

Answer **all** the questions in the spaces provided.

**1** Make reasonable estimates of the following quantities.

**(a)** mass of an apple

mass = ..... kg [1]

**(b)** number of joules of energy in 1 kilowatt-hour

number = ..... [1]

**(c)** wavelength of red light in a vacuum

wavelength = ..... m [1]

**(d)** pressure due to a depth of 10 m of water

pressure = ..... Pa [1]

**2** A student uses a micrometer screw gauge to measure the diameter of a wire. He fails to notice that, with the gauge fully closed, the reading is not zero.

**(a)** State and explain whether the omission introduces a random error or a systematic error into the readings of the diameter.

.....  
.....[2]

**(b)** Explain why the readings are precise but not accurate.

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.....  
.....[2]