



# CW High School

## Physics A

### 1. Measurement and Conversions (10.00%)

#### Learning Targets

#### 1.1 I can measure using the British and International Systems to the nearest mm and 1/16th inch.

Learning Target	Descriptor	Definition
4	Proficient	I can measure using the British and International Systems to the nearest mm and 1/16th inch.
3	Developing	I can measure to the nearest 1/8 inch.
2	Basic	I can measure to the nearest .1cm
1	Minimal	I can look at a ruler or meter stick and tell the difference between the metric side and the British side.
0	No Evidence	No evidence shown.

#### 1.2 I can convert units using the factor/label method and by moving decimals according to their prefixes.

Learning Target	Descriptor	Definition
4	Proficient	I can convert units using the factor/label method and by moving decimals according to their prefixes.
3	Developing	I can convert British and International units using the factor-label method.
2	Basic	I can convert units in the International system by moving a decimal.
1	Minimal	I can recognize a unit as British or International.
0	No Evidence	No evidence shown.

#### 1.3 I can convert numbers from scientific to decimal notation and vice-versa.

Learning Target	Descriptor	Definition
4	Proficient	I can convert numbers from scientific to decimal notation and vice-versa.
3	Developing	I can convert scientific notation to decimal notation.
2	Basic	I can write a number smaller than 0.1 in scientific notation.
1	Minimal	I can write a number bigger than 10 in scientific notation.
0	No Evidence	No evidence shown.

#### 1.4 I can express answers using the correct number of significant figures when multiplying or dividing.

Learning Target	Descriptor	Definition
4	Proficient	I can express answers using the correct number of significant figures when multiplying or dividing.


  
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Learning Target	Descriptor	Definition
3	Developing	I can state the correct number of significant figures in a number with ending zeros.
2	Basic	I can state the correct number of significant figures in a number with zeros between significant digits.
1	Minimal	I can state the correct number of significant figures in a number with no zeros.
0	No Evidence	No evidence shown.

### 1.5 I can transform a literal equation by solving for a different variable.

Learning Target	Descriptor	Definition
4	Proficient	I can transform a literal equation by solving for a different variable.
3	Developing	I can add, subtract, multiply, divide and take a root to solve a literal equation for a different variable.
2	Basic	I can multiply or divide to solve a literal equation for a different variable.
1	Minimal	I can add or subtract to solve a literal equation for a different variable.
0	No Evidence	No evidence shown.

## 2. Acceleration and Gravity (25.00%)

### Learning Targets

2.1 I can analyze the motion of accelerating objects with an initial velocity to find final velocities, displacement during an acceleration, acceleration and time of acceleration using equations derived from the definitions of velocity and acceleration.

Learning Target	Descriptor	Definition
4	Proficient	I can analyze the motion of accelerating objects with an initial velocity to find final velocities, displacement during an acceleration, acceleration and time of acceleration using equations derived from the definitions of velocity and acceleration.
3	Developing	I can calculate the displacement and distance travelled during accelerated motion.
2	Basic	I can calculate the acceleration of an object using initial and final velocity or distance and initial velocity.
1	Minimal	I can calculate velocity, distance and time using an average or constant velocity equation, use correct units, and direction based on the sign.
0	No Evidence	No evidence shown.

2.2 I can calculate gravitational motion using equations derived from the definitions of velocity and acceleration and compare accelerations to that of gravity on earth.

Learning Target	Descriptor	Definition
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Learning Target	Descriptor	Definition
4	Proficient	I can calculate gravitational motion using equations derived from the definitions of velocity and acceleration and compare accelerations to that of gravity on earth.
3	Developing	I can compare the time, final velocity, and distance travelled of an object falling on earth to that of another celestial body.
2	Basic	I can calculate the time for an object to free-fall a distance on earth.
1	Minimal	I can calculate the number of "G's" on an accelerating object.
0	No Evidence	No evidence shown.

**2.3 I can demonstrate the relationships between distance/time graphs and velocity and the relationship between velocity/time graphs and acceleration, distance and displacement and I use appropriate vocabulary and language to explain the motion of objects**

Learning Target	Descriptor	Definition
4	Proficient	I can demonstrate the relationships between distance/time graphs and velocity and the relationship between velocity/time graphs and acceleration, distance and displacement and I use appropriate vocabulary and language to explain the motion of objects
3	Developing	I can interpret a velocity-time graph to find position, distance travelled, and displacement.
2	Basic	I can use a velocity-time graph to find acceleration and speed.
1	Minimal	I can use a distance-time graph to find position, speed and velocity.
0	No Evidence	No evidence shown.

**2.4 I can interact directly with natural phenomena by using tools to collect and record data to investigate the acceleration of objects in pendulums, and linear acceleration or deceleration, analyze results and discuss findings.**

Learning Target	Descriptor	Definition
4	Proficient	I can interact directly with natural phenomena by using tools to collect and record data to investigate the acceleration of objects in pendulums, and linear acceleration or deceleration, analyze results and discuss findings.
3	Developing	I can calculate the acceleration of an object during an acceleration or collision while under rapid acceleration or deceleration in which time cannot accurately be found.
2	Basic	I can find my reaction time in a lab setting.
1	Minimal	I can use a pendulum to calculate gravity on earth.
0	No Evidence	No evidence shown.

### 3. Newton's Laws and Friction (25.00%)



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### Learning Targets

**3.1 I can use Newton's Three Laws to calculate forces on objects under acceleration, describe the motion of objects with net forces on them, and find the frictional forces on an object using correct units on all answers.**

Learning Target	Descriptor	Definition
4	Proficient	I can use Newton's Three Laws to calculate forces on objects under acceleration, describe the motion of objects with net forces on them, and find the frictional forces on an object using correct units on all answers.
3	Developing	I can calculate the net force on an object.
2	Basic	I can use Newton's second law to calculate force or acceleration, then use correct units on all answers.
1	Minimal	I can state Newton's three laws of motion and use correct units for forces.
0	No Evidence	No evidence shown.

**3.2 I can calculate the weight of an object, the normal force of an object on any surface, the coefficient of friction of various objects on various surfaces, then use the frictional force to calculate the net force on an object.**

Learning Target	Descriptor	Definition
4	Proficient	I can calculate the weight of an object, the normal force of an object on any surface, the coefficient of friction of various objects on various surfaces, then use the frictional force to calculate the net force on an object.
3	Developing	I can calculate the frictional coefficient and frictional force of an object on any surface.
2	Basic	I can calculate the normal force of an object on a horizontal surface.
1	Minimal	I can calculate weight of an object and explain the difference between weight and mass.
0	No Evidence	No evidence shown.

**3.3 I can analyze the flight of a rocket using forces, acceleration, and distance calculations, and then explore the uses of a computer spreadsheet to analyze the flight, create graphs of height vs. time, and velocity vs. time.**

Learning Target	Descriptor	Definition
4	Proficient	I can analyze the flight of a rocket using forces, acceleration, and distance calculations, and then explore the uses of a computer spreadsheet to analyze the flight, create graphs of height vs. time, and velocity vs. time.
3	Developing	I can calculate change in velocity, drag, and change in height of a rocket at any point in its flight.
2	Basic	can analyze the change in weight and force of a rocket during and after the burn phase.
1	Minimal	I can construct a rocket from a kit and launch it.



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Learning Target	Descriptor	Definition
0	No Evidence	No evidence shown.

**3.4 I can write a technical report of the flight of a rocket using the appropriate vocabulary to evaluate changes in forces, velocity, height and drag and explain various stages of the flight.**

Learning Target	Descriptor	Definition
4	Proficient	I can write a technical report of the flight of a rocket using the appropriate vocabulary to evaluate changes in forces, velocity, height and drag and explain various stages of the flight.
3	Developing	I can explain what it would feel like to be in a rocket at various stages of its flight by using my apparent weight at any moment.
2	Basic	I can relate the drag to changing velocity and acceleration of a rocket and explain why a change in velocity is equal to gravity only at the peak of flight.
1	Minimal	I can explain what provided thrust, how the drag changes, and what it means for a rocket to change velocity during its flight in writing.
0	No Evidence	No evidence shown.

#### 4. Vectors and Equilibrium (25.00%)

##### Learning Targets

**4.1 I can arrange vectors to create a scale vector diagram, draw a resultant, and calculate the magnitude and direction of the resultant.**

Learning Target	Descriptor	Definition
4	Proficient	I can arrange vectors to create a scale vector diagram, draw a resultant, and calculate the magnitude and direction of the resultant.
3	Developing	I can create a scale vector diagram for a three or more vector system and measure the magnitude and direction of the resultant.
2	Basic	I can sketch a vector diagram of three or more vectors and describe a resultant by stating its magnitude and direction.
1	Minimal	I can create the sketch of a vector diagram from a two vector free-body diagram and sketch a resultant
0	No Evidence	No evidence shown.

**4.2 I can calculate the components of multiple vectors and use the sum of the components to find the resultant of two or more vectors and the equilibrant vector.**

Learning Target	Descriptor	Definition
4	Proficient	I can calculate the components of multiple vectors and use the sum of the components to find the resultant of two or more vectors and the equilibrant vector.


  
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Learning Target	Descriptor	Definition
3	Developing	I can find the resulting magnitude and direction of the combination of two or more vectors using components.
2	Basic	I can create a table of components and sum the x and y components of two or more vectors.
1	Minimal	I can calculate the x and y components of a vector.
0	No Evidence	No evidence shown.

**4.3 I can calculate the necessary component forces on an object on an incline, find the net force with any necessary friction, and find the object's acceleration down the incline.**

Learning Target	Descriptor	Definition
4	Proficient	I can calculate the necessary component forces on an object on an incline, find the net force with any necessary friction, and find the object's acceleration down the incline.
3	Developing	I can calculate the acceleration of an object down a frictionless incline using component forces.
2	Basic	I can calculate the magnitude of the component vectors on an incline.
1	Minimal	I can sketch the component vectors of an object on an incline.
0	No Evidence	No evidence shown.

**4.4 I can use component vectors to analyze the motion of projectiles launched at angles or horizontally from any height.**

Learning Target	Descriptor	Definition
4	Proficient	I can use component vectors to analyze the motion of projectiles launched at angles or horizontally from any height.
3	Developing	I can calculate the range and flight time of objects launched at angles.
2	Basic	I can calculate the vertical and horizontal components of launched objects at the moment of launch, its peak, and at impact.
1	Minimal	I can analyze the time of flight and range of an object launched horizontally from any height.
0	No Evidence	No evidence shown.

**4.5 I can interact directly with natural phenomena by using tools to design investigations, collect and record data, engage in scientific reasoning, manipulate equipment, analyze results, to create or prove equilibrium, find the acceleration of**

Learning Target	Descriptor	Definition
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Learning Target	Descriptor	Definition
4	Proficient	I can interact directly with natural phenomena by using tools to design investigations, collect and record data, engage in scientific reasoning, manipulate equipment, analyze results, to create or prove equilibrium, find the acceleration of
3	Developing	I can analyze the launch of a projectile horizontally and at angles.
2	Basic	I can use a vertical force board to find an equilibrant force.
1	Minimal	I can use a force table to prove equilibrium graphically and by using components.
0	No Evidence	No evidence shown.

### 5. Planetary and Satellite Motion (15.00%)


#### Learning Targets

5.1 I can use Newton's Universal Law of Gravitation to calculate and compare the gravitational attraction of two objects to the centripetal force as one rotates around the other, and find the acceleration of gravity on any celestial

Learning Target	Descriptor	Definition
4	Proficient	I can use Newton's Universal Law of Gravitation to calculate and compare the gravitational attraction of two objects to the centripetal force as one rotates around the other, and find the acceleration of gravity on any celestial
3	Developing	I can use the fact that $F_g = \text{weight}$ to calculate the surface gravity on any celestial body
2	Basic	I can calculate the gravitational attraction between any two objects.
1	Minimal	I can calculate the centripetal acceleration and centripetal force of a rotating object.
0	No Evidence	No evidence shown.

5.2 I can describe the conditions that must be met for an object to stay in orbit of another (example: satellites) and calculate the velocity and period of the object's path.

Learning Target	Descriptor	Definition
4	Proficient	I can describe the conditions that must be met for an object to stay in orbit of another (example: satellites) and calculate the velocity and period of the object's path.
3	Developing	I can calculate the period of a satellite around any celestial body at any altitude.
2	Basic	I can calculate the velocity of a satellite in orbit at any altitude.
1	Minimal	I can calculate the gravitational acceleration as an object is moved away from the center of a planet.
0	No Evidence	No evidence shown.


  
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5.3 I can use appropriate vocabulary and language to explain the motion of objects as they rotate and know the names and discoveries of important historical figures who studied gravitation and circular motion.

Learning Target	Descriptor	Definition
4	Proficient	I can use appropriate vocabulary and language to explain the motion of objects as they rotate and know the names and discoveries of important historical figures who studied gravitation and circular motion.
3	Developing	I can name historical scientists and their significant struggles, discoveries, and contributions to the understanding of planetary motion.
2	Basic	I can explain the conditions that must be met for object to remain in orbit.
1	Minimal	I can explain the affect of distance from the center of a planet on the gravitational acceleration.
0	No Evidence	No evidence shown.

Submitted on 10/29/2019 by Bill Munch