

# Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

## 4 Forces

### Exercise C, Question 5

#### Question:

Two forces  $(3\mathbf{i} + 2\mathbf{j})\text{ N}$  and  $(-5\mathbf{i} + \mathbf{j})\text{ N}$  act at a point. Find the magnitude of the resultant of these forces and determine the angle which the resultant makes with the unit vector  $\mathbf{i}$ . [A]

#### Solution:

$$\mathbf{R} = (3\mathbf{i} + 2\mathbf{j}) + (-5\mathbf{i} + \mathbf{j})$$

$$\mathbf{R} = -2\mathbf{i} + 3\mathbf{j}$$

$$|\mathbf{R}| = \sqrt{(-2)^2 + 3^2}$$

$$= \sqrt{13}$$

$$= 3.61\text{ N (3 s.f.)}$$

$$\text{then } \tan \alpha = \frac{2}{3}$$

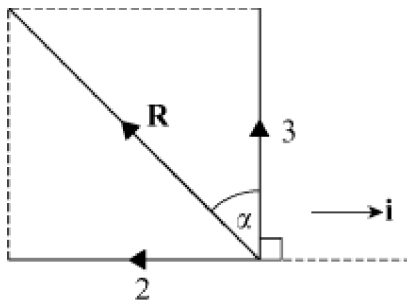
$$\text{gives } \alpha = 33.690\dots^\circ$$

$$\therefore \text{angle with } \mathbf{i} \text{ direction} = 90 + \alpha$$

$$= 90 + 33.690\dots^\circ$$

$$= 123.690\dots^\circ$$

$$= 124^\circ \text{ (3 s.f.)}$$



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