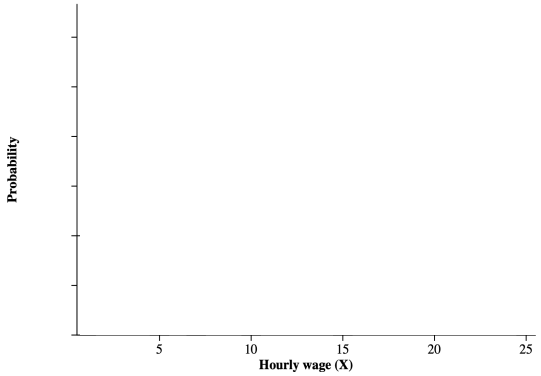
Is It Time For a Raise?

The employees have been working very hard and it's time to give them a raise. The boss is trying to decide if she should give everyone a $10 raise (add $10 per hour) or double everyone's wage (multiply by 2).

1. Copy the probability distribution from the previous lesson below. Graph, then use technology to find the mean and standard deviation.

X	1	5	7	10	15	25
Probability						

Mean: _____ Standard Deviation: _____



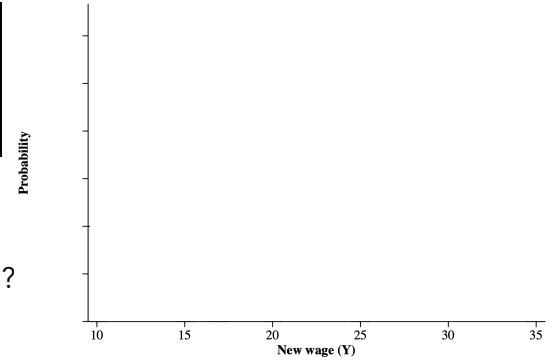
2. To make a decision about what raise should be given, complete the tables and graphs below and calculate the new mean and standard deviation using technology.

a. **Option 1:** Add $10 per hour to the old wage for all employees

X = Old Wage	1	5	7	10	15	25
Y = New Wage						
Probability						

Mean: _____ Standard Deviation: _____

How did adding a constant affect the mean and standard deviation?

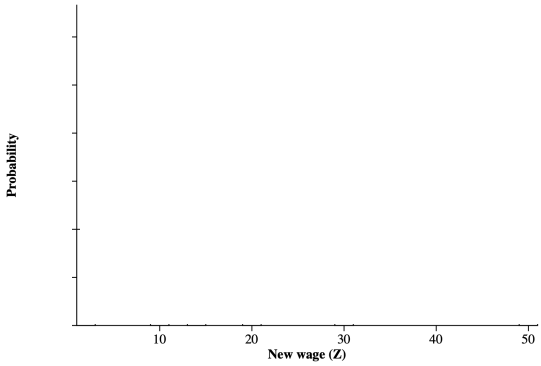


b. **Option 2:** Double the old wage for all employees

X = Old Wage	1	5	7	10	15	25
Z = New Wage						
Probability						

Mean: _____ Standard Deviation: _____

How did multiplying by a constant affect the mean and standard deviation?



3. Which option would you prefer? Why?

Lesson 6.3 – Transforming Random Variables

QuickNotes

Check Your Understanding

Let *X* = the number billionaires in a randomly selected state. Based on current records, the probability distribution of *X* is as follows:

Number of Billionaires	0	1	2	3	4	5	6	8	9	10	11	12	13	17	56	58	118	165
Probability	0.10	0.24	0.06	0.06	0.04	0.08	0.04	0.04	0.06	0.08	0.02	0.02	0.02	0.06	0.02	0.02	0.02	0.02

The random variable *X* has mean $\mu_x = 12.68$ and standard deviation $\sigma_x = 29.02$. Suppose a law is passed requiring each billionaire to pay a $7,000 tax to their state. Let *Y* = the tax money received by a randomly selected state.

1. For a state that has 9 billionaires (X = 9), how much tax money (Y) would they receive?

2. Consider the graph of the probability distribution of *X* and a separate graph of the probability distribution of *Y*. How would their shapes compare?

3. Find the mean and standard deviation of *Y*.

4. Each state agrees to invest $20,000 of the tax money they receive to improve roads. Therefore, the net amount (*N*) of money a randomly selected state has left to spend is *N* = *Y* – $20,000. Describe the shape, mean, and standard deviation of the probability distribution of *N*.