Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

4 Forces

Exercise B, Question 4

Question:

The resultant of two forces of magnitude F_1 and F_2 has magnitude 20 N. If $F_1 = 8$ N and the angle between the two forces is 70°, find F_2.

Solution:

cosine rule

$20^2 = 8^2 + F_2^2 - 2 \times 8 \times F_2 \times \cos 110°$

$0 = F_2^2 - (16 \cos 110°) \times F_2 + 8^2 - 20^2$

i.e. $F_2^2 - (16 \cos 110°) \times F_2 - 336 = 0$

$F_2 = \frac{-[-16 \cos 110°] \pm \sqrt{(-16 \cos 110°)^2 - 4 \times 1 \times (-336)}}{2 \times 1}$

$F_2 = 15.797...$ N or $F_2 = -21.269...$ (not possible for $\alpha = 70°$)

$\therefore F_2 = 15.8$ N (3 s.f.)