TOPIC 00: LAB SKILLS

LEARNING GOALS RECORD FOR _____

ASSIGNMENT/ASSESSMENT & DATE:										
0.1 – I can produce a graph of an appropriate size with properly labeled axes and a title.										
0.2 – I can determine a best-fit line, calculate the slope, and explain the significance.										
0.3 – I can use a common measurement system such as Vernier to create an experimental setup and collect data.										
0.4 – I can determine the way data should be graphed in order to create a linear graph.										
0.5 – I can identify standard graphs of uniform motion, such as: squared, square root, inverse relation, direct relation, and no relation.										
0.6 – I can use Excel to produce a graph with properly labeled axes and a title.										
0.7 – I can use Excel to find a best-fit curve (trendline), determine the equation of the curve, and explain the meaning of the coefficients of the equation of best-fit.										

4 – ADVANCED – I could be a peer teacher. I have high confidence on how to do this skill and I can explain/teach it to another student. I can have a conversation about this skill.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I need to continue practicing some parts that still give me problems. I need my handouts and notes once in a while.

2 – DEVELOPING - I need some help from my teacher (one-on-one or small group) to do the skill correctly and I do not feel confident enough to do the skill on my own. I need my handouts and notes most of the time.

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction. I need my handouts and notes at all times.

REPORTS OF EXPERIMENTS

LEARNING GOALS RECORD FOR _____

ASSIGNMENT/ASSESSMENT & DATE:									
LAB GOAL 1 – My reports are written in a professional manner. (*Uses only one side of paper; Uses pen or typed; Incorporates graphs within text; Uses headings; Maintains a logical order; Uses correct spelling and grammar; Tools of the program are used correctly if the document is typed (x^2, not x2 or x^2)*)									
LAB GOAL 2 — I can explain the theory that supports an experiment. *(Describes appropriate physics concept: Correctly describes physics concepts)*									
LAB GOAL 3 – I can clearly describe the design of an experiment. *(Clearly defines variables (indep/dep/con); Design is quantitative; Procedure includes all necessary steps)*									
LAB GOAL 4 – I can present data. *(Complete headings on tables/charts; Titles and axes labels on graphs; Use logical sig.figs. within tables and charts; Original data included)*									
LAB GOAL 5 – I can analyze data. *Smooth curve or best-fit included on all graphs; Data is linearized if needed; Slope is calculated (work is shown); Slope/values are interpreted*									
LAB GOAL 6 – I can summarize an experiment. *(Goals of introduction are addressed; Specific data are discussed; Errors are explained; Conclusion is written as a paragraph, not just a list of statements)*									

4 – ADVANCED – I have high confidence on how to do this skill and I can explain/teach it to another student. I can have a conversation about this skill. I may make a small error but everything I write shows a very strong understanding.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I need to continue practicing some parts that still give me problems. I may make an error but everything I write shows a good understanding.

2 – DEVELOPING - I do not feel confident enough to do the skill on my own, but I may be able to complete this with more help from my teacher. I make errors that show gaps in my understanding of this skill.

> *If your report or lab sheet is not turned in on time, I will assume you are not able to complete it on your own. You are given a full week to write all reports, so "forgetting" to do it is unacceptable. You will earn an incomplete on all sections until you work before or after school to complete the assignment. At that point, the highest possible score is a 1.*

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction.

UNIT 1: DESCRIBING CONSTANT MOTION

LEARNING GOALS RECORD FOR _____

ASSIGNMENT/ASSESSMENT & DATE: *Topic 1 — Constant Linear Speed* *Topic 2 — Constant Rotational Speed* *Topic 3 — Two-Dimensional Constant Speed and Displacement* *Topic 4 — Forces and Torque in Equilibrium*										
1.1 I can interpret a graph of (linear or angular) position vs. time.										
1.2 I can interpret a graph of (linear or angular) velocity vs. time.										
1.3 I can solve problems involving constant linear speed & constant angular speed.										
1.4 I can solve problems involving systems of objects.										
1.5 I can manipulate a single vector, using components, resultants, and unit vectors.										
1.6 I can manipulate multiple vectors using the rules of vector math.										
1.7 I can solve problems using vector math for situations involving relative velocities.										
1.8 I can draw and label a free-body diagram showing all forces acting on an object.										
1.9 I can determine unknowns for a system moving with constant velocity (or not moving).										
1.10 I can solve problems involving static equilibrium.										

4 – ADVANCED – I could be a peer teacher. I have high confidence on how to do this skill and I can explain/teach it to another student. I can have a conversation about this skill.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I need to continue practicing some parts that still give me problems. I need my handouts and notes once in a while.

2 – DEVELOPING - I need some help from my teacher (one-on-one or small group) to do the skill correctly and I do not feel confident enough to do the skill on my own. I need my handouts and notes most of the time.

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction. I need my handouts and notes at all times.

UNIT 2: ENERGY

LEARNING GOALS RECORD FOR _____

ASSIGNMENT/ASSESSMENT & DATE: *Topic 5 — Storing and Transferring Energy* *Topic 6 — Applications of Energy Conservation* *Topic 7 — Energy Conservation, including Rotational Motion*								
2.1 I can calculate the work done during a transfer of energy using formulas and graphs, and use the concept of work to determine unknowns.								
2.2 I can calculate values and apply the concept of potential energy for gravitational fields and systems involving springs.								
2.3 I can use the concept of energy conservation to determine unknowns for a system involving only conservative forces.								
2.4 I can use the concept of energy conservation to determine unknowns when a non-conservative force is acting.								
2.5 I can use the concept of power to analyze the transfer of energy within a system.								
2.6 I can calculate the moment of inertia for an object or system of objects; I can compare the moments of inertia of various objects based on their shapes and dimensions.								
2.7 I can use the concept of energy conservation to determine unknowns for a system that includes translational and/or rotational motion.								

4 – ADVANCED – I could be a peer teacher. I have high confidence on how to do this skill and I can explain/teach it to another student. I can have a conversation about this skill. I may make a careless mistake but I have a strong overall understanding.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I need to continue practicing some parts that still give me problems. I need my handouts and notes once in a while. I may make some mistakes but I have a good overall understanding.

2 – DEVELOPING - I need some help from my teacher (one-on-one or small group) to do the skill correctly and I do not feel confident enough to do the skill on my own. I need my handouts and notes most of the time. I make errors that show gaps in my overall understanding.

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction. I need my handouts and notes at all times.

UNIT 3: APPLICATIONS of CALCULUS

LEARNING GOALS RECORD FOR _____

ASSIGNMENT/ASSESSMENT & DATE: *Topic 8 — Describing Motion where Speed Changes* *Topic 9 — Revisiting Energy*								
3.1 I can derive expressions for (angular) velocity and (angular) acceleration from a function of (angular) position; I can use these expressions to determine zeroes, min/max values, and other quantities.								
3.2 On a graph of position vs. time, I can sketch and use appropriate lines representing instantaneous and average velocity; I can interpret an x vs. t graph, using features of the graph to describe the position, average velocity, instantaneous velocity, and acceleration of an object.								
3.3 On a graph of velocity vs. time, I can sketch and use appropriate lines representing instantaneous and average acceleration; I can interpret a v vs. t graph, using features of the graph to describe the displacement, velocity, and acceleration of an object.								
3.4 I can sketch and recognize graphs of uniform acceleration (linear and angular).								
3.5 I can use an anti-derivative to derive expressions for (angular) velocity and (angular) position; I can relate the area bounded by a curve to the anti-derivative or integral of a function.								
3.6 I can calculate work using integration; I can use work to analyze the transfer of energy and find unknowns.								
3.7 I can use integration and differentiation to derive an expression for potential energy and force.								
3.8 I can apply the principle of energy conservation to an object affected by a non-constant force.								
***3.9** I can use integration to compute formulas for rotational inertia of some shapes. (Assessment grades will not be counted.)								

4 – ADVANCED – I could be a peer teacher. I have high confidence on how to do this skill and I can explain/teach it to another student. I can have a conversation about this skill. I may make a careless mistake but I have a strong overall understanding.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I need to continue practicing some parts that still give me problems. I need my handouts and notes once in a while. I may make some mistakes but I have a good overall understanding.

2 – DEVELOPING - I need some help from my teacher (one-on-one or small group) to do the skill correctly and I do not feel confident enough to do the skill on my own. I need my handouts and notes most of the time. I make errors that show gaps in my overall understanding.

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction. I need my handouts and notes at all times.

LEARNING GOALS RECORD FOR _____

UNIT 04: FORCE

ASSIGNMENT/ASSESSMENT & DATE:									
4.1 I can use kinematics formulas to solve problems involving displacement (position), velocity (speed), acceleration, and time.									
4.2 I can use rotational kinematics formulas to solve problems involving angular displacement (angular position), angular velocity (angular speed), angular acceleration, and time; I can use the radius of or position on a rotating object to relate linear and angular quantities.									
4.3 I recognize situations where a system of equations is necessary to solve a problem; I can set up and solve a system of equations based on the information in such a problem.									
4.4 I understand the relationship between force, acceleration and mass, and can use this relationship to analyze changes in an object's motion.									
4.5 I can use a free-body diagram to analyze the forces acting on an object; I can use an FBD to analyze situations where an object moves horizontally, vertically, or along an incline.									
4.6 I can apply my understanding of tension to analyze problems involving a pulley system.									
4.7 I can use interaction force pairs within my problem solving.									

4 – ADVANCED – I could be a peer teacher. I have high confidence on how to do this skill and I can explain/teach it to another student. I may make a careless mistake but I have a strong overall understanding. I know when to use this skill and do not need to be reminded.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I may need to continue practicing some parts that still give me problems. I need my handouts and notes once in a while. I may make some mistakes but I have a good overall understanding. I do not need to be reminded to use this skill.

2 – DEVELOPING - I need some help from my teacher or peers (one-on-one or small group) to do the skill correctly and I do not feel confident enough to do the skill on my own. I need my handouts and notes most of the time. I make errors that show gaps in my overall understanding. I do not need to be reminded to use this skill.

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction. I need my handouts and notes at all times. Although I can do this skill, I do not recognize when to use it on my own.

An **incomplete** may be assigned if a student does not attempt to use the problem-solving methods taught in class and answers incorrectly, or leaves more than half of the related assessment questions blank. The student is then expected to work with the instructor on this skill until the goal can be assessed.

LEARNING GOALS RECORD FOR _____

UNIT 05: TORQUE

ASSIGNMENT/ASSESSMENT & DATE:									
5.1 I understand the relationship between torque, rotational inertia, and angular acceleration, and can use this relationship to analyze changes in an object's rotational motion.									
5.2 I can apply my understanding of torque to analyze problems involving a system that includes a massive pulley.									
5.3 I can apply my understanding of torque to analyze the rolling motion of an object.									
5.4 I can apply my understanding of force and torque to analyze the translational and rotational motion of a rigid object.									

4 – ADVANCED – I could be a peer teacher. I have high confidence on how to do this skill and I can explain/teach it to another student. I may make a careless mistake but I have a strong overall understanding. I know when to use this skill and do not need to be reminded.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I may need to continue practicing some parts that still give me problems. I need my handouts and notes once in a while. I may make some mistakes but I have a good overall understanding. I do not need to be reminded to use this skill.

2 – DEVELOPING - I need some help from my teacher or peers (one-on-one or small group) to do the skill correctly and I do not feel confident enough to do the skill on my own. I need my handouts and notes most of the time. I make errors that show gaps in my overall understanding. I do not need to be reminded to use this skill.

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction. I need my handouts and notes at all times. Although I can do this skill, I do not recognize when to use it on my own.

An **incomplete** may be assigned if a student does not attempt to use the problem-solving methods taught in class and answers incorrectly, or leaves more than half of the related assessment questions blank. The student is then expected to work with the instructor on this skill until the goal can be assessed.

LEARNING GOALS RECORD FOR _____

UNIT 06: FRICTION

ASSIGNMENT/ASSESSMENT & DATE:									
6.1 I can calculate the frictional force or coefficient of friction; I can analyze systems that do not move due to the presence of static friction.									
6.2 I can use the kinetic frictional force within the problems previously discussed.									
6.3 I can determine the terminal velocity of an object that experiences a drag force; I can use graphs to describe the motion of such an object.									
6.4 I can use calculus to analyze the motion of an object that experiences a drag force, deriving an expression for its motion.									

4 – ADVANCED – I could be a peer teacher. I have high confidence on how to do this skill and I can explain/teach it to another student. I may make a careless mistake but I have a strong overall understanding. I know when to use this skill and do not need to be reminded.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I may need to continue practicing some parts that still give me problems. I need my handouts and notes once in a while. I may make some mistakes but I have a good overall understanding. I do not need to be reminded to use this skill.

2 – DEVELOPING - I need some help from my teacher or peers (one-on-one or small group) to do the skill correctly and I do not feel confident enough to do the skill on my own. I need my handouts and notes most of the time. I make errors that show gaps in my overall understanding. I do not need to be reminded to use this skill.

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction. I need my handouts and notes at all times. Although I can do this skill, I do not recognize when to use it on my own.

An **incomplete** may be assigned if a student does not attempt to use the problem-solving methods taught in class and answers incorrectly, or leaves more than half of the related assessment questions blank. The student is then expected to work with the instructor on this skill until the goal can be assessed.

LEARNING GOALS RECORD FOR _____

UNIT 07: APPLICATIONS OF FORCE

ASSIGNMENT/ASSESSMENT & DATE:									
7.1 I can analyze the motion of a projectile.									
7.2 I understand the relationship between radius, acceleration, and speed for an object moving with uniform circular motion, and can use this relationship to analyze the object's motion.									
7.3 I can apply my understanding of uniform circular motion and net force to various situations.									
7.4 I can apply my understanding of uniform circular motion and the Law of Gravitation to analyze circular and elliptical orbits.									

4 – ADVANCED – I could be a peer teacher. I have high confidence on how to do this skill and I can explain/teach it to another student. I may make a careless mistake but I have a strong overall understanding. I know when to use this skill and do not need to be reminded.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I may need to continue practicing some parts that still give me problems. I need my handouts and notes once in a while. I may make some mistakes but I have a good overall understanding. I do not need to be reminded to use this skill.

2 – DEVELOPING - I need some help from my teacher or peers (one-on-one or small group) to do the skill correctly and I do not feel confident enough to do the skill on my own. I need my handouts and notes most of the time. I make errors that show gaps in my overall understanding. I do not need to be reminded to use this skill.

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction. I need my handouts and notes at all times. Although I can do this skill, I do not recognize when to use it on my own.

An **incomplete** may be assigned if a student does not attempt to use the problem-solving methods taught in class and answers incorrectly, or leaves more than half of the related assessment questions blank. The student is then expected to work with the instructor on this skill until the goal can be assessed.

LEARNING GOALS RECORD FOR _____

UNIT 08: MOMENTUM

ASSIGNMENT/ASSESSMENT & DATE:									
8.1 I can determine the center of mass of an object or of a system of objects; I can use the ideas of calculus to determine the velocity and acceleration of a system's center of mass.									
8.2 I can determine the momentum of an object or a system of objects; I can use the conservation of momentum to analyze a system of objects when they interact.									
8.3 I can apply the conservation of energy to an extended object as it rotates.									
8.4 I understand the relationship between impulse and change in momentum and can use it to an analyze problems with values, and information given within graphs or functions.									
8.5 I can determine the magnitude and direction of an object's angular momentum.									
8.6 I can use the conservation of angular momentum to analyze a system of objects or an object that changes its rotational inertia.									
8.7 I can apply the conservation of angular momentum to an object in orbit.									

4 – ADVANCED – I could be a peer teacher. I have high confidence on how to do this skill and I can explain/teach it to another student. I may make a careless mistake but I have a strong overall understanding. I know when to use this skill and do not need to be reminded.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I may need to continue practicing some parts that still give me problems. I need my handouts and notes once in a while. I may make some mistakes but I have a good overall understanding. I do not need to be reminded to use this skill.

2 – DEVELOPING - I need some help from my teacher or peers (one-on-one or small group) to do the skill correctly and I do not feel confident enough to do the skill on my own. I need my handouts and notes most of the time. I make errors that show gaps in my overall understanding. I do not need to be reminded to use this skill.

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction. I need my handouts and notes at all times. Although I can do this skill, I do not recognize when to use it on my own.

An **incomplete** may be assigned if a student does not attempt to use the problem-solving methods taught in class and answers incorrectly, or leaves more than half of the related assessment questions blank. The student is then expected to work with the instructor on this skill until the goal can be assessed.

LEARNING GOALS RECORD FOR _____

UNIT 09: SIMPLE HARMONIC MOTION

ASSIGNMENT/ASSESSMENT & DATE:									
9.1 I understand simple harmonic motion and the resulting relationships between displacement, velocity, acceleration, period, and frequency.									
9.2 I can apply the principles of simple harmonic motion to the analysis of a mass on a spring.									
9.3 I can apply the principles energy conservation to situations involving simple harmonic motion.									
9.4 I can apply the principles of simple harmonic motion to various types of pendula.									
9.5 I can combine the principles of energy conservation, momentum conservation, and simple harmonic motion to analyze situations.									
***9.6** I understand the concept of resonance.									

4 – ADVANCED – I could be a peer teacher. I have high confidence on how to do this skill and I can explain/teach it to another student. I may make a careless mistake but I have a strong overall understanding. I know when to use this skill and do not need to be reminded.

3 – PROFICIENT - I have confidence on how to do this skill on my own most of the time, but I may need to continue practicing some parts that still give me problems. I need my handouts and notes once in a while. I may make some mistakes but I have a good overall understanding. I do not need to be reminded to use this skill.

2 – DEVELOPING - I need some help from my teacher or peers (one-on-one or small group) to do the skill correctly and I do not feel confident enough to do the skill on my own. I need my handouts and notes most of the time. I make errors that show gaps in my overall understanding. I do not need to be reminded to use this skill.

1 – BASIC - I need lots of help from my teacher (one-on-one). I have low confidence on how to do this skill and need more instruction. I need my handouts and notes at all times. Although I can do this skill, I do not recognize when to use it on my own.

An **incomplete** may be assigned if a student does not attempt to use the problem-solving methods taught in class and answers incorrectly, or leaves more than half of the related assessment questions blank. The student is then expected to work with the instructor on this skill until the goal can be assessed.