

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

4 Forces

Exercise B, Question 4

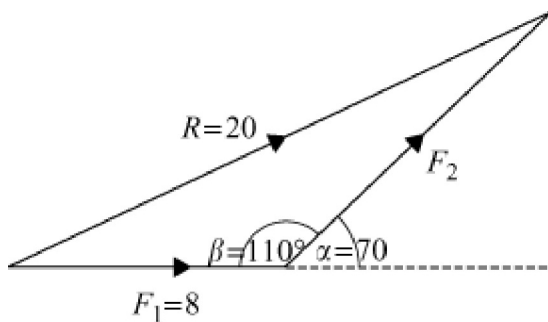
Question:

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

$$\begin{aligned}
 20^2 &= 8^2 + F_2^2 - 2 \times 8 \times F_2 \times \cos 110^\circ \\
 0 &= F_2^2 - (16 \cos 110^\circ) \times F_2 + 8^2 - 20^2 \\
 \text{i.e. } F_2^2 - (16 \cos 110^\circ) &= 0 \\
 \times F_2 - 336 & \\
 F_2 &= \frac{-[-16 \cos 110^\circ] \pm \sqrt{(-16 \cos 110^\circ)^2 - 4 \times 1 \times (-336)}}{2 \times 1} \\
 F_2 &= 15.797... \text{ N or } F_2 = -21.269... \text{ (not possible} \\
 &\text{for } \alpha = 70^\circ \text{)} \\
 \therefore F_2 &= 15.8 \text{ N (3 s.f.)}
 \end{aligned}$$



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