Oxford Cambridge and RSA

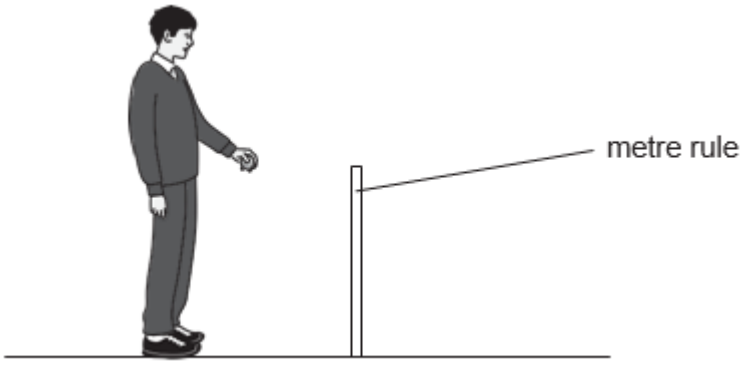
GCSE Physics A (Gateway)

J249/02 Physics A P5-P8 and P9 (Foundation Tier)

Question Set 10

1 A student wants to investigate how a ball bounces.

He drops the ball from different heights and measures the bounce height each time.



He calculates the ratio bounce height / drop height.

The table shows his results.

Drop height (cm)	Bounce height (cm)	Bounce height / drop height
100	70	0.70
80	64	0.80
60	54	0.90
40	40	1.00
20		

(a) The student predicts the ratio bounce height / drop height to be 1.10 when the drop height is 20 cm.

(i) Suggest why he has made this prediction.

Because for every 20cm decrease there is a 0.1 increase in the ratio. **[1]**

(ii) Use ideas about energy to explain why this prediction cannot be correct.

For a ratio of 1.10, the ball would bounce higher than its drop height. For this to happen energy would need to be created, which is not possible. **[1]**

(b) Suggest **two** improvements to his experiment. **[2]**

- Use a more accurate tool than a metre rule (Tape measure or light gates & data logger).
- Use a wider range of drop heights.

(c) The mass of the ball is 60 grams.

(i) Calculate the mass of the ball in kg.

$60g = 0.06kg$

Mass = ... 0.06 ..... kg

[1]

(ii) Calculate the potential energy of the ball when it is 0.80 m above the ground.

Use your answer to **(c)(i)** and the equation:
potential energy = mass × height × gravitational field strength

Gravitational field strength = 10 N / kg

$GPE = mgh$
$= 0.06 \times 10 \times 0.8$
$= 0.48J$

Potential energy = ... 0.48 ..... J

[2]

Total Marks for Question Set 10: 7

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