Mathematics- Extension Question11c transcript

(Duration 2minutes 51 seconds)

This is the HSC hub mathematics curriculum support from the New South Wales Department of Education. My name is Meagan Rodda This question is from the NESA sample exam and incorporates material from the calculus strand in the mathematics extension one course. This question looks at differential equations. We acknowledge that they may be different approaches, methods or techniques to answering this question, and we strongly encourage you to share these ideas with each other. Please pause the video and take a moment to read the question before we continue.

 A solution is a path through the slope field. In this case, we are looking for a solution in the form Y equals K, which is a horizontal line. So we're looking for a path in the slope field that is a horizontal line. We can see that there is a path that runs through Y equals two, so this will be our answer. Looking at the differential equation, it is easy to see why this occurs. Whenever Y equals two, the first bracket in our equation becomes zero, thus resulting in a gradient of zero.

The second part of the question is asking us to do two things. The first is to draw a sketch of the trajectory of a particle through the fluid. And the second is to describe what that trajectory looks like as X approaches Infinity in either direction. Identifying a path through a slope field is a bit like doing and dot to dot puzzle. To identify the trajectory of the particle, we need to start with the given point minus three, one. And we need to follow the direction of the tangent lines moving from one to another through the slope field. When we finish, we can see that as X approaches Infinity in either direction, our trajectory approaches Y equals two from below.

Thus, connecting with the first part of the question. Our completed answer would look something like this. An important piece of information to know is that you must have a worded answer to the second part of the question. It is not enough to simply show this on the graph. This is the HSC hub for the New South Wales Department of Education.

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