10. **Application** In a lottery, there are 2 000 000 tickets to be sold. The prizes are as follows:

Prize ($)	Number of Prizes
1 000 000	1
50 000	5
1 000	10
50	50

What should the lottery operators charge per ticket in order to make a 40% profit?

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Expected Value:

$$1\,000\,000\left(\frac{1}{2\,000\,000}\right)+50\,000\left(\frac{5}{2\,000\,000}\right)+1000\left(\frac{10}{2\,000\,000}\right)+50\left(\frac{50}{2\,000\,000}\right)$$

$= 0.63125 \Rightarrow$ Cost of the ticket

$$\%\ \text{Profit} = \frac{\text{Revenue} - \text{Cost}}{\text{Revenue}}.$$

sub $0.4 = \%$ Profit $0.63125 = $ Cost $R = $ Revenue

$$0.4 = \frac{R - 0.63125}{R}$$

$$0.4R = R - 0.63125$$

$$R - 0.4R = 0.63125$$

$$0.6R = 0.63125$$

$$R = \frac{0.63125}{0.6}$$

$$R \doteq 1.05$$

$\therefore$ the ticket price should be set at $\$1.05$.