**Question #168**
**Key: B**

$$S_X(150) = 1 - 0.2 = 0.8$$

$$f_{Y^p}(y) = \frac{f_X(y+150)}{S_X(150)} \quad \text{So} \quad f_{Y^p}(50) = \frac{0.2}{0.8} = 0.25$$

$$f_{Y^p}(150) = \frac{0.6}{0.8} = 0.75$$

$$E\left(Y^p\right) = (0.25)(50) + (0.75)(150) = 125$$

$$E\left[\left(Y^p\right)^2\right] = (0.25)\left(50^2\right) + (0.75)(150)^2 = 17{,}500$$

$$\text{Var}\left(Y^p\right) = E\left[\left(Y^p\right)^2\right] - \left[E\left(Y^p\right)\right]^2 = 17{,}500 - 125^2 = 1875$$

Slight time saver, if you happened to recognize it:

$Var\left(Y^p\right) = Var\left(Y^p - 50\right)$ since subtracting a constant does not change variance, regardless of the distribution

But $Y^p - 50$ takes on values only 0 and 100, so it can be expressed as 100 times a binomial random variable with $n = 1$, $q = 0.75$

$$Var = \left(100^2\right)(1)(0.25)(0.75) = 1875$$