$\Rightarrow$ The centre of gravity is 14 cm from C.

① $R = W$

② $\mu R = S$

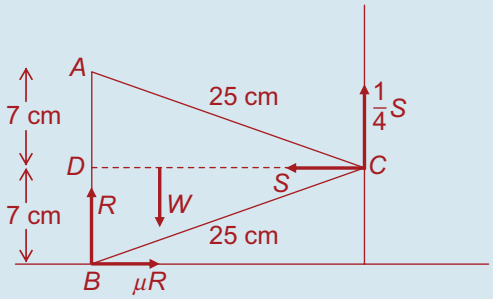
③ $W(7) = S(20)$

$\Rightarrow S = \frac{7}{20}W$

② $\mu W = \frac{7}{20}W$

$\Rightarrow \mu = \frac{7}{20}$

Q. 4.



(i) Using Pythagoras' Theorem:

$|CD|^2 + 7^2 = 25^2$

$\Rightarrow |CD| = \sqrt{25^2 - 7^2}$

$= 24$ cm

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

$\frac{2}{3}(24) = 16$

$\Rightarrow$ The centre of gravity is 16 cm from C.

① $R + \frac{1}{4}S = W$

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

② $\mu R = S$

③ $W(8) = S(7) + \frac{1}{4}S(24)$

$\Rightarrow 8W = 13S$

$\Rightarrow S = \frac{8}{13}W$

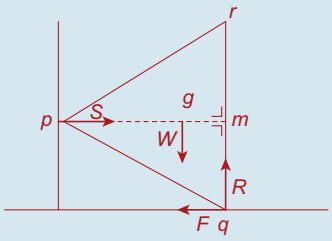
$\Rightarrow R = \frac{11}{13}W$

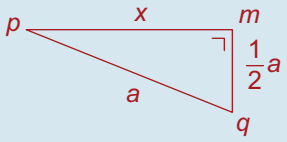
(ii) ② $\mu\left(\frac{11}{13}W\right) = \frac{8}{13}W$

$\Rightarrow \mu = \frac{8}{11}$

Q. 5. (a) See text

(b)





Let $|pm| = x$

$x^2 + \left(\frac{1}{3}a\right)^2 = a^2 \Rightarrow x = \sqrt{\frac{3}{2}}\,a$

$\therefore |pg| = \frac{2}{3}\left(\sqrt{\frac{3}{2}}a\right) = \frac{1}{\sqrt{3}}a$

$|gm| = \frac{1}{3}\left(\frac{\sqrt{3}}{2}a\right) = \frac{1}{2\sqrt{3}}a$

① $R = W$

② $F = S$

③ $S\left(\frac{1}{2}a\right) = W\left(\frac{1}{2\sqrt{3}}a\right)$

$\Rightarrow S = \frac{1}{\sqrt{3}}W$

The reactions are $\frac{1}{\sqrt{3}}W$, W

If it is on the point of slipping, then $F = \mu R$.

Equation 2

$\Rightarrow \mu R = S$

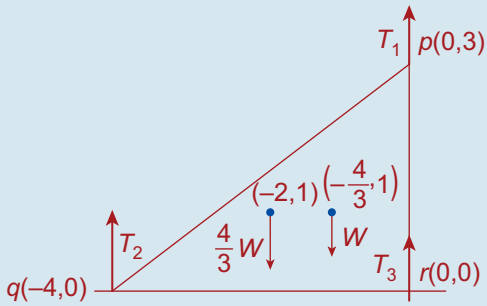
$\Rightarrow \mu W = \frac{1}{\sqrt{3}}W$

$\Rightarrow \mu = \frac{1}{\sqrt{3}}$

$\therefore$ The least value of μ is $\frac{1}{\sqrt{3}}$.

Q. 6. (a) See text

(b)



Centroid is at

$\left(\frac{0+0+4}{3}, \frac{0+3+0}{3}\right) = \left(-\frac{4}{3}, 1\right)$