

Forces Review - Key

Note Title

6/6/2015

$$1. \vec{F}_g = mg = (5.0)(9.8) = 49 \text{ N } \downarrow$$

mass of Earth

$$2. \vec{F}_g = \frac{Gm_1m_2}{r^2} = \frac{(6.67 \times 10^{-11})(5)(5.98 \times 10^{24})}{(10,000 + 6.38 \times 10^6)^2}$$

10.0 km converted to m radius of Earth

$$= 48.8 \text{ N } \downarrow$$

$$3. \vec{F}_g = \frac{Gm_1m_2}{r^2} = \frac{(6.67 \times 10^{-11})(5)(7.36 \times 10^{22})}{(1.74 \times 10^6)^2}$$

mass of moon

radius of moon

$$= 8.10 \text{ N } \downarrow$$

$$4. k = ?$$

$$x = 2.0 \text{ cm} \stackrel{\div 100}{=} 0.02 \text{ m}$$

$$\vec{F}_e = kx$$

$$k = \frac{F_e}{x} = \frac{12}{0.02} = 600 \text{ N/m}$$

$$5. \vec{F}_{\text{net}} = m\vec{a}$$

need to find a first

$$\vec{v}_i = 0$$

$$d = \cancel{v_i}t + \frac{1}{2}at^2$$

$$200 = \frac{1}{2}a(2.5)^2$$

$$200 = 3.125a$$

$$\vec{a} = 64 \text{ m/s}^2$$

$$\vec{F}_{\text{net}} = m\vec{a}$$

$$= (1500)(64) = 96,000 \text{ N}$$

$$6. \vec{F}_g = mg = (15)(-9.8) = -147 \text{ N or } 147 \text{ N } \downarrow$$

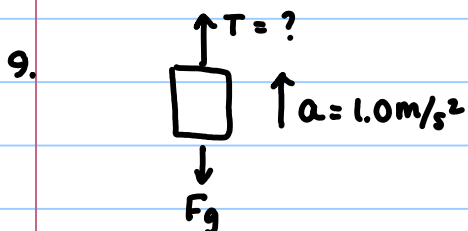
7. equal in magnitude, opposite in direction

$$147 \text{ N } \uparrow$$

8. $x = 1.5 \text{ cm} = 0.015 \text{ m}$
 $k = ?$

$$F_e = kx$$

$$k = \frac{F_e}{x} = \frac{147}{0.015} = 9800 \text{ N/m}$$



$$F_{\text{net}} = F_{\text{app}} - F_{\text{opp}}$$

$$ma = T - F_g$$

$$(350)(1.0) = T - (350)(9.8)$$

$$350 = T - 3430$$

$$+3430 \quad +3430$$

$$3780 \text{ N} = T$$

10. $F_{\text{net}} = F_{\text{app}} - F_{\text{opp}}$

$$ma = 1200 - F_f$$

$$(a=0)$$

$$0 = 1200 - \mu F_n$$

$$\frac{-1200}{-2450} = \frac{-\mu(2450)}{-2450}$$

$$F_n = mg \cos \theta \quad (\theta = 0^\circ)$$

$$= (250)(9.8) = 2450 \text{ N}$$

$$\mu = 0.49$$

11. $F_{\text{net}} = F_{\text{app}} - F_{\text{opp}}$

$$ma = F_{\text{app}} - F_f$$

↑ must find first

$$(70)(1.2) = F_{\text{app}} - 25$$

$$84 = F_{\text{app}} - 25$$

$$V_f = V_i + at$$

$$12 = 0 + a(10)$$

$$a = 1.2 \text{ m/s}^2$$

$$F_{\text{app}} = 109 \text{ N}$$

12. $\mu = ?$

$$F_f = \mu F_n \quad (\theta = 0^\circ)$$

$$F_f = \mu(mg \cos \theta)$$

$$25 = \mu(70)(9.8)$$

$$\frac{25}{686} = \frac{\mu(686)}{686}$$

$$\mu = 0.036$$

