Assume it is just on the point of slipping when the man reaches the top.

① $R = W + 2W = 3W$

② $\frac{4}{5}R = S$

$\Rightarrow S = \frac{4}{5}(3W) = \frac{12}{5}W$

③ $W(5\cos A) + 2W(10\cos A)$

$= S(10\sin A)$

$\Rightarrow 5W = 2S\tan A$

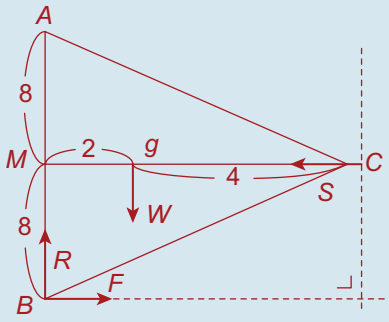
But $S = \frac{12}{5}W$,

$\therefore 5W = \frac{24}{5}W\tan A$

$\Rightarrow \tan A = \frac{25}{24}$

Exercise 8G

Q. 1. (i)



$|MC| = 6$ (from Pythagoras' Theorem)

The centroid, g, is 2 cm from m, 4 cm from C.

Assume it is on the point of slipping. Therefore, $F = \mu R$.

(ii) ① $R = W$

② $\mu R = S$

③ **Taking moments about *b*:**

$W(2) = S(8)$

$\Rightarrow S = \frac{1}{4}W$

Equation ②

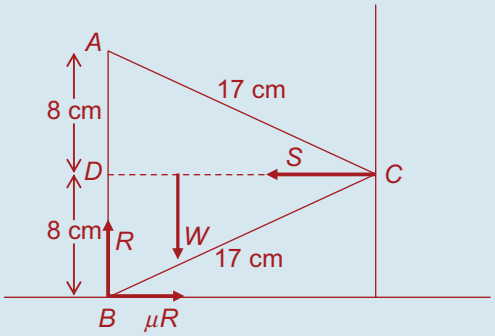
$\Rightarrow \mu R = S$

$\Rightarrow \mu(W) = \frac{1}{4}W$

$\Rightarrow \mu = \frac{1}{4}$

The least value of is $\frac{1}{4}$.

Q. 2.



(i) Using Pythagoras' Theorem

$|CD|^2 + 8^2 = 17^2$

$\Rightarrow |CD| = \sqrt{17^2 - 8^2}$

$= 15$ cm

$[CD]$ is a median of the triangle. The centroid therefore lies $\frac{2}{3}$ of the way along $[CD]$.

$\frac{2}{3}(15) = 10$

$\Rightarrow$ The centre of gravity is 10 cm from C.

(ii) ① $R = W$

② $\mu R = S$

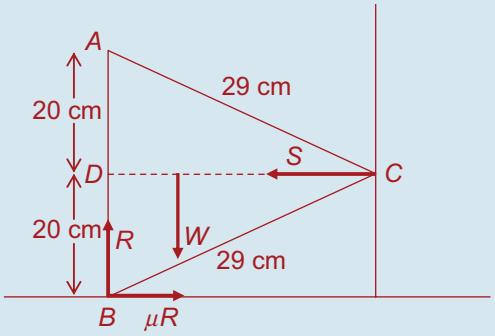
③ $W(5) = S(8)$

$\Rightarrow S = \frac{5}{8}W$

② $\mu W = \frac{5}{8}W$

$\Rightarrow \mu = \frac{5}{8}$

Q. 3.



Using Pythagoras' Theorem

$|CD|^2 + 20^2 = 29^2$

$\Rightarrow |CD| = \sqrt{29^2 - 20^2} = 21$ cm

$[CD]$ is a median of the triangle. The centroid therefore lies $\frac{2}{3}$ of the way along $[CD]$.

$\frac{2}{3}(21) = 14$