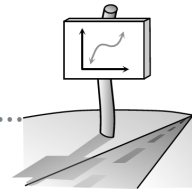


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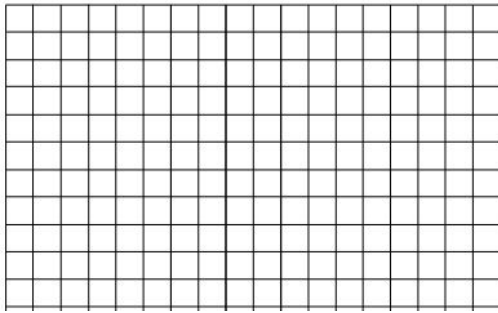
1.1.4 What is the rate?

Rates of Change



#31 A huge storm is quickly filling up Manuel's rainwater collection tank. Manuel wants to know if his 1000 gallon tank will overflow in the next hour, so he uses a rain gauge to determine that rain water is filling up his tank at a rate of $0.5t$ gallons per minute.

a. Sketch a graph of this situation. Label the axes with correct units.



b. How fast is the tank filling up at $t = 10$ minutes? 20 minutes? 30 minutes? What does this tell you about how fast the tank is filling up?

c. Write a summary statement describing how the rate of $0.5t$ gallons per minute relates to how fast the tank is filling up.

d. If Manuel's predicted rate is correct, will his rainwater tank overflow within the hour? Support your answer with mathematics.

#32 A child tosses a tennis ball into the air and it lands in the mud. The function $h(t) = -16t^2 + 16t + 4$ gives the ball's height in feet with respect to time in seconds.

a. Sketch a graph of $y = h(t)$. Highlight the portion of the curve that fits this situation.

b. What is happening to the height of the tennis ball with respect to the time?

c. Since velocity is a function of distance traveled over time, what part of the graph represents the velocity of the ball? What is happening to the velocity of the tennis ball with respect to time?

d. Complete the following table of time (s) versus height (ft).

t (s)	0	0.25	0.5	0.75	1	1.25	1.5
h (ft)							

e. Use the table to determine the ball's average velocity in ft/sec for each 0.25-second time interval.

f. Predict the velocity of the ball at $t = 0.8$ seconds. Be prepared to justify your answer to the class.