ثانويـة التكنولوجيـا التطبيقيـة
Applied Technology High School

Student Name:_____

ID Number:_____ **Section:** _____

Physics

EOT-1

Revision

Chapter 1.1- Mathematics and Physics

Table 1-1
SI Base Units

Base Quantity	Base Unit	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Temperature	kelvin	K
Amount of a substance	mole	mol
Electric current	ampere	A
Luminous intensity	candela	cd

Table 1-2
Prefixes Used with SI Units

Prefix	Symbol	Multiplier	Scientific Notation	Example
femto-	f	0.000000000000001	10^{-15}	femtosecond (fs)
pico-	p	0.000000000001	10^{-12}	picometer (pm)
nano-	n	0.000000001	10^{-9}	nanometer (nm)
micro-	μ	0.000001	10^{-6}	microgram (μg)
milli-	m	0.001	10^{-3}	milliamps (mA)
centi-	c	0.01	10^{-2}	centimeter (cm)
deci-	d	0.1	10^{-1}	deciliter (dL)
kilo-	k	1000	10^{3}	kilometer (km)
mega-	M	1,000,000	10^{6}	megagram (Mg)
giga-	G	1,000,000,000	10^{9}	gigameter (Gm)
tera-	T	1,000,000,000,000	10^{12}	terahertz (THz)

1. Write in scientific notations.

a) 0.0023m _____

b) 10000g _____

c) 250.4cm _____

2. Determine the number of significant digits in the following.

a) 10005 _____ b) 0.0045 _____ c) 2.50×10^5 _____

3. For each term on the left, write the letter of the matching item on the right.

i. base quantity of temperature	a. meter
ii. base quantity of electric current	b. 10^{-2}
iii. base quantity of length	c. kelvin
iv. base quantity of time	d. 10^{-12}
v. base amount of a substance	e. ampere
vi. pico	f. second
vii. centi	g. 10^{6}
viii. micro	h. mole
ix. mega	i. 10^{-6}

4. Convert the following units.

a) 200 m to km _____

b) 1.2L to mL _____

c) 124mm to cm _____

d) 1200 mg to g _____

e) 0.720 μm to m _____

5) Force is measured in (N) , where 1N = 1 kg.m/s^2, will the following expression give the force in correct unit? Explain

$$\frac{(0.5\text{kg})\text{x}\left(\frac{4\text{m}}{\text{s}}\right)}{2s^2}$$

6) Acceleration can be determined using Newton's Second Law of Motion using the following equation: $a = F_{net}/m$

a) What relationship exists between a and m? (**Inverse Relation)**

b) What relationship exists between a and F_{net} ? **(Direct Relation)**

c) What is the net force (F_{net}) needed to accelerate an object of mass 5kg at uniform rate of acceleration(a) of 2 m/s^2

_____

7. What is Scientific method? Write the steps of Scientific method in order.

_____

_____

_____

8. Choose the best answer.

i. The valid digits in a measurement are called _____.

a. scientific notation
b. significant digits
c. uncertain digits
d. powers of 10

ii. The standard SI unit of mass is the _____.

a. kilomole
b. pound
c. kilometer
d. kilogram

iii. Convert 57.7 kg to grams.

a. 57.7×10^4 g
b. 577,000 g
c. 5.77×10^3 g
d. 5.77×10^4 g

iv. The multiplier for SI units with the prefix *mega* is _____.

a. 1/1,000,000
b. 1,000,000
c. 1/1000
d. 1000

v. The SI base unit of length is the _____.

a. kilogram
b. candela
c. mole
d. meter

vi. The prefix that means 1×10^{-6} is _____.

a. Mega
b. micro
c. milli
d. nano

vii. Combinations of SI base units are called _____.

a. derived units
b. straight measurements
c. dimensional analogs
d. base quantities

viii. Express the quantity 0.00000095 kg in scientific notation.

a. 9.5×10^{7} kg
b. 9.5×10^{-7} kg
c. 95/1,000,000,000 kg
d. 9.5/1,000,000 kg

ix. The dimensional analysis is used to find _____.

a. significant digit
b. scientific notation
c. correct SI unit
d. no. of decimal

x. An electric current of 2 amperes passes through a light bulb when connected to 24-volts battery. Ohm's law states that voltage = electric current x resistance. What is the resistance of the light bulb?

a. 22Ω
b. Ω26
c. 12Ω
d. 0.08Ω

xi. A _____is the explanation for why things work they way they do.

a. theory
b. hypothesis
c. method
d. prediction

xii. A(n)_____ is description of a rule of nature.

a. theory
b. hypothesis
c. model
d. scientific law

Name: **Grade:**

1.2- Accuracy and Precision

1. Choose the best answer and circle it.

i. A comparison between an unknown quantity and a standard is referred to as a _____.

a. margin of error b. measurement

c. consistency d. variables

ii. A device with very small divisions on its scale can measure with _____.

a. scientific notation b. agreement

c. precision d. fundamental units

iii. To avoid parallax errors, laboratory instruments should be read _____.

a. below eye level b. from the side

c. at eye level d. at all of these positions

iv. _____describes how well the results of an experiment agree with the standard value.

a. Accuracy b. Significance c. Certainty d. precision

v. _____describes the degree of exactness in a measurement.

a. Accuracy b. Significance c. Certainty d. Precision

vi. _____is a technique used to assure the accuracy of a measuring instrument.

a. Two-point calibration b. Precision
c. Analysis d. Dimension

vii. The degree of possible error in a measurement is called its _____.

a. fundamental unit b. margin of uncertainty
c. mechanical quantity d. precision balance

viii. Which type of navigation would be more precise?

a. star chart b. globe c. road map d. GPS

ix. What is the precision of an instrument?

a. The smallest division of an instrument.
b. The least count of an instrument.
C. One-half of the least count of an instrument.
d. One-half of the smallest division of an instrument

x. Four students reported results from an experiment.

Mass of unknown liquid				
Student A	Student B	Student c	Student D	
1cm	1.1 cm	1.12cm	1.124cm	

Which result is more precise?

a. Student A b. Student B c. Student C d. Student D

2. Three students measure acceleration due to gravity ($9.81 m/s^2$) on Earth.

Students1 obtains (8.88 $\pm$ 0.10) m/s; while

Student 2 obtains (9.68 $\pm$ 0.50) m/s.

Students 3 obtains (9.90 $\pm$ 0.20) m/s

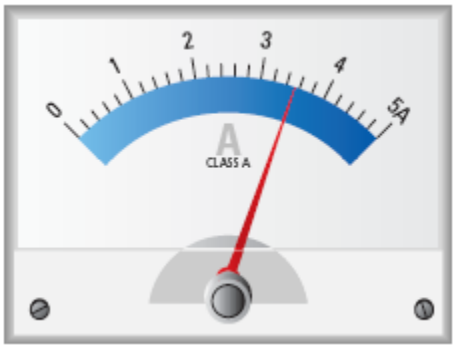
a. Which is more precise?

_____

b. Which is more accurate?

_____

3. Give the measure shown on the meter in Figure below as precisely as you can. Include the uncertainty in your answer.



Precision = 0.2 / 2 = 0.1

Measurement = 3.6 ± 0.1 A

1.3- Graphing the data

1. Choose the best answer

i. A line drawn as close as possible to all data points is called the

A. Linear relationship
B. Line of best fit
C. Vertical value
D. Parabola

ii. Which equation is most closely associated with a inverse relationship?

A. $y = mx + b$
B. $m = \frac{\Delta y}{\Delta x}$
C. $y = ax^2 + bx + c$
D. $y = \frac{a}{x}$

iii. Which of the following must be included in the vertical axis (y-axis) of a graph?

A. Dependent variable with its unit
B. Independent variable without its unit
C. Dependent variable without its unit

D. Independent variable with its unit

iv. A graph of quadratic relationship has a shape of a _____.

A. Straight line
B. Parabola
C. Hyperbola
D. Circle

v. A _____ is the factor that is changed or manipulated during the experiment.

A) Dependent variable
B) Independent variable
c) Data
D) hyperbola

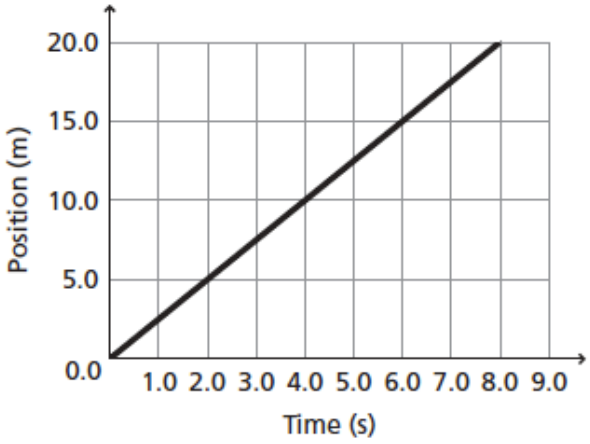
2. Use the graph below to answer the questions.

a. What is the independent variable in this graph? _____

b. Find the slope of this graph? (Include appropriate units).

_____

_____



c. What does slope of this graph represent? _____

d. What is the position at 5 seconds?

_____

d. What is the y-intercept of this graph?

2.2- where and When?

Q1. Choose the best answer:

i. A quantity with magnitude only without direction is called _____

a) Vector b) scalar

c) time interval d) dependent

ii. Which of the following is a vector quantity?

a) speed b) distance

c) 12 seconds d) 20m East

iii. Sum of two or more vectors is called _____

a) magnitude b) Resultant

c) velocity d) direction

iv. _____ is the location of an object relative to origin.

a) position b) displacement

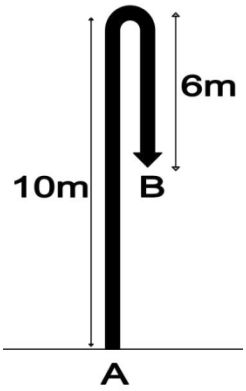
c) time interval d) distance

v. Another term used for size of a vector is called _____

a) direction b) time interval

c) magnitude d) displacement

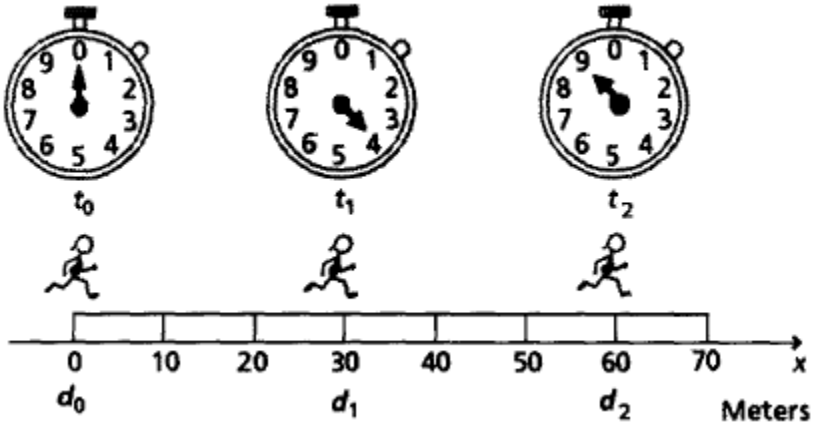
2. The diagram shows an object thrown up from A to finally reach at point B.



a. What is its displacement?

b. What is the distance covered by the object.

3. Look at the diagram below to answer the following questions.



Stop watch (seconds)

a) What is the displacement covered during the time interval t_0 to t_1?

b) How long does it take the runner to move from d_0 to d_1?

c) What is the displacement covered during the time interval t_1 to t_2?

d) How long does it take the runner to move from d_1 to d_2?

e) What is the total displacement covered for this motion?

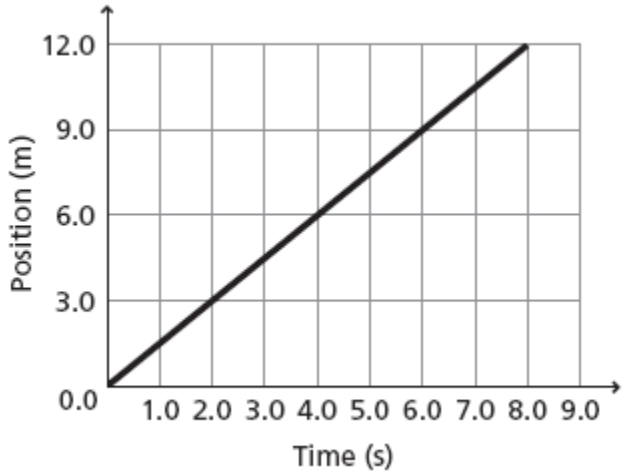
f) What is the speed/velocity of this motion?

$\mathbf{V}_{av}$ = total displacement / total time interval

= 60/9 = 6.66 m/s

2.3- Position-time graphs

5. Refer to the following position-time graph to answer the questions i-vii



i. Find **Δ*t*** for the change in position from d = 5 m to d = 15 m.

_____

ii. Find **Δ*d*** for the time interval from t = 2.0 s to t = 8.0 s.

_____

iii. What is the position of the object at 6.0 s? _____

iv. How much time has passed when the object is at 6.0 m? _____

v. How far does the object travel for every second it is in motion?

_____

vi. If the object continues at this speed, when will the object reach 18.0 m?

_____

vii. Where will the object be after 300 s? _____

6. Write the short answers of the following questions.

1. What is a resultant?

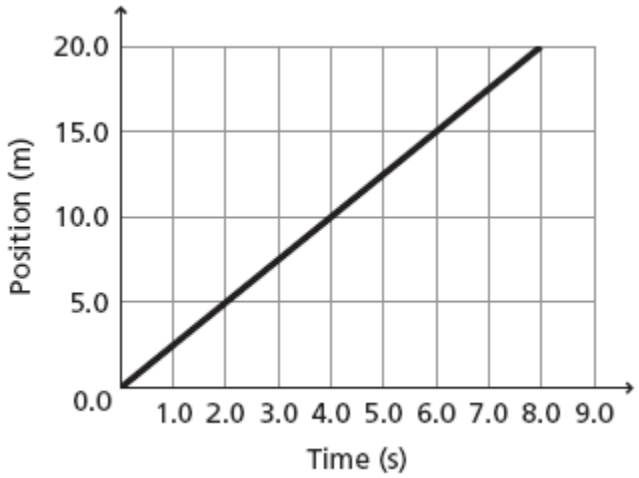
2. What is the difference between distance and displacement? Can distance and displacement ever be equal?

3. What is the difference between vectors and scalars? Give two examples of each.

4. What is difference between accuracy and precision?

2.4- How Fast?

1. Answer the questions i to x by referring to the following graph.



i. Find Δt for the change in position from d = 5 m to d = 15 m.

_____

iii. Find Δd for the time interval from t = 2.0 s to t = 8.0 s.

_____

iv. What is the formula for finding the slope on a position-time graph?

_____

v. What is the slope of this line? _____

vi. What does the absolute value of the slope of this line represent?

_____

vii. What is the velocity of this object in m/s? _____

viii. If this object continues at the same velocity, how long would it take this object to reach a position of d =150 m? _____

ix. If this object continues at the same velocity, how far will it have traveled when t =200 s? _____

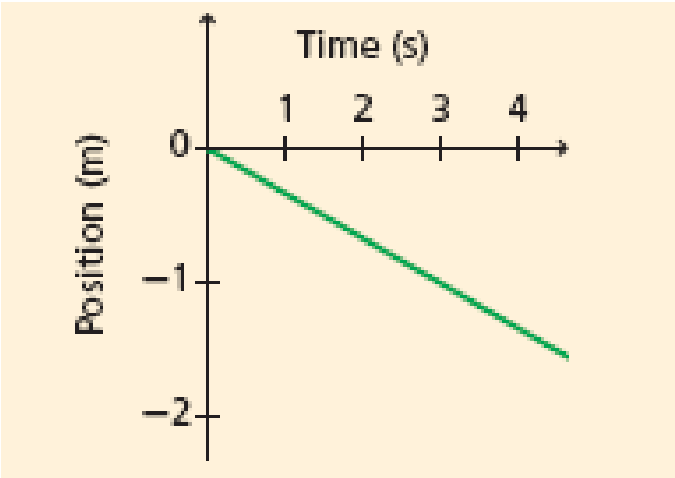
x. How far will this object have traveled if it had an initial position of 220 m and traveled at a velocity of 2.5 m/s for 48 s

$d_f = d_i + v \times t$

$= 220 + 2.5 \times 48 = 340m$

2. The graph in Figure below describes the motion of a cruise ship during its voyage through calm waters.

The positive *d*-direction is defined to be south.



a. What is the ship's average velocity?

_____

b. What is its average speed?

_____

3. Write the short answers of the following questions.

a) What is the difference between speed and velocity?

_____

_____

b. What is the difference between average velocity and instantaneous velocity? Give an example of each.

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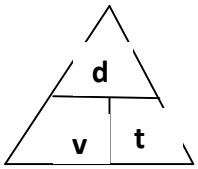
4. Calculate the following.



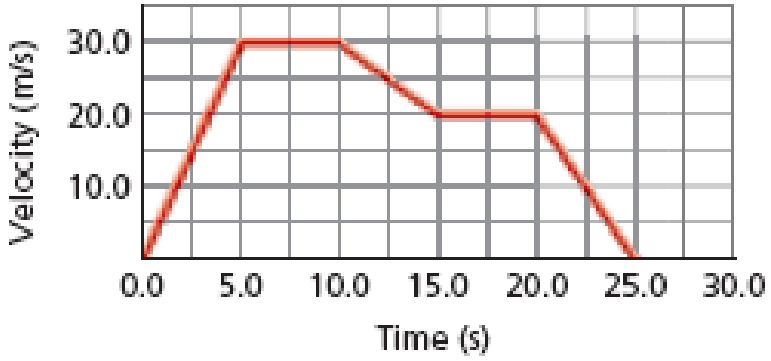
a) A missile travels 2500 km in 2.2 hours. What is its velocity?

b) Light from the Sun reaches Earth in 8.3 min. The speed of light is 3.00 x 10^8 m/s. How far is Earth from the Sun?

c) How far has a cyclist traveled if she has been moving at 30 m/s for 5.0 minutes?

3.1- Acceleration

1.(part A) Refer to the figure below to find the <u>acceleration</u> of the moving object at each of the following times.



a. during the first 5.0 s of travel

_____

b. between 5.0 s and 10.0 s

_____

c. between 10.0 s and 15.0 s

_____

d. between 20.0 s and 25.0 s

_____

(Part B), Find the <u>Displacement</u> of the object in the graph above during following time intervals.

a. during the first 5.0 s of travel

_____

b. between 5.0 s and 10.0 s

_____

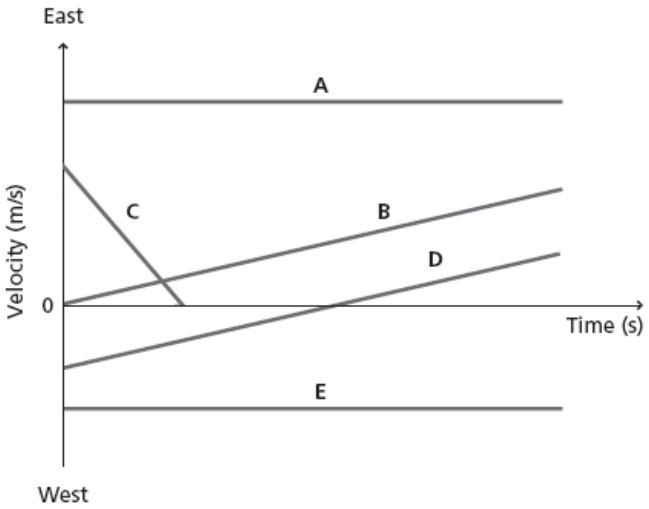
c. between 10.0 s and 15.0 s

_____

d. between 20.0 s and 25.0 s

_____

2. Refer to the diagram below to answer the following questions.



a. Which has the greater acceleration, Object A or B? How do you know?

_____

b. Which of these objects has the least value of acceleration? How do you know?

_____

c. Which of these objects started its motion from rest? Which object comes to a complete stop?

_____

d. which of the object change its direction while maintain constant positive acceleration.

_____

e. Object A and Object E both have a constant velocity and acceleration of zero. What is different between these two?

_____

f. which graph represents positive velocity and negative acceleration?

_____

3. Calculate the following

a) A race car slows from 36 m/s to 15 m/s over 3.0 s. What is its average acceleration?

b) A car is coasting backwards downhill at a speed of 3.0 m/s when the driver gets the engine started. After 2.5 s, the car is moving uphill at 4.5 m/s. If uphill is chosen as the positive direction, what is the car's average acceleration?

c) The speeds of an object at the ends of 4 successive seconds are 12, 16, 20, and 24 m/s respectively. What is the acceleration of the object?

d) If a car accelerates from rest at a constant 5.5 m/s^2, how long will it take for the car to reach a velocity of 28 m/s?

4. Choose the best answer.

1. The rate at which an object's velocity changes is its _____.

a. displacement b. velocity

c. time interval acceleration

2. The slope of a tangent line on a velocity-time graph is the _____.

a. instantaneous acceleration b. average acceleration

c. velocity d. acceleration due to gravity

3. When acceleration and velocity vectors are pointing in opposite directions, the object is _____.

a. speeding up b. moving at constant speed

c. slowing down d. not moving

4. If a runner accelerates from 2 m/s to 3 m/s in 4 s, her average acceleration is_____ .

a. 4.0 m/s^2 b. 0.40 m/s^2

c. 2.5 m/s^2 d. 0.25 m/s^2

5. The area under a velocity-time graph is equal to the object's _____.

a. stop time b. displacement

c. acceleration d. average speed

6. The area under an acceleration-time graph is equal to the object's _____.

a. velocity b. change in acceleration

c. weight d. displacement

7. Which of the following results in the largest acceleration?

a. a small change in velocity over a short time interval

b. a large change in velocity over a short time interval

c. a small change in velocity over a long time interval

d. a large change in velocity over a long time interval

8. Average acceleration is the same as instantaneous acceleration when ___.

a. acceleration is constant
b. velocity is constant
c. acceleration is changing
d. constant speed

9. As velocity increases, an object's displacement _____ .

a. cannot be determined
b. decreases for each time interval
c. remains the same for each
d. increases for each time interval

10. The change in velocity of an object at an instant of time is its _____.

a. average acceleration
b. instantaneous acceleration
c. acceleration due to gravity
d. instantaneous velocity

11. Which of the following describes an object that is speeding up?

a. v(+) & a(−)
b. v(+) & a(zero)
c. v(−) & a(−)
d. v(−) & a(+)

12. If velocity of a moving object is constant, its motion is called _____.

a. constant motion
b. uniform motion
c. non uniform motion
d. uniform accelerated motion

5. Write short answer of the following questions.

a. What information can you determine from a velocity-time graph? How?

b. What is the difference between average acceleration and instantaneous acceleration?

6. Calculate the following.

$\mathbf{V_f = V_i + (a \times t)}$

$\mathbf{d = (V_i \times t) + (1/2 \times a \times t^2)}$

$\mathbf{2 \times a \times d = V_f^2 - V_i^2}$

a) A supersonic jet flying at 145 m/s experiences uniform acceleration at the rate of 23.1 m/s^2 for 20.0 s. What is its final velocity?

b) A bus that is traveling at 30.0 km/h speeds up at a constant rate of 3.5 m/s. What velocity does it reach 6.8 s later?

c) A train traveling at 6.4 m/s accelerates at 0.10 m/s^2 over a distance of 100 m. What is its final velocity?

d) A dragster starting from rest accelerates at 49 m/s^2. How fast is it going when it has traveled 325 m?

e) A car moves at 12 m/s and coasts up a hill with a uniform acceleration of -1.6 m/s^2. What is its displacement after 6.0 s?

f) How far does a plane fly in 15 s while its velocity is changing from 145 m/s to 75 m/s at a uniform rate of acceleration?