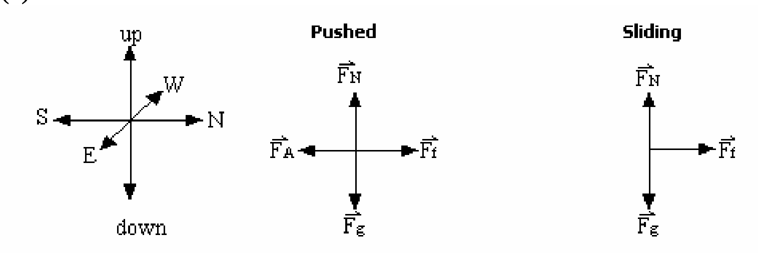
MULTIPLE CHOICE

1.	ANS:		6.	ANS:	D
2.	ANS:	E	7.	ANS:	A
3.	ANS:	C	8.	ANS:	B
4.	ANS:	B	9.	ANS:	D
5.	ANS:	E	10.	ANS:	D

PROBLEM

11. ANS:

(a)



(b) $\vec{F}_{net} = \vec{F}_A + \vec{F}_f$

$= 8.2\text{ N [S]} + 5.8\text{ N [N]}$

$= 2.4\text{ N [S]}$

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

$= \dfrac{2.4\text{ N [S]}}{4.2\text{ kg}}$

$= 0.57\text{ m/s}^2\text{ [S]}$

The acceleration of the box is 0.57 m/s^2 [S].

(c) $v_f = v_i + a\Delta t$

$= 0.0\text{ m/s} + 0.571\text{ m/s}^2(3.6\text{ s})$

$= 2.1\text{ m/s}$

The speed of the box is 2.1 m/s.

(d) $\vec{F}_{net} = \vec{F}_f$

$= 5.8\text{ N [N]}$

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

$= \dfrac{5.8\text{ N [N]}}{4.2\text{ kg}}$

$= 1.4\text{ m/s}^2\text{ [N]}$

The acceleration of the box is 1.4 m/s^2 [N].

REF: I OBJ: 2.4 LOC: FM2.04

12. ANS:

(a) $a = \dfrac{v_f - v_i}{\Delta t}$

$= \dfrac{1.0\text{ m/s} - 4.0\text{ m/s}}{0.80\text{ s}}$

$= -3.8\text{ m/s}^2$

The acceleration of the smaller object is –3.8 m/s^2.

(b) $\vec{F}_{net}$ on smaller object:

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

$= 2.0\text{ kg}\left(-3.75\text{ m/s}^2\right)$

$= -7.5\text{ N}$

The force acting is 7.5 N [right].

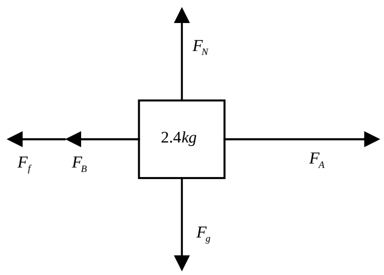
(c) $\vec{F}_{net}$ on larger object $= +7.5\text{ N}$ (no friction)

$$\vec{a} = \frac{\vec{F}_{net}}{m}$$
$$= \frac{7.5\ \text{N}}{3.0\ \text{kg}}$$
$$= 2.5\ \text{m/s}^2$$
$$v_f = v_i + a\Delta t$$
$$= 0.0\ \text{m/s} + 2.5\ \text{m/s}^2 (0.80\ \text{s})$$
$$= 2.0\ \text{m/s}$$

The object's speed is 2.0 m/s.

REF: I OBJ: 2.5 LOC: FM2.04

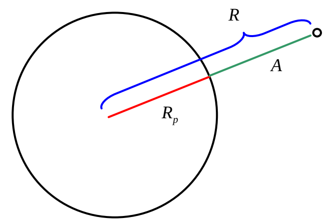
13. ANS:



$\vec{F}_{net_x}$	$\vec{F}_{net_y}$
$\vec{F}_{net_x} = \vec{F}_A + \vec{F}_B + \vec{F}_f$	$\vec{F}_{nety} = \vec{F}_N + \vec{F}_g$
$ma = +F_A - F_B - \mu F_N$	$0 = +F_N - F_g$
$a = \dfrac{+F_A - F_B - \mu F_N}{m}$	$F_N = mg$

$$a = \frac{+F_A - F_B - \mu mg}{m}$$
$$a = \frac{+8.4 - 3.6 - 0.18(2.4)(9.8)}{2.4}$$
$$a = +0.24\, m/s^2$$
$$\vec{a} = 0.24\, m/s^2\, [N]$$

14. ANS:

<table>
<tr><td>Given
$M = 6.2\times10^{20}\, kg$
$m = 50.0\, kg$
$R_p = 3.8\times10^4\, m$
$A = 3.8\times10^4\, m$</td><td>RTF
F_g</td><td>Formula
$F_g = \dfrac{GMm}{R^2}$</td></tr>
<tr><td colspan="3">Solution</td></tr>
<tr><td></td><td colspan="2">$F_g = \dfrac{GMm}{R^2}$
$F_g = \dfrac{GMm}{(R_p + A)^2}$
$F_g = \dfrac{(6.67\times10^{-11})(6.2\times10^{20})(50.0)}{(3.8\times10^4 + 3.8\times10^4)^2}$
$F_g = 358N$</td></tr>
</table>

REF: I OBJ: 3.2 LOC: FM2.04

ESSAY

15. ANS:
Push an object of known mass across a horizontal surface, letting go before it crosses a starting line. Measure the time interval and distance from this initial position until it stops. Knowing Δd, v_f, and Δt, the object's acceleration can be found using

$$\Delta d = v_f \Delta t - \frac{a(\Delta t)^2}{2}, \text{ where } a = \frac{-2\Delta d}{(\Delta t)^2}; (v_f = 0)$$

Considering the dynamics of the situation, the only horizontal force acting is friction (and F_g and F_N are in balance with one another). Since $F_{net} = F_f$, then $F_f = ma$. As well, $F_N = F_g = mg$. Finally,

$$\mu = \frac{F_f}{F_N} = \frac{ma}{mg} = \frac{a}{g}.$$

REF: I OBJ: 3.4 LOC: FM2.01