

THE FUTURES CHANNEL
PLANETARY DEFENSE LESSON

Subject: Mathematics

Grade Level: 11th grade (Algebra 2)

CCSS: HS.F-IF.4, HS.F-IF.7.A

Topics: Conic sections

Concepts: Quadratic elliptical equations

Knowledge and Skills Needed for the Project:

- Is familiar with elliptical paths as they are represented by quadratic equations
- Is familiar with the specifics of the ellipse equations as to graphing them

Materials: Pencils, paper, graphing paper, student handout

Lesson: This lesson begins as a class discussion and ends with each student filling out the handout individually.

Procedure:

1. Watch the Futures Channel video "Planetary Defense" with the class.
2. Discuss elliptical patterns and paths as far as their ability to simplistically map the paths of the movements of celestial bodies.
3. As needed remind students of the specifics of using a and b as the semi major and semi minor axis of the ellipse in order to get the x and y intercepts down before finding more specific points along the line.
4. Give the students the attached handout.

STUDENT HANDOUT - PLANETARY DEFENSE

NAME _____ DATE _____

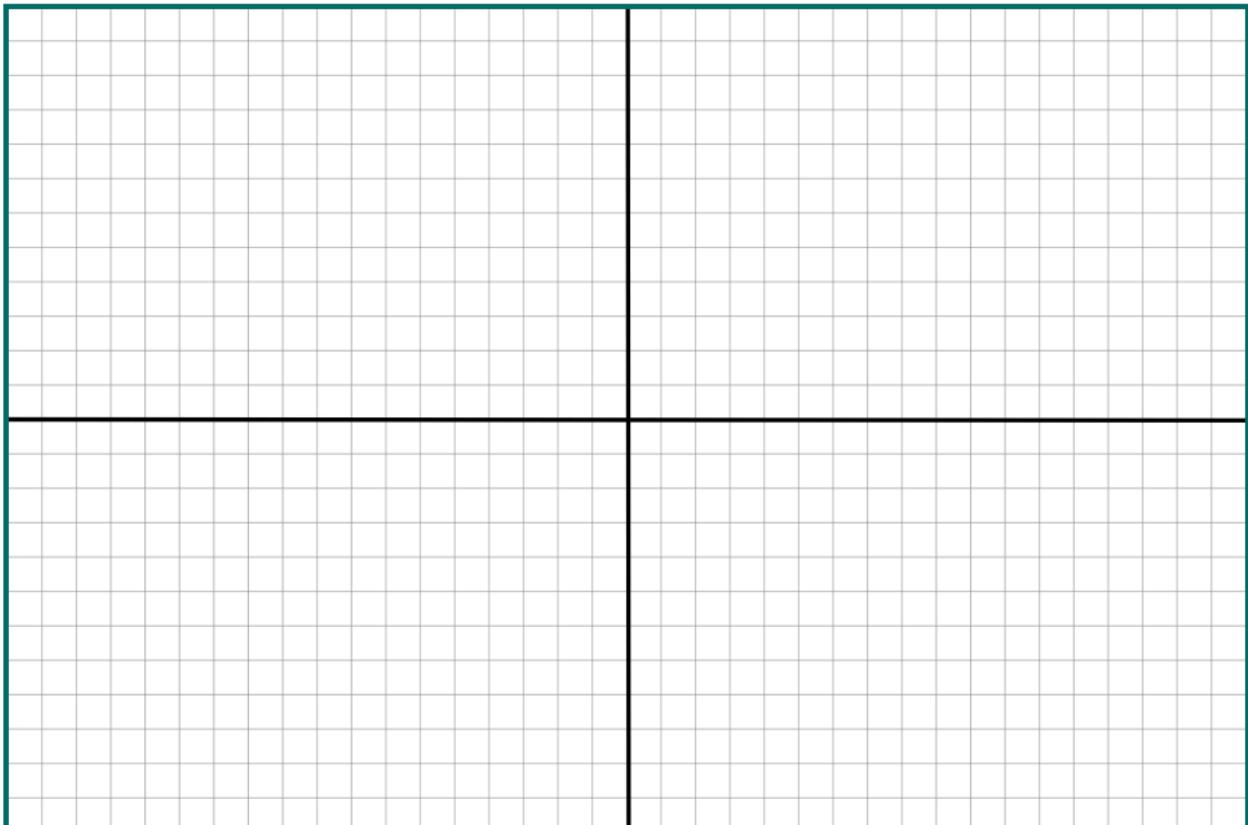
You have been given a summer internship with Bob Holmes, helping to record data from his 4 massive telescopes. One night, Bob must quickly take a call with NASA and leaves you watching the big 50 Inch telescope! Bob already has the big scope trained on a specific area of the sky, he has been alerted there has been asteroid activity in this area. You watch the telescope intently for any movement. THERE IT IS! An asteroid, just as predicted. After observing the asteroid's movements for a while you see it is on an elliptical path of the equation A (below) and you know that Earth moves on the elliptical path as given in B (below).

A. $1 = (x^2/10^2) + (y^2/7^2)$

B. $1 = (x^2/8^2) + (y^2/7.5^2)$

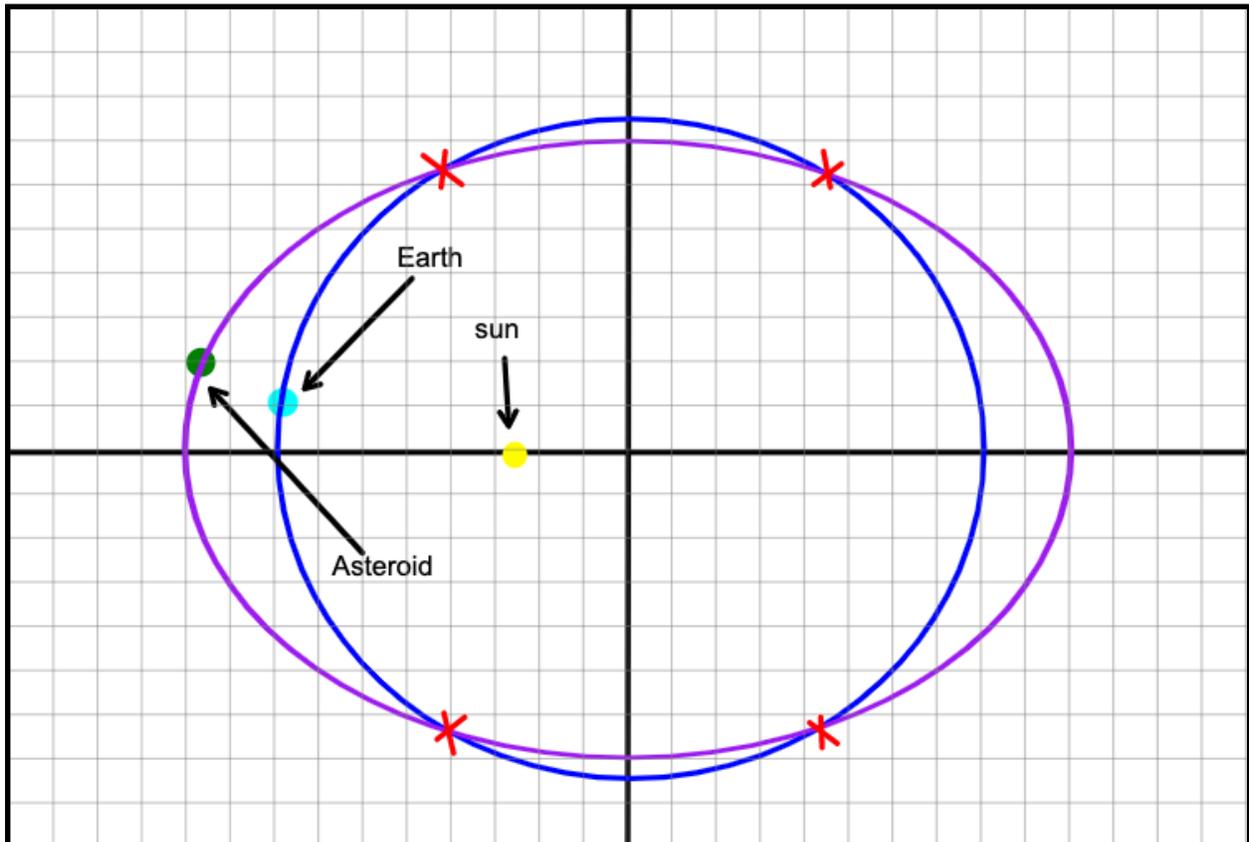
You decide to do a little more math before alarming anyone. Let's find out if this asteroid is actually on a collision path with Earth before sounding the alarms and pulling Bob off his important phone call with NASA.

1. Graph the 2 equations above. Does the path of the asteroid have any chance of collision with Earth? If so, how many times do the two paths cross? Should you alert Bob?



ANSWER SHEET

1. Graph the 2 equations above. Does the path of the asteroid have any chance of collision with Earth? If so, how many times do the two paths cross? Should you alert Bob?



The asteroid's path will cross with Earth orbit 4 times in one full orbiting of the sun. Bob should definitely be alerted so further math can be done to see if there is any danger.