

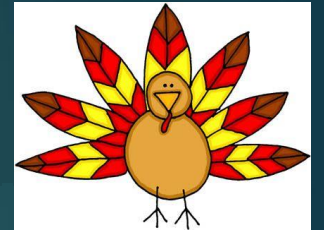
Math Moves Me on Black Friday 2014

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Math Moves Me on Black Friday 2014

- ▶ Every year, millions of Americans celebrate Thanksgiving on the last Thursday of November.
- ▶ The Friday morning after Thanksgiving is Black Friday, where stores have the biggest discounts of the year.
- ▶ I want to get some video games for my Nintendo 2DS for Christmas.
- ▶ I will help my mom so she doesn't have to go driving around comparing prices, and I will use math to calculate which are the best Black Friday deals.
- ▶ The two games that I want to compute are Pokémon Omega Ruby and Super Smash Bros.
- ▶ This year, Target and Toys R Us are offering discounts on both games on Black Friday.



Transportation Cost

Premium Shell Gasoline (tax included)	\$3.07 per gallon
Vehicle Fuel Efficiency	12 miles per gallon
One Way Distance to Toys R Us from Home	14.5 miles
One Way Distance to Target from Home	5.5 miles

► Equation for Cost of Gas:

$$G \text{ miles} \times \frac{1 \text{ gallon}}{12 \text{ miles}} \times \frac{\$3.07}{1 \text{ gallon}} = \frac{\$3.07 \cdot G}{12}$$

“G” represents how far the destination is in miles; for the round trip cost, multiply G by 2.

Round Trip Cost of Gas to Toys R Us: $(\$3.07 \times 14.5 \times 2) \div 12 = \7.42

Round Trip Cost of Gas to Target: $(\$3.07 \times 5.5 \times 2) \div 12 = \2.81

Round Trip Gas Cost to Toys R Us from Home \$7.42

Round Trip Gas Cost to Target from Home \$2.81

Video Game Cost

Pokémon Omega Ruby Retail Price	\$39.99
Super Smash Bros Retail Price	\$39.99
Pinellas County Sales Tax	7%

▶ Equation for Video Game Cost:

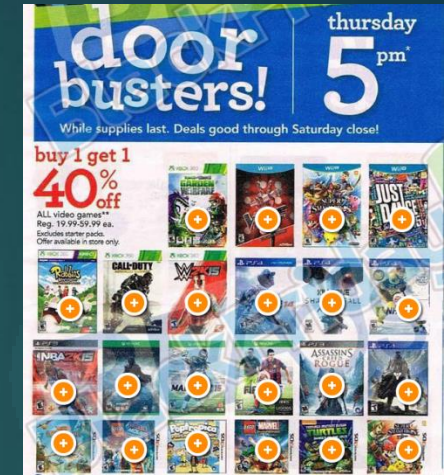
Total Cost = Item Cost + Total Sales Tax

- ▶ Total Sales Tax = Item Cost x Sales Tax
- ▶ First convert the percent of the tax to a decimal, then multiply the price of the item by the decimal.
- ▶ Total Sales Tax = $\$39.99 \times 0.07 = \2.80

Pokémon Omega Ruby Sales Tax	\$2.80
Super Smash Bros Sales Tax	\$2.80

Toys R Us Black Friday Sale: Buy 1 Full Price, Get 1 40% OFF

Round Trip Gas Cost to Toys R Us from Home	\$7.42
Cost of Pokémon Omega Ruby	\$39.99
Pokémon Omega Ruby Sales Tax	\$2.80
Cost of Super Smash Bros with 40% discount	\$23.99
Super Smash Bros Sales Tax with 40% discount	\$1.68



Cost of Super Smash Bros with discount of 40%:

- ▶ First, convert the percent of the discount to a decimal, then multiply the original price of the item by the decimal.
- ▶ $\$39.99 \times 0.40 = \16.00 (Discount)
- ▶ Next, subtract the discount from the original price.
- ▶ $\$39.99 - \$16.00 = \$23.99$

Total Sales Tax of Super Smash Bros with discount of 40%:

- ▶ $\$23.99 \times 0.07 = \1.68

Target Black Friday Sale: Buy 2, Get 1 Free



Round Trip Gas Cost to Target from Home	\$2.81
Cost of Pokémon Omega Ruby	\$39.99
Pokémon Omega Ruby Sales Tax	\$2.80
Cost of Super Smash Bros	\$39.99
Super Smash Bros Sales Tax	\$2.80
Free Game	\$0
Free Game Sales Tax	\$0

Black Friday Sales Comparison

Items	Toys R Us	Target
Round Trip Gas Cost to Store from Home	\$7.42	\$2.81
Cost of Pokémon Omega Ruby	\$39.99	\$39.99
Pokémon Omega Ruby Sales Tax	\$2.80	\$2.80
Cost of Super Smash Bros	\$23.99	\$39.99
Super Smash Bros Sales Tax	\$1.68	\$2.80
Free Game	N/A	\$0
Free Game Sales Tax	N/A	\$0
Total Cost	\$75.88	\$88.39

Total Cost at Toys R Us: $\$7.42 + \$39.99 + \$2.80 + \$23.99 + \$1.68 = \75.88

Total Cost at Target: $\$2.81 + \$39.99 + \$2.80 + \$39.99 + \$2.80 + \$0 + \$0 = \88.39

Black Friday Sale Conclusions

Items	Toys R Us	Target
Total Cost	\$75.88	\$88.39
Total Number of Games	2	3
Average Cost per Game	\$37.94	\$29.46

- ▶ My first observation is that Toys R Us seems like the best deal, because it has a lower total cost than Target.
- ▶ But, if I calculate the average cost per game, a different conclusion can be made.
- ▶ **Equation for Computing the Mean or Average Cost per Game**
- ▶
$$A = \frac{T}{N}$$
 A = Average or Arithmetic Mean T = Total Cost
 N = Number of games
- ▶ **Average Cost per Game at Toys R Us:** $\$75.88 \div 2 = \37.94
- ▶ **Average Cost per Game at Target:** $\$88.39 \div 3 = \29.46
- ▶ **After calculating the average cost per game, Target is the overall best deal.**

Game Combinations

- ▶ I would like to calculate how many combinations of games I can buy at the Target Buy 2, Get 1 Free Black Friday sale. As of 11/23/2014, there are 759 games available for the Nintendo 3DS.

- ▶ **Math Problem:**

In how many ways can 3 games be chosen from 759 games to form the Buy 2, Get 1 Free deal at Target?

- ▶ **Game Combinations Equation:**

Number of Combinations = $\frac{n!}{r!(n-r)!}$ $n = \#$ of total items

$r = \#$ of items being chosen

$$= \frac{759!}{3!(759-3)!} = \mathbf{72,586,459 \text{ game combinations}}$$

Game Probability

- ▶ If my mom forgot which games I wanted for Christmas, what is the probability that she will randomly pick exactly these 2 games (Super Smash Bros and Pokémon Omega Ruby) that I want out of the 759 available games?

- ▶ **Probability Equation**

$$P = \frac{\text{The Number of Ways Event Can Occur}}{\text{The Total Number of Possible Outcomes}}$$

- ▶ **Dependent events:** Two events are dependent when the outcome of the first event affects the outcome of the second event. The probability of the two events happening is the product of probability of the first event happening and the probability of the second event happening.

$$\frac{1}{759} \times \frac{1}{758} = \frac{1}{575,322} \text{ chance that my mom will pick the correct 2 games}$$

Resources:

- ▶ blackfriday.com
- ▶ www.google.com/maps
- ▶ www.fueleconomy.gov
- ▶ www.gasbuddy.com
- ▶ happythanksgivingpictures-2014.com/wp-content/uploads/2014/11/thanksgiving-pictures-clip-art.jpg
- ▶ www.nintendo.com