

Name: \_\_\_\_\_ Hour: \_\_\_\_\_ Date: \_\_\_\_\_

### Reese thinks Reese's is lying



Mr. Wilcox's daughter Reese had a special Halloween bag of Reese's pieces. She took a random sample of 50 pieces and found 27 of the pieces were orange. Google says a bag of Reese's pieces is 40% orange pieces. She thinks that the Halloween bags must have a higher proportion of orange pieces than the regular bag of Reese's pieces. Does Reese have convincing evidence that the proportion of orange Reese's pieces in the Halloween bag is greater than the proportion of orange Reese's pieces in the regular bag?

**STATE:** State the hypotheses you want to test and the significance level, and define any parameters you use.

Parameter:  $p \rightarrow$  true proportion of orange in Reese's bag      Statistic:  $\hat{p} = \frac{27}{50} = 0.54$

Hypotheses:  $H_0: p = 0.40$       Significance level:  $\alpha = 0.05$   
 $H_a: p > 0.40$

**PLAN:** Identify the appropriate inference method and check conditions.

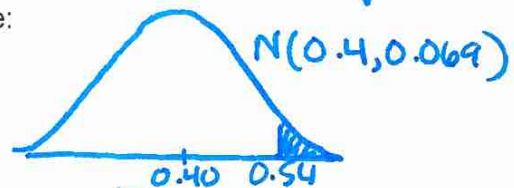
Name of procedure: One Sample z test for p

Check conditions: Random:  $\checkmark$  Reese took a random sample of 50      10%:  $\checkmark$   $50 < \frac{1}{10} \times$  Big Bag of Reese's      Normal:  $\checkmark$   $50 \times .40 = 20 \geq 10$   $50 \times .60 = 30 \geq 10$

**DO:** If the conditions are met, perform the calculations.

Mean:  $\mu_{\hat{p}} = p = 0.40$       Standard deviation:  $\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{.4 \times .6}{50}} = 0.069$

General Formula:  $\text{Test Stat} = \frac{\text{Stat} - \text{param}}{\text{SD of Stat}}$       Picture:



Specific Formula:  $Z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$

Work:  $= \frac{0.54 - 0.40}{.069} = 2.03$

Test statistic:  $Z = 2.03$

P-value:  $1 - .9788 = 0.0212$

**CONCLUDE:** Make a conclusion about the hypotheses in the context of the problem.

Conclusion: Assuming the null hypothesis is true ( $p = 0.40$ ) there is a 0.0212 probability of getting a  $\hat{p} = 0.54$  or higher purely by chance. This provides convincing evidence that this bag has a greater proportion of orange than a regular bag.