

In this activity, you will explore a paper-folding technique for creating a conic. You will need waxed paper, a pencil, and access to dynamic geometry software.

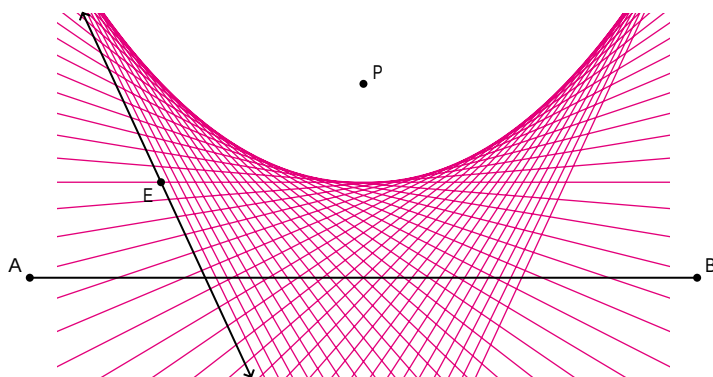
- Tear off a rectangular sheet of waxed paper. Mark a point close to the centre of the bottom edge. Mark this point P .
- Fold the paper, at any angle, so that the bottom edge of the paper touches point P . Crease the paper along the fold line and then open up the paper.
- Fold the paper again, at a different angle, so that the bottom edge of the paper touches point P and crease the paper. Open up the paper.
- Continue this process until you have many different creases in the waxed paper.



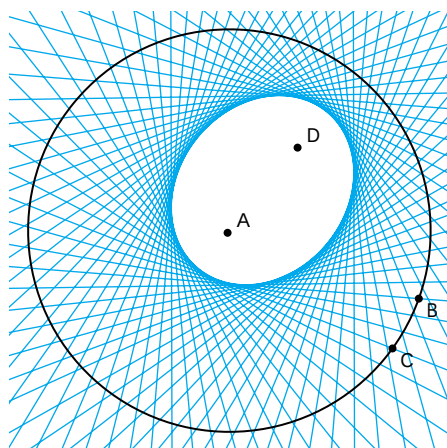
Think, Do, Discuss

1. What pattern emerges?
2. Compare your shape with the shapes that other students in the class have made. How are the shapes similar? How are they different? What conic does your shape resemble?
3. How does changing the position of point P affect the curve?
4. Explain why you could describe each line you made as a **tangent**. (A line is tangent to a curve if it touches the curve at exactly one point.)
5. How could you construct the tangent lines using what you know about geometry?
6. Use *The Geometer's Sketchpad* to recreate this waxed-paper model of your curve. Begin with a line and a point, P .
7. How will you construct the crease lines? (Hint: Choose a point on the line and connect it to P . What is the next step?)
8. Once you have drawn the first crease line, choose Trace Line from the Display menu to create other crease lines. Is the figure you created similar to your waxed-paper model?

9. What happens if you move the original point or line?



10. This shape appears to be a conic. But how can you be sure that the shape is a conic? What do you need to do?
11. You can make similar models of the conics, using waxed paper and *The Geometer's Sketchpad*. Start by cutting out a circle from another piece of waxed paper and marking a dot, or point, inside the circle, but not at the centre. Fold the paper so that the edge of the circle just touches the point. Continue creasing the paper by folding the edge at different angles.
12. What type of conic appears to be forming?
13. Try recreating the waxed-paper construction by using *The Geometer's Sketchpad*. Can you confirm your conjecture? What happens if the dot on the inside of the circle is near to the centre? very close to the edge?



14. You can create another design by starting with a point outside the circle, rather than inside the circle. What shape do you construct?