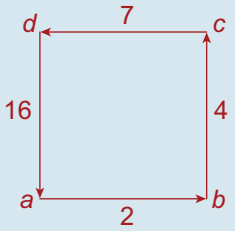
Taking moments about the point of intersection.

$10(0) = 3(0) - 2(1-k) - 5(1) + 4(k)$

$\Rightarrow k = \frac{7}{6}$ m

Answer: $1\frac{1}{6}$ m from a.

Q. 3.



(i) $\vec{R} = 2\vec{i} + 4\vec{j} - 7\vec{i} - 16\vec{j}$

$= -5\vec{i} - 12\vec{j}$

(ii) $\therefore |\vec{R}| = \sqrt{(-5)^2 + (-12)^2}$

$= \sqrt{169}$

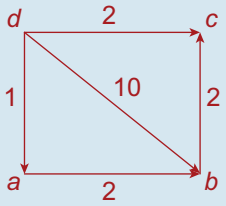
$= 13$ N

(iii) **Taking moments about *a*:**

$13(x) = 2(0) + 4(1) + 7(1) + 16(0)$

$\Rightarrow x = \frac{11}{13}$ m

Q. 4.



(i) $\vec{R} = 2\vec{i} + 2\vec{j} + 2\vec{i} - \vec{j} + (8\vec{i} - 6\vec{j})$

$= 12\vec{i} - 5\vec{j}$

$\therefore |\vec{R}| = \sqrt{12^2 + (-5)^2}$

$= \sqrt{169}$

$= 13$ N

(ii) **Taking moments about *d*:**

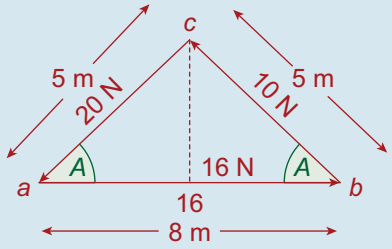
$13(x) = 2(3) + 2(4) + 2(0) + 1(0) + 10(0)$

$\Rightarrow x = \frac{14}{13}$ m

(iii) $13x = 2(3) + 2(4) + 2(0) + 1(0) + 10(0) + 12$

$\Rightarrow x = 2$ m

Q. 5.



$|ad|^2 + |dc|^2 = |ac|^2$

$\Rightarrow 4^2 + |dc|^2 = 5^2$

$\Rightarrow |dc| = 3$ m

$\therefore \tan A = \frac{3}{4}$

$\therefore \sin A = \frac{3}{5}$

$\therefore \cos A = \frac{4}{5}$

$\overrightarrow{ab} = 16\vec{i}$

$\overrightarrow{bc} = -10\cos A\vec{i} + 10\sin A\vec{j}$

$= -8\vec{i} + 6\vec{j}$

$\overrightarrow{ca} = -20\cos A\vec{i} - 20\sin A\vec{j}$

$= -16\vec{i} - 12\vec{j}$

$\Rightarrow \vec{R} = -8\vec{i} - 6\vec{j}$

$\therefore |\vec{R}| = \sqrt{(-8)^2 + (-6)^2}$

$= \sqrt{100}$

$= 10$ N

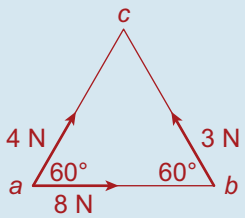
Taking moments about *c*:

Moment of the sum = the sum of the moments

$10(x) = 16(3) + 10(0) + 20(0)$

$\Rightarrow x = 4.8$ m

Q. 6.



(i) $\overrightarrow{ab} = 8\vec{i}$

$\overrightarrow{bc} = -8\cos 60°\vec{i} + 8\sin 60°\vec{j}$

$= -8\left(\frac{1}{2}\right)\vec{i} + 8\left(\frac{\sqrt{3}}{2}\right)\vec{j}$

$= -4\vec{i} + 4\sqrt{3}\vec{j}$