t} = \frac{mg \Delta x}{t}$$

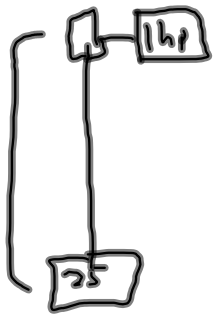
$$200W = \frac{110(g)(7.3m)}{7.2sec}$$

$$g = 1.8 m/s^2$$

60) 1 hp

$t = ?$

25kg



$$P = \frac{W}{t} = \frac{Fx}{t} = \frac{25(9.81)(10)}{t}$$

$$1\,hp\left(\frac{746\,W}{hp}\right) = \frac{2452.5}{t}$$

$$t = 3.3\,sec$$

61) $0.083 kw-hr 250W 12hrs

0.25 kw (12hrs) = 3 kwhrs

3kwhrs x .083 = $0.25

25¢

62)

$30hp \times 746W = 22380W$

$50mph \times \frac{1609m}{3600} = 22.3 m/s$

$F_f = ?$

F_f

$P = \frac{W}{t} \quad \frac{F\Delta x}{t} = FV$

$F = \frac{P}{V} = 1000N$

65) 2150kg 28m 15sec

$F_f = 1534N$

$P = \frac{W}{t}$ $P = \frac{F(x)}{t}$

F_g F_f

$P = \frac{[2150(9.81) + 1534N)(28m)}{15sec}$

$P = 42,234\ W$

65)

2150kg

28m

15 sec

$F_f = 1534N$

$W = F_x$

$(mg + 1534N)$

$\Downarrow$

$22625N\,(28m)$

$P = \frac{W}{t}$ $\frac{633514J}{15sec} =$ 42,200W

69) $24.3N = F$

$5.66cm = x$

$F = kx$

$24.3 = k(.0566)$

$k = 429 N/m$

$W = \frac{1}{2}(429)(.0566)^2$

$W = 0.69 J$

73

$$0.5\,(m)\,15.7^2 + 9.81(m)(12.7) = 9.81(m)(1.29) + 293J$$

$$m = 1.25kg$$

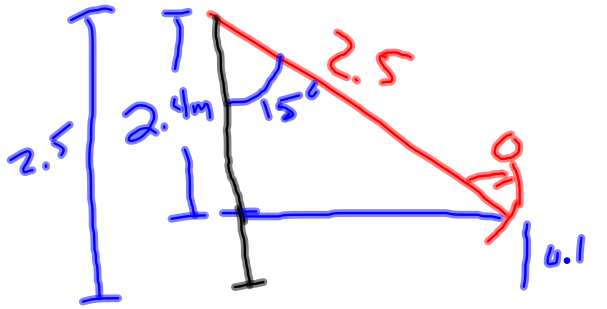
74

40kg = m

2.5 m = Δx

V = ?

1.4 m/s



$2.5\cos(15) = 2.4\text{m}$

$PE = 0.1(9.8)(40) = 39.4\text{J}$

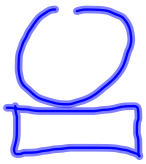
$PE_{\text{at } 0.1} = KE_{\text{at bottom}}$

$KE = \frac{1}{2}mv^2$

$39.4\text{J} = \frac{1}{2}(40)v^2$

$V = 1.4\text{ m/s}$

77)



10mm

20cm

$(.437)(9.81) = k(.01m)$

$K = 429\ N/m$

$PE = 0.437kg(9.81)(0.2) = .85\ J$

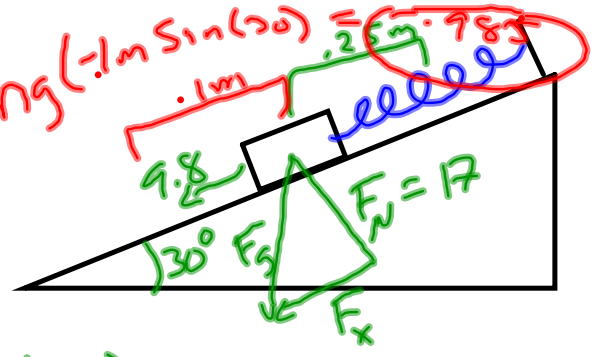
$.85 = \frac{1}{2}kx^2$

$429\ N/m$

$X = 0.063m$

$0.063m + 0.01m = 0.073m$

78)



$W_g = mg(.1m \sin(30)$ .2m .98

$2(9.81)\cos(30)$

$F_N = mg\cos\theta = 17N$

$F_x = mg\sin\theta = 9.8N$

$mg\sin\theta = kx$

$2(9.81)\sin(30) = 40(x)$

$x = 0.25m$

$W = \frac{1}{2}kx^2$

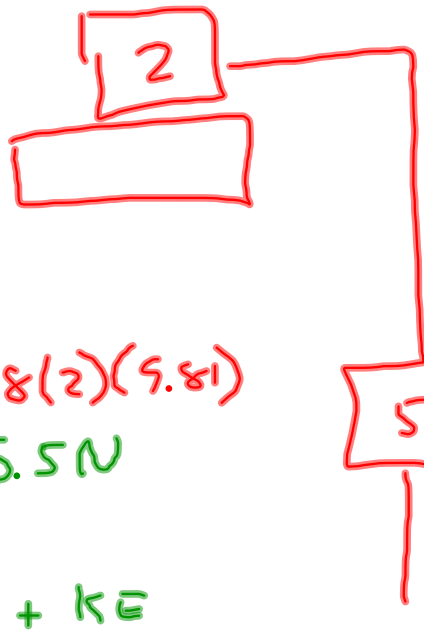
$W = \frac{1}{2}(40N/m)(x_2^2 - x_1^2)$

$[(.35)^2 - (.25)^2]$ = 1.2J

.12J

k = 40N/m
x = 0.1m
m = 2kg
μ = 0
μ = 0.17

79)



$F_f = .28(2)(9.8)$

$5.5N$

$5(9.8)(1m) = 49.1J$

$E_{friction}$

PE + KE

$49.1J + 0 = 0 + \frac{1}{2}(m_1 + m_2)v^2 - 5.5N(1m)$

$m_1 = 5$, $m_2 = 2$

$49.1J = 3.5v^2 - 5.5J$

$3.5 m/s$

Attachments

- hookes law
- simple machines
- more simple machines
- compound machine
- spring scale lab
- roller coaster energy
- mck05_int_rollercoaster.html