

شرح الوحدة الأولى toolkit physics A متبوعة بتدريبات منهج انسابير



تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ⇨ المناهج الإماراتية ⇨ الصف التاسع المتقدم ⇨ فيزياء ⇨ الفصل الأول ⇨ ملفات متنوعة ⇨ الملف

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ملفات اكتب للمعلم اكتب للطالب | اختبارات الكترونية | اختبارات | حلول | عروض بوربوينت | أوراق عمل
منهج انجليزي | ملخصات وتقارير | مذكرات وبنوك | الامتحان النهائي | للمدرس

المزيد من مادة
فيزياء:

إعداد: sibal Monika

التواصل الاجتماعي بحسب الصف التاسع المتقدم



صفحة المناهج
الإماراتية على
فيسبوك

الرياضيات

اللغة الانجليزية

اللغة العربية

التربية الاسلامية

المواد على تلغرام

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة فيزياء في الفصل الأول

حل مراجعة الوحدة الأولى مدخل إلى علم الفيزياء

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ملخص الوحدة الأولى Toolkit Physics منهج انسابير

2

حل نموذج اختبار تجريبي منهج انسابير

3

نموذج اختبار تجريبي منهج انسابير

4

أسئلة الامتحان النهائي القسم الورقي منهج بريدج العام 2024-2025

5

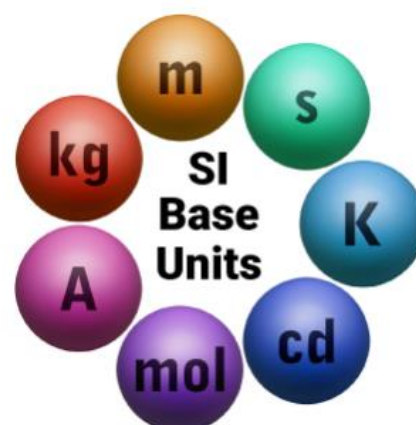
SI Base Units

SI Base Units

There are seven SI base units of measurement. Each base unit has its own physical standard based on an object or an event. It is not defined in terms of other units.

Each unit has a name and symbol. The seven base units are:

- **ampere**
- **candela**
- **kelvin**
- **kilogram**
- **meter**
- **mole**
- **second**



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

Standard Prefixes

Prefixes are added to base units to make them easier to work with.

A prefix represents a multiple or a fraction of a unit. The metric system is a decimal based system. It means that everything can be multiplied or divided by multiples of 10.

Prefix	Prefix Symbol	Meaning (multiples)	Power of Ten
giga-	G	1,000,000,000	10^9
mega-	M	1,000,000	10^6
kilo-	k	1,000	10^3
deci-	d	0.1	10^{-1}
centi-	c	0.01	10^{-2}
milli-	m	0.001	10^{-3}
micro-	μ	0.000001	10^{-6}
nano-	n	0.000000001	10^{-9}
pico-	p	0.000000000001	10^{-12}

To convert a small unit into a larger unit (such as from meter to kilo- and mega-) we need to divide.
To convert a large unit into a smaller unit (such as from meter to milli- and centi-) we need to multiply.

Converting Between Temperature Scales

Convert between kelvin and degrees Celsius:

$$K = ^\circ C + 273$$

Convert between degrees Celsius and degrees Fahrenheit:

$$^\circ F = 1.8(^{\circ}C) + 32$$

Solved Examples

1. Convert 0.44 kilometers (km) to centimeters (cm).

 There are 100 centimeter in a meter and 1000 meters in a kilometer.

To convert from km to cm we should multiply by 100,000 (or 1,000 and 100) because there are 1,000 meters in a kilometer and 100 centimeters in a meter.

$$0.44 \times 1,000 \times 100 = 44,000 \text{ cm}$$

2. Convert 3.23 milligrams (mg) to kilograms (kg).

 A kilogram is a larger unit than a milligram.

 When converting a larger unit to a smaller unit, multiplication is used.

There is 1 000 000 mg in 1 kg. We can divide 3.23 by 1 000 000 or break it down as shown below.

$$3.23 \div 10 \div 100 \div 1,000 = 0.00000323$$

Scientific Notation

Scientists must deal with numbers every-day. Scientists use numbers with many zeros in different calculations and even to communicate results. It is easier for scientists to express very big or small numbers in **scientific notation**. **Scientific notation** is a special way of writing numbers. When a number is written in scientific notation, it is expressed as a number between 1 and 10 multiplied by 10 raised to an **exponent**.

The coefficient is any number between 1-9

The base is always 10

The exponent can be any number other than 0 (zero).

Solved Examples

1. Write 863,000,000,000 in scientific notation (Positive Exponent)

Step-1: Move the decimal point to the right until you get a number between 1 and 9 (8.630000000000)

Step-2:

Count the number of places the decimal point moved to determine the exponent.

$$\begin{array}{c} 8.63,000,000,000 \\ \underbrace{\hspace{1.5cm}}_{\substack{1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 10\ 11}} \\ \text{exponent} = 11 \end{array}$$

If you move the decimal point to:

- the left, the exponent is positive
- the right the exponent is negative

Step-3:

Write the number in scientific notation.

$$8.63 \times 10^{11}$$

2. Write 0.00000082 in scientific notation (Negative Exponent)

Step-1: Move the decimal point to the left until you get a number between 1 and 9 (8.2)

Step 2

Count the number of places the decimal point moved. Since the decimal was moved to the right, the exponent is negative.

$$\begin{array}{c} \xrightarrow{\text{green arrow}} \\ 0.00000082 \\ \text{n} = 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \\ \text{exponent} = -7 \end{array}$$

Step 3

Write the number in scientific notation.

$$8.2 \times 10^{-7}$$

Dimensional Analysis

Dimensional analysis is the method used to convert from one unit to another.

Mohammed decides to convert his time to minutes to see who completed the lap faster. Take a look at the steps he used:

$$192 \text{ seconds} \times \frac{1 \text{ minute}}{60 \text{ seconds}} = 3.2 \text{ minutes}$$

In order to convert Khalid and Mohammed's units to the same dimension, Mohammed used $\frac{1 \text{ minute}}{60 \text{ seconds}}$ as his **conversion factor**.

Conversion factor

A **conversion factor** is a ratio that always equals 1, where the top and bottom equal the same amount, but in different units.

Example: How many liters are there in 28 mL?

Step 1: Set up your problem.

28 mL must be multiplied by a conversion factor to get an answer in L.

$$28 \text{ mL} \times \frac{?}{?} = ? \text{ L}$$

Step 2: Pick your conversion factor.

Since you want to change mL to L, you must cancel the mL. So, mL must be on the bottom and L on the top.

$$28 \text{ mL} \times \frac{? \text{ L}}{? \text{ mL}} = ? \text{ L}$$

Recall that 1 L = 1,000 mL.

$$28 \text{ mL} \times \frac{1 \text{ L}}{1,000 \text{ mL}} = ? \text{ L}$$

Step 3: Check that the units cancel out properly.

$$28 \cancel{\text{ mL}} \times \frac{1 \text{ L}}{1,000 \cancel{\text{ mL}}} = ? \text{ L}$$

Step 4: Solve.

$$28 \cancel{\text{mL}} \times \frac{1 \text{ L}}{1,000 \cancel{\text{mL}}} = ? \text{ L}$$

$$28 \div 1,000 \text{ L} = 0.028 \text{ L}$$

Significant Figures

A **significant figure** is a digit of a number that emerges from the original measurement.

Rules for recognizing significant figures

Rule-1: All non-zero digits are significant figures. For example, both values 0.000025 and 2.5 have two significant figures.

Rule-2: Zeros between non-zero digits are significant.

The number 14,000,003 has eight significant figures and 403,058 has six significant figures.

Rule-3: Zeros to the right of the last non-zero digit **and after** the decimal point are significant. The number 12.500 has five significant figures.

Rule-4: Zeros to the left of the first non-zero are **not** significant. The number 0.0002 has one significant figure.

Rule-5: Zeros to the right of the last non-zero digit **and before** the decimal point are **not** significant. The number 12500 has only three significant figures.

Calculation using significant figures

Multiply and Divide	Answers will have the same number of significant figures as the least precise measurement. $2.17 \times 1.179 = 2.56$
Add and Subtract	Answers will have the same number of decimal places as the value with the fewest number of decimal places in its mantissa. $1.871 + 3.2214 = 5.092$

Examples for Practice

Convert the following as asked

1. 54 milliLitre (mL) to Litre (L)
2. 60 kilogram (kg) to gram (g)
3. 24 milliseconds (ms) to seconds (s)
4. 12 gigahertz (GHz) to Hertz (Hz)
5. 15 femtometres (fm) to centimeters (cm)

Write the following numbers in scientific notation & also mention the number of significant figures in each.

1. 0.000678
2. 23908868
3. 58476289
4. 0.00000008989
5. 0.000098009879



SECTION 3: Measurement

A measurement: is a comparison between an unknown quantity and a standard. Like the unknown quantity is the mass of the cart and the standard is the gram.

Uncertainty When we estimate uncertainty we represent it as $\pm$ the smallest increment of the measuring tool

We can say the measurement is $7.2 \text{ cm} \pm 0.05 \text{ cm}$ uncertainty.

Precision The degree of exactness of a measurement or how close measurements are to each other, when taken in the same way.

Accuracy describes how well the results of a measurement agree with the “real” value.

Techniques of Good Measurement Scales should be read with one’s eye directly in front of the measure

Parallax The apparent shift in the position of an object when it is viewed from different angles.

(GPS) The Global Positioning System

Consists of 24 satellites with transmitters in orbit and numerous receivers on Earth. The satellites send signals with the time, measured by highly accurate atomic clocks.

Questions:

1. What is the difference between accuracy and precision?

2. Three students measured the mass of the same apple using different balances and got results of 200 ± 20 g, 192 ± 10 g, and 210 ± 5 g.

Which of these measurements is the most precise? Why?

The actual mass of the apple was 195 g. Which measurement is the most accurate?

Measurement of Students

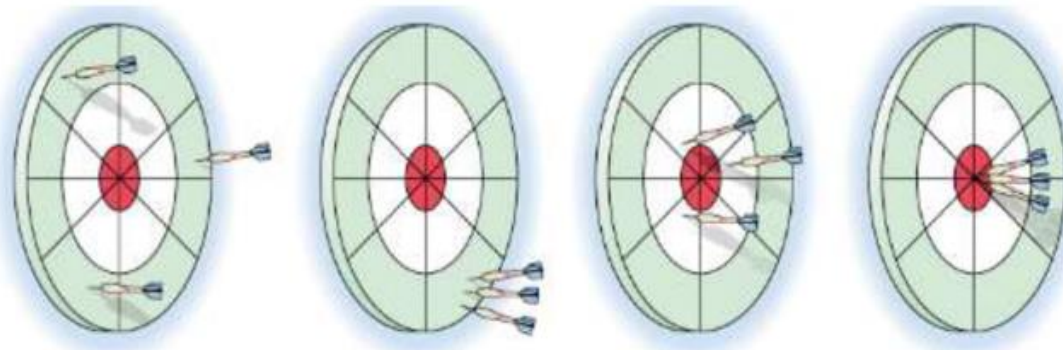
► Correct Value = 38.5g

	Trial 1	Trial 2	Trial 3
Student 1	31.5	31.4	31.3
Student 2	35.2	31.2	42.3
Student 3	38.4	38.6	38.3

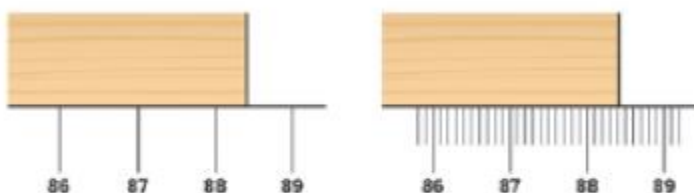
- Which student has High accuracy and High precision?
- Which student has low accuracy and High precision?
- Which student has low accuracy and low precision?

Identify if the images below are:

- precise,
- accurate,
- both precise and accurate
- not precise and not accurate.



Use the diagram below to answer the questions.



- a. Explain which meterstick you would use to make the more precise measurement.

SECTION 4: Graphing Data

Dependent variable is the variable in an experiment that is measured by the scientist.

Independent variable is the variable in an experiment that is changed by the scientist doing the experiment.

A line of best fit is a straight line. It can pass through all of the points or some of them.

The steps for drawing the graph

1. Label the x-axis with the title and unit of the independent variable. Label the y-axis with the title and unit of the dependent variable.
2. Look at the range of values on the x and y-axes and choose the correct scales for plotting so that the graph is spread out as much as possible.
3. Put the data points on the graph.
4. Draw a line of best fit.
5. Give your graph a title.

Linear Relationships

The dependent variable varies linearly with the independent variable.

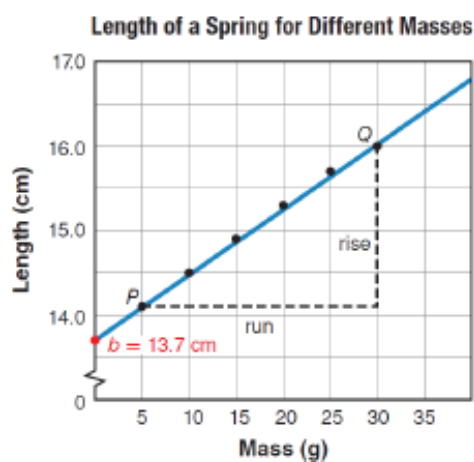
The linear relationship is expressed by the following equation: $y=mx+b$

where m is the slope of the line

b is the y-intercept.

The slope of a line is equal to the rise divided by the run, which also can be expressed as the vertical change divided by the horizontal change.

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$$

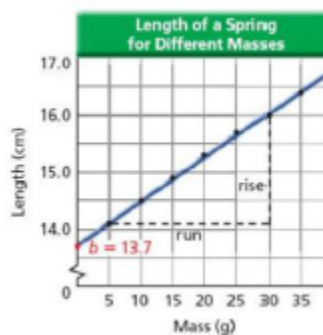


1. Which describes an independent variable?

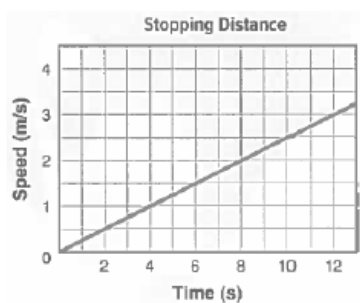
1. ☐ the factor that is changed or manipulated during an experiment
2. ☐ the factor that depends on what is changed or manipulated during an experiment
3. ☐ the line of best fit
4. ☐ the result of an experiment

2. Where is the dependent variable plotted on the graph?

1. ☐ horizontal axis
2. ☐ the dotted line
3. ☐ at (0, 0)
4. ☐ vertical axis



4. What is the slope of this graph.



A. 0.25 m/s^2

B. 0.4 m/s^2

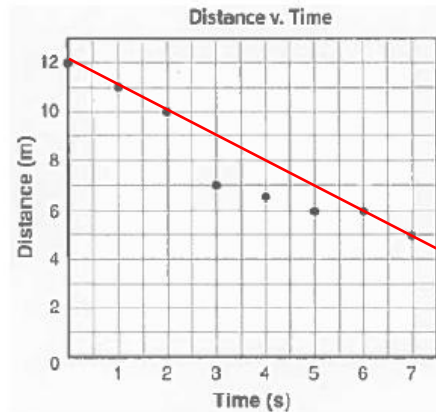
C. 2.5 m/s^2

D. 4.0 m/s^2

5. Physicists use _____ to accurately predict how systems will behave.

1. ☐ graphs
2. ☐ the line of best fit
3. ☐ models
4. ☐ relationships

Find an equation for a line of best fit for the data shown below.



► $Y = mX + b$

► $m = \text{rise/run}$

► $m = (12-5)/(7-0)$

► $d = -(7/7)t + 12$

► $d = -t + 12$

► **CHECK**

► What is the distance when

► time is 1 sec?

► $d = -t + 12$

► $= -1 + 12$

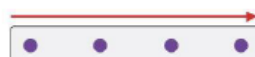
$= 11$

Chapter 2

5. Picturing Motion

Summary

- Objects move in different ways (straight line, curved path, spiral).
- Motion along a straight line is a direct path between two points.
- **Motion diagrams:** the images represent position at equal time intervals, so change in position with time.
- A **particle model** (ticker tape) – each dot represents a point to record an object's position at equal time intervals.
- This is an object that is covering the same distance in the same amount of time.



Choose the correct answer:

- 1) Which statement best describes the motion diagram of an object in motion?
 - a) a graph of the time data on a horizontal axis and the position on a vertical axis.
 - b) a series of images showing the positions of a moving object at equal time intervals.
 - c) a diagram in which the object in motion is replaced by a series of single points.
 - d) a diagram that tells us the location of the origin of the object in motion.
- 2) What does the following particle model show?
 - a) the object is speeding up.
 - b) the object is slowing down.
 - c) the object is moving at a constant velocity.
 - d) the object is stationary.
- 3) In the particle model, the object in the motion diagram is replaced by.....
 - a) a series of dots.
 - b) a large rectangle.
 - c) a stick figure.
 - d) an arrow showing direction.



Motion diagram and particle model

Motion can be pictured using 2 diagrams :

1. **Motion diagram**: The separate images taken by a camera can be combined to show the position of the object at equal time intervals.
2. **Particle model**: turning the shapes into dots



End

Start

This object is _____ (ثابت في مكانه)



This object is moving at a _____ (سرعة ثابتة)



لاحظي كيف ان المسافات بين الصور والنقاط متساوية
هذا يعني ان السيارة قطعت مسافات متساوية خلال فترات زمنية متساوية
هنا (كل ثانية تقطع نفس المسافة)

This object is _____ (يتسارع)



لاحظي كيف ان المسافات بين الصور والنقاط تزداد
هذا يعني ان السيارة قطعت مسافات اكبر واكثر خلال فترات زمنية متساوية
هنا (تزداد المسافة التي تقطعها السيارة في كل ثانية تمر)

This object is _____ (يتباطئ)



لاحظي كيف ان المسافات بين الصور والنقاط تتناقص
هذا يعني ان السيارة قطعت مسافات اقل واقل خلال فترات زمنية متساوية
هنا (كل ثانية تمر تقطع السيارة مسافة اقل واقل في كل ثانية)

Motion diagram and particle model

Match the motion diagram with the correct motion expression



Slowing down

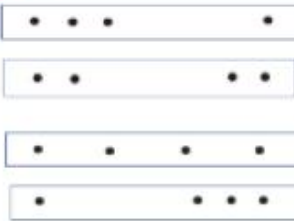
Speeding up

Constant speed

Standing still

Ministry: which of the following particle model motion diagrams represent the motion of the flying bird in the figure

a.
b.
c.
d.



Ministry: shown is the particle model for a car's motion, which of the following is a correct description of the car's motion?

- The car moves in a constant speed
- The car is speeding up
- The car is slowing down
- The car was speeding up and then started to slow down



Worksheet 02: Measurement

Name:

Class:

Level 1:

1. Which of the following prefixes is suitable for measuring the length of an insect:

- A. kilo
- B. mega
- C. giga
- D. milli

2. – **This is a device used to measure a basic physical quantity.**

1-What is the name of the physical quantity that the device measures

.....

2- Convert the measurement (g) in SI unit

3- What is the name of the device



3. – **This is a device used to measure a basic physical quantity.**

1-What is the name of the physical quantity that the device measures

2- Convert the measurement in SI unit

3- What is the name of the device



Level 2:

4. a. Convert 2.3L to cm^3

$$1 \text{ L} = 1000 \text{ cm}^3$$

b. 201kg = ____ g

c. 12Pm = _____ m

d. 560 nm = _____ m

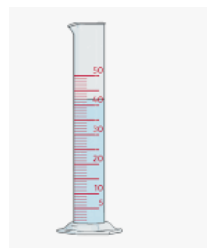
5. The S.I unit of temperature is _____

6. The absolute zero temperature is roughly equal to _____ k and _____ C

7. Mass is measured in _____ --- in S.I Units.

Level 3:

match the following



Screw gauge



Weighing Scale



Measuring cylinder



Al Tahmooh School

Emirates School Establishment

Term 1

Measurement

Mrs. Monika sibal



وزارة التربية والتعليم
MINISTRY OF EDUCATION

1. The S.I unit of length is _____

2. Candela is the S.I unit of _____ while Ampere is the S.I unit of _____