

Name of the Student: \_\_\_\_\_

Max. Marks : 24 Marks

Time : 24 Minutes

Mark Schemes

**Q1.**

- (a) uniform acceleration  
*allow constant / steady acceleration*  
*allow velocity / speed increasing at a constant rate*  
*ignore reference to direction*  
*acceleration scores 1 mark*  
**or**  
*velocity / speed is increasing scores 1 mark*  
*do **not** accept acceleration increases*

2

- (b) up(wards)

1

- (c) a group of objects that interact

1

- (d) velocity just after bounce is less than just before bounce  
*allow velocity is less / decreases*  
*velocity decreases to zero – on its own scores zero*

**or**

the height at the top of the bounce is less than the height from which it was dropped

1

so the ball has lost energy

1

correct reference to (loss of) ke or (reduced) gpe

1

total energy of ball and Earth / ground is constant  
*allow 'a system' for ball and Earth*  
*allow energy is conserved*

1

[8]

**Q2.**

- (a) **Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.

5-6

**Level 2:** The method would not necessarily lead to a valid outcome. Most steps are

identified, but the method is not fully logically sequenced.

3-4

**Level 1:** The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.

1-2

**No relevant content**

0

**Indicative content**

set up a clamp stand with a clamp

hang the spring from the clamp

use a second clamp and boss to fix a (half) metre ruler alongside the spring

record the metre ruler reading that is level with the bottom of the spring

hang a 2 N weight from the bottom of the spring

record the new position of the bottom of the spring

calculate the extension of the spring

measure the extension of the spring

add further weights to the spring so the force increases 2 N at a time up to 10 N

for each new force record the position of the bottom of the spring and calculate / measure the extension

**possible source of inaccuracy**

not fixing the ruler in position but simply holding the ruler next to the spring

not clamping the ruler vertical

misjudging the position of the bottom of the spring

parallax error

allow any other sensible suggestion that could reasonably lead to inaccuracy in the data

allow a description that would increase accuracy

repeating the measurements is insufficient

(b) to identify any anomalous results

*allow calculate an average for the spring constant*

**or**

to reduce the effect of random error

*allow (more) accurate*

*to obtain an average is insufficient*

*to be able to draw a graph is insufficient*

1

(c) both points plotted correctly

1

correct line of best fit drawn  
to pass through (0,0) and (10,20)

1

(d) force = spring constant  $\times$  extension  
allow  $F = ke$

1

(e) extension = 0.2  
allow 0.035 / 0.08 / 0.125 / 0.16

1

$10 = k \times 0.2$   
force value must match extension  
this mark may be awarded if e is in cm

1

$$k = \frac{10}{0.2}$$

allow correct transformation of their chosen values  
this mark may be awarded if e is in cm

1

$k = 50$   
an answer 0.5 scores **3** marks  
an answer of 50 scores **4** marks

1

(f) the line is straight  
allow the line does not curve

1

and passes through the origin  
this mark is dependent on scoring the first mark  
allow a correct description of direct proportionality for **2**  
marks  
ignore the line shows they are directly proportional

1

[16]