

الإدارة المركزية للتعليم العام

Science development office



Physics

Second Secondary Grade

Home Work

Week

2

20
26

Name:

Class:

School:

إعداد

محمد عنتر

مراجعة

مجدي فتحي - عمرو مالي

مكتب مستشار العلوم

عبدالله مصطفى - سعيد محمد

إشراف

د/ عزيزة رجب خليفة
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إشراف عام

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رئيس الإدارة المركزية للتعليم العام



Dimensional formula - Multiples and fractions of units - Measurement error

First: Choose the correct answer:

- 1-Which of the following correctly expresses the concept of dimensional formula?
 - a) The relationship between numerical values of physical quantities.
 - b) Expressing the physical quantity in terms of the fundamental quantities.
 - c) Expressing the physical quantity using SI units only.
 - d) The mathematical relationship between derived quantities.
- 2-What is the correct statement that describes the importance of the dimensional formula?
 - a) If the dimensional formulas of both sides of the equation are identical, the equation must be correct.
 - b) If the dimensional formulas of both sides of the equation are identical, the equation may be correct.
 - c) If the dimensional formulas of both sides of the equation are identical, the equation must be incorrect.
 - d) If the dimensional formulas of both sides of the equation are different, the equation may be correct.
- 3-If two physical quantities are of the same type, but the first follows the Gaussian system and the second the British system; which of the operations (addition, subtraction) can be performed?
 - a) Both can be performed, since the condition is only that both quantities have the same dimensional formula.
 - b) Cannot be performed, since they must have the same units.
 - c) Only addition can be performed, since subtraction depends on proportionality.
 - d) Only subtraction can be performed, since addition depends on proportionality.



- 4- Having the same dimensional formula on both sides of the equation
- a) Confirms its validity
 - b) Does not guarantee its validity
 - c) Confirms its error
 - d) Guarantees its validity
- 5- The unit of measurement of a physical quantity with dimensions $M^0 L T^{-2}$ is:
- a) m/s
 - b) $kg \cdot m/s^{-2}$
 - c) m/s^2
 - d) $m \cdot s^2$
- 6- If the dimensional formula of quantity **A** is $L T^{-1}$, and of **B** is T^{-1} , then the dimensional formula of $(A \times B)$ is:
- a) $L \cdot T^{-1}$
 - b) T^{-2}
 - c) $L T^{-2}$
 - d) $L T^0$
- 7- If the dimensional formula of **A** is $L \cdot T^{-1}$, and of **B** is T^{-1} , then the dimensional formula of $(A \times B)$ is:
- a) $L \cdot T^{-1}$
 - b) T^{-2}
 - c) $L \cdot T^{-2}$
 - d) $L \cdot T^0$
- 8- Three physical quantities **X**, **Y**, **Z** have the following dimensional formulas respectively:
Which of the following relations could be correct?
- a) $Z = XY$
 - b) $Z = \frac{X}{Y}$
 - c) $Z = \frac{Y}{X}$
 - d) $Z = Y^2/X$
- 9- If the wavelength of red light is $0.7 \mu m$, then its wavelength in millimeters equals:
- a) 7×10^{-3}
 - b) 7×10^{-4}
 - c) 7×10^{-6}
 - d) 7×10^{-7}
- 10- An electric current has a magnitude of 7 mA. Its value in μA is:
- a) 7×10^3
 - b) 7×10^6
 - c) 7×10^9
 - d) 7×10^{12}
- 11- Which of the following is an example of indirect measurement?
- a) Measuring the mass of a liquid with a hydrometer
 - b) Measuring the mass of an object with a balance
 - c) Measuring a person's height with a measuring tape
 - d) Measuring the volume of a cube by measuring its length
- 12- To measure the density of a liquid directly, is used
- a) Ruler
 - b) Micrometer
 - c) Hydrometer
 - d) Graduated cylinder



- 13-To measure a physical quantity accurately, the line of sight must be the instrument scale.
a) Parallel to b) Perpendicular to c) Above d) Below
- 14-A group of students estimated the mass of a gold ring, but the measurement was inaccurate. The source of error is most likely:
a) Using an ordinary balance instead of a sensitive one
b) Gold's density is high
c) The copper content in the alloy is low
d) The gold content in the alloy is low.
- 15-The ratio between the dimension of volume sphere to dimension of circle circumference equals the dimensions of
a) time b) length c) mass d) area

Second: Essay Questions:

Express the following quantities in the required units using scientific formula:

(a) 88 kg , in milligrams

(b) 1.8 MW, in kilowatts

(c) 50 mg, in kilograms

(d) $0.4 \mu\text{g}$, in milligrams



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Dimensional formula - Multiples and fractions of units - Measurement error

First: Choose the correct answer:

1-The dimension formula of pi (π) is

a) $M^0 . L . T^0$

b) $M^0 . L^0 . T^0$

c) $M^0 . L . T$

d) $M . L . T$

2-The physical quantity that has dimensional formula of LT^{-1} , so its unit in the Gaussian system is

a) $g.cm^{-1}$

b) $cm.s^{-1}$

c) $m.s^{-1}$

d) $m.s$

3-Density = $\frac{\text{mass}}{\text{volume}}$ so the dimensional formula and unit of measurement in the British system

a) ML^{-3} , pound/foot³

b) ML^{-3} , g/cm^3

c) ML^3 , pound/foot³

d) ML^{-3} , kg/m^3

4-If the quantity X is calculated from the relation $X = Y + Z$ and the equation for the dimensions of Z is MLT^{-2} , then the unit of measurement of quantity Y is

a) Newton

b) joule

c) watt

d) $kg\ m/s$

5-If you know that $\frac{K}{t} = F . d + \frac{R}{t^2}$

So the dimensional formula of the quantity ($\frac{R}{K}$) is

a) ML^0T^0

b) M^0L^0T

c) M^0LT^0

d) $M^0L^0T^{-1}$



6- If the dimensional formula of the physical quantity (X) is ML^2T^{-2} and the dimensional formula of the physical quantity (Y) is LT^{-2} so the measuring unit of the quantity $(\frac{X}{Y})$ in the British system is

- a) pound.s b) pound.foot c) g.cm d) kg.m

7- If the distance between the atoms in a crystal is 9×10^{-4} mm, then this is equal to

- a) 9×10^{-7} cm b) 9×10^{-5} cm
c) 9×10^{-9} cm d) 9×10^{-10} cm

8-If mass C = sum of two masses A = 3 tons, B = 6000 g ,then mass C is equal to kg

- a) 3600 b) 6003
c) 63000 d) 3006

9-An example of direct measurement is a measurement of

- a) Room area by metric tape b) Body mass by a sensitive scale
c) Density of a liquid measured by its mass and volume d) cuboid volume by measuring length, width and height

10-Which of the following measurements is considered an indirect measurement..

- a) Measuring speed with a speedometer b) Volume measurement by a graduated cylinder
c) Density measurement by hydrometer d) Area measurement by metric tape



Seond: Essay Questions:

11-Write each of the following quantities in the required unit between brackets:

a) Train speed 180 km/h. (in unit of m/s).

b) Vehicle speed 50 m/s. (in unit of km/h).

c) Gold density 19300 kg/m³ (in unit of g/cm³)

d) Aluminum density 2.7 g/cm³ (in unit of kg /m³)

12-Explain:

The existence of an error in the Ammeter measurement after several years of operating it ?

13-Explain:

The sensitive scale is kept inside a glass box?



14-From the relation $\frac{X}{t^2} = F \cdot v + \frac{Y}{d^2}$

Deduce the dimensional formula of the physical quantity (X) and (Y)

If you know that (t) is the time, (F) is the force, (v) is the velocity and (d) is the displacement

15-Verify from the validity of the relation $T = 2 \pi \sqrt{\frac{\ell}{g}}$

If you know that (T) is the time of one complete oscillation of a vibrating simple pendulum, (ℓ) is the length of the pendulum's thread and (g) is the gravity acceleration
