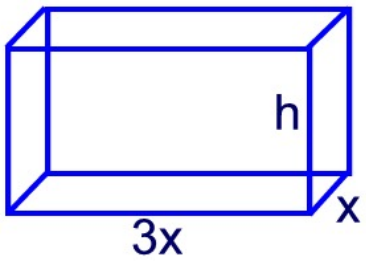
AP Calculus Review Name___**ANSWER KEY**_____

The movie, *Stand and Deliver*, is the true story of the math students of teacher Jaime Escalante in the Los Angeles Barrio. Inspired by their teacher, these students from poor Latino backgrounds struggled to pass the Advanced Placement Examination in calculus. Due to their unexpected high scores and to their similar answers on one particular question, the students were required to re-take the AP examination. The one perplexing question was Question 6 on the 1982 AP Calculus Examination. (**source**: *Escalante – The Best Teacher in America*, by Jay Mathews, 1988, p. 144)

The following question is similar to the question that caused the re-take of the AP Exam for Mr. Escalante's students. (Actual AP questions cannot be posted on the internet.)

An open box is being constructed whose base length is 3 times the base width and whose volume is 50 cubic meters. If the materials used to build the box cost \$10 per square meter for the bottom and \$6 per square meter for the sides, what are the dimensions of the least expensive box?



$$V = 50 = h \cdot x \cdot 3x$$

$$h = \frac{50}{3x^2}$$

Minimize the cost:

$$C = 10 \cdot 3x^2 + 6 \cdot hx + 6 \cdot hx + 6 \cdot 3xh + 6 \cdot 3xh$$

$$C = 30x^2 + 48hx$$

$$C = 30x^2 + 48 \cdot \frac{50}{3x^2} \cdot x = 30x^2 + 48 \cdot \frac{50}{3x^2} \cdot x$$

$$C = 30x^2 + \frac{800}{x}$$

$$\frac{dC}{dx} = 60x - \frac{800}{x^2}$$

$$0 = 60x - \frac{800}{x^2}$$

$$x = 2.371262203$$

$$3x = 7.113786609$$

$$h = 2.964077754$$

$2.371 \times 7.114 \times 2.964$ meters