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## HL Paper 1

The volume  $V$  of a cylinder of radius  $R$  and height  $H$  is given by  $V = \pi R^2 H$ . The volume of the cylinder was measured with an uncertainty of 10% and the height was measured with an uncertainty of 6%. What is the uncertainty in the radius of the cylinder?

- A. 1%
- B. 2%
- C. 4%
- D. 8%

## Markscheme

D

## Examiners report

When calculating uncertainties a distinction must be made between what is measured and what is calculated. The calculated should be made the subject of the formula before proceeding.

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Two lengths,  $a$  and  $b$ , are measured to be  $51 \pm 1$  cm and  $49 \pm 1$  cm respectively. In which of the following quantities is the percentage uncertainty the largest?

- A.  $a + b$
- B.  $a - b$
- C.  $a \times b$
- D.  $\frac{a}{b}$

## Markscheme

B

## Examiners report

[N/A]

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What is a correct value for the charge on an electron?

- A.  $1.60 \times 10^{-12} \mu\text{C}$
- B.  $1.60 \times 10^{-15} \text{mC}$
- C.  $1.60 \times 10^{-22} \text{kC}$
- D.  $1.60 \times 10^{-24} \text{MC}$

## Markscheme

C

## Examiners report

[N/A]

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A ball is thrown with velocity  $u$  at an angle of  $55^\circ$  above the horizontal. Which of the following is the magnitude of the horizontal component of velocity?

- A.  $u \cos 55^\circ$
- B.  $u \sin 55^\circ$
- C.  $u$
- D.  $u \tan 55^\circ$

## Markscheme

A

## Examiners report

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Which of the following expresses the units of capacitance in terms of fundamental units?

- A.  $\text{s}^4 \text{A}^2 \text{m}^{-2} \text{kg}^{-1}$
- B.  $\text{s}^2 \text{Am}^{-2} \text{kg}^{-1}$
- C.  $\text{s}^4 \text{A}^2 \text{m}^{-2}$
- D.  $\text{s}^2 \text{Am}^{-2}$

## Markscheme

A

## Examiners report

[N/A]

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