

# AP PHYSICS: UNIT 4 - Circular Motion, Gravitation, Static Equilibrium

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Topic (Percent of AP Exam)	Reading	HW Problems	
<b>5. CIRCULAR MOTION, GRAVITATION (10%)</b>		<i>Chapter 5</i>	
<b>5.1 Kinematics of Uniform Circular Motion</b>	5.1	<u>page 130</u>	
*Definition of uniform circular motion		7	
*Derivation of the equation for centripetal acceleration of an object moving in a circle at constant speed		9	
		10	
<b>5.2 Dynamics of Uniform Circular Motion</b>	5.2	12	
*Understand that centripetal force is not some new type of force		13	
*Understand that centrifugal force does not exist		14	
<b>5.3 A Car Rounding a Curve</b>	5.3	<u>page 131</u>	
*Driving on a curve examples		18	
*Banking angles calculation		19	
<b>5.6 Newton's Law of Universal Gravitation</b>	5.6	29	
*Newton's derivation of his law of universal gravitation		<u>page 132</u>	
*Statement of the law of universal gravitation		31	
*Cavendish experiment and the value of the universal gravitation constant		37	
<b>5.7 Gravity Near the Earth's Surface</b>	5.7	38	
*Derivation of the acceleration due to gravity at the surface of the earth		41	
*Geophysical applications			
<b>5.8 Satellites and "Weightlessness"</b>	5.8		
*The relationship between the speed and the orbital radius of a satellite			
*Apparent weightlessness in a satellite and in an elevator			
<b>5.9 Kepler's Laws</b>	5.9		
*Statement of Kepler's three laws of planetary motion			
*Derivation of Kepler's third law of planetary motion			
<b>9. STATIC EQUILIBRIUM (% INCLUDED IN NEWTON)</b>		<i>Chapter 9</i>	
<b>8. ROTATIONAL EQUILIBRIUM</b>		<i>Chapter 8</i>	
<b>8.4 Torque</b>	8.4	<u>page 220</u>	
*Definition of the lever arm of a force about an axis of rotation		22	
*Definition of the torque of a given force about an axis of rotation		24	
*Sign convention for torques		26	
<b>9.1 Statics</b>	9.1	<u>page 247</u>	<u>page 248</u>
*Definition of a body in equilibrium		5	11
			18
<b>9.2 Conditions for Equilibrium</b>	9.2	8	<u>page 249</u>
*State the two conditions for equilibrium		14	21

1.25 WEEKS

0.75 WEEKS

CIRCULAR MOTION, GRAVITATION AND STATICS EXAM AND PROBLEM SET DUE DATE: FRIDAY, NOVEMBER 16