

1) The monthly premium for a life insurance policy is a function of the age of the policyholder. For a 30 year old nonsmoker the monthly premium is \$6.48 and for a 35 year old nonsmoker it is \$7.33. This can be modelled by a linear function.

a) Calculate the slope of this linear function, show all work.

Noticing that the age is the input, and the premium is the output, we can write the ordered pairs (30, 6.48) and (35, 7.33). The slope is calculated below.

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7.33 - 6.48}{35 - 30} = \frac{.85}{5} = .17$$

b) Solve for the vertical intercept. Show all work.

$$\begin{aligned} y &= .17x + b \\ 7.33 &= .17(35) + b \\ 7.33 &= 5.95 + b \\ 1.38 &= b \end{aligned}$$

c) Write the linear equation which gives the monthly premium, P , for a life insurance policy as a function of the age, a , of the policyholder. Be sure to use the variables P and a .

$$P = .17a + 1.38$$

d) What is the monthly premium for a 57 year old nonsmoker? Show all work.

$$P = .17(57) + 1.38 = 9.69 + 1.38 = 11.07$$

2) The equation $D(x) = 70 - 5.8x$ gives the dew point, in degrees Fahrenheit, as a function of the height above ground, in miles.

a) What is the slope in the equation above? Explain its practical meaning.

The slope is -5.8 . This tells us that the dew point decreases by $5.8^\circ F$ for every mile above the ground.

b) What is the vertical intercept in the equation above? Explain its practical meaning.

The vertical intercept is (0, 70). This means that the dew point at 0 miles above ground is $70^\circ F$.

c) What is the dew point 15 miles above ground? Show all work.

$$D(15) = 70 - 5.8(15) = 70 - 87 = -17^\circ F$$

d) At what height above ground is the dew point $40^\circ F$? Show all work.

$$\begin{aligned} 40 &= 70 - 5.8x \\ -30 &= -5.8x \\ 5.1724 &= x \end{aligned}$$