1 What is equal to 0.000005 J?

A 5 mJ **B** 5 MJ **C** 5 μJ **D** 5 nJ

2 The measurement of a physical quantity may be subject to random errors and to systematic errors.

Which statement is correct?

A A systematic error **cannot** be reduced by adjusting the apparatus.

B A systematic error results in a different reading each time the measurement is taken.

C Random errors are always caused by the person taking the measurement.

D Random errors can be reduced by taking the average of several measurements.

3 The Young modulus of the material of a wire is to be found. The Young modulus E is given by the equation shown.

$$E = \frac{4FL}{\pi d^2 x}$$

The wire is extended by a known force and the following measurements are made.

Which measurement has the largest effect on the uncertainty in the value of the calculated Young modulus?

	measurement	symbol	value
A	length of wire before force applied	L	2.043 ± 0.002 m
B	diameter of wire	d	0.54 ± 0.02 mm
C	force applied	F	19.62 ± 0.01 N
D	extension of wire with force applied	x	5.2 ± 0.2 mm

4 Two physical quantities combined together as a product can produce a scalar quantity or a vector quantity.

Which product of two quantities produces a scalar quantity?

A (force) × (displacement of an object in the direction of the force)

B (mass) × (acceleration of the mass)

C (pressure) × (area on which the pressure acts)

D (velocity) × (time for which an object has that velocity)