Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

Name of the Student:_____

Max. Marks : 17 Marks   **Time : 17 Minutes**

Q1.

(a)   Attempt to calculate weight of cage
eg $1.2 \times 10^3 \times 9.81$ or 1.18×10^4 seen ✔

Attempt to find vertical component of tension T_V in one rope
eg $3.7 \times 10^4 \cos20$ or 3.5×10^4 seen ✔

Uses F = twice their tension – their weight ✔
If weight not calculated, allow MP3 for doubling their tension or their resolved component

5.8×10^4 (N) ✔

4

(b)   Use of F = ma with 6×10^4 N or their (a) ✔
50 (m s^{-2}) ✔
Allow 48 (m s^{-2}).

2

(c)   Calculation of length of rope
eg 35/cos20 or 37.2 seen ✔
Allow methods using $F = k\Delta L$ and $E = ½\,k\Delta L^2$

Calculation of extension of one rope or calculation of total extension of both ropes
eg their length–24 or 13.2 or 26.4 seen ✔

Use of $E = ½\,F\Delta L$
e.g. $½ \times 3.7 \times 10^4 \times 13.2 = 2.44 \times 10^5$ (J) ✔

4.9×10^5 (J) ✔

4

(d)   Use of E lost = ΔE_p
eg $1.2 \times 10^3 \times 9.81 \times h = 5 \times 10^5$ ✔
No credit for use of suvat in either method and MP3 must come from correct Physics.
First method is for calculation of max h and comparison with 50 m.

h = 42 (m) ✔
Allow h from their (c) if it rounds to 5×10^5

42 < 50 (m), so claim not justified ✔

OR

Use of $\Delta E_p = mg\Delta h$ with 50 m
eg $1.2 \times 10^3 \times 9.81 \times 50$ ✔

Second method is for calculation of ΔE_p and comparison with E.

$\Delta E_p = 5.9 \times 10^5$ (J) ✔

$5.9 \times 10^5 > 5 \times 10^5$, so claim not justified ✔

3

(e) 90 km h^{-1} = 25 m s^{-1} ✔

The conversion mark stands alone.

1

Use of $E_k = \frac{1}{2} mv^2$
eg $\frac{1}{2} \times 1.2 \times 10^3 \times$ (their v)^2 ✔

3.8×10^5 (J) ✔

ecf for their v

2

(f) If their $E_k > 5 \times 10^5$, claim is unjustified

OR

If their $E_k < 5 \times 10^5$, claim may be justified depending on gain in E_p or losses due to resistive forces ✔

1

[17]