



The Fundamentals of Data Visualization

A Review of the Halloween Visualization Assignment

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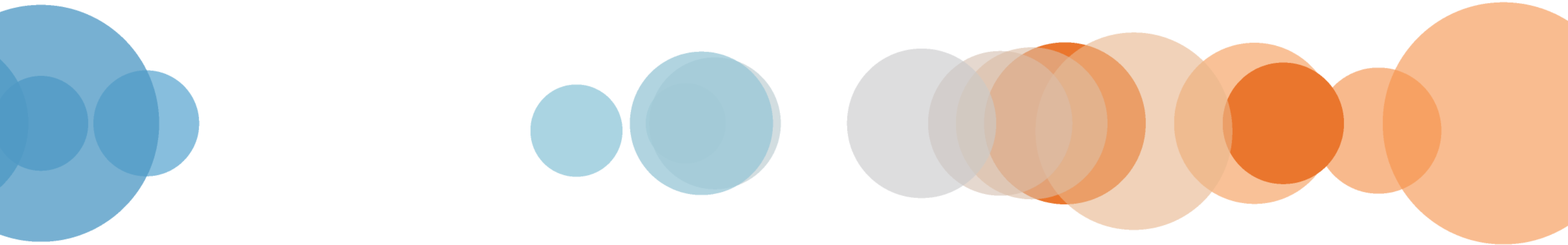
Goals

By completing the course modules, students will:

- Learn fundamental design choices through review of Halloween exercise
- Learn data visualization best practices by compare and contrast through numerous examples
- Discover some of the pitfalls in the analysis of the Halloween data set



Selected Samples: Halloween Assignment



Halloween Data Set

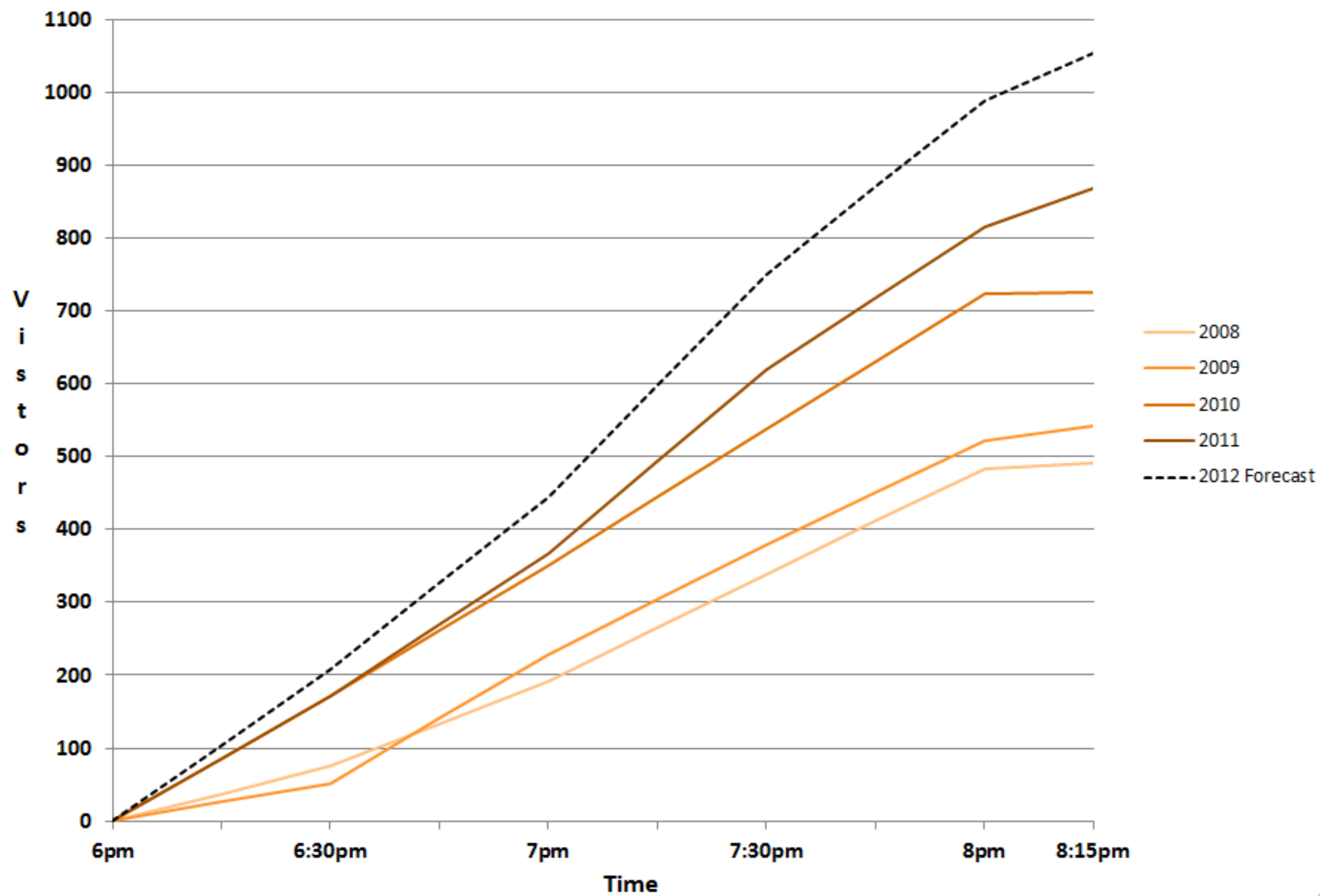
Year	6pm	6:30pm	7pm	7:30pm	8pm	Total (8:15pm)
2016	22	160	386	612	759	822
2015	13	148	336	523	667	747
2014	0	106	197	321	436	454
2013	33	152	233	303	371	391
2012	0	147	310	542	653	673
2011	0	172	367	619	816	869
2010	0	172	351	538	723	726
2009	0	52	229	379	522	542
2008	0	75	192	339	483	492



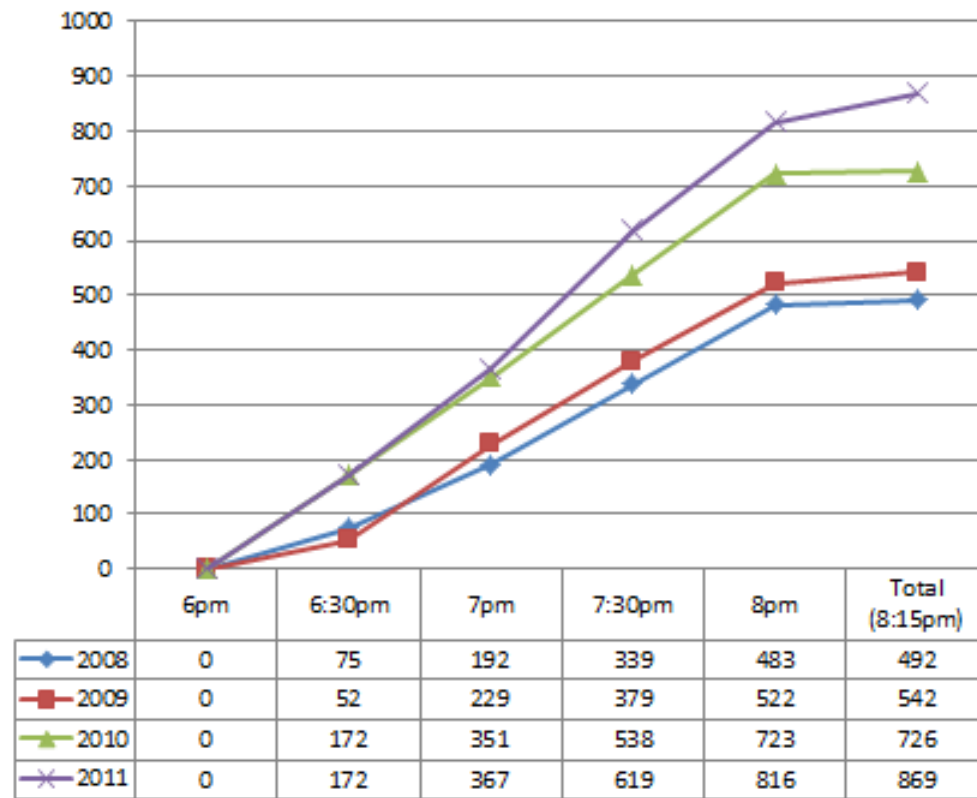
Examples from 2012



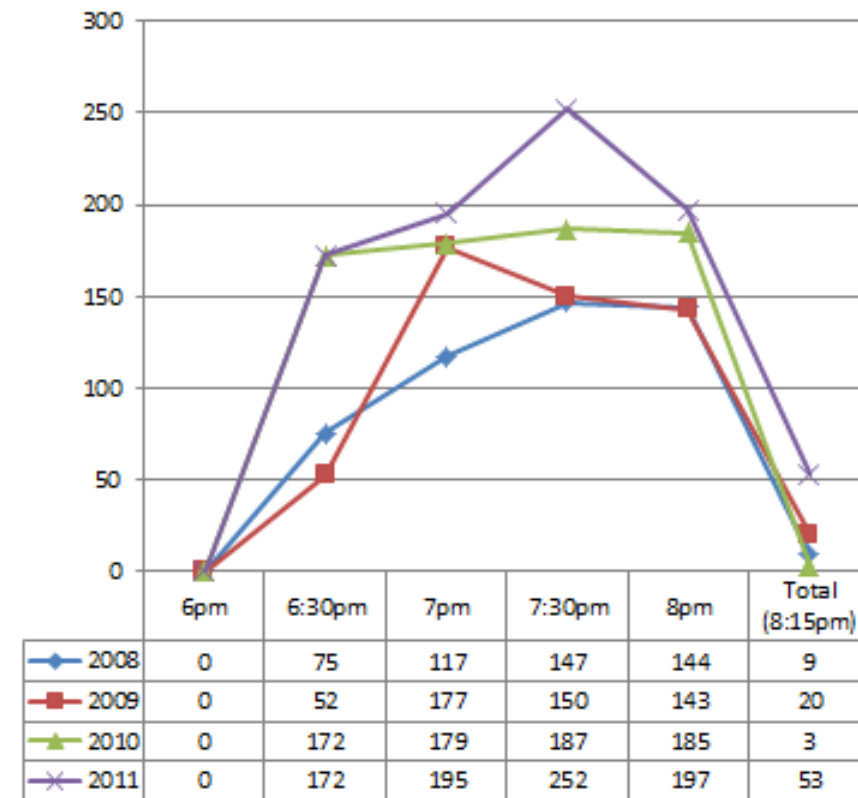
Historical and Forecasted Trick or Treaters - October 31st



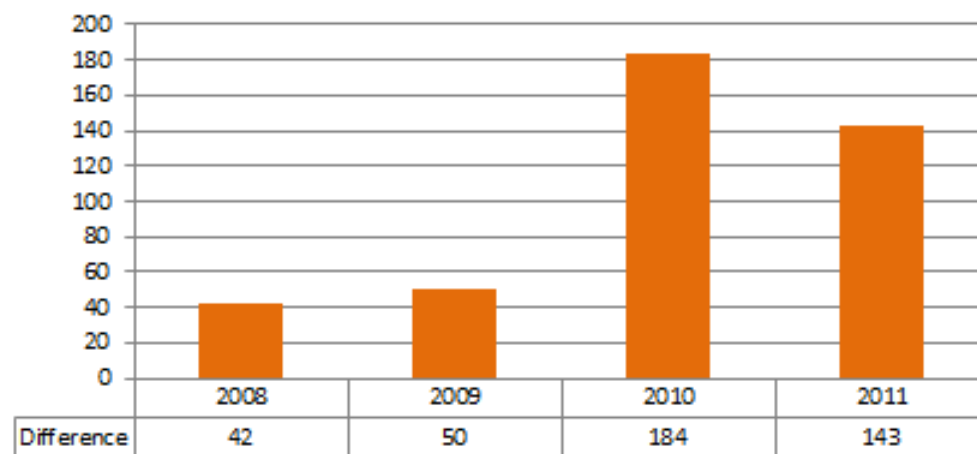
Cumulative Trick or Treaters



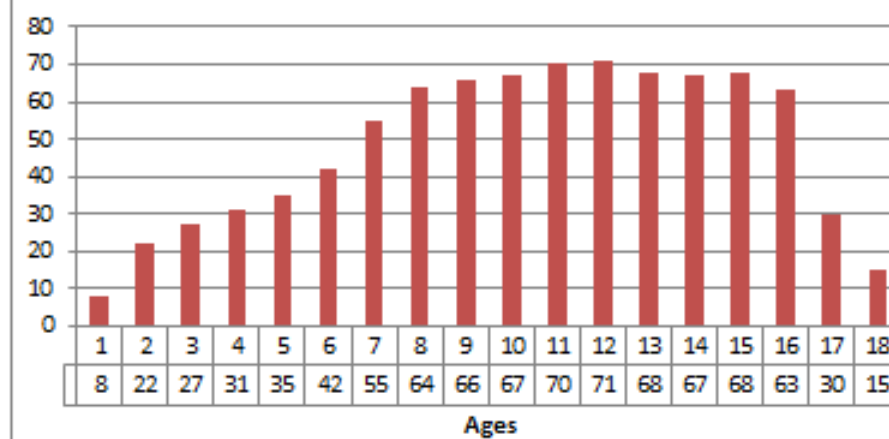
Trick or Treaters per hour

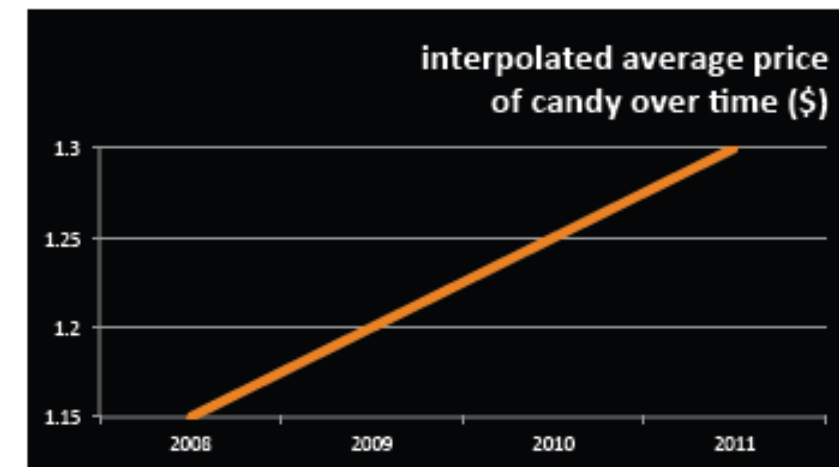
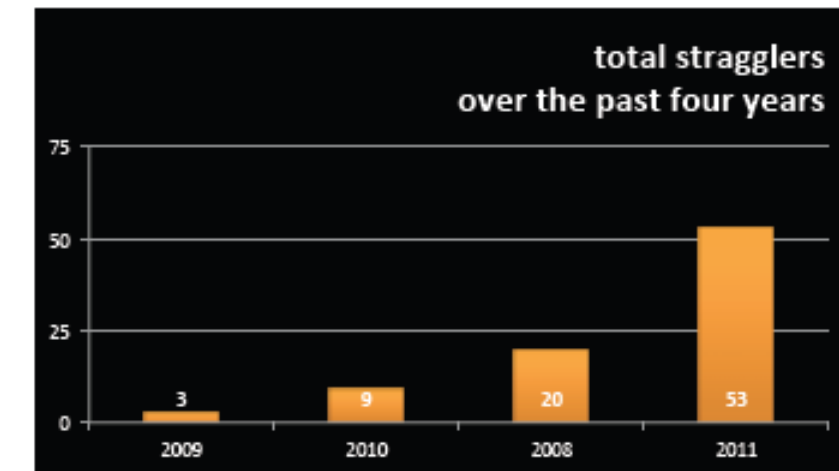
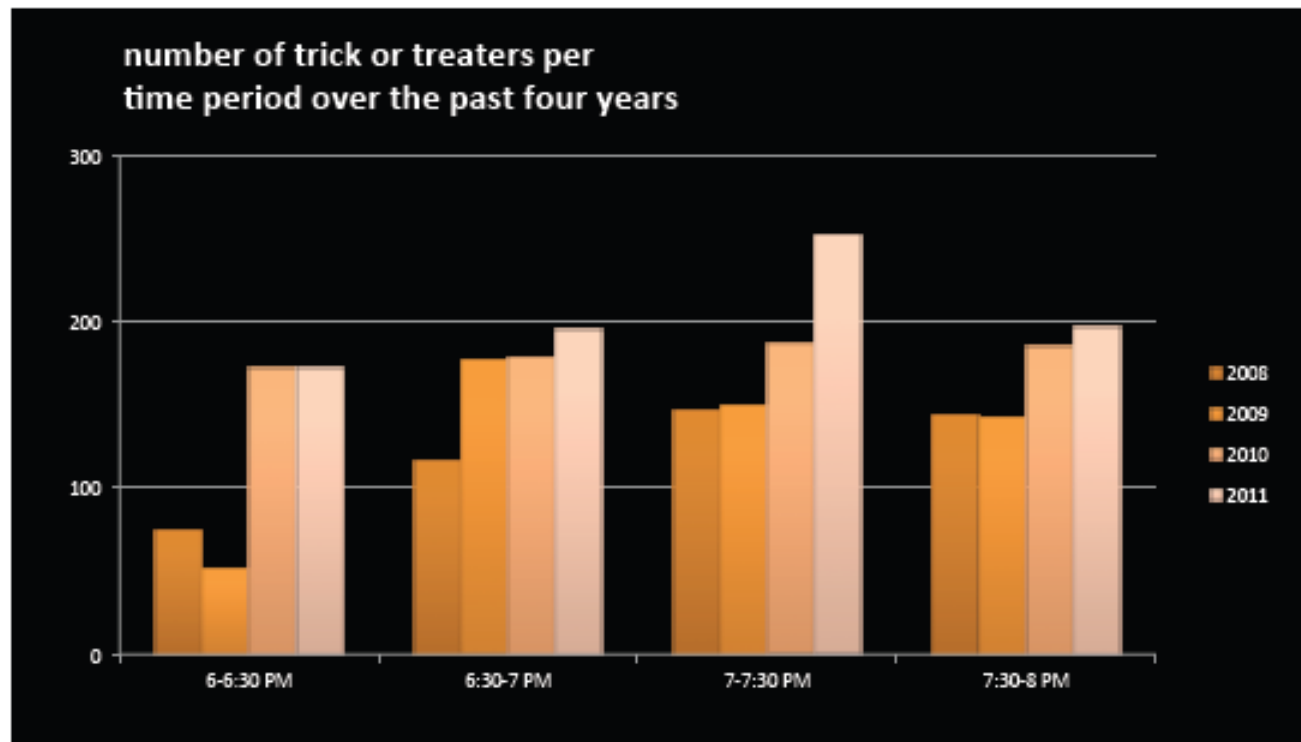
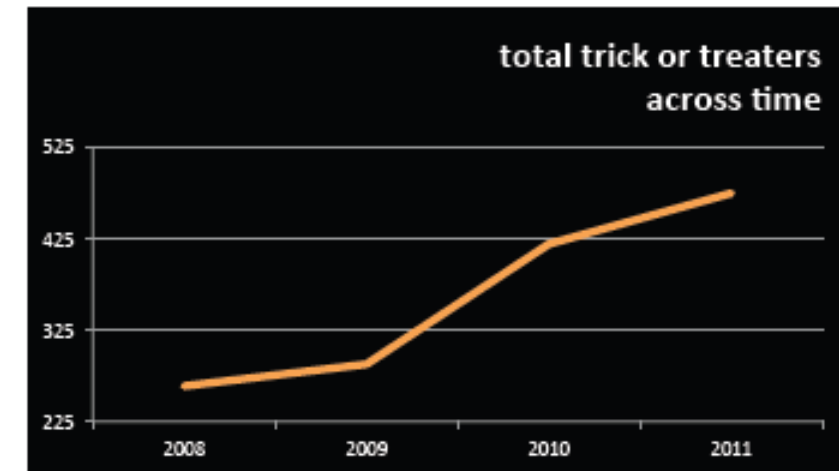
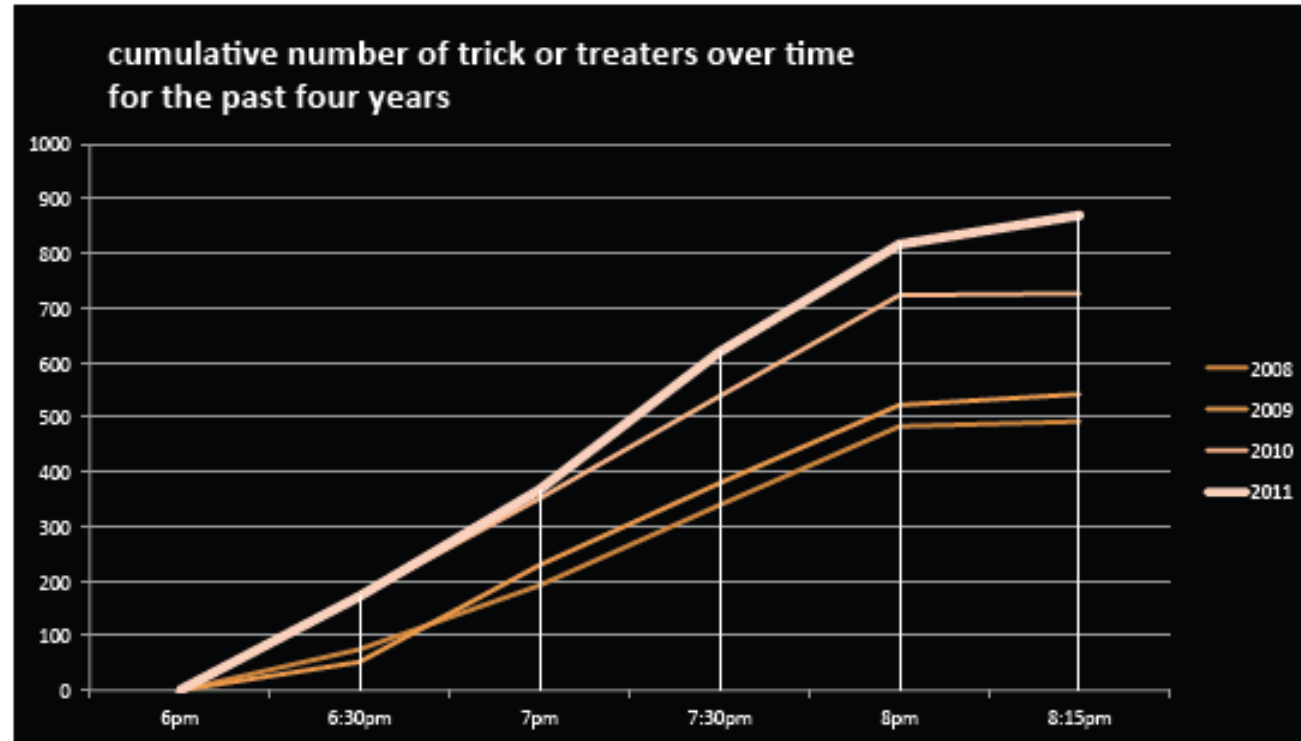


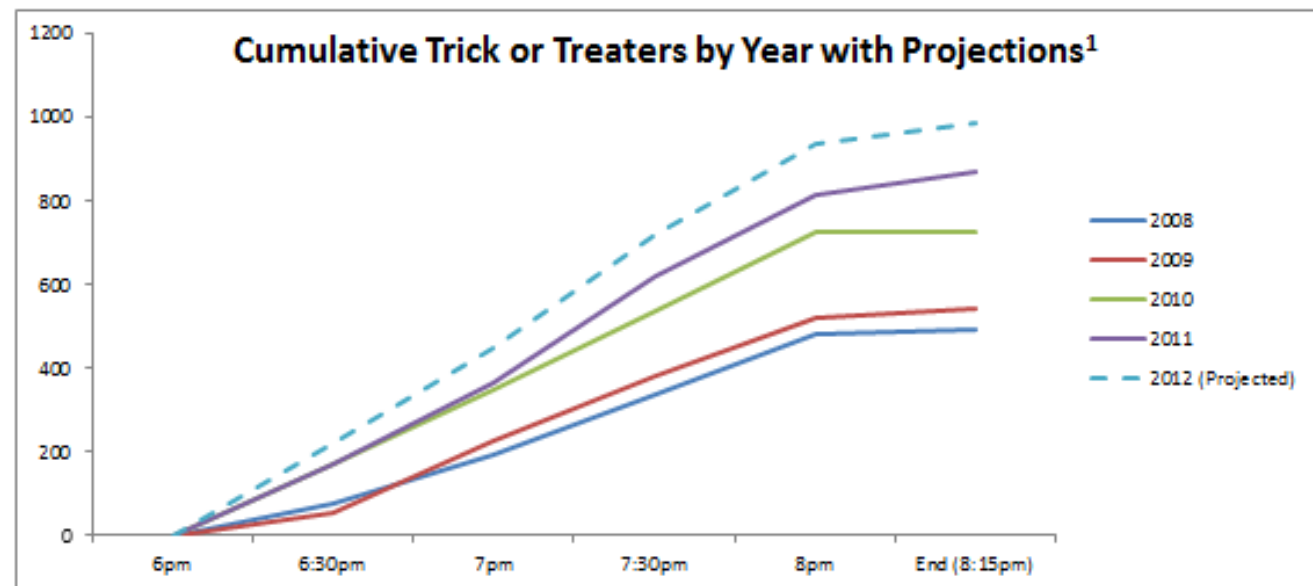
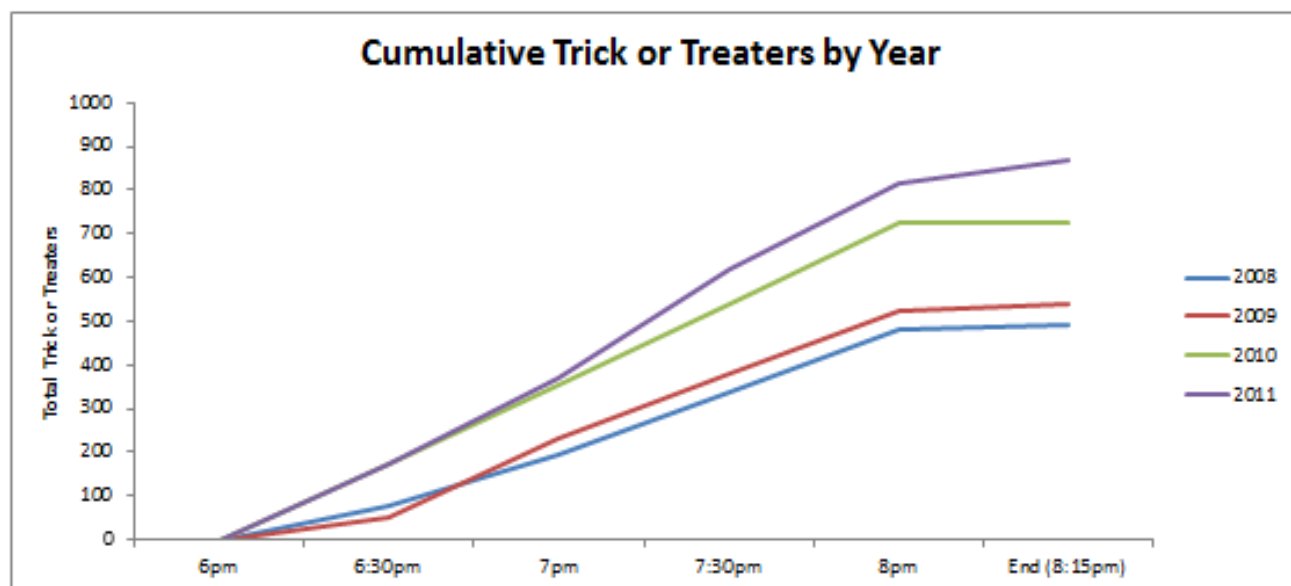
Change from Previous Year



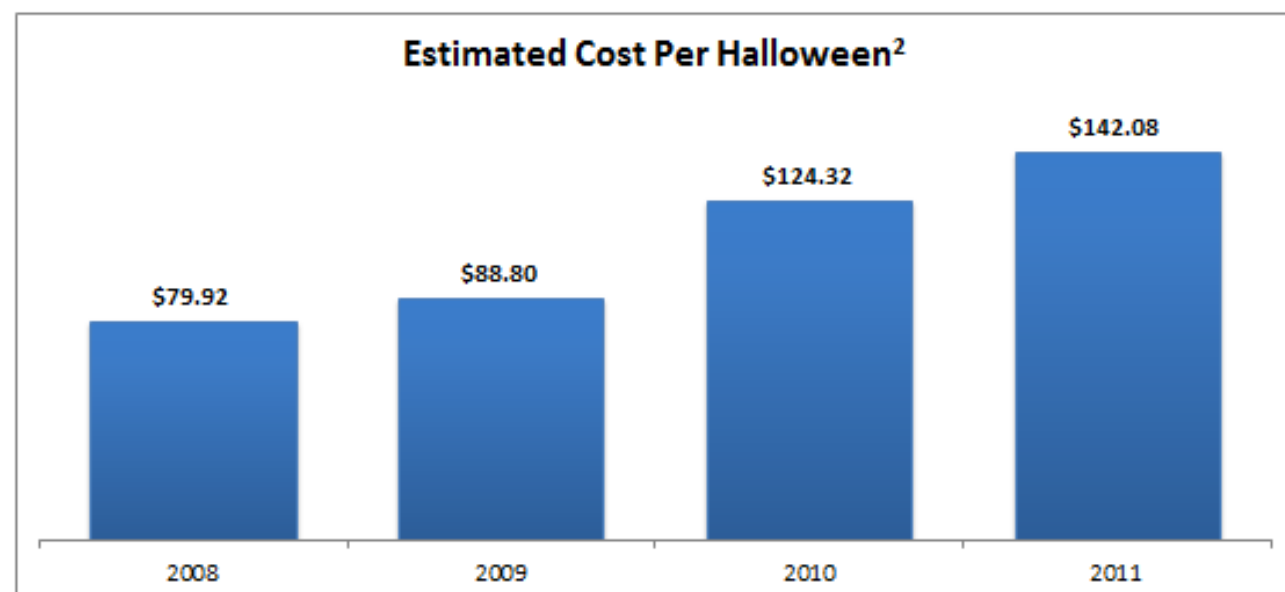
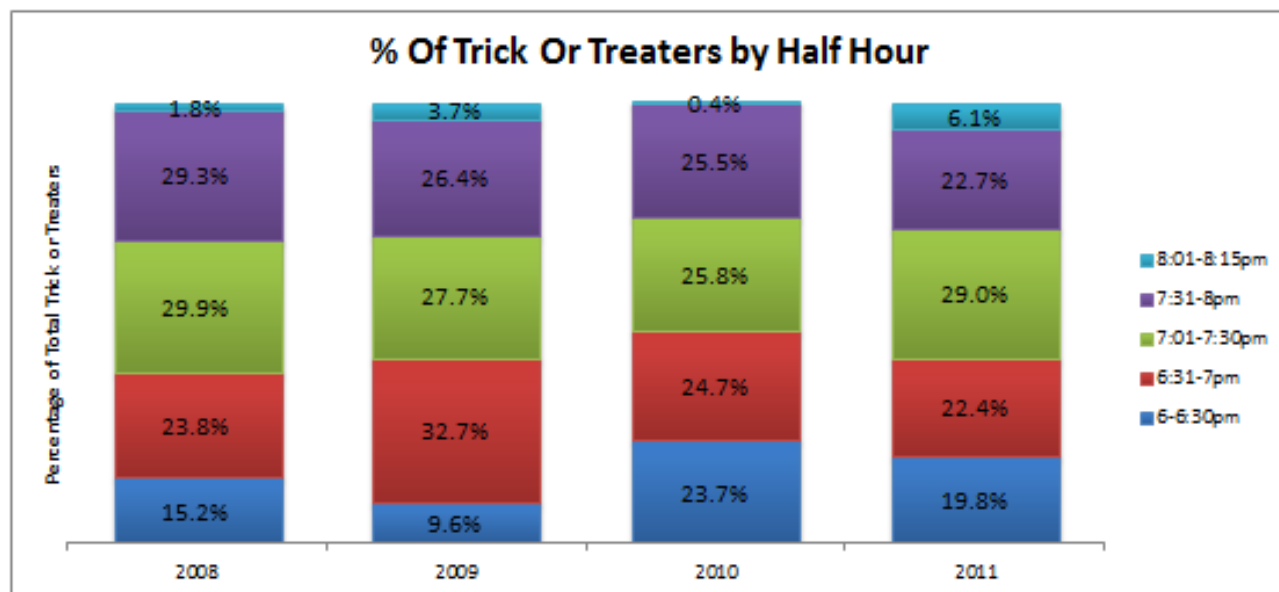
2011 Age Frequency



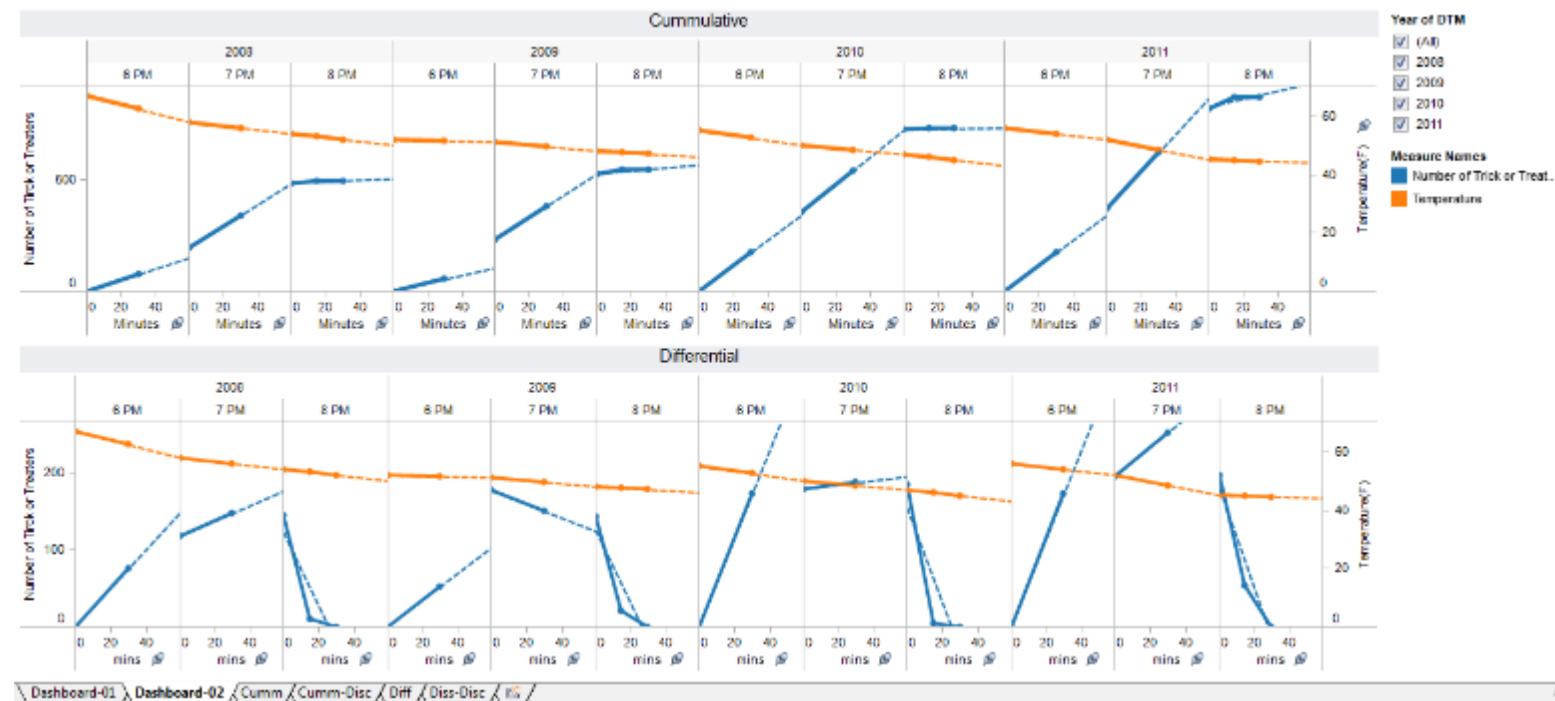
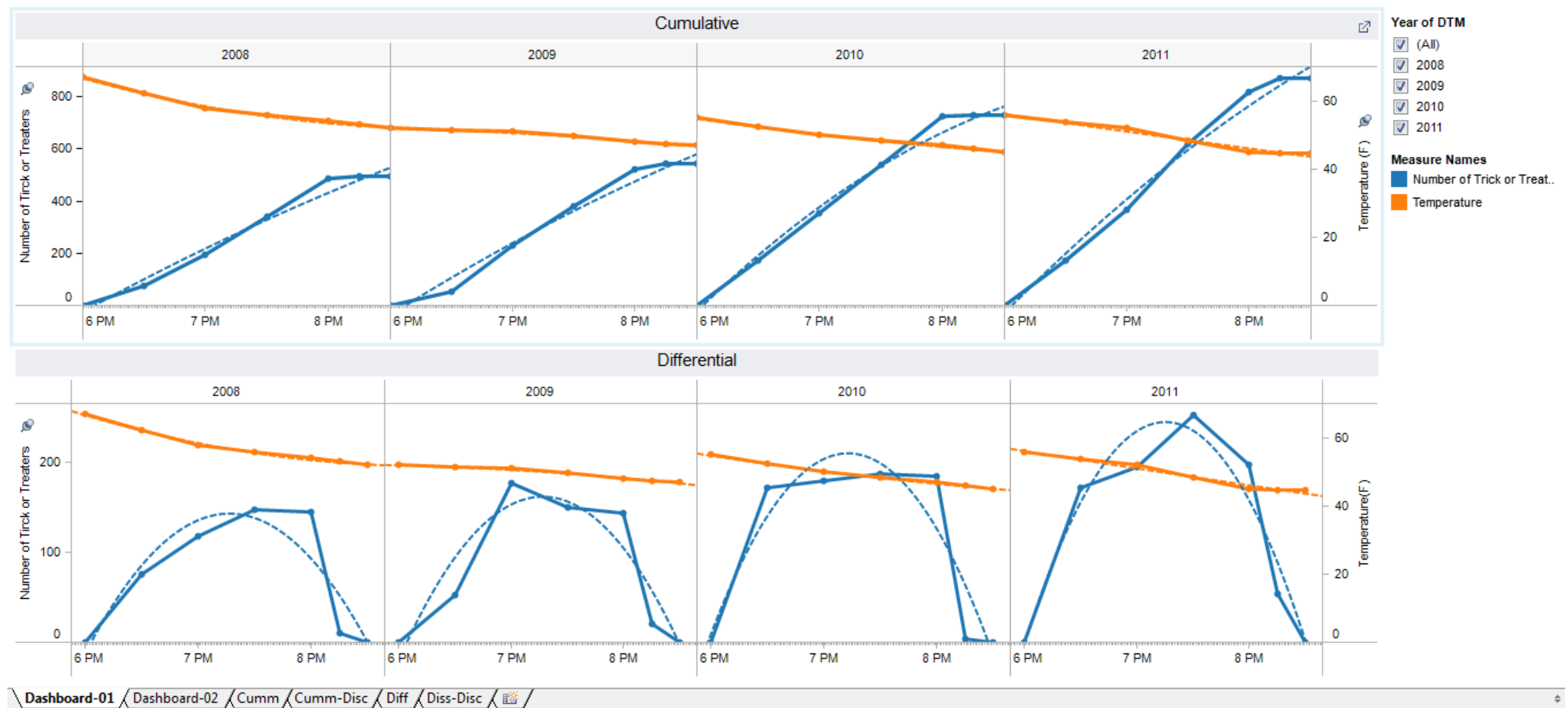




¹ Assumes average year on year growth based on historical data



² Assumes each trick or treater receives 1 piece of candy. 55 pieces of candy per bag, house owners cannot buy half bag
Source: <http://www.walmart.com/ip/Mars-Fun-Size-Twix-Snickers-Milk-Chocolate-M-M-s-Peanut-M-M-s-Candy-Mix>



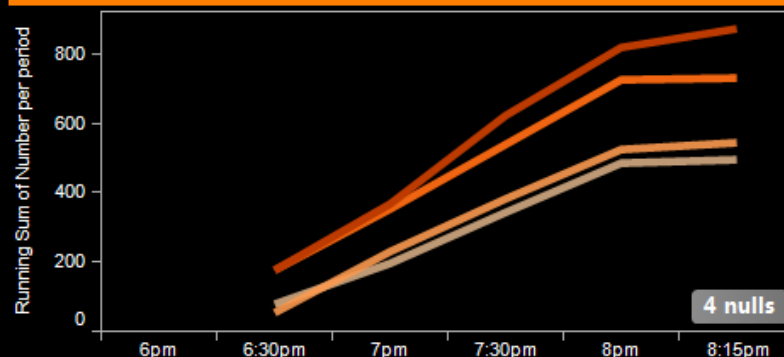


Jeff's Halloween Metrics

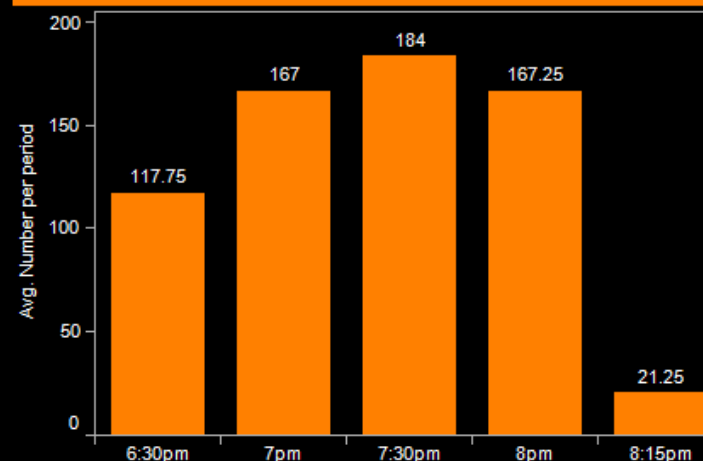
TRICK
OR
TREAT

Year
2008 2009 2011

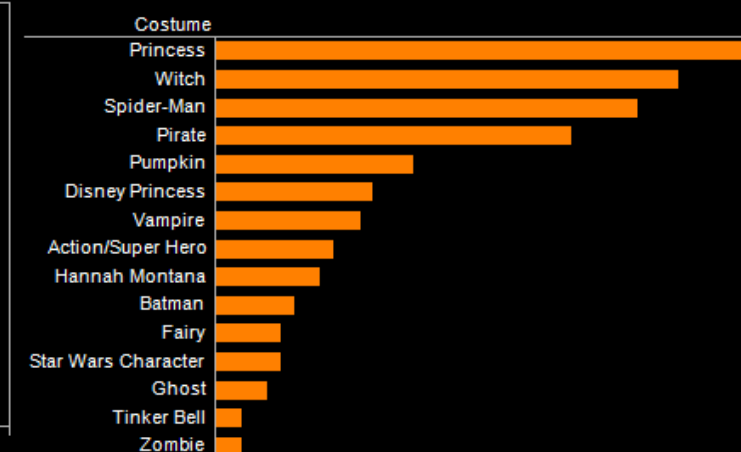
Running Total by Time Period



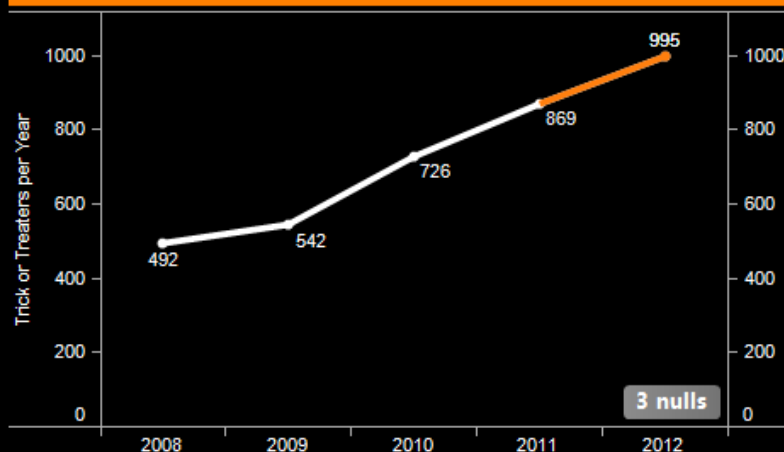
Average Number of Trick or Treaters by Time Period



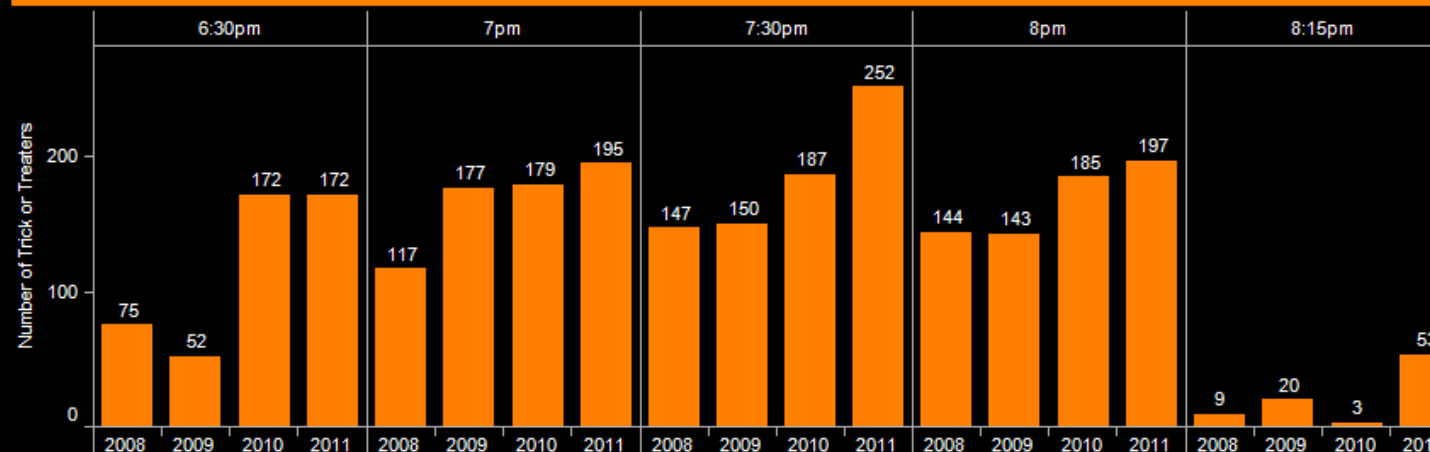
Most Popular Costumes From 2008-2011



Year to Year Trend with 2012 Projection



Yearly Comparison by Time Period

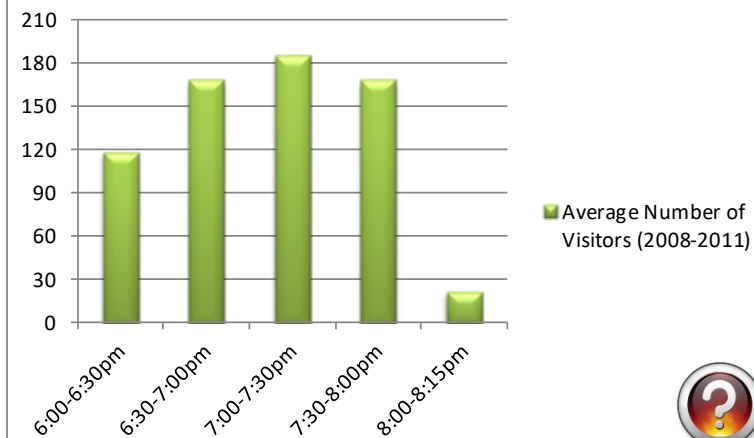




HALLOWEEN PLANNING DASHBOARD



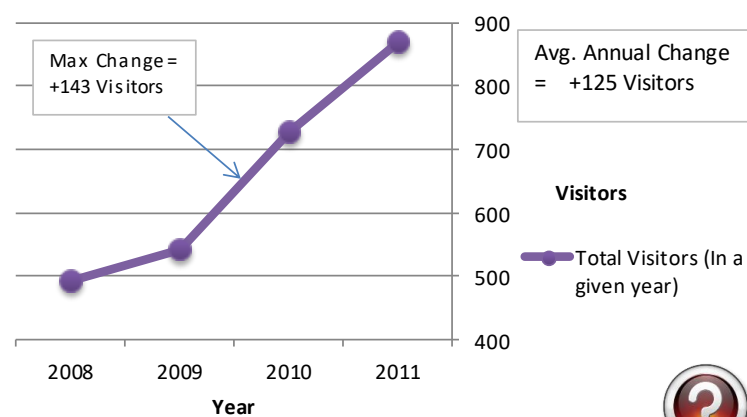
Average Visitors per Timeframe



Knowledge: Trick -or- Treaters visits have come in a bellcurve, with less at the beginning and end, and more towards the middle.

Recommendation: If you have an offer from someone who wants to help, historically the 7:00-7:30pm timeslot has been the busiest.

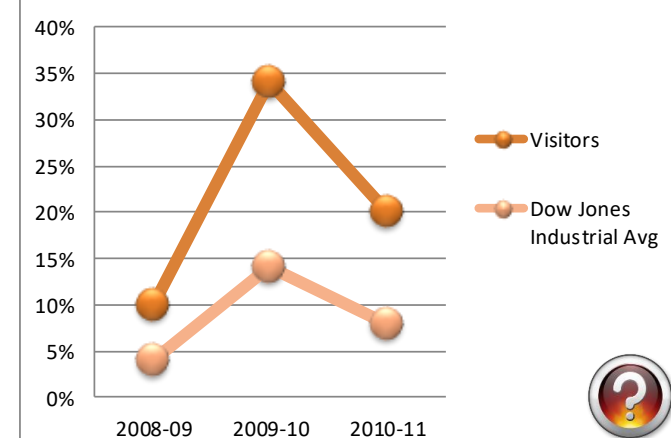
Total Visitors (in a given year)



Knowledge: The total number of visitors has increased each year.

Recommendation: Purchase candy for ~1160 visitors.
Last years total (869) + maximum increase (143)+ a 10% buffer(~105)

Growth Percentage

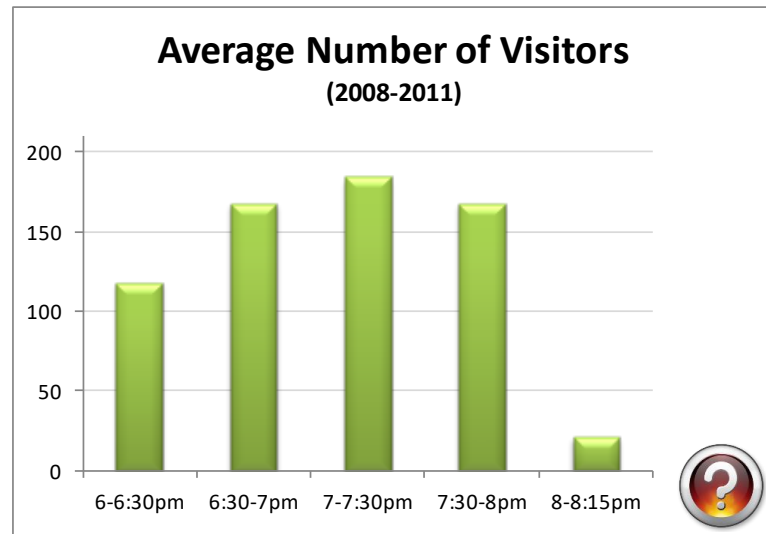


Knowledge: With limited data, the percentage growth of the DJIA *correlates* with the percentage growth of visitors.

Recommendation: The past three years the visitor growth has almost exactly equaled 2.5x the DJIA growth. With growth sitting at 6%, prepare for 15% growth in visitors.

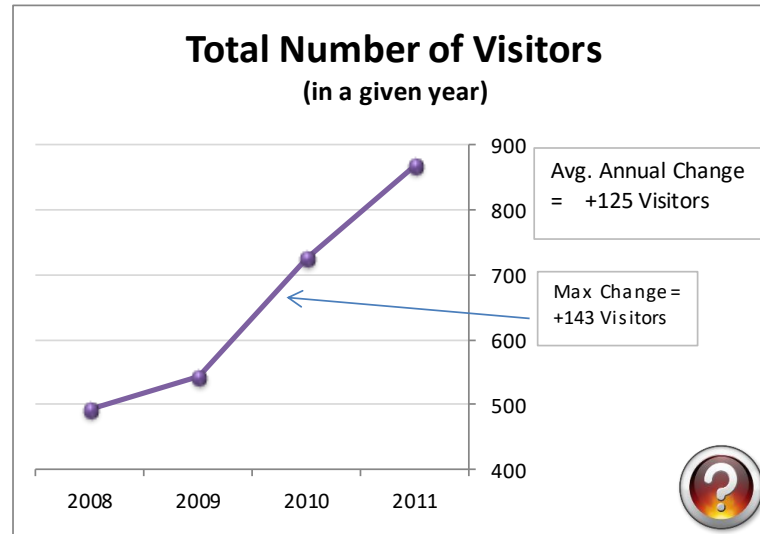


HALLOWEEN PLANNING DASHBOARD



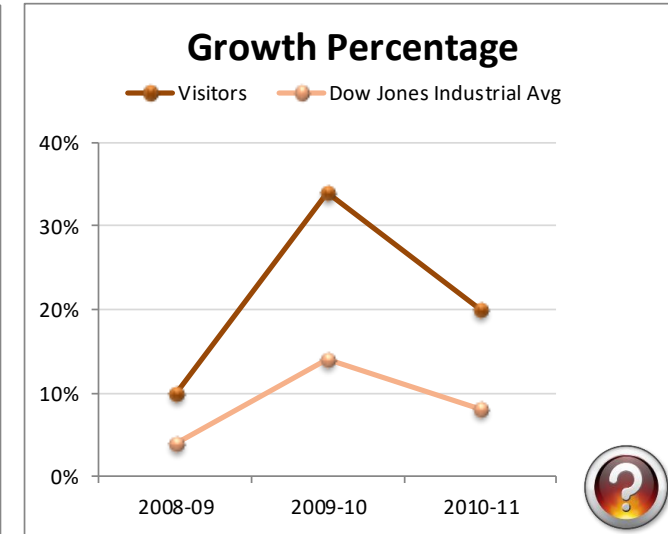
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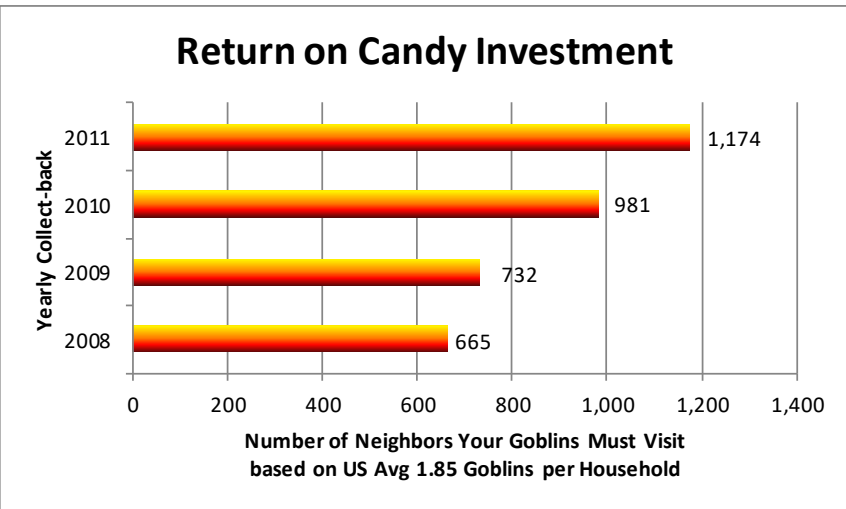
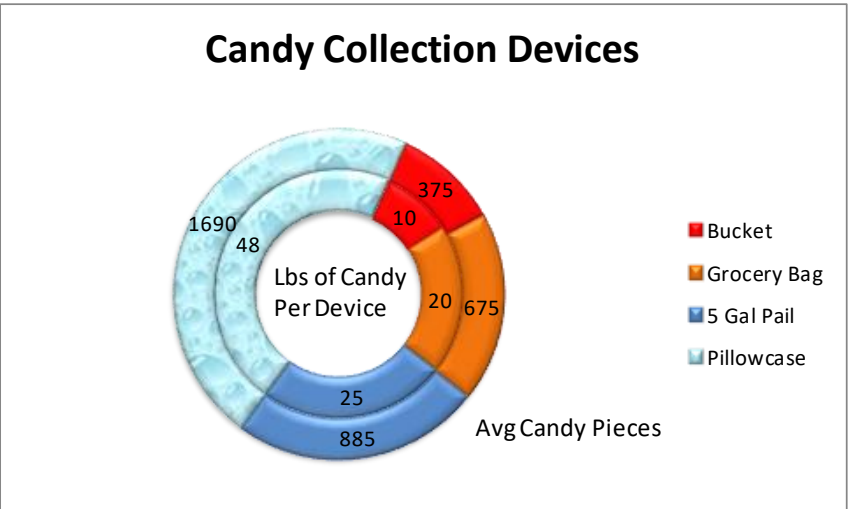
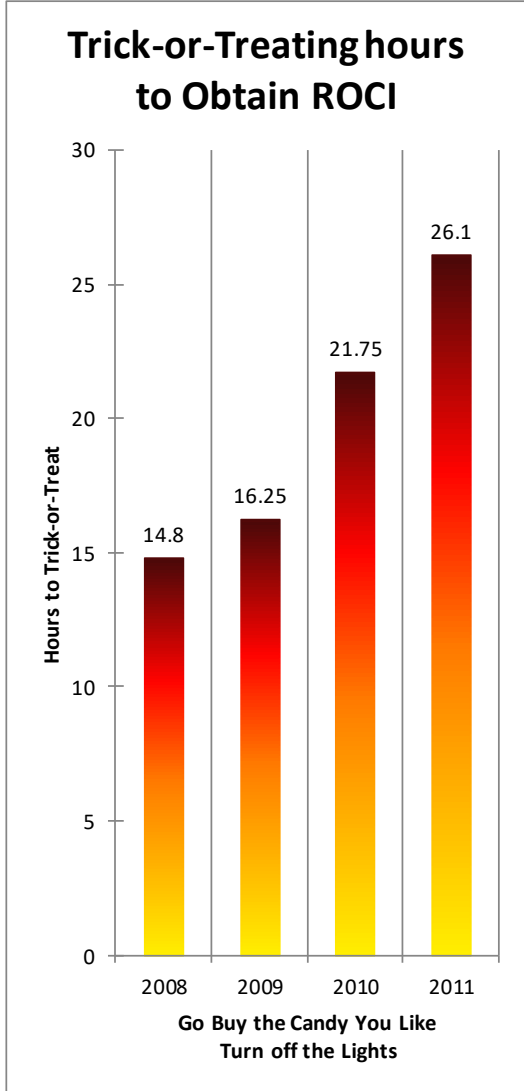
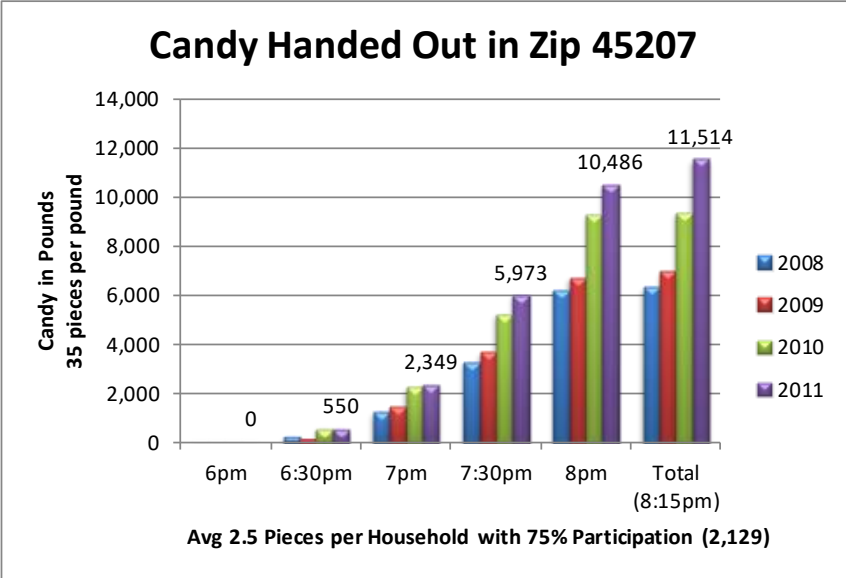
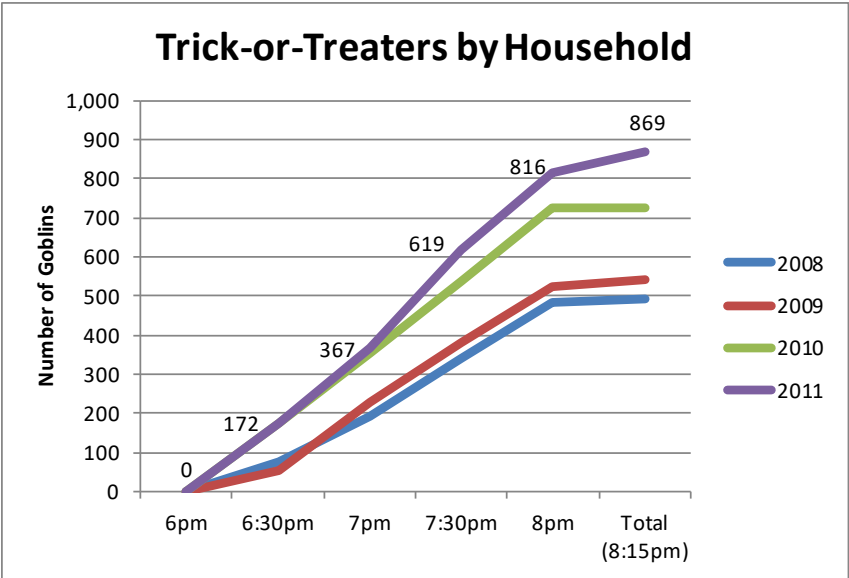
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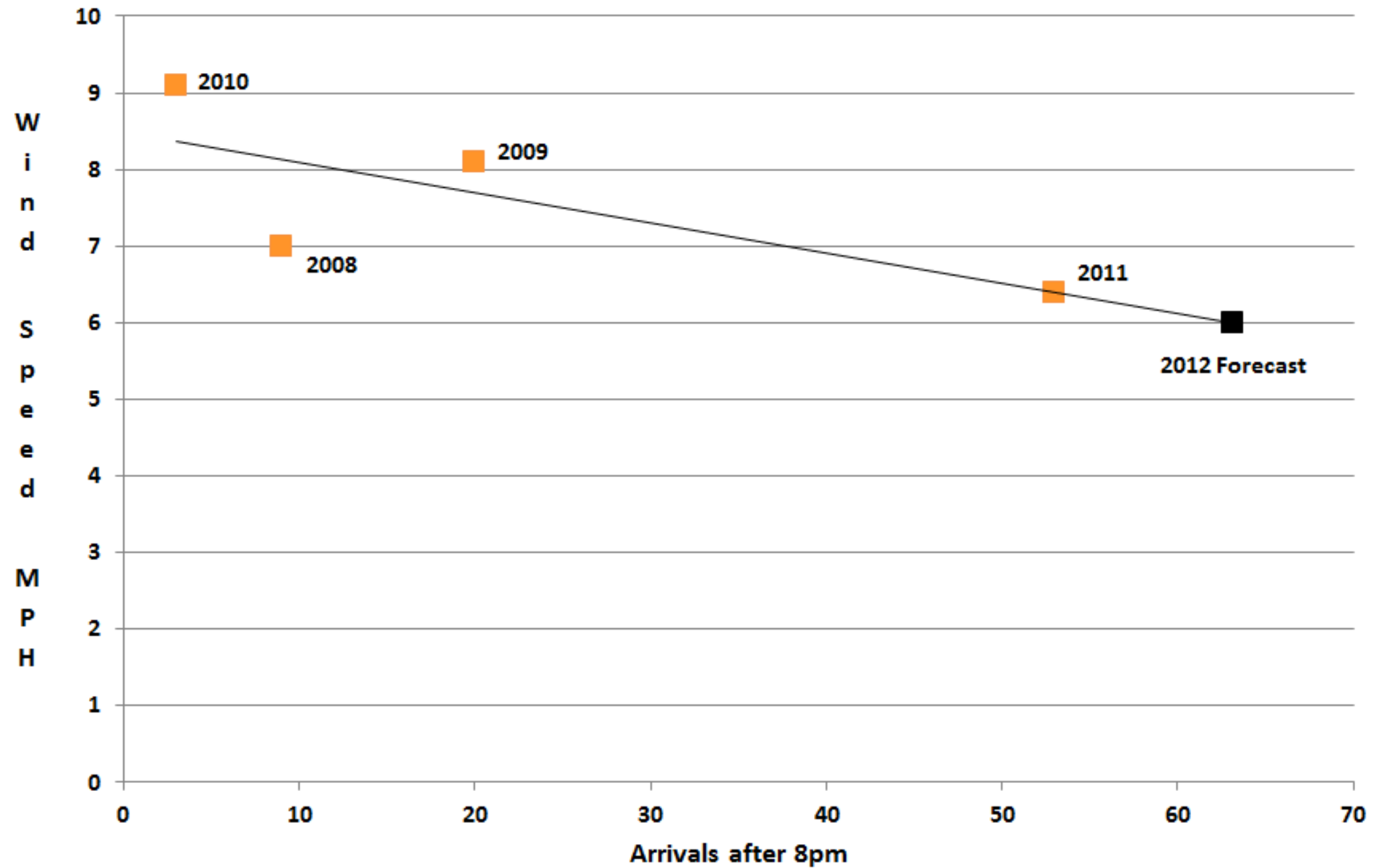
Knowledge: With limited data, the percentage growth of the DJIA *corresponds* with the percentage growth of

Recommendation: The past three years the visitor growth has almost exactly equaled 2.5x the DJIA growth. With growth sitting at 6%, prepare for 15% growth in visitors.

Halloween Chart Assignment Samples

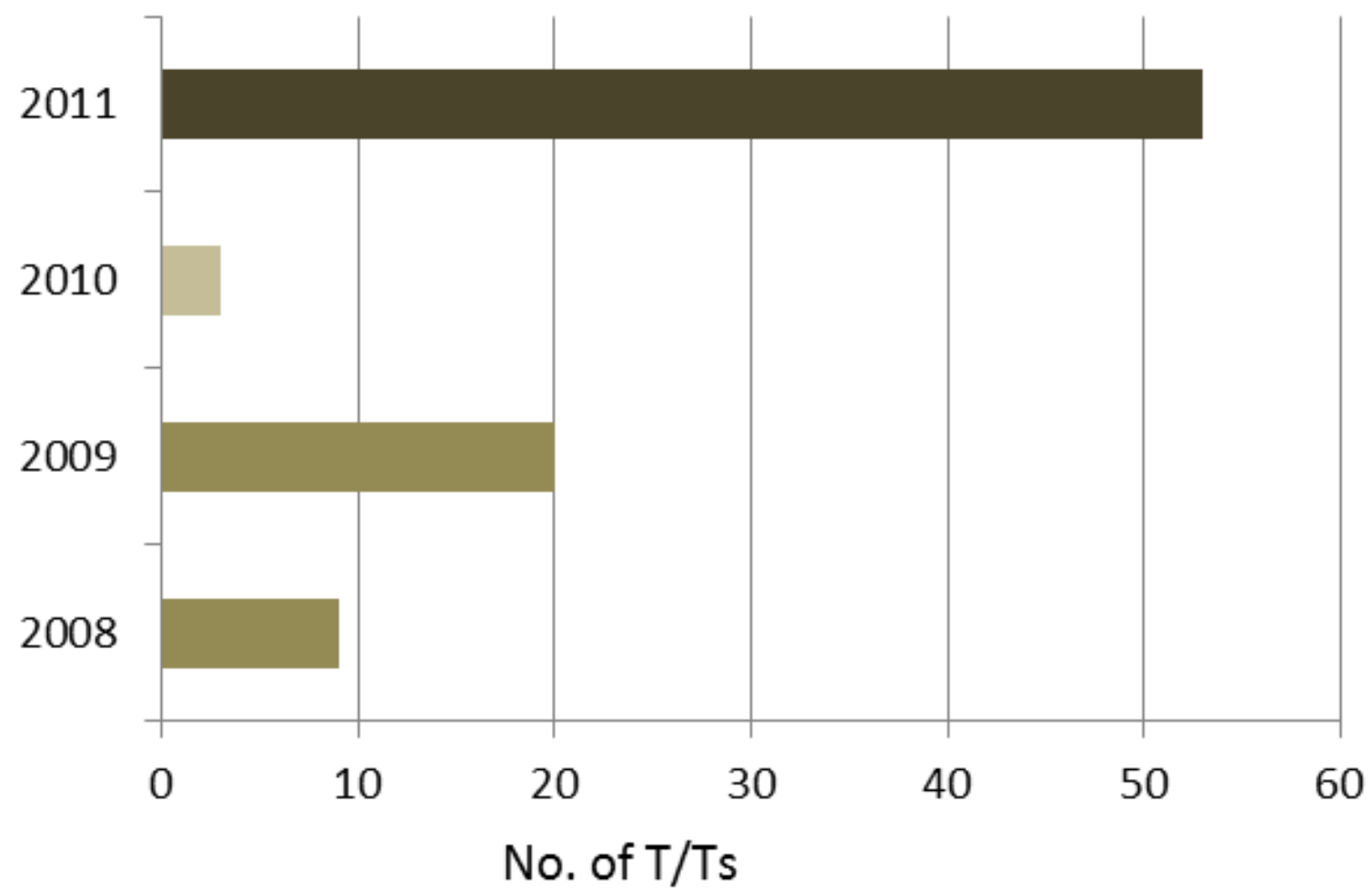


Average Wind Speed VS Late Trick or Treaters

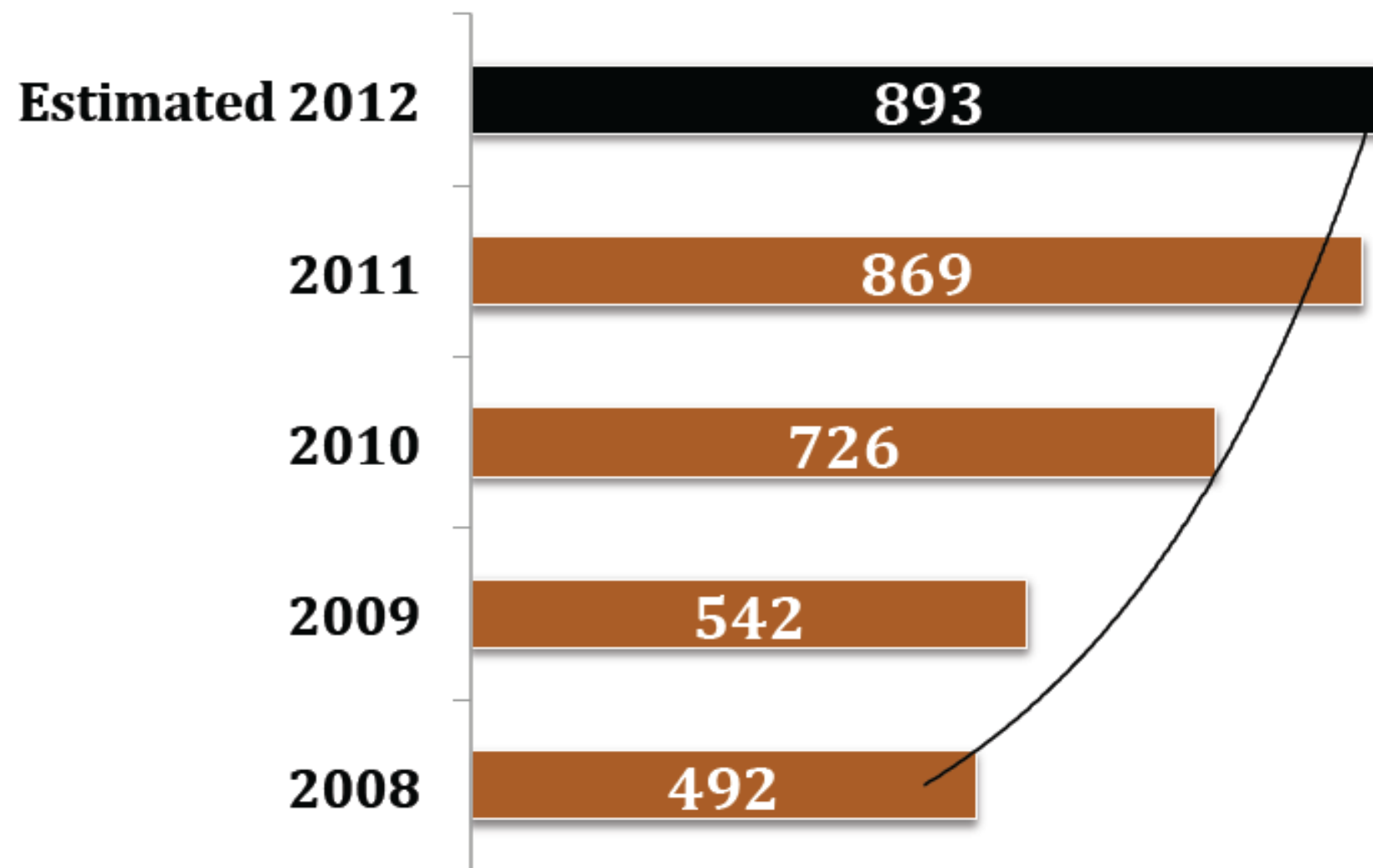


Weather forecast is predicting 6 mph average wind speeds for October 31st, 2012

Past 8pm

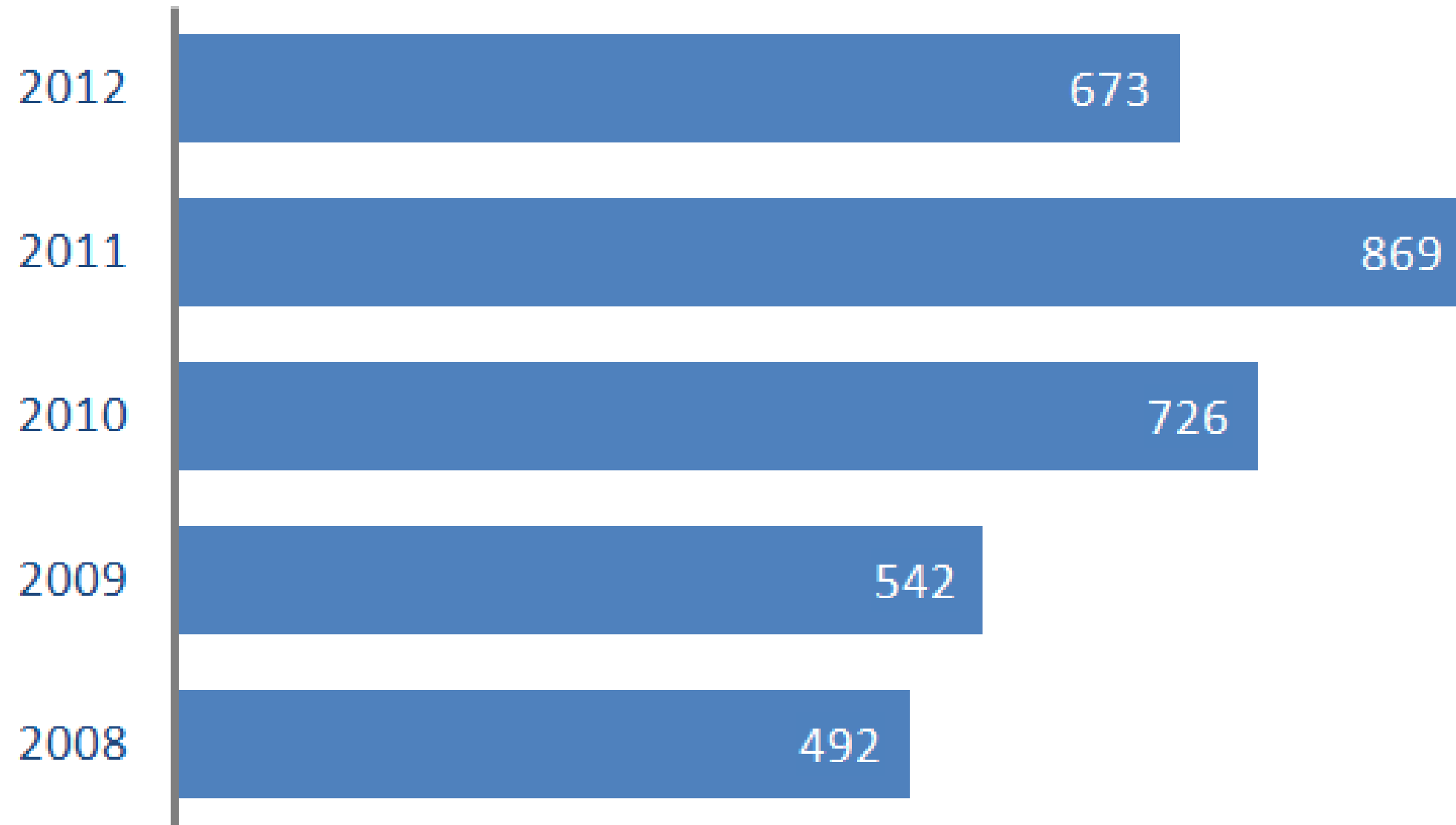


Trick or Treaters By Year



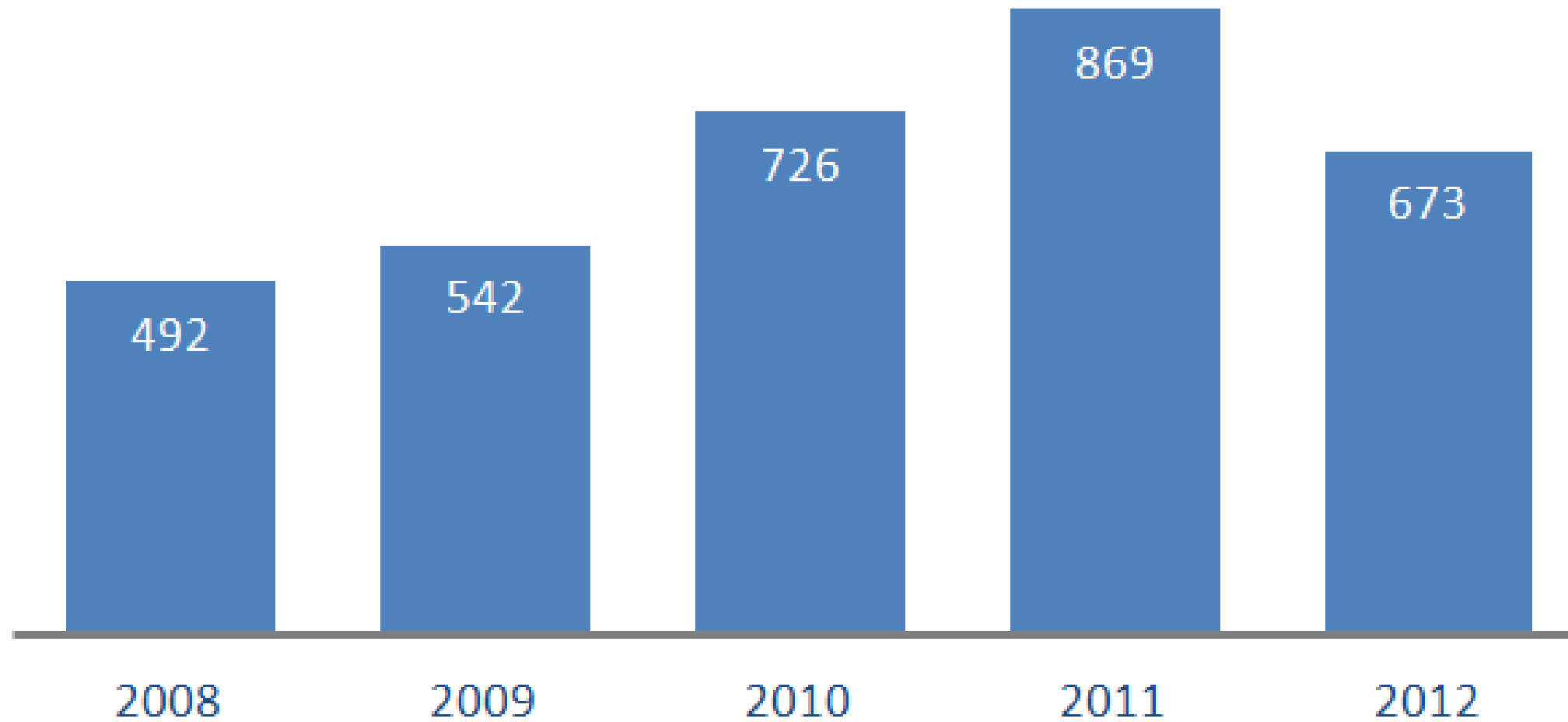
Keep Time on x-axis!

Total Visitors



Keep Time on x-axis!

Total Visitors



Line Charts for Time Series

(Usually a good option)

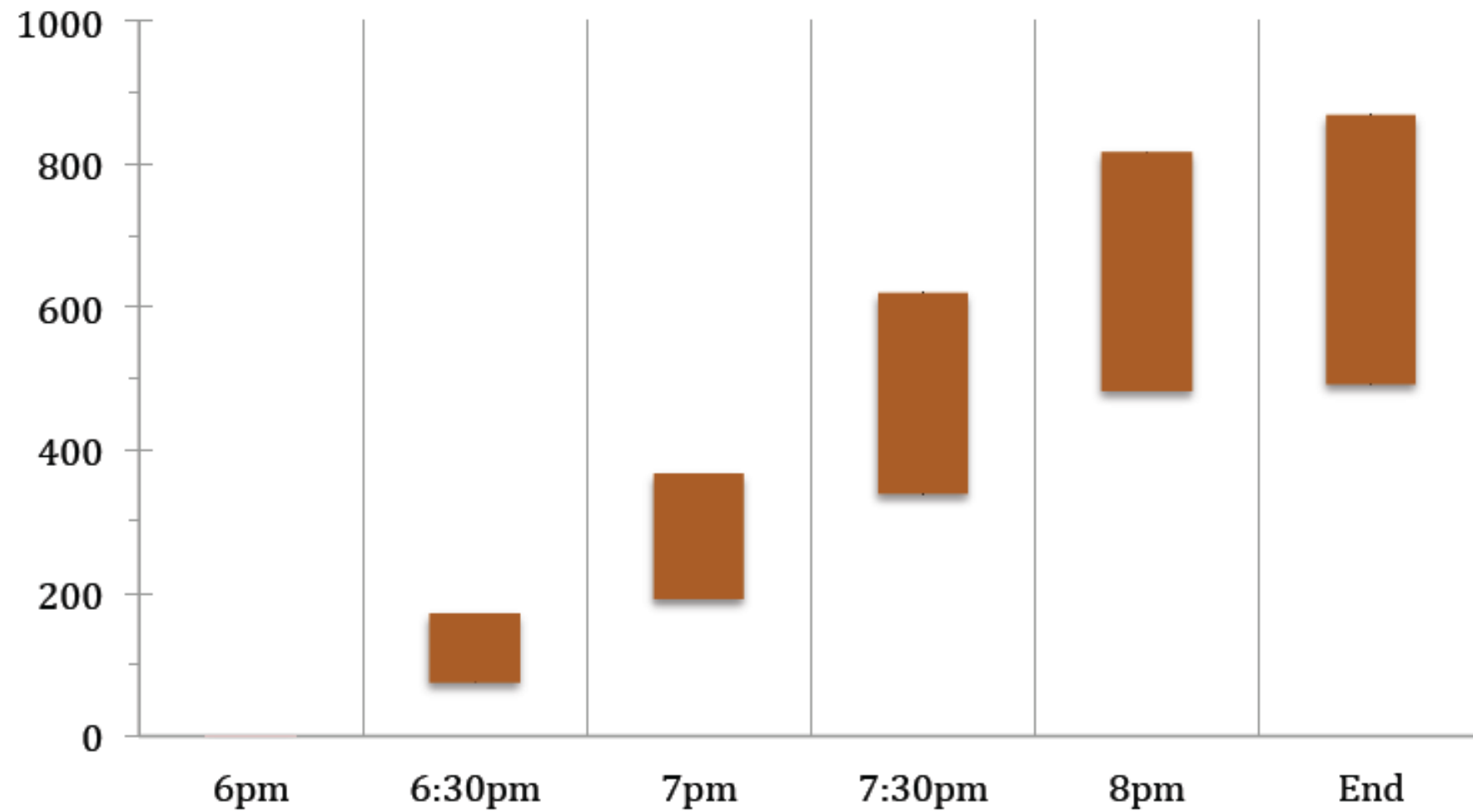


Line Charts for Time Series

(Usually a good option)

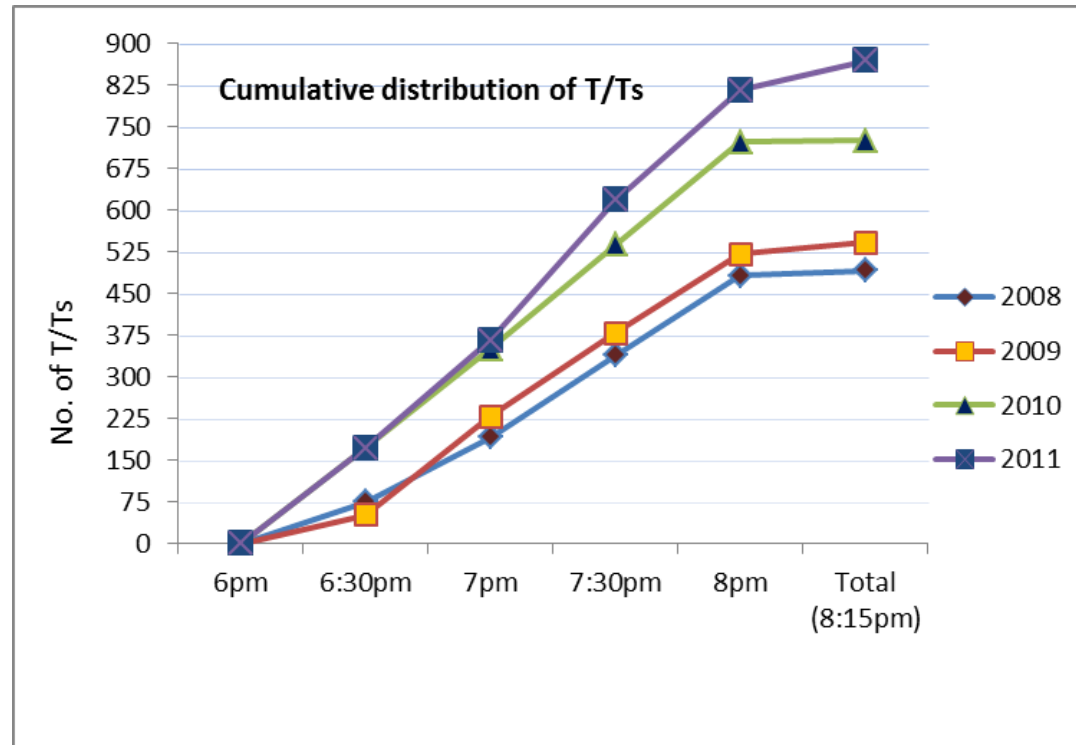


Range of Trick or Treaters Per Time 2008 - 2011

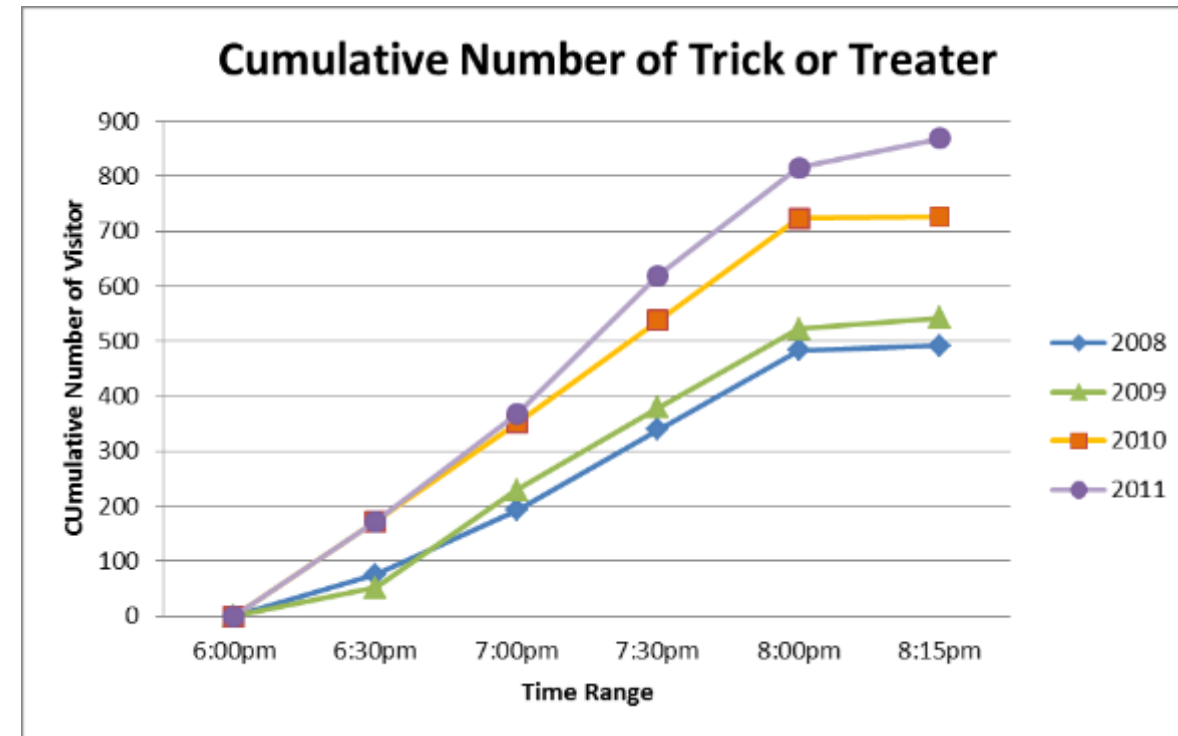


Avoid Excel Defaults

Person A

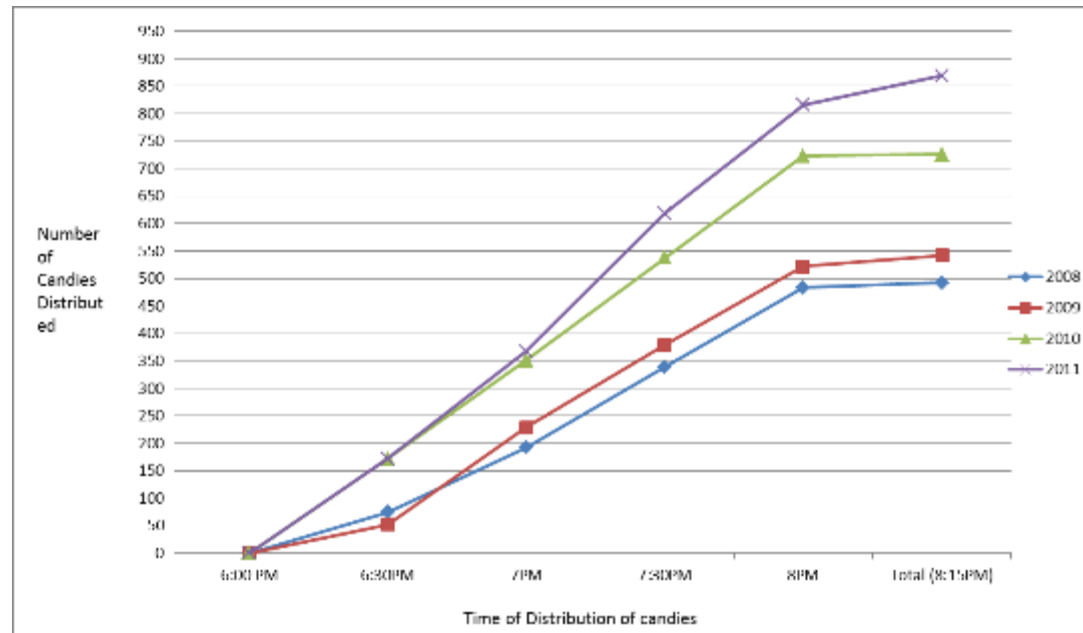


Person B

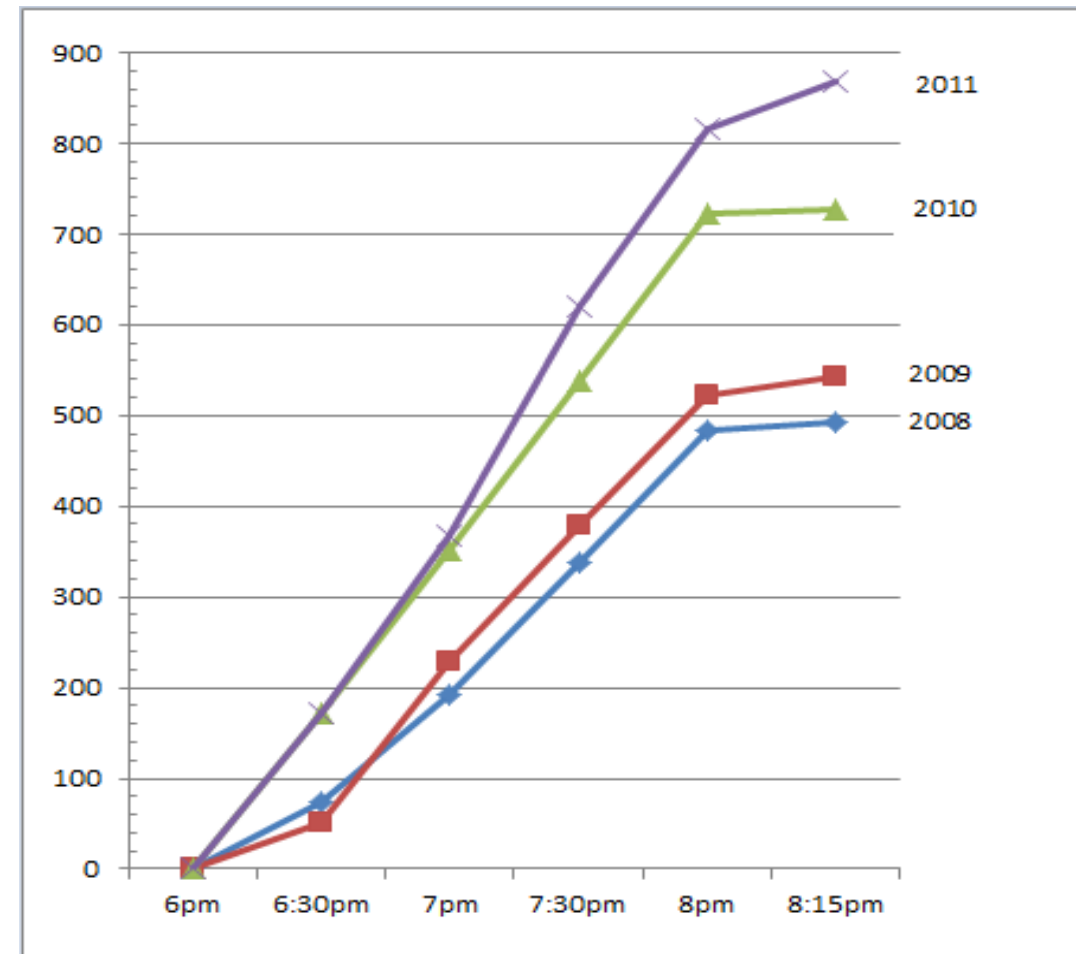


Avoid Excel Defaults

Person C

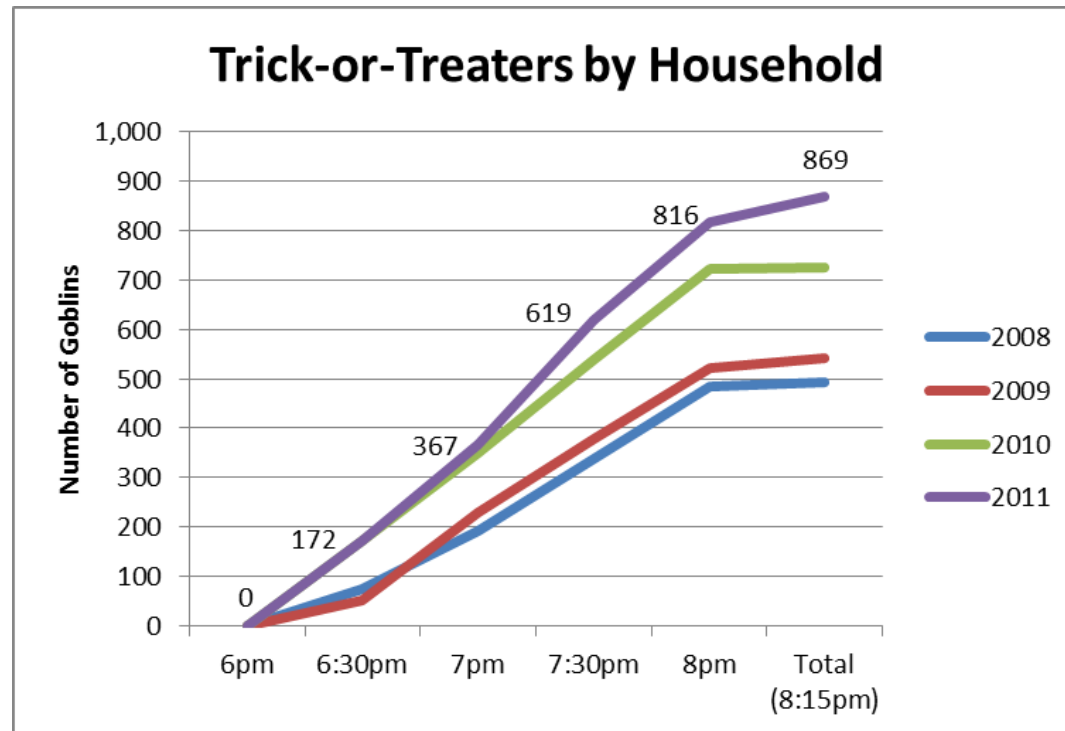


Person D

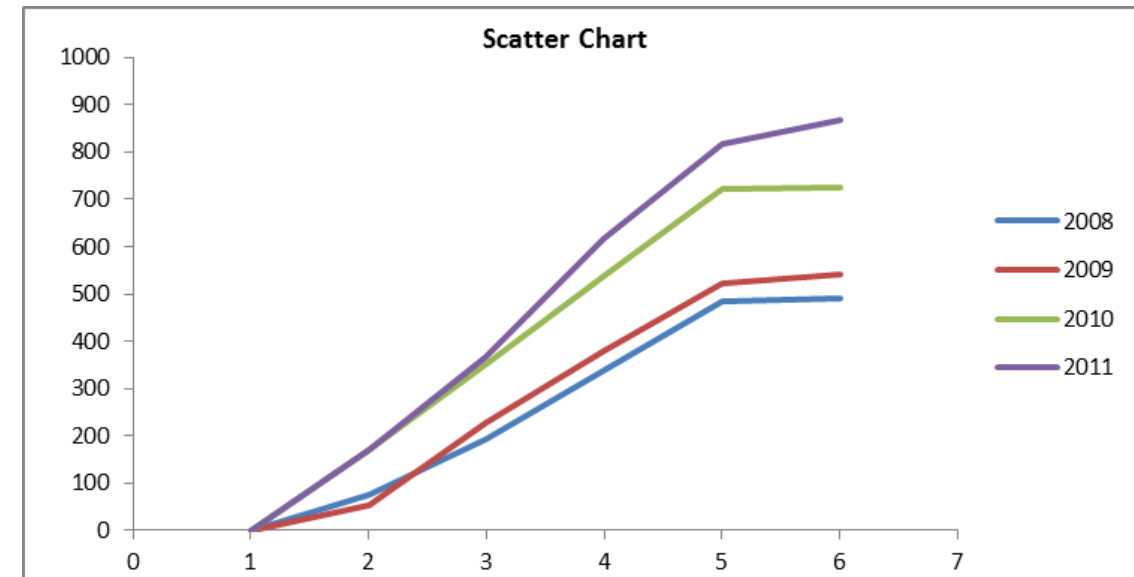


Avoid Excel Defaults

Person E

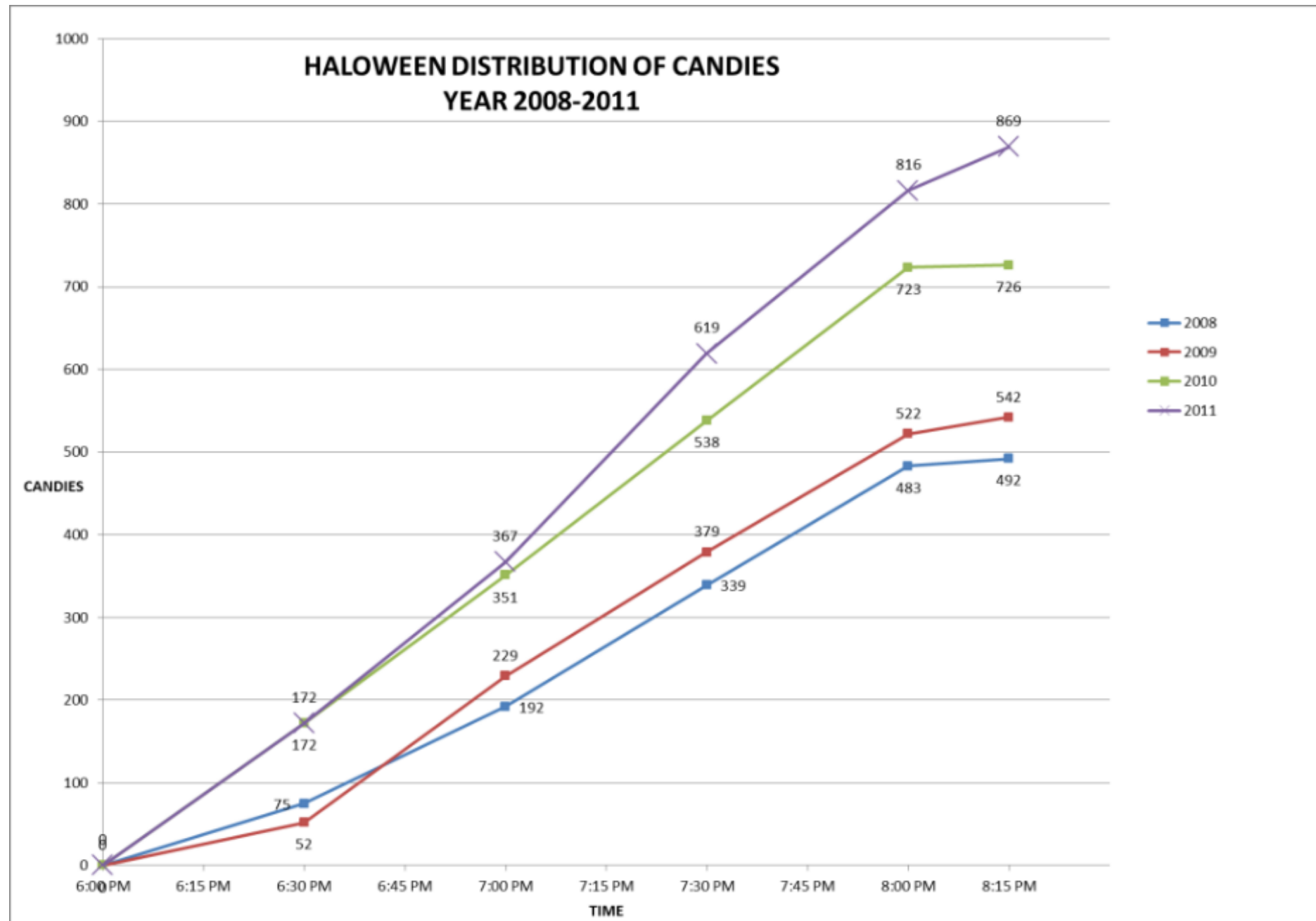


Person F



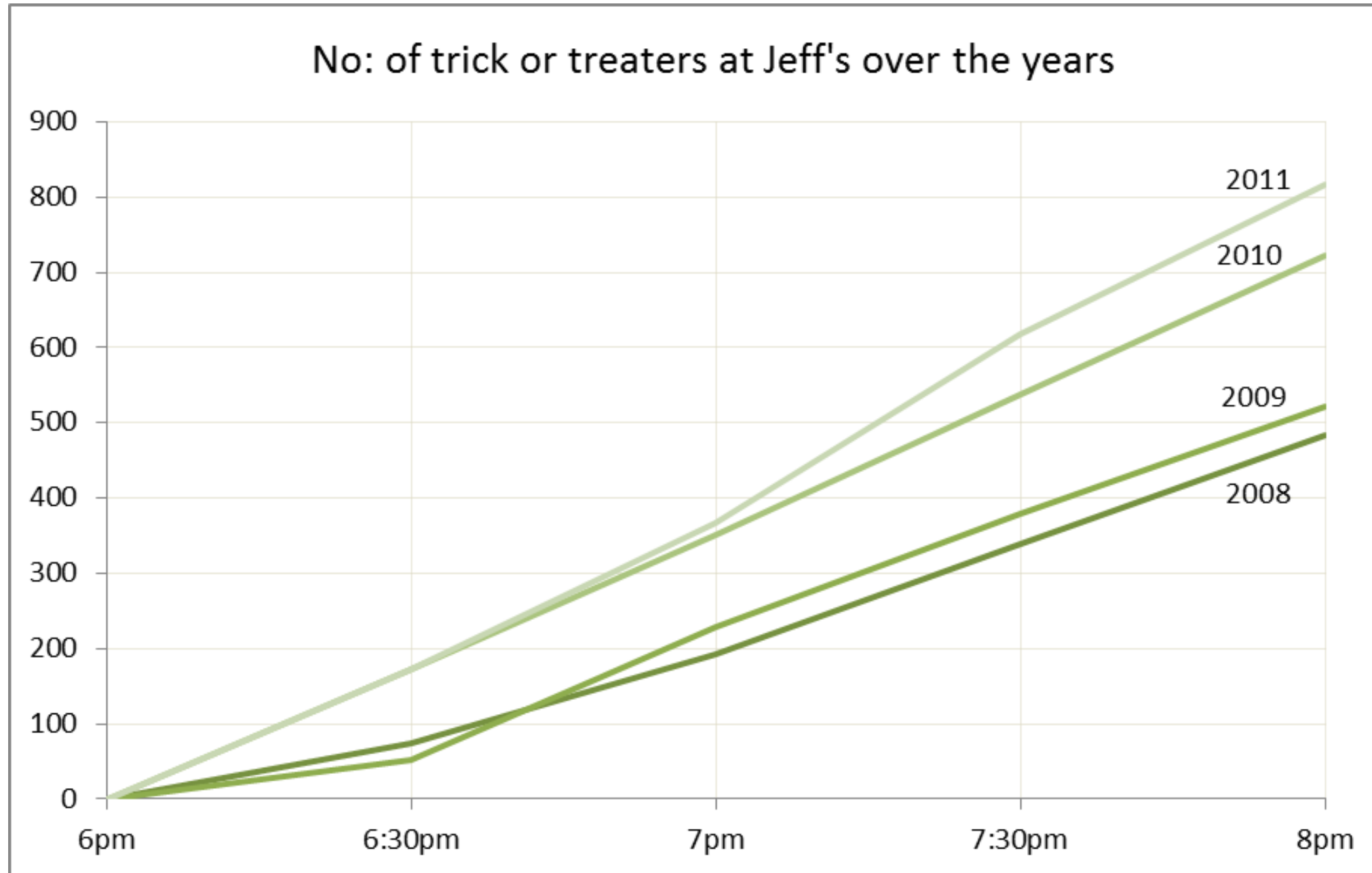
Avoid Excel Defaults

Person G



Avoid Excel Defaults

Sigh of Relief



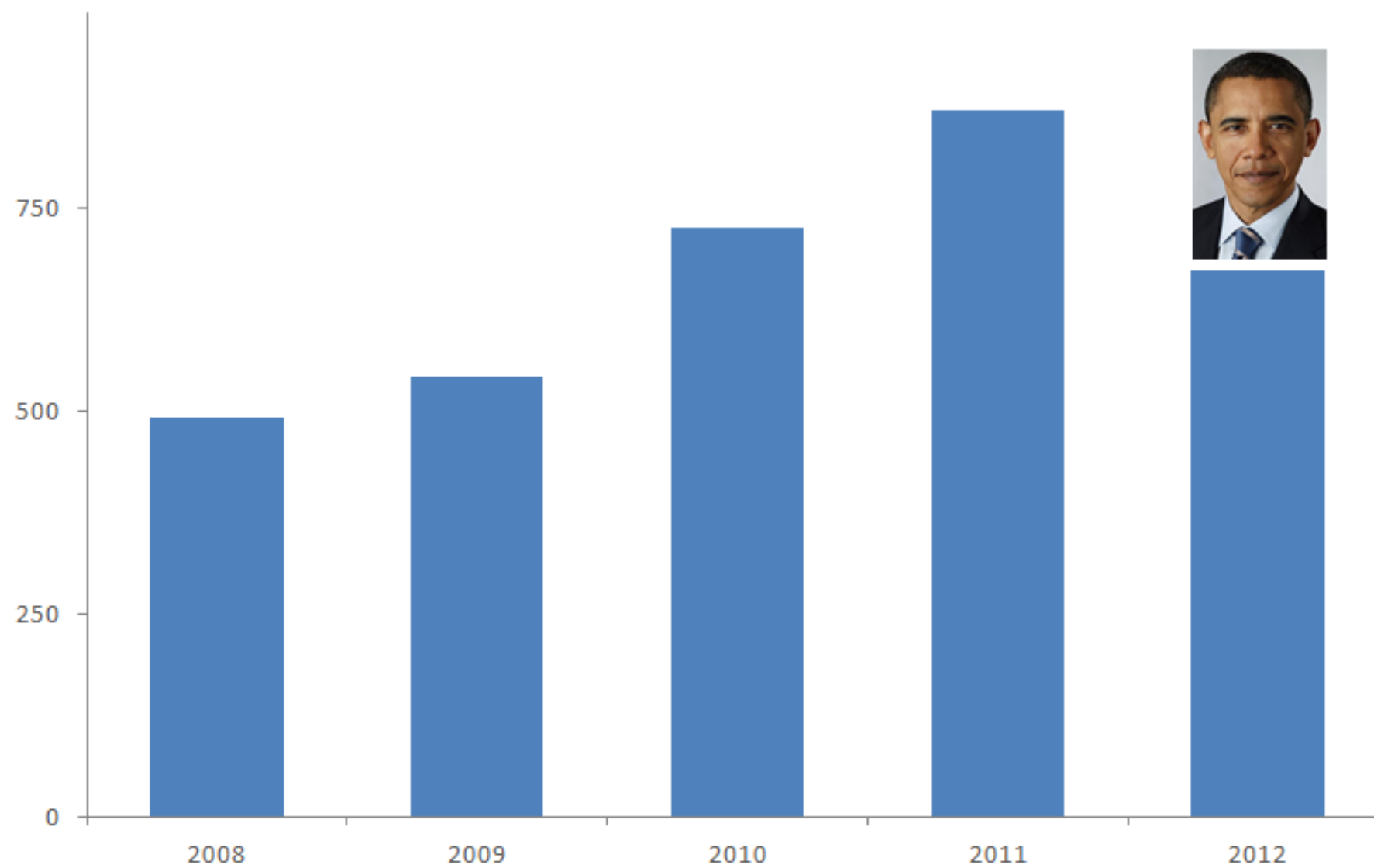
Remove
to improve
(the **data-ink** ratio)

Examples from 2013-2015



The Obama Factor

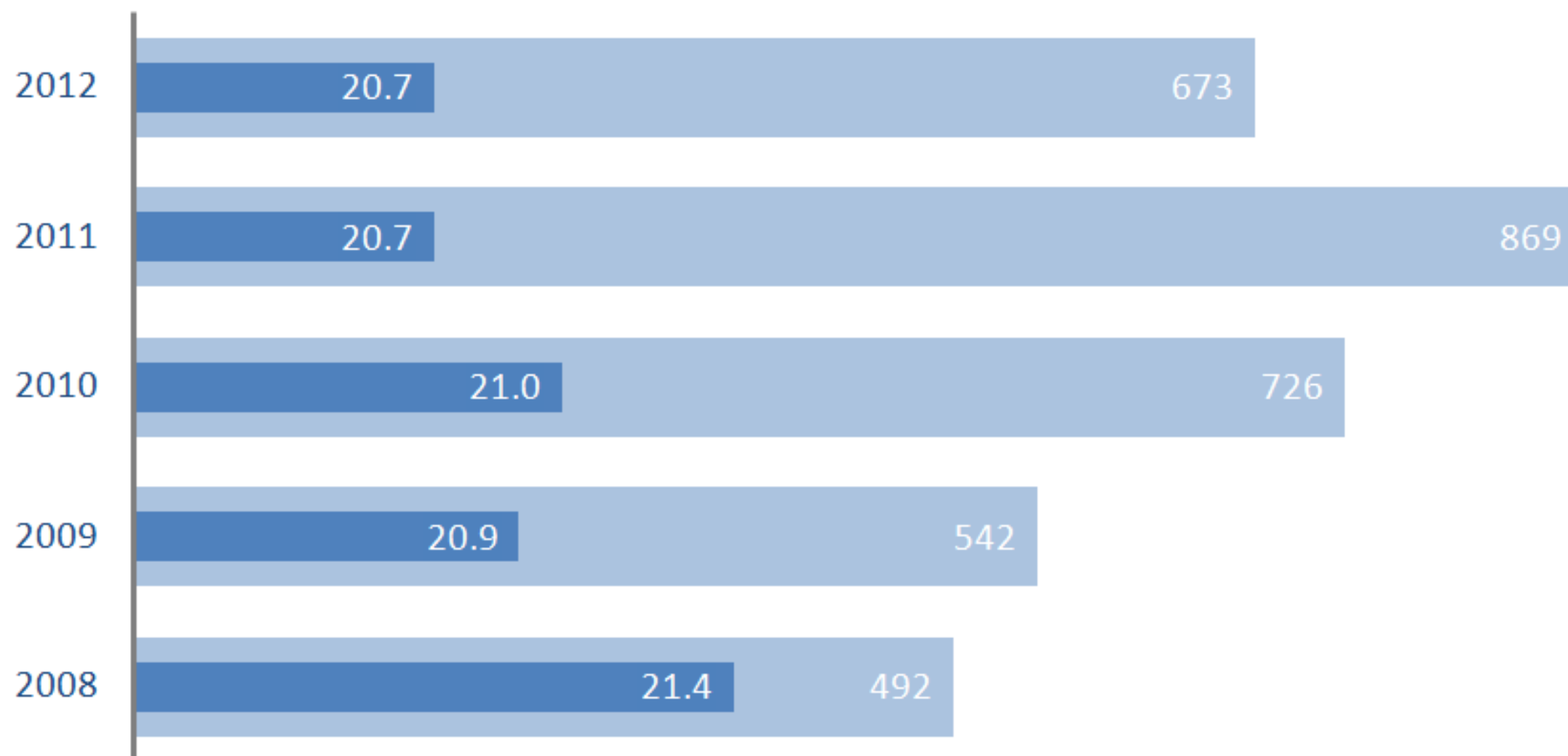
Trick or Treaters reduced in 2012 due to Obama speaking in Cincinnati



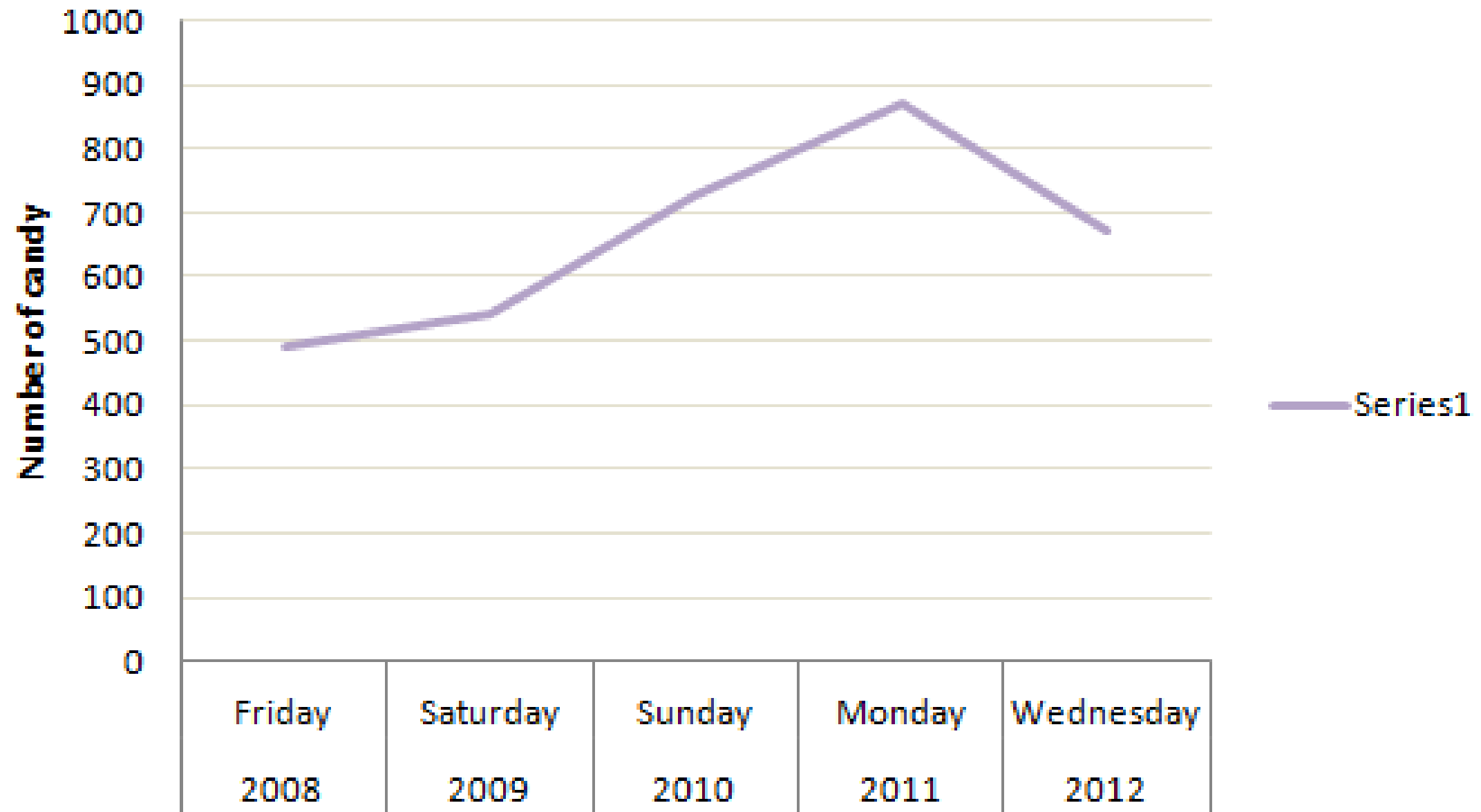
Number of 'Trick or Treaters' vs Unemployment Rate



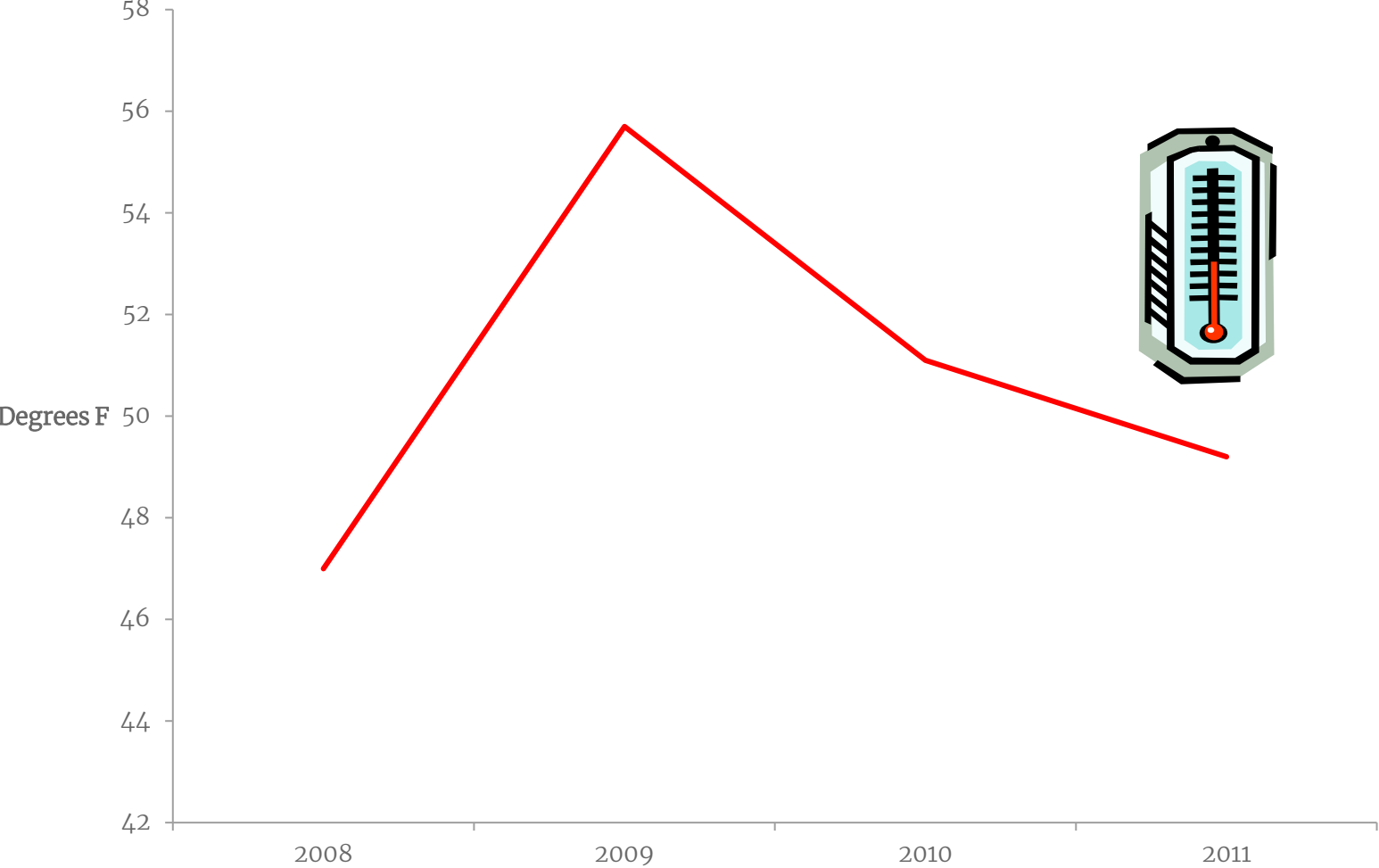
Total Visitors vs. Childhood Obesity %



Day of week v/s number of candy consumed



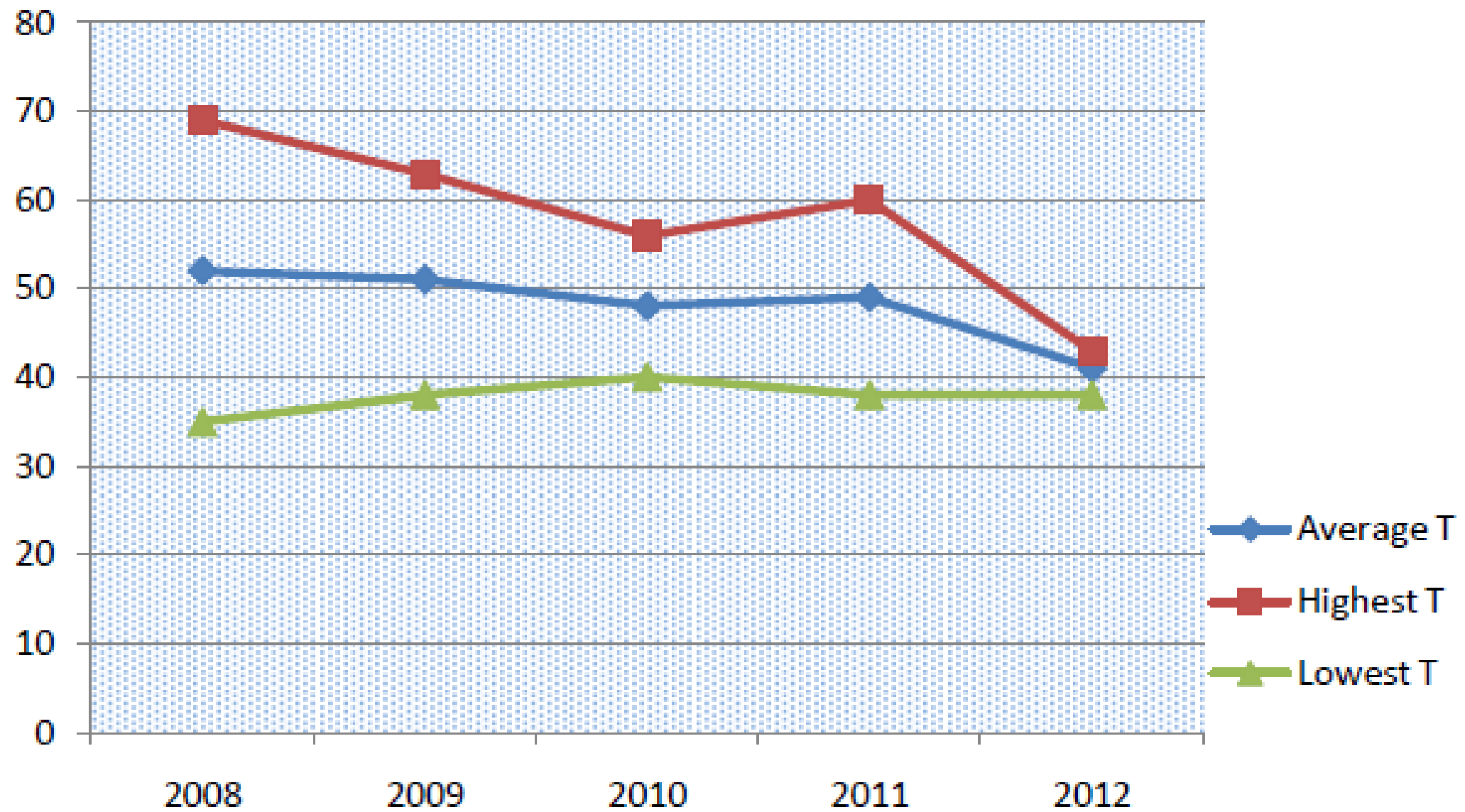
Average Temperature



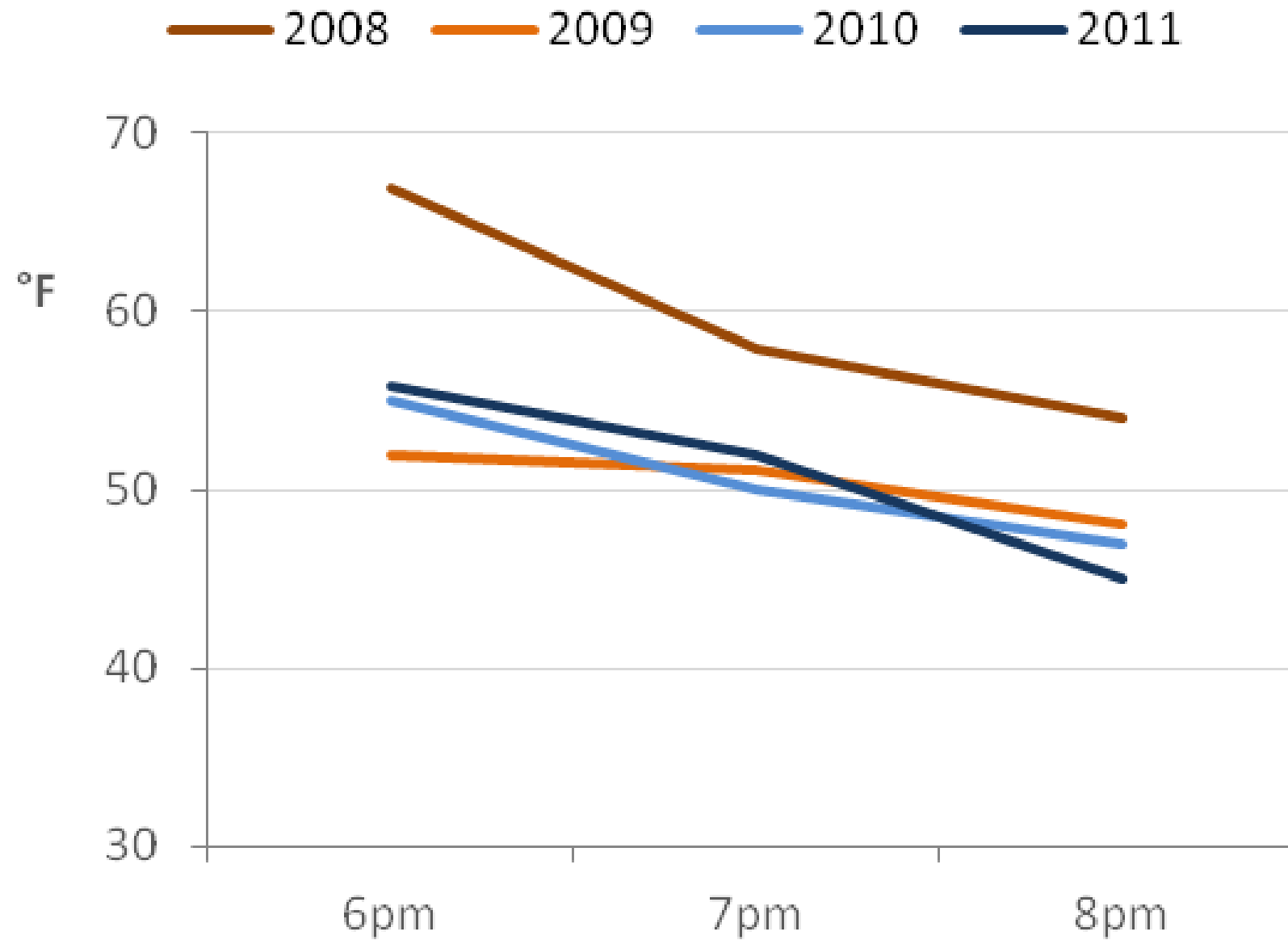
Temperature Date

	Min	Max	Average
2008	30	72	50
2009	39	66	54
2010	35	57	46
2011	39	60	49
2012	39	44	42

HALLOWEEN TEMPERATURE TREND

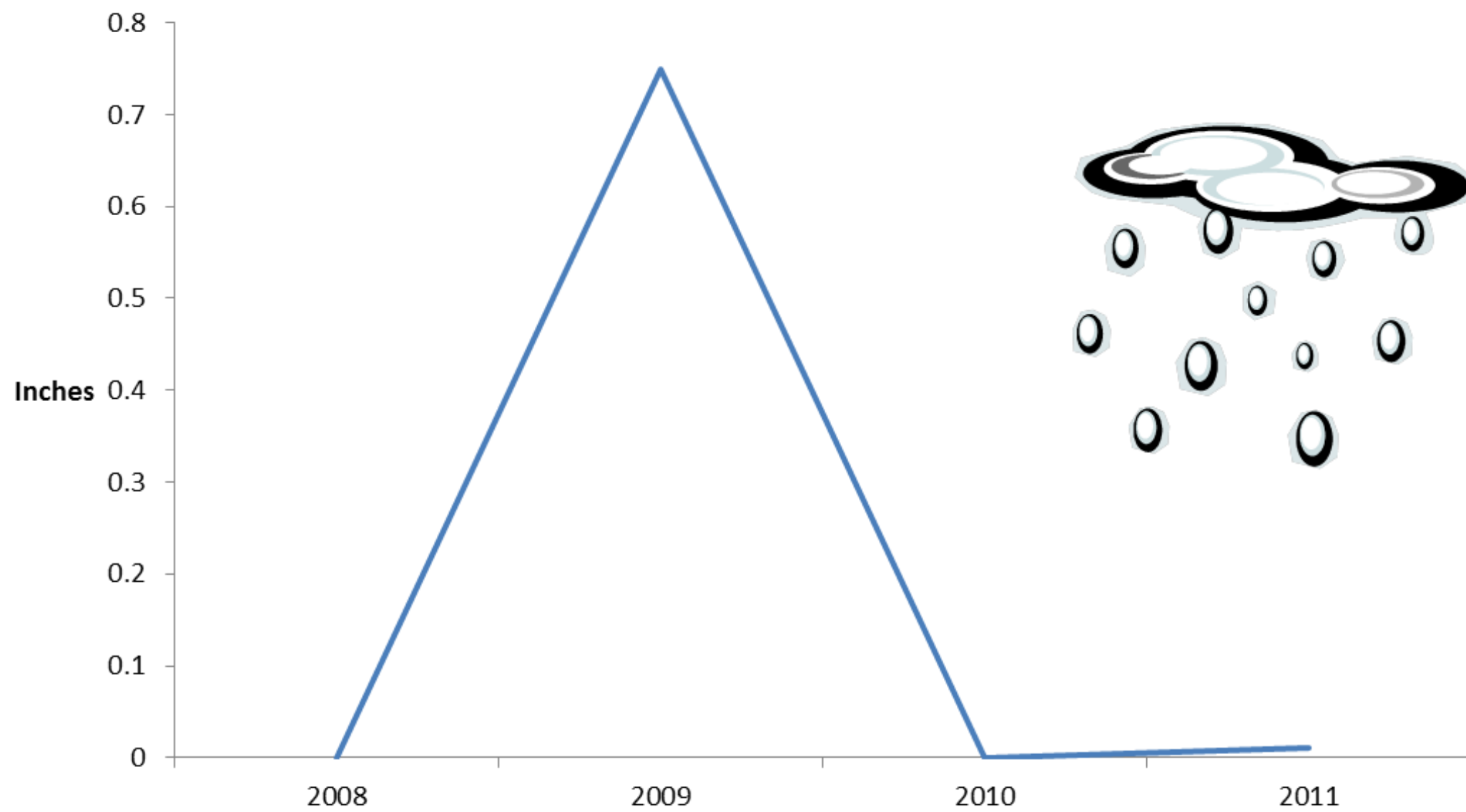


Hourly Temperature

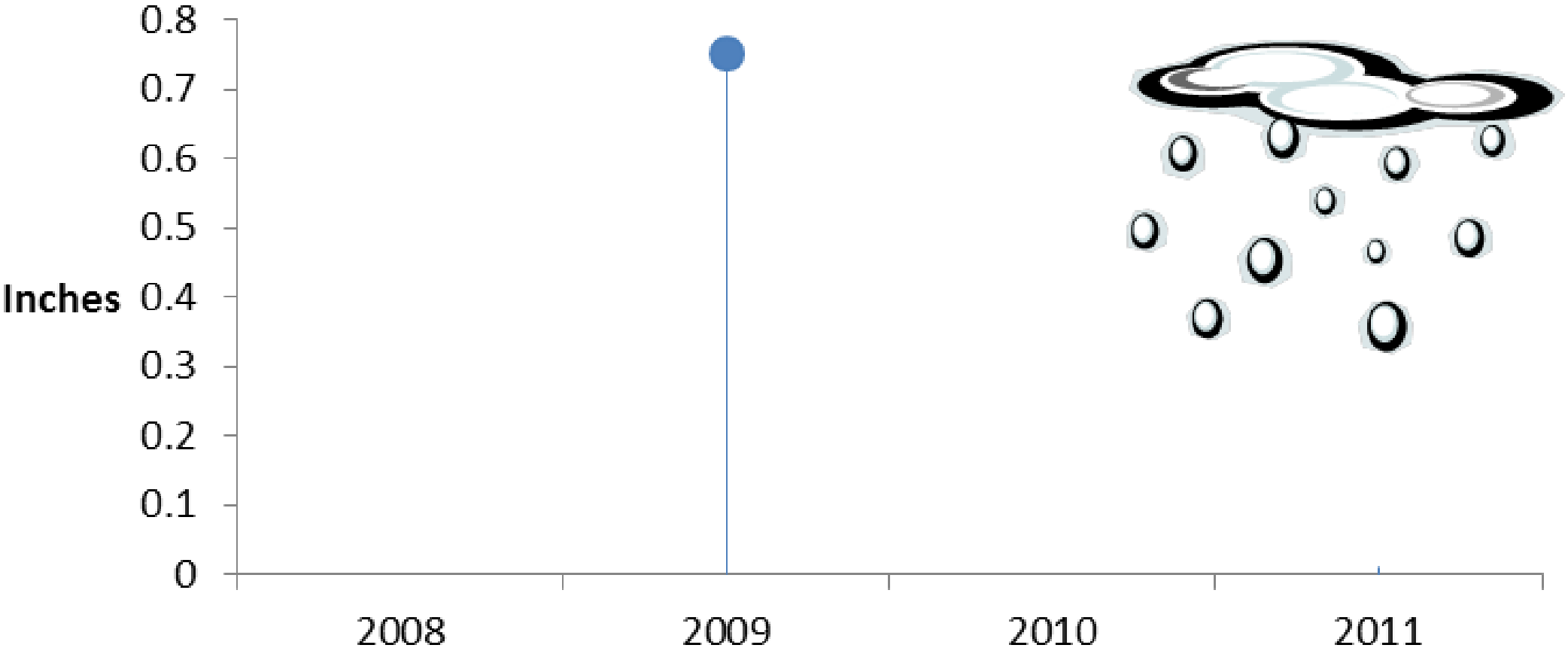


Source: Weather Underground

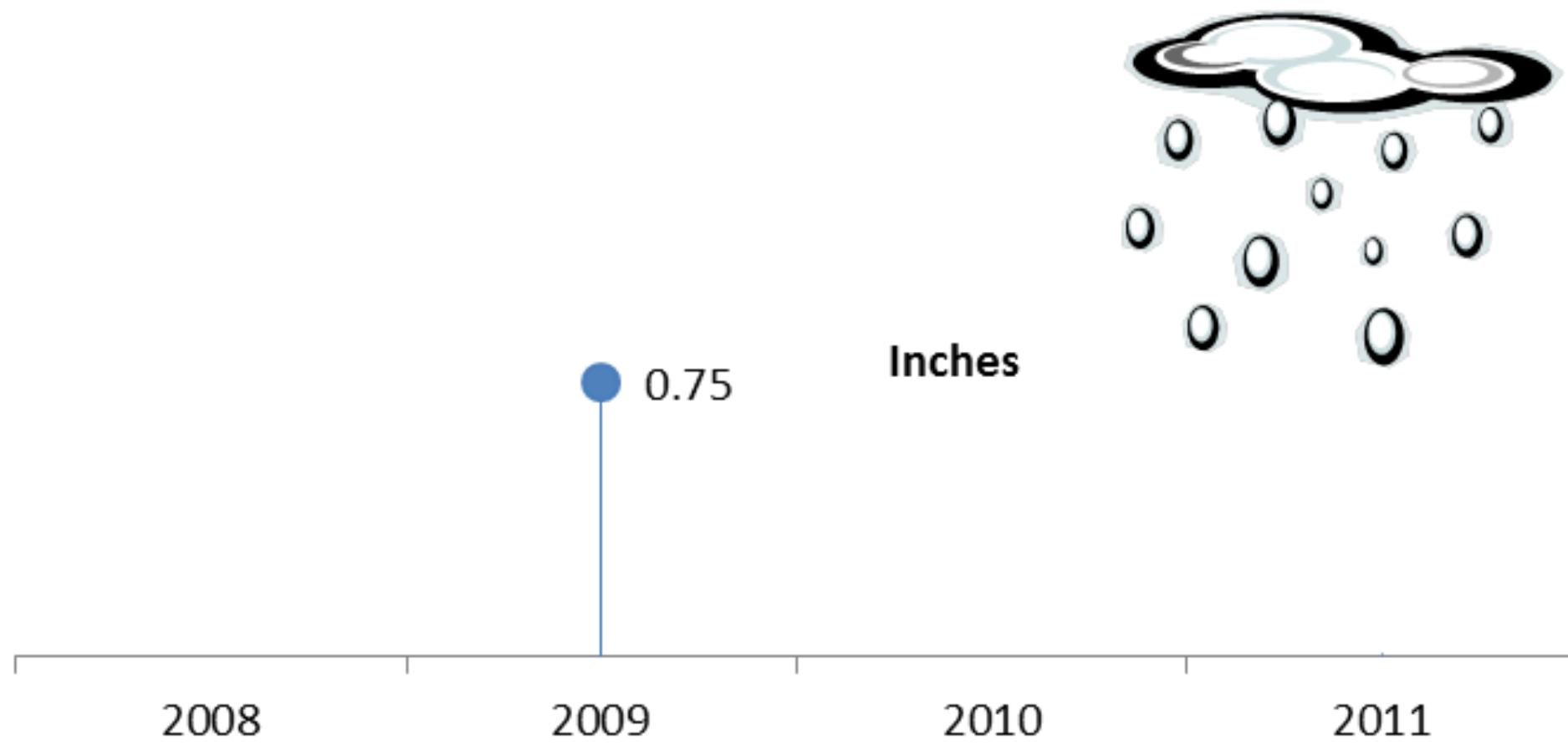
Total Precipitation



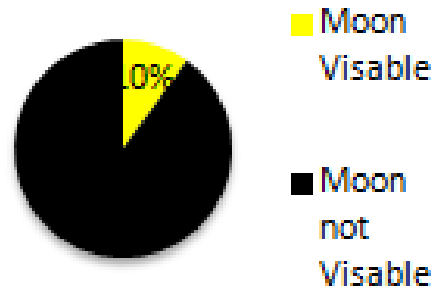
Total Precipitation



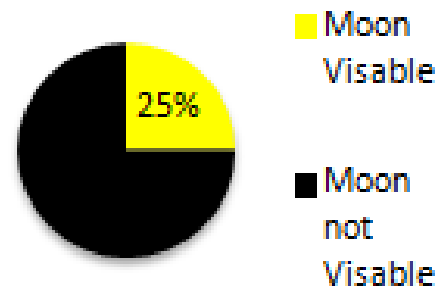
Total Precipitation



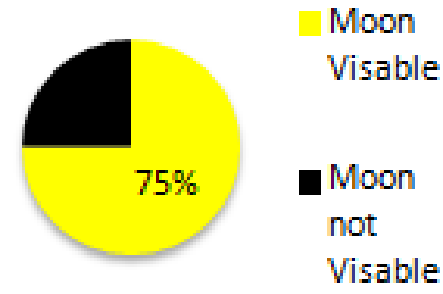
2008



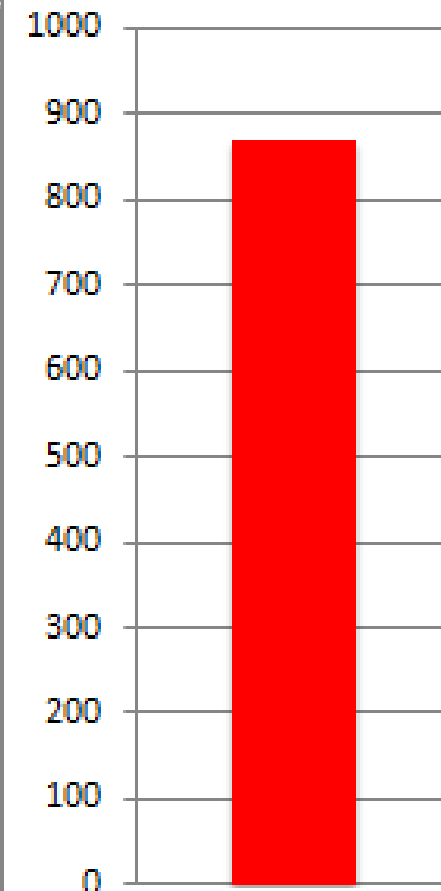
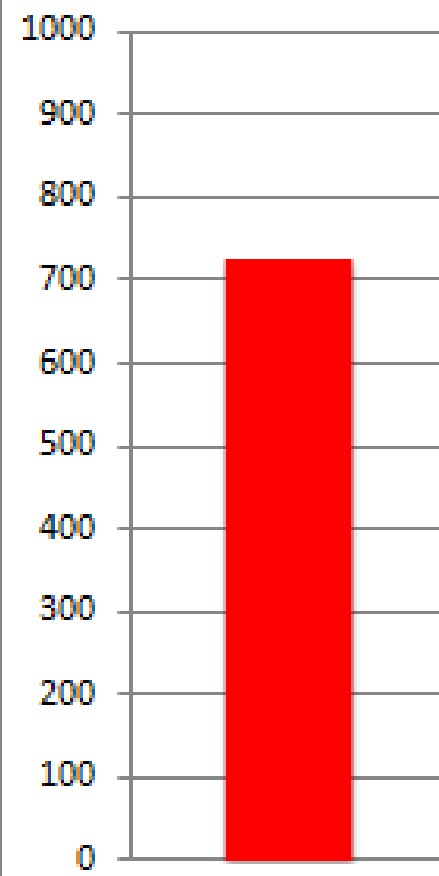
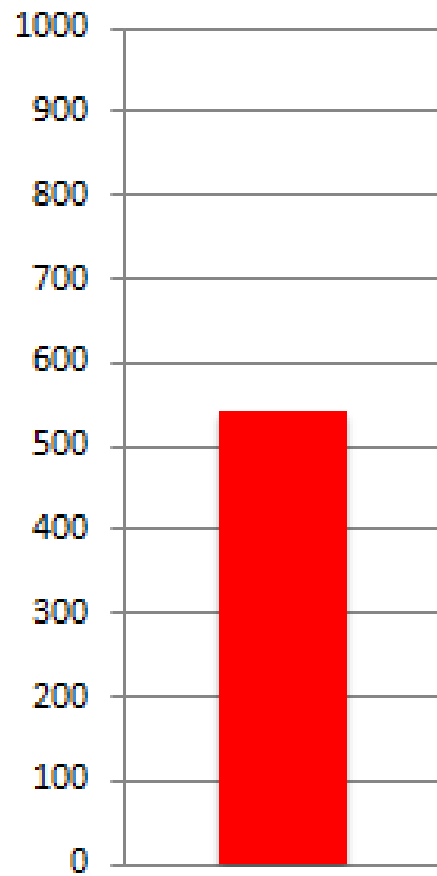
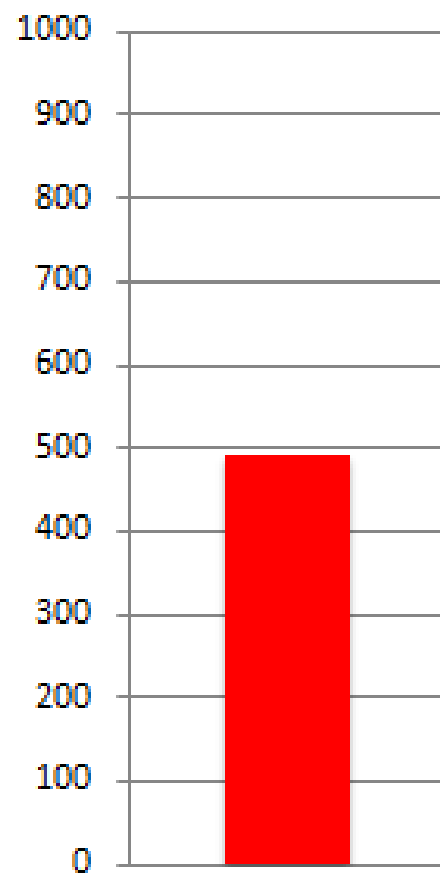
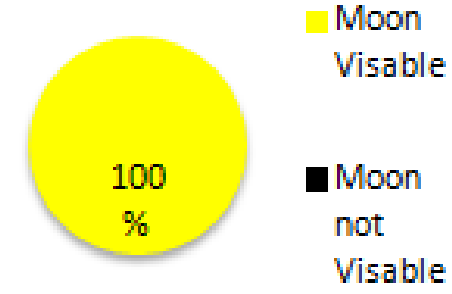
2009

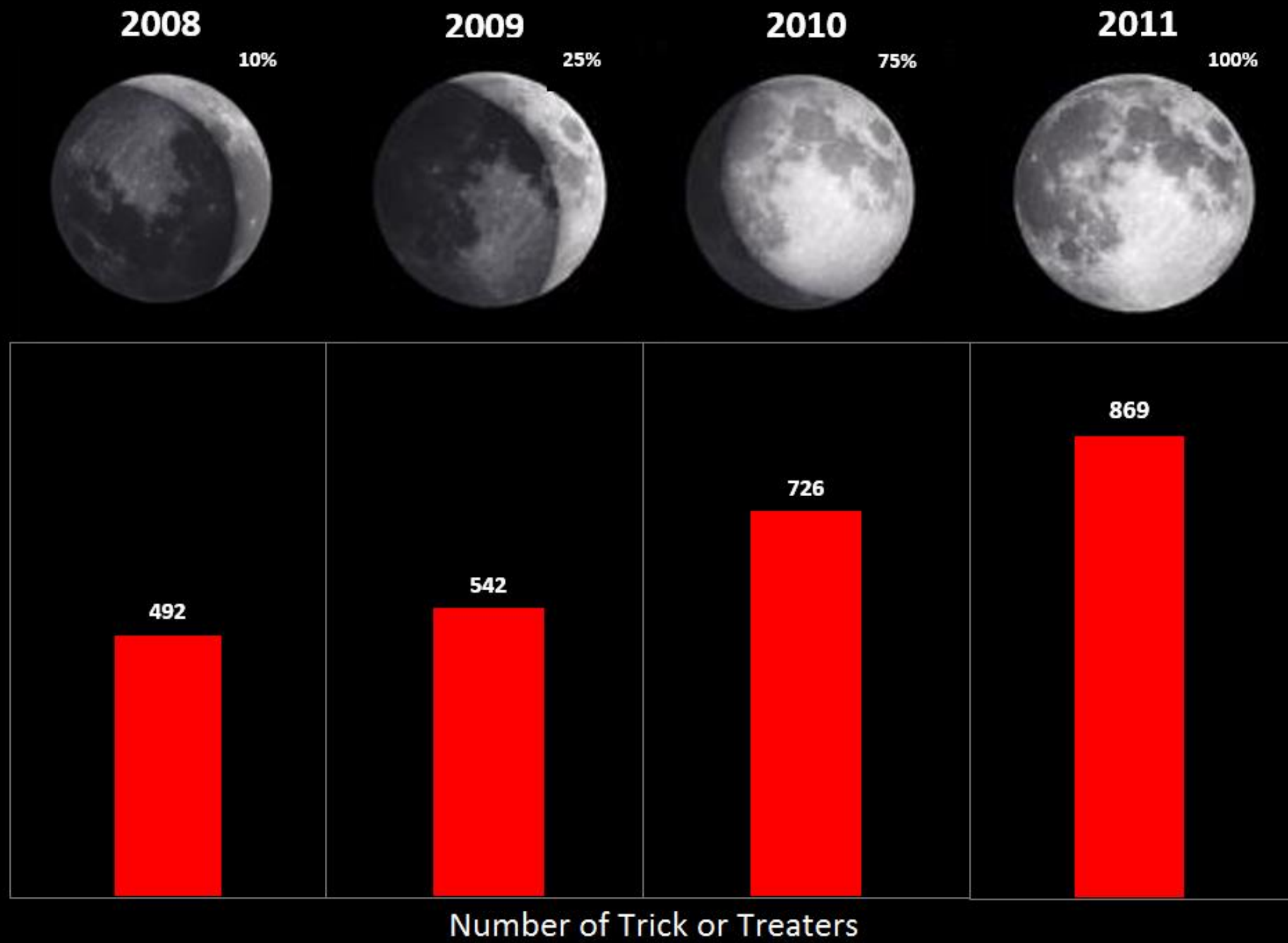


2010

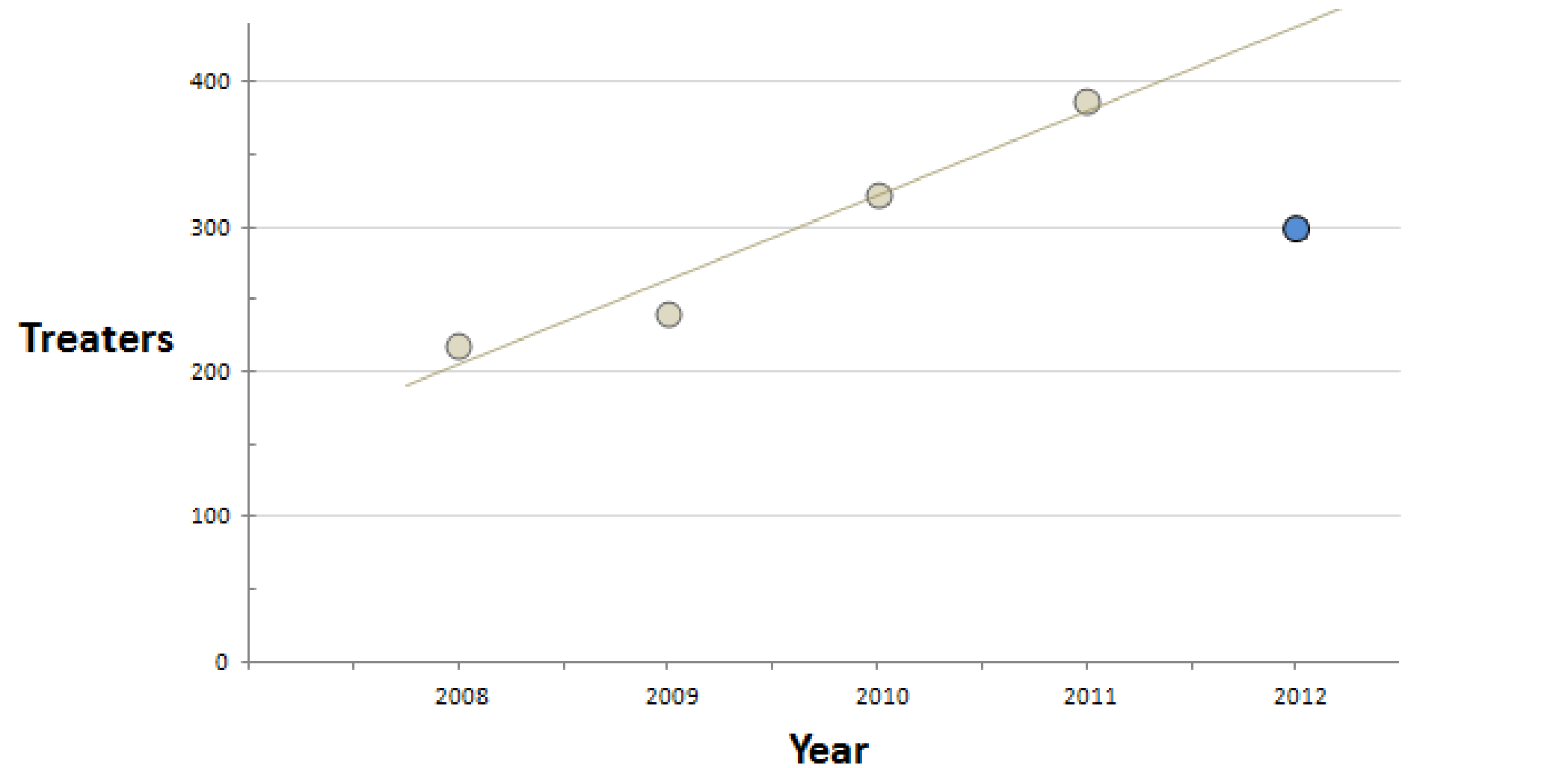


2011





Rain Reduces 2012 Halloween Turnout

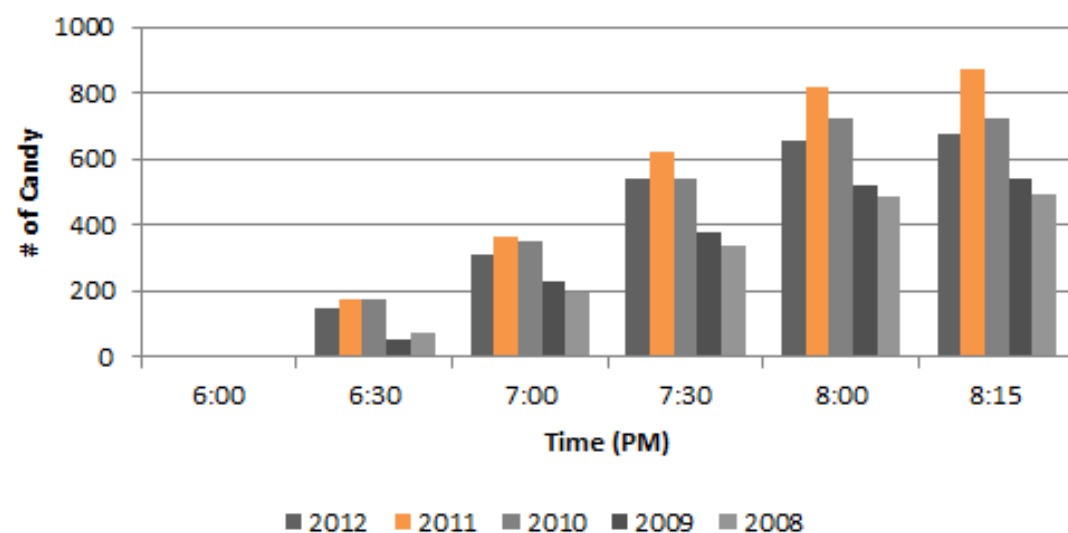


Source: Average Treaters per Hour, Halloween at Schaffers
Conditions on Halloween, WeatherUnderground.com

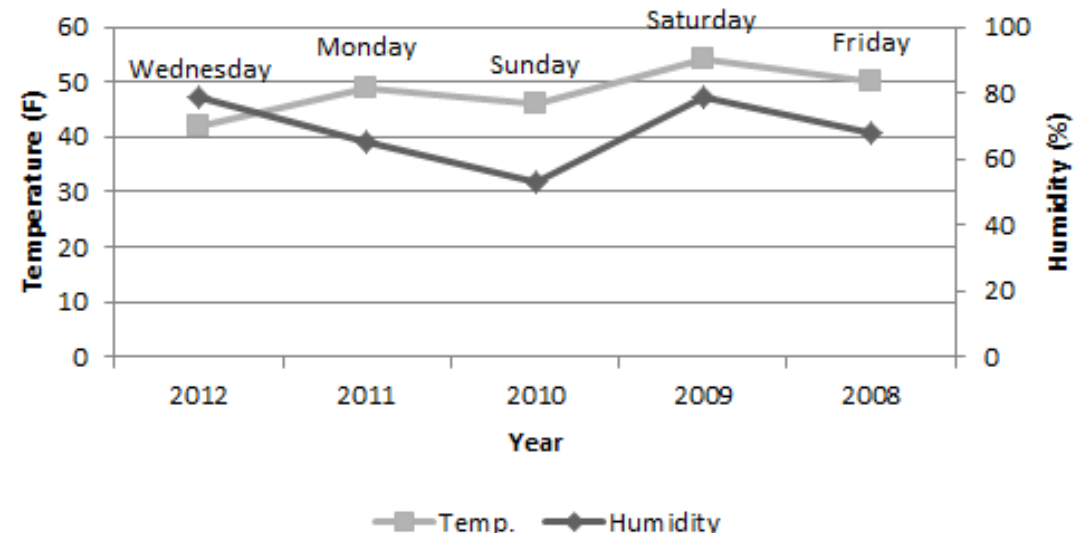
Created By: John Smith
1/18/2013

- Rain
- No Rain
- Treater 4-Year Growth Trend, when No Rain

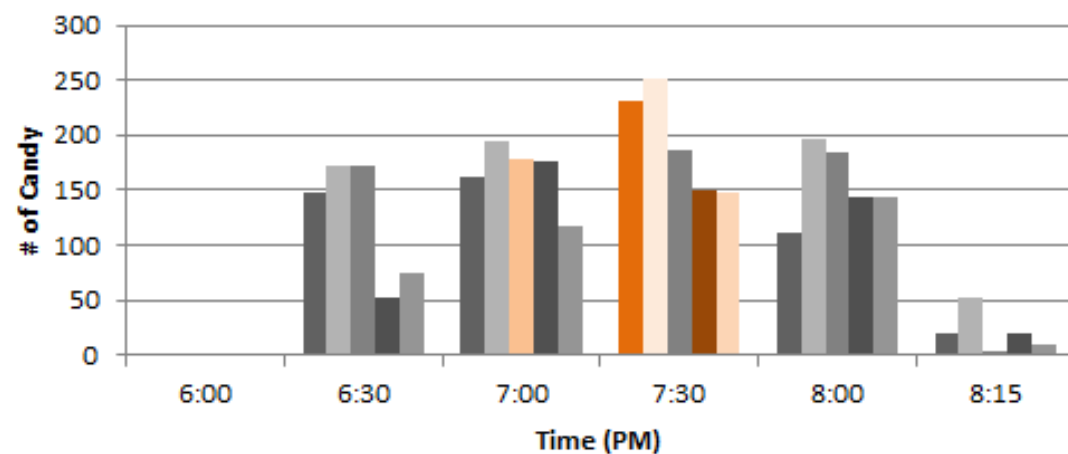
Yearly Candy Accumulation



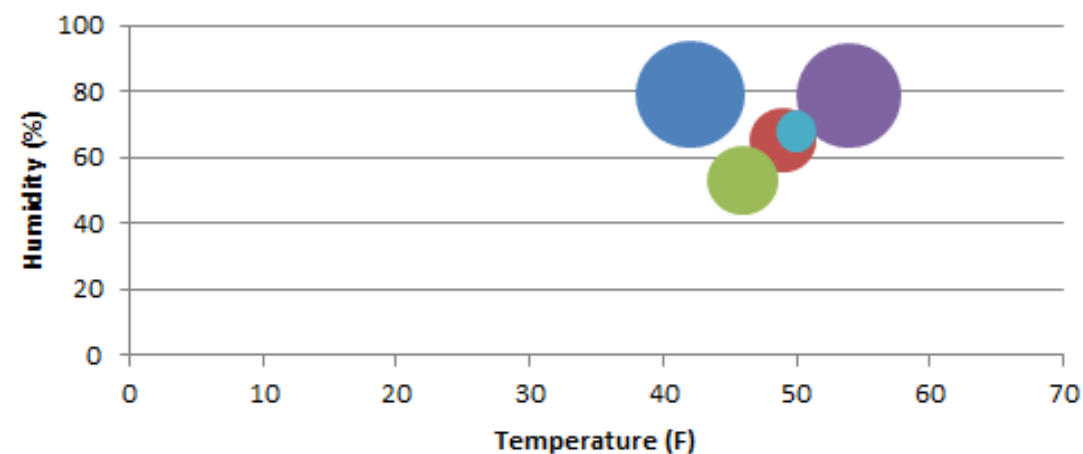
Weather/Day of Week



Yearly Candy Passed Out Each Hour



Weather and Moon Fullness



Halloween Candy Distribution For Years 2008 - 2012

Analysis of Observational Data

Total Counts Of Distributed Candies By Given Time

Year					
2012	147	310	542	653	673
2011	172	367	619	816	869
2010	172	351	538	723	726
2009	52	229	379	522	542
2008	75	192	339	483	492
	Candies by 6:30pm	Candies by 7pm	Candies by 7:30pm	Candies by 8pm	Candies total by 8:15pm

Distribution of candies has shown an **increasing trend** during the years 2008 - 2011. The distribution in **2012 decreased** compared to 2011 and 2010.

Candies Distributed In Separate Time Intervals

Year					
2012	147	163	232	111	20
2011	172	195	262	197	53
2010	172	179	187	185	3
2009	52	177	150	143	20
2008	75	117	147	144	9
Total	618	831	968	780	105
	Candies in 6:01-6:30pm	Candies in 6:31-7:00pm	Candies in 7:01-7:30pm	Candies in 7:31-8:00pm	Candies in 8:01-8:15pm

The **largest numbers of candies** were distributed **between 7:01pm and 7:30pm** in each reporting year (with the total of 968 candies in this interval) followed by 6:31-7:00pm and 7:31-8:00pm intervals. The year **2011** has consistently shown **the largest distributions** in all time intervals.

% Changes Of Distributed Candies In Separate Time Intervals, Referenced to 2008

Year					
2012	96%	39%	58%	-23%	37%
2011	129%	67%	71%	37%	77%
2010	129%	53%	27%	28%	48%
2009	-31%	51%	2%	-1%	10%
2008	0%	0%	0%	0%	0%
	% Changes in 6:01-6:30pm	% Changes in 6:31-7:00pm	% Changes in 7:01-7:30pm	% Changes in 7:31-8:00pm	% Changes Total by 8:15pm

Cost of Candy Per Year

