Mark schemes

Q1.

(a) tension

1

(b) (combined) mass of trolley and mass hanger

allow mass / weight of trolley / hanger

1

(c) divide distance travelled by time taken to give (average / mean) velocity

allow speed for velocity throughout

1

double mean velocity (to give maximum velocity)

1

divide change in velocity by time taken (to give acceleration)

allow divide maximum velocity by time (to give acceleration) allow use of $v^2 = u^2 + 2as$

allow correct use of

$$s = ut + \frac{1}{2}at^2$$

1

(d) (range =) 0.06 (m/s^2)

or

(mean =) 1.36 (m/s^2)

1

uncertainty = ±0.03 (m/s^2)

1

(e) a component of the weight of the trolley acts parallel to runway

1

(so) resultant force increases so acceleration increases

allow <u>work</u> is done (by raising the trolley) so the trolley gains gravitational potential energy (1)

gravitational potential energy is transferred to kinetic energy increasing the final velocity and the acceleration (1)

1

[9]

Q2.

(a) the point at which weight may be considered to act

allow the point through which the line of action of the weight acts

or

the point where the mass appears to be concentrated

allow the point at which the mass is concentrated

1

(b) mass of 5 tomatoes = 0.425 (kg)

1

mass of 1 tomato = 0.085 (kg)

allow an incorrect and / or not converted reading correctly divided by 5

1

$W = (0.085 \times 9.8) = 0.833$ (N)

allow a correct calculation using their value of mass

1

(c) $6.0 = k \times 0.015$

1

$$k = \frac{6.0}{0.015}$$

allow correct rearrangement using an incorrectly <u>calculated</u> value of e

1

$k = 400$ (N/m)

allow a correct calculation using an incorrectly <u>calculated</u> value of e

1

(d) deforms elastically

1

(so) will return to its original length / shape (after force is removed)

OR

compression is directly proportional to the force (applied) (1)

(so) gives a linear scale (1)

allow easy to calibrate

1

[9]