Projectile Motion

*When an object is thrown or fired so that it moves freely under gravity, it follows a **parabolic** (quadratic) path.*
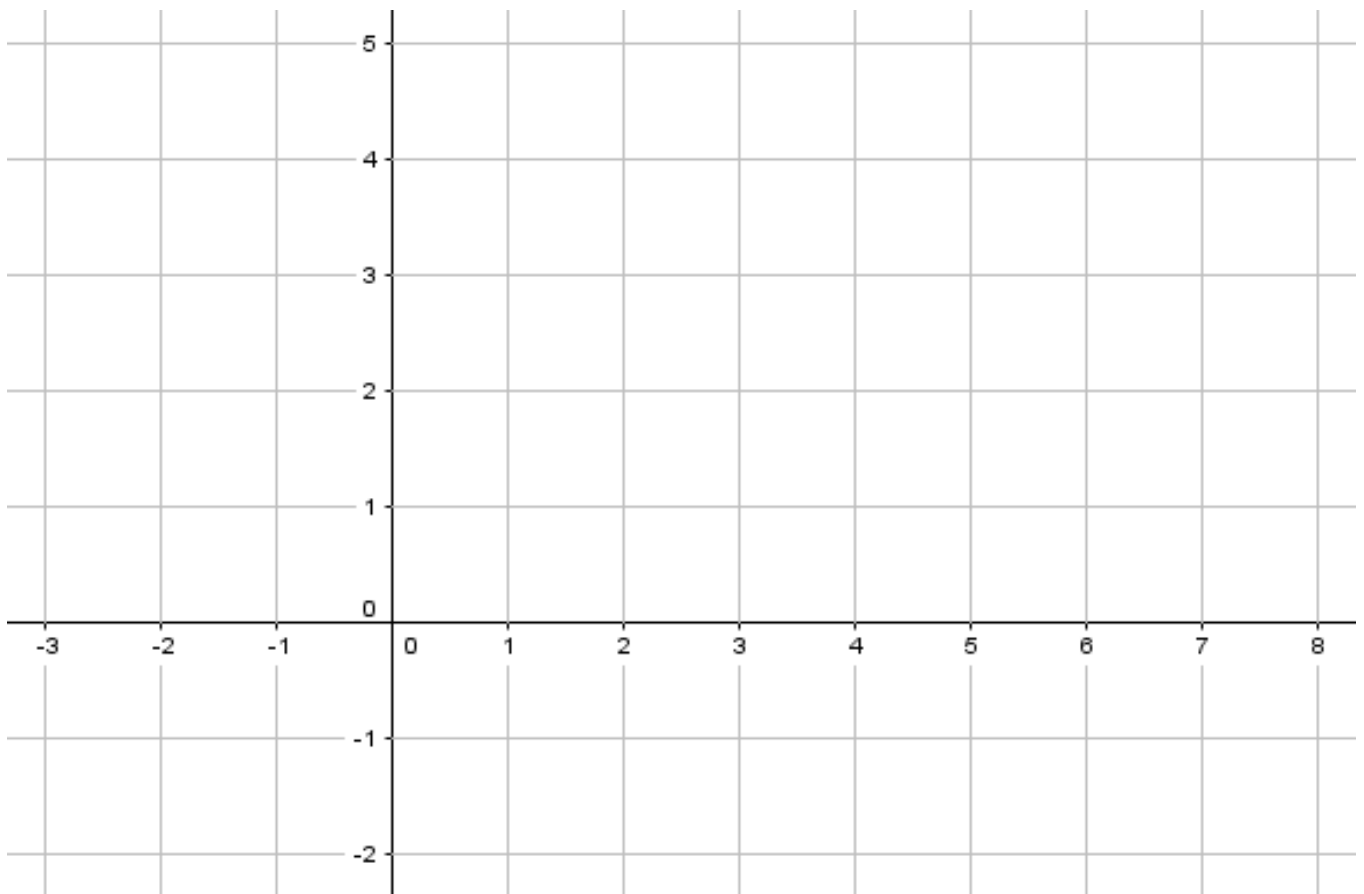
A ball is thrown at a speed of $16mph$ at an angle of $45°$. Its trajectory is described by:

$$y = 2 + x - 0.2x^2$$

where x is the horizontal distance travelled and y is the height (both in metres)

1. Use your calculator to complete the table of values and hence sketch the graph below.

x	0	1	2	3	4	5	6	7
y								

Your graph should be a smooth continuous curve which goes through each point you have plotted.

2. Use the graph to answer the following questions:

a) What is the greatest height reached by the ball?

b) What is the total (horizontal) range of the ball?

c) During its flight, the ball passes over the top of a $3m$ high fence. Where *could* it be?

d) The graph crosses the y-axis at $(0,2)$. What does this tell you about the scenario?

e) In reality, a ball thrown through the air may not follow a perfect parabola. Why?

Projectile Motion SOLUTIONS

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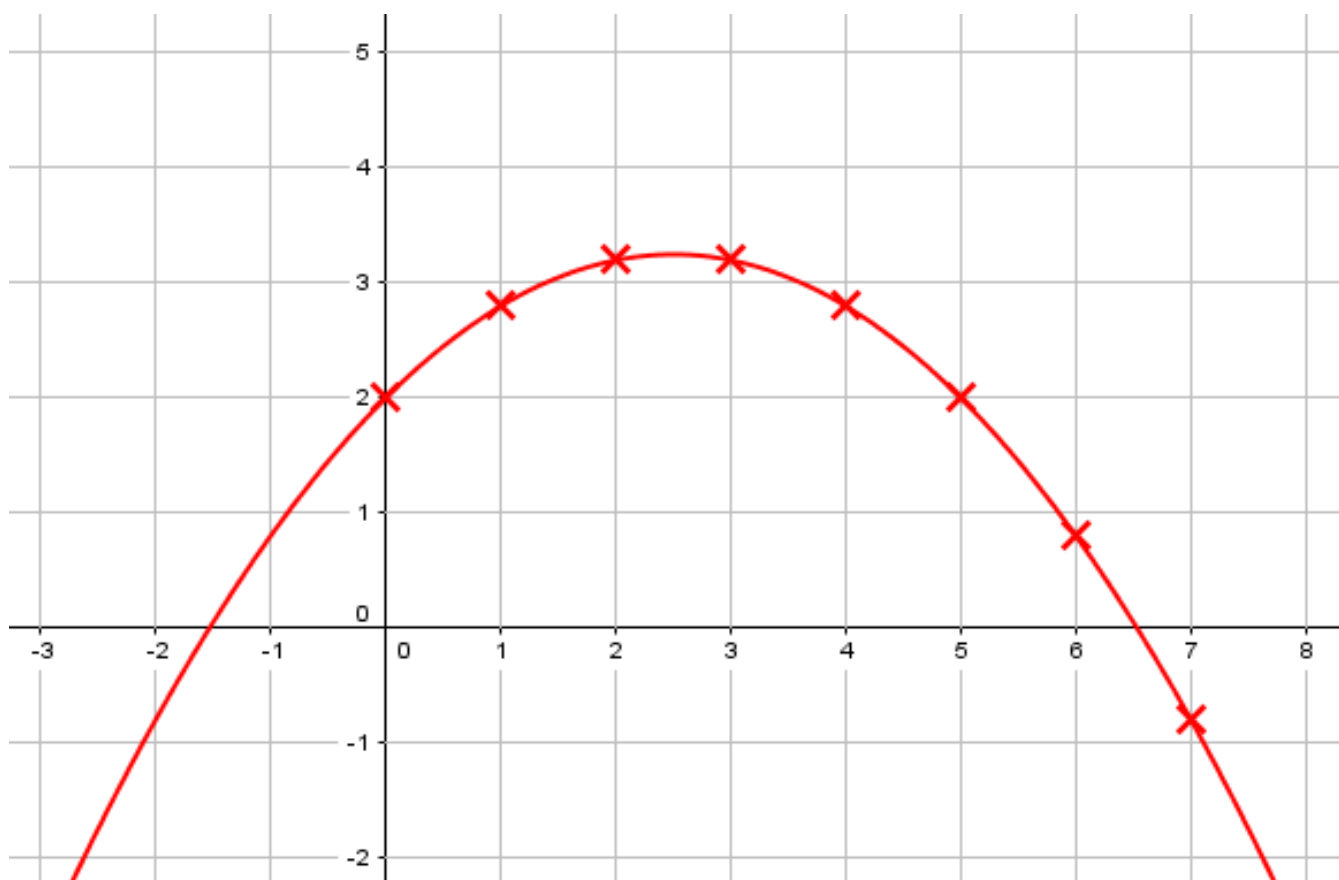
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1. Use your calculator to complete the table of values and hence sketch the graph below.

x	0	1	2	3	4	5	6	7
y	2	2.8	3.2	3.2	2.8	2	0.8	-0.8

Your graph should be a smooth continuous curve which goes through each point you have plotted.

2. Use the graph to answer the following questions:

a) What is the greatest height reached by the ball?

$$3.25m$$

b) What is the total (horizontal) range of the ball?

$$6.5m \text{ to } 1 \, d.p.$$

c) During its flight, the ball passes over the top of a $3m$ high fence. Where *could* it be?

$$\textit{Between } 1.4m \textit{ and } 3.6m \textit{ from the thrower to } 1 \, d.p.$$

d) The graph crosses the y-axis at $(0,2)$. What does this tell you about the scenario?

$$\textit{The ball is thrown from an initial height of } 2m$$

e) In reality, a ball thrown through the air may not follow a perfect parabola. Why?

$$\textit{Air resistance (espeically if thrown very fast) affects it as well as gravity}$$