1.1 Measurements in Physics

Question Paper

Course	DP IB Physics
Section	1. Measurement & Uncertainties
Topic	1.1 Measurements in Physics
Difficulty	Medium

Time allowed: 20

Score: /10

Percentage: /100

Question 1

Blue light has a wavelength of 450 nm.

Which of the following also represents this wavelength?

A. 4.5 pm

B. 0.45 μm

C. 0.0045 mm

D. 0.45 km

[1 mark]

Question 2

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 3

For which quantity is the magnitude a reasonable estimate?

A. frequency of an infrared wave 500 MHz

B. mass of an atom 250 μg

C. the Young modulus of an elastic band 5 kPa

D. wavelength of red light 700 nm

[1 mark]

Question 4

$\frac{8}{9}$ kilowatt-hours (kW h) is equivalent to

A. 2.0×10^{-13} eV

B. $\frac{16}{3} \times 10^{8}$ eV

C. 2.0×10^{25} eV

D. 3.2×10^{6} eV

[1 mark]

Question 5

The equation of hydrostatic pressure relates the pressure of a fluid, P, to the density of the fluid, ρ

$$P = \rho g \Delta h$$

where g is the gravitational field strength, and Δh is the depth from the surface of the fluid.

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

A. $(\text{N m}^{-1}) = (\text{kg m}^{-3})\,(\text{m s}^{-1})\,(\text{m})$

B. $(\text{N m}^{-2}) = (\text{kg m}^{-2})\,(\text{m s}^{-2})\,(\text{m})$

C. $(\text{kg m}^{-1}\,\text{s}^{-2}) = (\text{kg m}^{-3})\,(\text{m s}^{-2})\,(\text{m})$

D. $(\text{kg m}^{-1}\,\text{s}^{-1}) = (\text{kg m}^{-1})\,(\text{m s}^{-2})\,(\text{m})$

[1 mark]

Question 6

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

Which pair contains quantities with different base units?

A. emf and lost volts

B. mass per unit area and density

C. impulse and momentum

D. work and energy

[1 mark]

Question 7

The best estimate for the time it takes light to cross the nucleus of a hydrogen atom is:

A. 10^{-23} s

B. 10^{-20} s

C. 10^{-15} s

D. 10^{-7} s

[1 mark]

Question 8

A glider is momentarily stationary in the air before losing 1.00 m of vertical height for every 6.00 m that it goes forward horizontally. The horizontal speed of the glider is 12 m s^{-1}.

What is the vertical speed of the glider, to an appropriate number of significant figures, after it falls a total of 31.25 m?

A. 25.0 m s^{-1}

B. 30 m s^{-1}

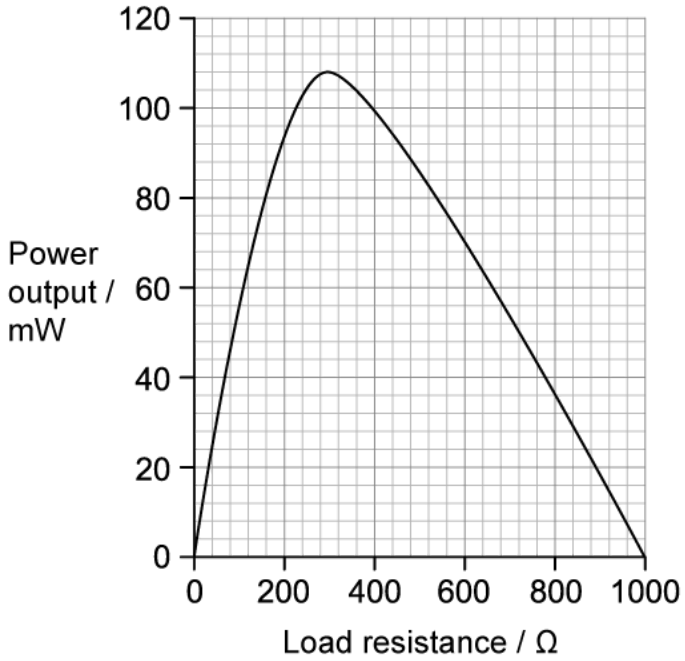
C. 25 m s^{-1}

D. 30.0 m s^{-1}

[1 mark]

Question 9

The graph shows the data for the variation of the power output of a photovoltaic cell with load resistance. The data were obtained by placing the cell in sunlight. The intensity of the energy from the Sun incident on the surface of the cell was constant.



The intensity of the Sun's radiation incident on the cell is 0.6 W m^{-2}. The active area of the cell has dimensions of 30 mm × 30 mm.

At the peak power, what is the ratio $\frac{\text{electrical energy at peak power}}{\text{energy arriving at the cell from the sun}}$?

A. 2×10^{-4}

B. 200

C. 0.54

D. 0.2

[1 mark]

Question 10

An object falls for a time of 0.081 s. The acceleration of free fall is 9.81 m s^{-2}. The displacement is calculated. Which of the following gives the correct number of significant digits for the calculated value of the displacement of the object?

A. 4

B. 2

C. 1

D. 3

[1 mark]