

Shooting Hoops!

Dan Meyer, 3-Act Task

Prerequisite Information:

- Standard form of a quadratic: $y = ax^2 + bx + c$
- Vertex form of a quadratic: $y = a(x - h)^2 + k$
- Factored form of a quadratic: $y = a(x - x_1)(x - x_2)$
- What is a parameter?

Prelude:

Watch Parabolas and Basketball @ https://www.youtube.com/watch?v=A1R_TDTv6fg

Act 1:

1. On your own:

a.

Is he going to make it? Can you draw me the path of a shot that will make it? That will miss it?



b.

How about now? Can you draw me the path of a shot that will make it? That will miss it?



C.

How about now? Can you draw me the path of a shot that will make it?
That will miss it?



The “answer”: <http://vimeo.com/16832687>

2. **Work with a Partner or Team:** Watch: <http://www.101qs.com/1195-will-it-hit-the-hoop>
Which shots will go in the hoop? If your answer is “no”, predict why the ball won't go in. Will the ball be short, long, or something else entirely?

A.

B.

C.

D.

E.

F.

G.

3. **Discuss:** What information/action would help you be surer of your answer?

Act 2: Analyzing the Data and Mathematical Modeling

4. **Frozen Strobes:** Which shots A. – G. will go in the hoop?

For each of the following still photographs, without using technology (we will do that later) create a quadratic function model for each situation and use it to help you answer each question.

A. **Yes or No?** If your answer is “no”, predict why the ball won't go in. Will the ball be short, long, or something else entirely?



B. **Yes or No?** If your answer is “no”, predict why the ball won't go in. Will the ball be short, long, or something else entirely?



C. **Yes or No?** If your answer is “no”, predict why the ball won't go in. Will the ball be short, long, or something else entirely?



D. **Yes or No?** If your answer is “no”, predict why the ball won't go in. Will the ball be short, long, or something else entirely?



E. **Yes or No?** If your answer is “no”, predict why the ball won't go in. Will the ball be short, long, or something else entirely?



F. **Yes or No?** If your answer is “no”, predict why the ball won't go in. Will the ball be short, long, or something else entirely?



G. **Yes or No?** If your answer is “no”, predict why the ball won't go in. Will the ball be short, long, or something else entirely?



The “answers” to shots A. – G.: <http://www.101qs.com/1195-will-it-hit-the-hoop>

Act 3: Using Technology: Geogebra applets

- a. Go to: <https://www.geogebra.org/student/m30849> and attempt to model a parabola onto the path of the basketball to decide whether or not the ball goes in. Be sure to write down your quadratic model to record the parameters chosen.

- b. In this exercise, the programmer chose to use the vertex form $y = a(x - h)^2 + k$ to model the parabola. Would it have been better to use the standard form $y = ax^2 + bx + c$ or the factored form $y = a(x - x_1)(x - x_2)$ in the program? Explain.