Depreciation *Suppose the cost of a business property is $860,000 and a company depreciates it with the straight-line method. Suppose y is the value of the property after t years.*[1]

Let's start by making sure that we know what is meant by depreciating something with the straight-line method. In business and accounting, straight-line depreciation is the simplest and most often used method. As the name suggests, this method describes a constant (or straight line) drop in value spread evenly across the life of an asset or product.

a. *What is the value at the beginning of the depreciation (when $t = 0$)?*

The purchase price of the property, when $t = 0$, is $860,000.

b. *If the property is completely depreciated ($y = 0$) in 25 years, write the equation of the line representing the value as a function of years.*

Notice that we have two points in the form $(time, value)$, or (t, y). The first point, $(0, 860{,}000)$, tells us that at time $t = 0$, the value of the property is $860,000. The second point, $(25, 0)$, tells us that after 25 years, $t = 25$, the value of the property is $0.

We'll use these two points and find the equation of the line through them. I'm going to find the slope, m, and then use the point-slope equation of a line.

If $(0, 860{,}000)$ is the first point and $(25, 0)$ is the second point,

$$\begin{aligned} m &= \frac{y_2 - y_1}{t_2 - t_1} \\ &= \frac{0 - 860{,}000}{25 - 0} \\ &= \frac{-860{,}000}{25} \\ &= -34{,}400 \end{aligned}$$

Use m and either point to fill in the point-slope equation and solve for y.

$$\begin{aligned} y - y_1 &= m(t - t_1) \\ y - 860{,}000 &= -34{,}400(t - 0) \\ y - 860{,}000 &= -34{,}400t \\ y &= 860{,}000 - 34{,}400t \end{aligned}$$

The equation of the line representing value as a function of years is: $y = 860{,}000 - 34{,}400t$

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[1]Harshbarger/Yocco, *College Algebra In Context*, 5e, p. 72, #52.