1.1 Physical Quantities & Units

Question Paper

Course	CIE A Level Physics (9702) 2019-2021
Section	1. Physical Quantities & Units
Topic	1.1 Physical Quantities & Units
Difficulty	Medium

Time allowed: **10**

Score: **/10**

Percentage: **/100**

Question 1

The equation relating pressure and density is $P = \rho g h$

How can both sides of this equation be written in terms of base units?

A $[N\ m^{-1}] = [kg\ m^{-3}]\ [m\ s^{-1}]\ [m]$

B $[N\ m^{-2}] = [kg\ m^{-2}]\ [m\ s^{-2}]\ [m]$

C $[kg\ m^{-1} s^{-2}] = [kg\ m^{-3}]\ [m\ s^{-2}]\ [m]$

D $[kg\ m^{-1} s^{-1}] = [kg\ m^{-1}]\ [m\ s^{-2}]\ [m]$

[1 mark]

Question 2

For which quantity is the magnitude a reasonable estimate?

A frequency of a radio wave 500pHz

B mass of an atom 500μg

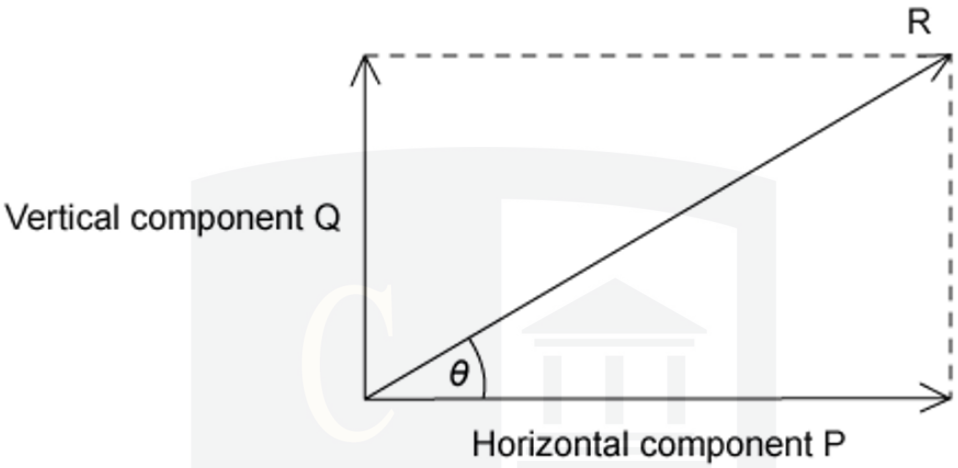
C the Young modulus of a metal 500kPa

D wavelength of green light 500nm

[1 mark]

Question 3

A vector has magnitude *R* and perpendicular components *P* and *Q*, as shown in the diagram.



Which row correctly describes the perpendicular components?

	vertical component	horizontal component
A	*Q*	*sinθ*
B	*R cosθ*	*P*
C	*R cosθ*	*R sinθ*
D	*R sinθ*	*R cosθ*

[1 mark]

Question 4

Which of the following correctly expresses the volt in terms of SI base units?

A $A\Omega$

B WA^{-1}

C $kg\ m^2\ s^{-1}\ A^{-1}$

D $kg\ m^2\ s^{-3}\ A^{-1}$

[1 mark]

Question 5

What is the ratio $\frac{10^{-3}\ THz}{10^{3}\ kHz}$?

A 10^{-9} **B** 10^{-6} **C** 10^{0} **D** 10^{3}

[1 mark]

Question 6

The table contains some quantities, together with their symbols and units.

quantity	symbol	unit
gravitational field strength	g	$N\ kg^{-1}$
density of liquid	ρ	$kg\ m^{-3}$
vertical height	h	m
volume of part of liquid	V	m^3

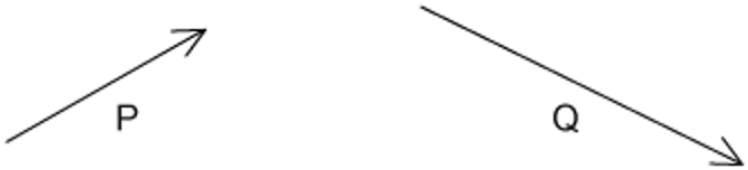
Which expression has the units of energy?

A $\rho g^2 h$ **B** $\frac{\rho h V}{g}$ **C** $\frac{\rho g}{hV}$ **D** $g \rho h V$

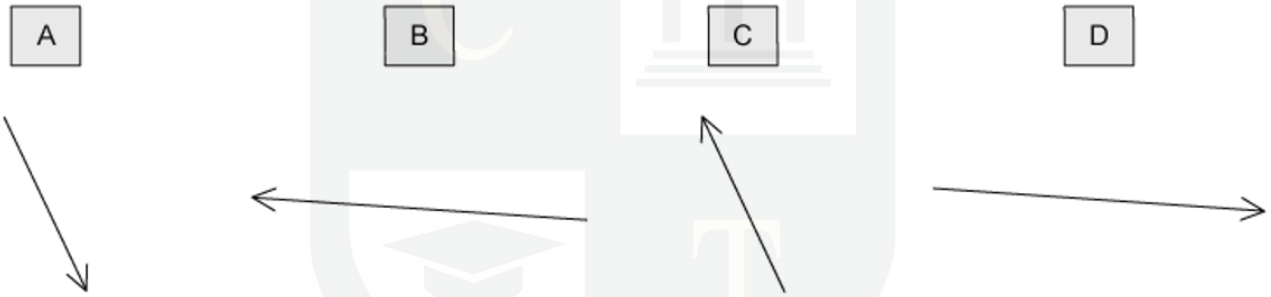
[1 mark]

Question 7

Vectors *P* and *Q* are drawn to scale.



Which diagram represents the vector (*P* – *Q*)?



[1 mark]

Question 8

The units of all physical quantities can be expressed in terms of SI base units.

Which pair contains quantities with the same base units?

A force and momentum

B pressure and Young modulus

C power and kinetic energy

D mass and weight

[1 mark]

Question 9

The speed of an aeroplane in still air is 200kmh^{-1}. The wind blows from the west at a speed of 85.0kmh^{-1}.

In which direction must the pilot steer the aeroplane in order to fly due north?

A 23.0° east of north

B 23.0° west of north

C 25.2° east of north

D 25.2° west of north

[1 mark]

Question 10

The average kinetic energy *E* of a gas molecule is given by the equation

$$E = \frac{3}{2} kT$$

where *T* is the absolute (kelvin) temperature.

What are the SI base units of *k*?

A $kg^{-1}\, m^{-1}\, s^{2}\, K$

B $kg^{-1}\, m^{-2}\, s^{2}\, K$

C $kg\, m\, s^{-2}\, K^{-1}$

D $kg\, m^{2}\, s^{-2}\, K^{-1}$

[1 mark]