Parametric points

Teacher notes

Why use this resource?

In this resource, students differentiate a collection of parametric equations in order to complete a matching exercise. This gives practice at the mechanisms of differentiation and encourages understanding of how the chain rule is used in this context. The matching with graphs encourages students to think about how algebraic properties relate to features of curves.

Preparation

The sets of cards for matching are provided as double sets to be printed out. Each card appears twice on each A4 sheet. If possible, it is suggested that the sheets of cards are printed on coloured paper or card matching the colours used in the resource (E-cards on blue, etc.). This will help if the on-screen version is used, perhaps as a plenary.

There is a separate set of cards showing x-intercept values which can be used together with the main cards. It is suggested that these be printed on a different colour such as yellow if you choose to use them.

All the cards are labelled to assist with referring to them in class.

The resource introduces the concept of critical points on a curve which is not usually covered. You should make sure you are familiar with what it means.

Possible approaches

The Warm-up walks through a simpler example of what appears in the main problem. This could be done as a whole-class activity to make sure all students are comfortable with the concepts.

For the main problem, you could either give out all the cards straight away, or you could start with just the (blue) E-cards and (green) S-cards and then progress through the other cards as appropriate.

You can use the interactive card sorter on the Problem page to draw together students' solutions as a means of encouraging discussion or at the end of the activity. If students have access to online devices they could tackle the problem using the interactive themselves rather than using physical cards, but they will still need to do some working on paper.

Key questions

- What do we need to know in order to find the stationary points?
- We don't have y in terms of x. How could we find the gradient, dy/dx?
- If a fraction is equal to zero, what do we know about the numerator and denominator?
- Is that the only value of t (or x), or could there be others?
- A critical point is where the tangent is vertical. What is the gradient of a vertical line?

Possible support

For students who are not ready to dive straight into calculus, you could start with the (blue) E-cards and the (yellow) X-cards which show x-intercepts. Beware if you try to do the same thing with the y-intercepts, not all of them have nice values and they aren't all unique.

For students who are more willing to find their own strategies, you could give them just the (blue) E-cards and the (white) C-cards and encourage them to match them up by exploring properties as necessary.