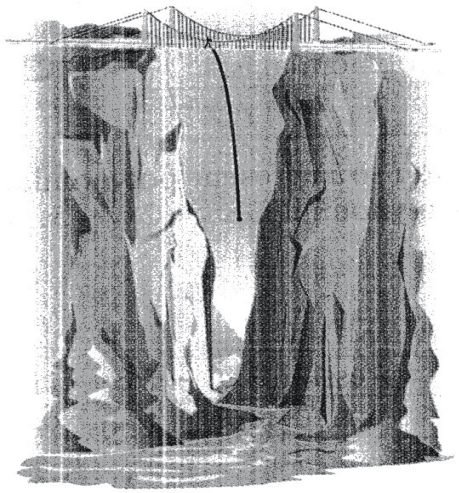
**Math 195Q and Math 101**

# Group Work on Polynomials: Free Falling from High Bridges

The world highest bridge, Royal Gorge suspension bridge in Colorado, stretches across the Arkansas River. An object is dropped from the top of this bridge. Neglecting air resistance, it is calculated that the height of the object from the water below, at time t seconds after its fall is given in feet by the polynomial function $P(t) = -16t^2 + 1053$ .



To the right is a picture of the situation described above.

We will explore the information packed in this relatively simple formula.

**a.** Find the height of the object 1 second after its fall.

$P(1) =$

**b.** Find the height of the object 7 seconds after its fall.

$P(7) =$

**c**. How long does it take for the object to hit the water of the Arkansas River?

$t =$

**d**. Use the quadratic formula to find the roots of P(t). What is the meaning of the roots you found in the context of this problem?

**e**. What does the constant term of P(t) represent in this problem?

**f.** An object is dropped from the top of one of the towers of the Golden Gate Bridge in San Francisco. The height above the ocean surface of the object at time t seconds after its fall is given in feet by the polynomial function $P(t) = -16t^2 + 746$. How high is the tower of the Golden Gate Bridge?