p.156 # 13, 14 p.159 23-27 p.164 36, 38, 47, 49 p.165 50, 69, 70, 72, 76 p.166 63, 65

13. $V = 22\ m/s$, $r = 56\ m$

$a_c = \frac{v^2}{r} = \frac{22^2}{56} = 8.6\ m/s^2$

$F_c = \frac{mv^2}{r}$

$F_F = \frac{mv^2}{r}$

$\mu F_N = \frac{mv^2}{r}$

$\mu mg = \frac{mv^2}{r}$

$\mu = \frac{v^2}{rg} = \frac{22^2}{(56)(9.80)} = .88$

14. $v = 201\ m/s$, $a_c = 5.0\ m/s^2$, $r = ?$

$a_c = \frac{v^2}{r}$

$r = \frac{v^2}{a_c} = \frac{201^2}{5.0} = 8100\ m$

23. $V_{WG} = .75\ m/s$, $V_{CW} = -.020\ m/s$, $V_{CG} = ?$

$V_{CG} = V_{CW} + V_{WG}$

$= .73\ m/s$

24. $V_{BR} = 2.5\ m/s$, $V_{BS} = .5\ m/s$, $V_{RS} = ?$

$V_{BR} + V_{RS} = V_{BS}$

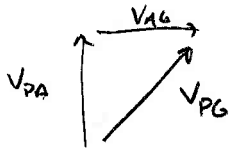
$V_{RS} = V_{BS} - V_{BR}$

$= (.5) - (2.5)$

$= -2.0\ m/s$

25. $V_{PA} = 150\ km/h$ N, $V_{AG} = 75\ km/h$ E, $V_{PG} = ?$

$V_{PA} + V_{AG} = V_{PG}$



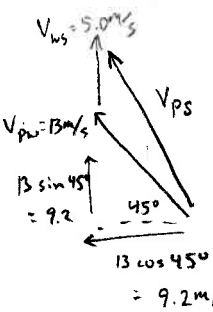
$V_{PG} = \sqrt{75^2 + 150^2}$

$= 170\ km/hr$

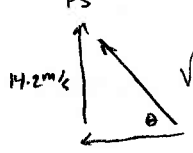
26. on your own

27. $V_{PW} = 13\ m/s$ @ 45° N of W, $V_{WS} = 5.0\ m/s$ N, $V_{PS} = ?$

$V_{PW} + V_{WS} = V_{PS}$



	x	y
V_{PW}	$-9.2\ m/s$	$9.2\ m/s$
$+ V_{WS}$	0	5.0
V_{PS}	$-9.2\ m/s$	$14.2\ m/s$



$\sqrt{9.2^2 + 14.2^2} = 17\ m/s$

$\theta = \tan^{-1} \frac{14.2}{9.2} = 57°$ N of W

$17\ m/s$ @ 57° N of W

36.
38.
47. > on your own
49.

50. on your own

69. Time for Odina

$V_o = 4.0\ m/s$

$\Delta d_o = 3.0 \times 10^3\ m$

$\Delta t = \frac{\Delta d_o}{V_o} = \frac{3.0 \times 10^3}{4.0}$

$= 750s$

Times for LeToya

$V_{Bw} = 4.0\ m/s$

$V_{ws} = -2.0\ m/s$

$V_{Bs} = ?$

$V_{Bw} + V_{ws} = V_{Bs}$

$(4.0) + (-2.0) = 2.0\ m/s$

$\Delta d = 1.5 \times 10^2\ m$

$\Delta t = \frac{\Delta d}{V} = \frac{1.5 \times 10^3}{2.0}$

$= 750s$

$V_{Bw} = 4.0\ m/s$

$V_{ws} = 2.0\ m/s$

$V_{Bs} = ?$

$(4.0) + (2.0) = 6.0\ m/s$

$\Delta d = 1.5 \times 10^3\ m$

$\Delta t = \frac{\Delta d}{V} = \frac{1.5 \times 10^3}{6.0}$

$= 250s$

Odina wins!

$750 + 250 = 1.00 \times 10^3\ s$

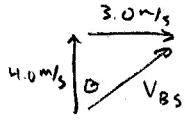
70.

$V_{Bw} = 4.0\ m/s$

$V_{ws} = 3.0\ m/s$

$V_{Bs} = ?$

$V_{Bw} + V_{ws} = V_{Bs}$



a) $V_{Bs} = \sqrt{3.0^2 + 4.0^2}$

$= 5.0\ m/s$

$\theta = \tan^{-1}\frac{3.0}{4.0}$

$= 37°$ E of N

$5.0\ m/s$ @ $37°$ E of N

b) comp. $\parallel$ $= 5.0 \sin 37°$

$= 3.0\ m/s$

comp. $\perp$ $= 5.0 \cos 37°$

$= 4.0\ m/s$

76. $V_{RO} = 1.25\ km/s$

$V_{GR} = -2.75\ km/s$

$V_{GO} = ?$

$V_{GR} + V_{RO} = V_{GO}$

$-2.75 + (1.25) = -1.50\ km/s$

72. $V_{Bs} = 6.0\ m/s$ N

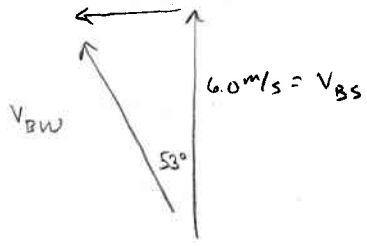
$V_{ws} = ?$ E

$V_{Bw} = ?$ @ $53°$ W of N

$V_{Bw} + V_{ws} = V_{Bs}$

$V_{Bs} - V_{ws} = V_{Bw}$

V_{ws} (remember, we're subtracting)



$\tan 53° = \frac{V_{ws}}{V_{Bs}}$

a) $V_{ws} = 6.0 \tan 53°$

$= 8.0\ m/s$

b) $\cos 53° = \frac{6.0}{V_{Bw}}$

$V_{Bw} = \frac{6.0}{\cos 53°} = 10.\ m/s$

63 a) towards the center

b) $33.3\ rev/min$

$\frac{1\ min.}{33.3\ rev} * \frac{60\ sec}{1\ min} = 1.80\ s/rev = T$

$V = \frac{2\pi r}{T}$

$a_c = \frac{v^2}{r}$

$a_c = \frac{4\pi^2 r^2}{T^2 r}$

$a_c = \frac{4\pi^2 r}{T^2}$

$= \frac{4\pi^2(.105)}{1.80^2}$

when $r = 5.0cm = .61\ m/s^2$

when $r = 10.0cm = \frac{4\pi^2(.100)}{1.80^2}$

$= 1.22\ m/s^2$

when $r = 15.0cm = \frac{4\pi^2(.150)}{1.80^2}$

$= 1.83\ m/s^2$

c) on your own

d) on your own

65. $\mu_s = .40$

$r = 80.0\ m$

$F_c = \frac{mv^2}{r}$

$F_F = \frac{mv^2}{r}$

$\mu_s F_N = \frac{mv^2}{r}$

$\mu_s mg = \frac{mv^2}{r}$

$v = \sqrt{r\mu_s g}$

$= \sqrt{(80.0)(.40)(9.80)}$

$= 18\ m/s$