Name: Hr: Worksheet 3 – Ch4 -Circular motion & relative Velocity

To be Submitted

1) A satellite is in circular Earth orbit, at altitude $h = 200\,\text{km}$ above Earth's surface. There the free-fall acceleration *g* is $9.20\,\text{m/s}^2$. What is the orbital speed *v* of the satellite? Earth's radius 6.37×10^6 m (Ans: 7.77 Km/ s)

2) A particle undergoes uniform circular motion on a horizontal *xy* plane. At time t= 0, it moves through coordinates (3.0 m, 0) with velocity $\vec{v} = (6.0\,\text{m/s})\hat{j}$. At $t = 5.0\,\text{s}$, it moves through (11.0 m, 0) with velocity $\vec{v} = (-6.0\,\text{m/s})\hat{j}$. In unit vector notation, what is its acceleration at $t = 2.5\,s$? (Ans: - 9j m/s^2)

What is v_y when $v_x = 5.0\,\text{m/s}$? (Ans: 3.3 m/s)

What is *a* when $v_x = 5.0\,\text{m/s}$? (Ans: 9 m/s^2)

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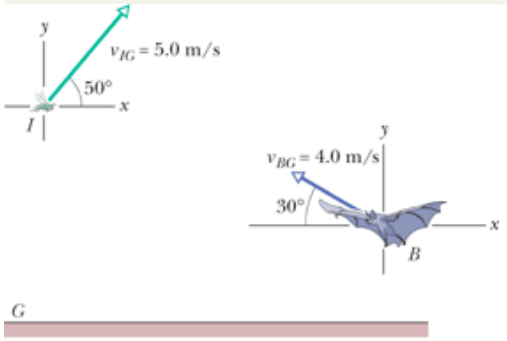
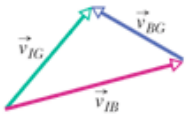
3. A boat moves downstream in the positive direction of an *x* axis. The boat's velocity relative to the shore is $(15.0\,\mathrm{m/s})\hat{i}$, and the water's velocity relative to the shore is $(5.0\,\mathrm{m/s})\hat{i}$. A child walks upstream from the front to the rear of the boat with a velocity of $(-2.0\,\mathrm{m/s})\hat{i}$ relative to the boat. What is the child's velocity relative to the water? (Ans: 8 m/s i)

4. In the figure, a bat detects an insect (lunch) while the two are flying. The bat has velocity $\vec{V}_{BG}$ relative to the ground, and the insect has velocity $\vec{V}_{IG}$ relative to the ground. What is the velocity $\vec{V}_{IB}$ of the insect relative to the bat, in unit-vector notation and as a magnitude and an angle? (Ans: 6.7m/s i + 1.8 m/s j ; 6.9m/s; 15 deg from +x axis)



(a)



(b)