Mathematics: Extension 1

Vectors Q12b transcript

(Duration 3 minutes)

This is the HSC hub Mathematics curriculum support from the New South Wales Department of Education, my name is Daniel Proctor. This video provides a solution to question 12 b from the sample examination provided by the New South Wales Education Standards Authority for the Mathematics Extension one course. This question looks at vectors.

The solution provided in this video demonstrates one way to unpack a question, there may be other methods, and we encourage you to discuss any alternative methods with your teacher. This question involves analysing the effect of a force defined by a vector two, one in the direction along the line and perpendicular to it. Press pause now to read the question.

As best as time permits, it's a good idea to draw a diagram representing the information provided in the question. In this case a force described by Vector F is applied to an object lying on a line L parallel to the vector three, four which we will define as the vector V.

The vector F is projected onto the vector V and we are asked to find the resulting component in the direction of the line L which is on the vector V. The result is a vector quantity. To start this solution we need to determine the scalar projection of F on to V. This determines the magnitude of the component of the force. The direction of the component of the force is determined by the unit vector of V.

Finally, the vector component of the force in the direction of L is determined by multiplying the scalar projection and the unit vector above, giving the result two fifths of the vector three, four.

In this part of the question we are asked to find the component of the force F perpendicular to the line L. We need to use the information from part one with the vector projection of vector F onto the vector V. The component of the force f in the direction perpendicular to the line can be found by following the vector path and using vector arithmetic. In this case, subtracting the vector component of F onto L from the vector F. Simplifying, gives us one fifth of the vector, four negative three.

End of transcript