A

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Index No U00131/__ Name GAYAZA HIGH SCHOOL

Subject SENIOR SIX P425/2 FEB. 2013.

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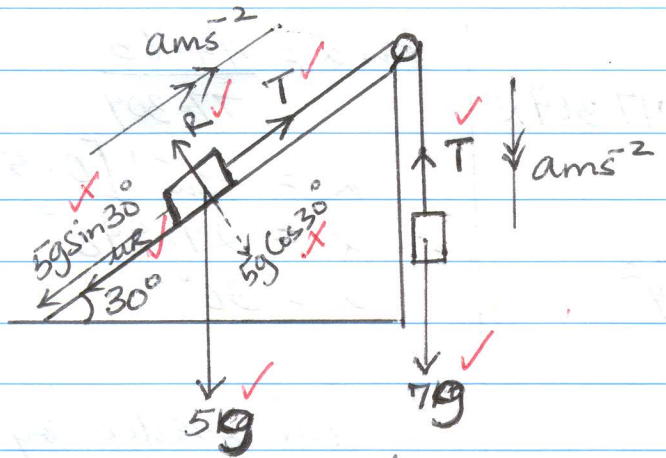
1.

Qn	Marks
1	12
2	12
3	6
T	30.



$\mu = 0.35$.

$R = 5g\cos 30°$.

B_2 (for all forces or B_1 for at least 4).

The equations of motion;

$7g - T = 7a$ ---(i) B_1

$T - 5g\sin 30° - \mu R = 5a$; $R = 5g\cos 30°$. B_1

$T - 5g \times \frac{1}{2} - 0.35\left(5g \cdot \frac{\sqrt{3}}{2}\right) = 5a$ ---(ii)

(i) + (ii)

$7g - \frac{5}{2}g - 0.875(\sqrt{3}g) = 12a$. M1

$29.24766 = 12a$.

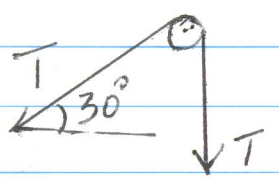
$a = \underline{2.43727 ms^{-2}}$. A1

from (i)

$T = 7g - 7a$

$T = 7(9.8 - 2.43727)$

$T = \underline{51.5391 N}$. A1



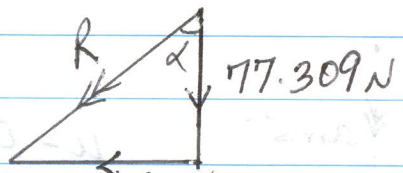
Resolving;

$(\rightarrow) \quad -T\cos 30° = -51.5391\cos 30° = -44.63 N$ B_1

$(\uparrow) \quad -T - T\sin 30° =$

$= -51.5391 - 51.5391\sin 30°$

$= -77.309 N$. M1



$R = \sqrt{44.63^2 + 77.309^2}$

$= 89.267N$

$= 89.3N$ B1

$\tan\alpha = \frac{44.63}{77.309}$

$\alpha = \tan^{-1}[0.5773]$

$\alpha = 29.998°$

$\alpha = 30°$. B1

The force exerted by the string onto the pulley is 89.3N inclined at 60° to the horizontal. A1

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2.

$$f(x) = \begin{cases} \frac{x}{3} - \frac{2}{3} & 2 \le x \le 3 \\ \alpha & 3 \le x \le 5 \\ 2 - \beta x & 5 \le x \le 6 \\ 0 & \text{otherwise} \end{cases}$$

$f(3) = \alpha$

$\therefore \alpha = \frac{3}{3} - \frac{2}{3}$ M1

$\alpha = \underline{\underline{\frac{1}{3}}}$. A1

$f(5) = \alpha$.

$\alpha = 2 - \beta(5)$ M1

$\frac{1}{3} = 2 - 5\beta$.

$5\beta = 2 - \frac{1}{3}$.

$5\beta = \frac{5}{3}$

$\beta = \underline{\underline{\frac{1}{3}}}$. A1