

COMPACTED MATHEMATICS: CHAPTER 7C

FOOD AND RESTAURANTS



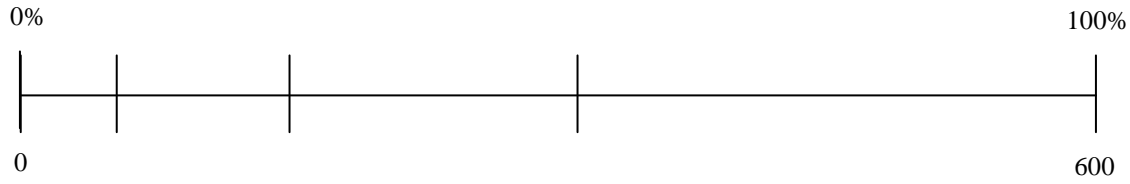
Archaeologist finds the first food pyramid.

PERCENTAGE EQUATIONS TOPICS COVERED:

- Percent of a number
- Sales, discounts, taxes, and tips
- Create a Menu Project



Gallop surveyed 600 people concerning their favorite food.



| | | |
|----|---|--|
| 1. | 10% voted for ice cream. How many people voted for ice cream? | |
| 2. | 25% voted for hamburgers. How many people voted for hamburgers? | |
| 3. | 50% voted for pizza. How many people voted for pizza? | |
| 4. | 15% voted for pie. How many people voted for pie? | |
| 5. | What percentage of people did not vote for pie? | |
| 6. | How many people did not vote for hamburgers? | |
| 7. | What percentage of people did not vote for ice cream? | |

| Number | 0% | 10% | 25% | 50% | 100% |
|--------|----|-----|-----|-----|------|
| 20 | | | | | |
| 40 | | | | | |
| 120 | | | | | |
| 800 | | | | | |

| % | Pattern |
|-----|---------|
| 0 | |
| 10 | |
| 25 | |
| 50 | |
| 100 | |

Use the information in the box below and mental math to help you solve the problems.

| Percent | Fraction | Decimal | Means | What To Do |
|----------------|-----------------|----------------|-------------------------|--|
| 200% | 2 | 2.00 | twice as much | Multiply by 2 |
| 100% | 1 | 1.00 | the same as the number | Write the number |
| 75% | $\frac{3}{4}$ | 0.75 | $\frac{3}{4}$ as much | Multiply by $\frac{3}{4}$ or 0.75 (divide by 4, then multiply by 3) |
| 50% | $\frac{1}{2}$ | 0.5 | $\frac{1}{2}$ as much | Multiply by $\frac{1}{2}$ or 0.5 (or divide by 2) |
| 25% | $\frac{1}{4}$ | 0.25 | $\frac{1}{4}$ as much | Multiply by $\frac{1}{4}$ or 0.25 (or divide by 4) |
| 10% | $\frac{1}{10}$ | 0.1 | $\frac{1}{10}$ as much | Multiply by $\frac{1}{10}$ or 0.1 (or divide by 10) |
| 1% | $\frac{1}{100}$ | 0.01 | $\frac{1}{100}$ as much | Multiply by $\frac{1}{100}$ or 0.01 (or divide by 100) |

Solve mentally.

| | | | | | | | | |
|-----|-------------|--|-----|------------|--|-----|------------|--|
| 1. | 100% of 16 | | 2. | 10% of 80 | | 3. | 50% of 60 | |
| 4. | 200% of 10 | | 5. | 25% of 104 | | 6. | 50% of 50 | |
| 7. | 200% of 4 | | 8. | 100% of 23 | | 9. | 25% of 96 | |
| 10. | 100% of 200 | | 11. | 50% of 40 | | 12. | 25% of 100 | |
| 13. | 10% of 150 | | 14. | 75% of 40 | | 15. | 100% of 10 | |
| 16. | 10% of 230 | | 17. | 50% of 38 | | 18. | 10% of 200 | |
| 19. | 200% of 7 | | 20. | 10% of 240 | | 21. | 25% of 44 | |
| 22. | 100% of 12 | | 23. | 200% of 6 | | 24. | 10% of 400 | |
| 25. | 5% of 500 | | 26. | 1% of 300 | | 27. | 1% of 1000 | |

Find the percent of each number.

| | | | | | | | | |
|-----|------------|--|-----|--------------|--|-----|-------------|--|
| 1. | 75% of 52 | | 2. | 40% of 65 | | 3. | 15% of 80 | |
| 4. | 30% of 24 | | 5. | 62.5% of 96 | | 6. | 9% of 20 | |
| 7. | 28% of 75 | | 8. | 95% of 60 | | 9. | 70% of 15 | |
| 10. | 12% of 300 | | 11. | 85% of 48 | | 12. | 125% of 16 | |
| 13. | 0.6% of 5 | | 14. | 36% of 175 | | 15. | 48% of 50 | |
| 16. | 160% of 90 | | 17. | 65% of 120 | | 18. | 87.5% of 56 | |
| 19. | 5% of 85 | | 20. | 90% of 18 | | 21. | 0.4% of 150 | |
| 22. | 120% of 70 | | 23. | 37.5% of 104 | | 24. | 52% of 25 | |
| 25. | 80% of 40 | | 26. | 45% of 200 | | 27. | 2.5% of 4 | |

Solve each word problem.

| | | |
|-----|--|--|
| 28. | Michael read 35% of his 140-page book. How many pages did he read? | |
| 29. | Lisa delivered 75% of her 120 newspapers. How many papers did she deliver? | |
| 30. | Of the 368 students enrolled at Carroll Middle School, 276 take either band or chorus. What percentage of CMS's students take band or chorus? | |
| 31. | 25% of Johnson's 132 fourth graders made the honor roll. One-third of the honor roll students made straight A's. How many fourth graders made straight A's? | |
| 32. | In a basketball game, Jenna made 50% of her 3-point shots, 75% of her 2-point shots, and 100% of her free throws. If Jenna attempted 14 3-pointers, 8 2-pointers, and 1 free throw, how many points did she score? | |
| 33. | What percent of the states in the United States have two word names? | |
| 34. | Brad just celebrated his eighth birthday. His dad's age is 375% of Brad's. How old will Brad's dad be in three years? | |
| 35. | 50% of one year equals how many weeks? | |
| 36. | 40% of the states are larger in area than Georgia. What is Georgia's rank in area? | |
| 37. | 25% of a gallon of milk equals how many ounces? | |
| 38. | 50% of three dimes, three nickels, and three pennies equals... | |
| 39. | 75% of a yard equals how many inches? | |
| 40. | 25% of the band and choral students at Carroll Middle School are in beginning band, which is made up of one-third girls. How many girls are in beginning band? | |
| 41. | 75% of the months that end with the letter "y" have ____ days each. | |
| 42. | 59% of a piano's keys are white. What's the difference between the percentage of white keys and black keys? | |

You now get to create a menu for your restaurant! The menu should include the following items:

A restaurant name

A menu with prices for every item

The menu should contain at least:

- 3 appetizers
- 6 entrees (main dishes)
- 5 side items
- 4 desserts
- 5 beverages (no alcohol)

Please have each item listed individually – no combo meals.

Items on the menu must be edible. Prices should be somewhat realistic.

Review standard meal prices on your summary form.

Ideas for a Theme/Concept

- A certain style of food
- An individual dish
- Ethnic influence
- Décor and ambience
- A character from a book, movie, or TV show
- Sporting events, hobbies, or games
- Geography

Choosing a Name

- Name of someone significant to you
- Geography
- Historic or traditional names and spaces
- Ethnic and cultural names
- Pop culture
- Weather
- Humor and irony

Menus nominations for awards will be given for the following categories:

Best Theme

Best Original Logo

Most Creative Original Restaurant Name

Most Creative Food Item Name/Description

Best Original Slogan

Best Overall Presentation

Best “Extra” Item

Best Overall Menu (based on fun, creativity, and originality)

| | | | | |
|---|-----------|-----------------------------------|-------------|-----|
| Restaurant Name | | | | |
| Type of Restaurant (circle one) Examples: Fast Food – McDonalds, Jason’s Deli, Long John Silvers Casual Dining – Chili’s, Olive Garden, Joe’s Crab Shack Fine Dining – An expensive steakhouse or seafood place | Fast Food | Casual Dining | Fine Dining | |
| Theme/Style | | | | |
| Number of Seats (circle one) | Fast Food | 50 | 75 | 100 |
| | Casual | 150 | 175 | 200 |
| | Fine | 75 | 100 | 125 |
| Total meal price per person (for planning purposes) | Fast Food | Lunch = \$4-8, Dinner = \$5-9 | | |
| | Casual | Lunch = \$7-12, Dinner = \$12-18 | | |
| | Fine | Lunch = \$15-25, Dinner = \$20-50 | | |
| | Menu Item | | Price | |
| My Best-Selling Appetizer | | | | |
| Top 4 Selling Entrees | | | | |
| | | | | |
| | | | | |
| | | | | |
| Top 3 Selling Side Dishes | | | | |
| | | | | |
| | | | | |
| Top 3 Selling Drinks | | | | |
| | | | | |
| | | | | |
| Top 2 Selling Desserts | | | | |
| | | | | |

The next step to determine the overall income for your restaurant is to find out the average amount of money you would make in one day. *You may use a calculator to find the following numbers.*

| | | |
|---|--|--|
| A | Average price of my 4 best-selling entrees | |
| B | Average price of my 3 best-selling side dishes | |
| C | Average price of my 3 best-selling drinks | |
| D | Average price of my 2 best-selling desserts | |
| E | Price of my best-selling appetizer | |

$$\text{Average Lunch Check per Person} = A + B + C + 0.2D$$

$$\text{Average Dinner Check per Person} = 0.25E + A + 2B + C + 0.5D$$

| | | |
|---|---------------------------------|--|
| F | Average Lunch Check per Person | |
| G | Average Dinner Check per Person | |

Next, you need to find out how many people you will serve each day. Restaurants call this the number of covers. This is based on table turnover or how many people eat per each seat in your restaurant. Find your turnover in the chart below.

| | | TURNOVER |
|---------------|-----------|-----------------|
| LUNCH | Fast Food | 4 |
| | Casual | 1.5 |
| | Fine | 0.5 |
| DINNER | Fast Food | 6 |
| | Casual | 2 |
| | Fine | 1.25 |

So how much money does your restaurant bring in during lunch and during dinner?

$$\text{Lunch} = \text{Average Lunch Check per Person} \bullet \text{Turnover} \bullet \text{Number of Seats}$$

$$\text{Dinner} = \text{Average Dinner Check per Person} \bullet \text{Turnover} \bullet \text{Number of Seats}$$

| Meal | Average Check | Turnover | Seats | Total Revenue |
|--|----------------------|-----------------|--------------|----------------------|
| Lunch | | | | |
| Dinner | | | | |
| Total per Day | | | | |
| Total per Week (Total per Day • 7) | | | | |
| Total per Month (Total per Day • 30) | | | | |
| Total per Year (Total per Month • 12) | | | | |

Expense Report/Income Statement

| | | Percentage | Monthly Example *** |
|--|---|--------------|------------------------|
| Total Revenue | A | | \$270,000 |
| Food Sales | B | 90% | \$243,000 |
| Beverage Sales | C | 10% | \$27,000 |
| Food Cost | D | 35% | \$85,050 |
| Beverage Cost | E | 28% | \$7,560 |
| COGS (Cost of Goods Sold) | F | 34.3% | \$92,610 |
| Gross Profit | G | 65.7% | \$177,390 |
| Payroll | H | 30% | \$81,000 |
| Benefits | I | 4.4% | \$11,880 |
| Total Payroll | J | 34.4% | \$92,880 |
| Direct Operating Expenses* | K | 5% | \$13,500 |
| Marketing/ Entertaining/Advertising | L | 1.5% | \$4,050 |
| Energy/Utilities | M | 3.5% | \$9,450 |
| General/Administrative | N | 4% | \$10,800 |
| Repairs/Maintenance | O | 2% | \$5,400 |
| Total Operating Expenses | P | 16% | \$43,200 |
| Gross Operating Profit | Q | 15.3% | \$41,310 |
| Rent/Lease expenses | R | 4.3% | \$11,610 |
| Real estate taxes | S | 2% | \$5,400 |
| Insurance | T | 1.2% | \$3,240 |
| Total Other Expenses | U | 7.5% | \$20,250 |
| Adjusted Profit | V | 7.8% | \$21,060 |
| Interest | W | 1% | \$2,700 |
| Depreciation | X | 2% | \$5,400 |
| Net Income** (Profit/Loss) | Y | 4.8% | \$12,960 |

* Telephone, accounting, legal, office supplies, paper, china, glass, menus, landscaping, cleaning supplies, etc.

** Net income before income taxes

*** Average monthly sales per Chili's restaurant

Activity 7-34: **Expense Report/Income Statement Directions** Name: _____

| Item | How To Complete |
|------------|--|
| A | On your Menu Finances page you already determined the monthly income for your restaurant. Copy this number in Box A. |
| B | We will use the industry average of about 90% of sales coming from food items. B = 90% of A |
| C | The remaining 10% of sales are for beverages. C = 10% of A |
| D | Restaurants use the food cost percentage to help determine the price of menu items. Typically, the price of the food may be about 3 times the ingredients it takes to prepare the food. That would be a food cost percentage of 33%. Most places target between 20-40% for this number. $\text{Food Cost Percentage} = \frac{\text{Cost of Raw Ingredients}}{\text{Selling Price}} \cdot 100$ We are going to use 32%. So: D = 32% of B |
| E | Same as D, except beverages usually have a lower percentage because the cost is so low that restaurants can make a higher percentage profit on drinks. E = 24% of C |
| F | Cost of goods sold or COGS. For the dollar amount: F = D + E For the percent, you can not just add. For the % use the total cost divided by the total revenue: $\frac{F}{A}$ |
| G | Your gross profit is how much you made on the food and drink before you take out all your other expenses. G = A - F |
| H, I, J | Now you have to pay all of your managers, waiters, cooks, etc. They get paid a certain amount plus you have to pay for their benefits, like health insurance. H = 30% of A I = 5% of A J = 35% of A |
| K to P | Next, you add all the other expenses in owning a restaurant - the cost of plates and utensils, menus, furniture, and kitchen supplies, advertising your business, phone and electricity, paperwork, repairs, maintenance of your building and grounds....the list goes on and on. K through P are all a certain % of A |
| Q | Now you have your gross operating profit. Q = G - J - P |
| R, S, T, U | Next you have to pay for your occupancy (rent, equipment rental, real estate taxes, insurance, property taxes, etc.) R through U are all a certain % of A |
| V | Your adjusted profit is: V = Q - U |
| W, X | Depreciation is an accounting process of spreading out your capitol costs over time. Interest is what you have to pay on all loans you have taken out to run the restaurant. W and X are a % of A |
| Y | The bottom line! Hopefully you are making money! Most profitable restaurants will have a bottom line of 3-8%. This means for every \$100 they sell, they make between \$3 and \$8. Y = V - W - X |

Expense Report/Income Statement for _____

| | | Percentage | Monthly |
|--|---|-------------------|----------------|
| Total Revenue | A | | |
| Food Sales | B | 90% | |
| Beverage Sales | C | 10% | |
| COGS (Cost of Goods Sold) | | | |
| Food Cost | D | 32% | |
| Beverage Cost | E | 24% | |
| COGS (Cost of Goods Sold) | F | | |
| Gross Profit | | | |
| Payroll | H | 30% | |
| Benefits | I | 5% | |
| Total Payroll | J | 35% | |
| Operating Expenses | | | |
| Direct Operating Expenses | K | 5% | |
| Marketing/ Entertaining/Advertising | L | 1.5% | |
| Energy/Utilities | M | 3.5% | |
| General/Administrative | N | 4% | |
| Repairs/Maintenance | O | 2% | |
| Total Operating Expenses | P | 16% | |
| Gross Operating Profit | | | |
| Rent/Lease expenses | R | 4% | |
| Real estate taxes | S | 2% | |
| Insurance | T | 1.2% | |
| Total Other Expenses | U | 7.2% | |
| Adjusted Profit | | | |
| Interest | W | 1% | |
| Depreciation | X | 2% | |
| Net Income (Profit/Loss) | Y | | |

| | |
|------------------------|--|
| Restaurant Name | |
| Owner | |
| Server | |
| Guest | |
| Chef | |

| Items Ordered | | Price |
|--------------------------|--|------------|
| Appetizer | | |
| Entrée | | |
| Side Item | | |
| Beverage | | |
| Dessert | | |
| Other | | |
| ***** TOTAL ***** | | (A) |

| | | <i>Guest Calculations</i> | | <i>Server Calculations</i> | |
|--|--|---|------------|----------------------------|--|
| Tax | 8% = _____ (convert to decimal) | Calculate 8% of (A) | | (B) | |
| Subtotal before tip | | Add (A) + (B) | | (C) | |
| Tip 10% poor, 15% good, or 20% excellent service | _____ % = _____ (convert to decimal) | Choose a tip Calculate x% of (A) | (D) | | |
| Total bill | | Add (C) + (D) | (E) | | |
| Amount of CASH given to server (you only have \$50 bills) | | A multiple of \$50 large enough to pay for the bill | (F) | | |
| Change provided to customer | | Subtract (F) – (E) | | (G) | |
| Restaurant Profit for Owner | 6% = _____ (convert to decimal) | Calculate 6% of (A) | | (H) | |
| Amount of tip for Server | 50% = _____ (convert to decimal) | Calculate 50% of (D) | | (I) | |
| Amount of tip for Chef | 25% = _____ (convert to decimal) | Calculate 25% of (D) | | (J) | |

Discounts

Example 1: Regularly \$212.50 – 10% discount
 To calculate the discount multiply \$212.50 by 0.1 (the equivalent of 10%).
 $\$212.50 \cdot 0.1 = \21.25
 The discount is \$21.25. This is how much you SAVE off the original price.

Sale Prices

Example 2: Regularly \$88.75 – 20% off sale
 There are two ways to calculate the sale price.

1. Calculate the discount and subtract the discount from the original price.
 $\$88.75 \cdot 0.2 = \17.75
 $\$88.75 - \$17.75 = \$71.00$
 The sale price is \$71.00
2. Multiply the price by the percentage of the price remaining. In this example, 80% of the original price is still left.
 $\$88.75 \cdot 0.8 = \71.00

What is the sale price of a \$62 sweater if it is:

| | | | | | | | | | | | |
|----|---------|--|----|---------|--|----|---------|--|----|---------|--|
| 1. | 30% off | | 2. | 25% off | | 3. | 15% off | | 4. | 80% off | |
|----|---------|--|----|---------|--|----|---------|--|----|---------|--|

What is your discount if your bill is \$49.50 and you get a:

| | | | | | | | | | | | |
|----|--------------|--|----|--------------|--|----|-------------|--|----|--------------|--|
| 5. | 10% discount | | 6. | 30% discount | | 7. | 4% discount | | 8. | 50% discount | |
|----|--------------|--|----|--------------|--|----|-------------|--|----|--------------|--|

Find the amount of the discount and the sale price.

| | Regular Price | Savings | Discount | Sale Price |
|---------|---------------|---------|----------|------------|
| 9./10. | \$1,200 | 12% | | |
| 11./12. | \$70 | 30% | | |
| 13./14. | \$120 | 15% | | |
| 15./16. | \$16.50 | 50% | | |
| 17./18. | \$60 | 40% | | |
| 19./20. | \$160 | 25% | | |
| 21./22. | \$85 | 100% | | |
| 23./24. | \$124 | 0% | | |
| 25./26. | \$90 | 40% | | |
| 27./28. | \$125 | 20% | | |
| 29./30. | \$500 | 15% | | |

Bargain Becky loves to get a good deal and won't buy anything unless it's on sale. She decided to go to Bobby's Bargain Basement where everything is on sale!

| *** Bobby's Bargain Basement *** | | | | | |
|---|---------|---------|----------|---------|---------|
| skirts | \$26.50 | 40% off | sweaters | \$32.40 | 20% off |
| shirts | \$24.00 | 25% off | jeans | \$18.50 | 10% off |
| shoes | \$28.60 | 15% off | boots | \$30.00 | 12% off |
| socks | \$7.20 | 35% off | dresses | \$31.90 | 50% off |
| pants | \$27.40 | 30% off | belts | \$12.00 | 8% off |
| coats | \$34.00 | 45% off | robes | \$28.20 | 5% off |

Use the table above to answer the following questions.

| | | |
|-----|---|--|
| 1. | What is the discount on shoes? | |
| 2. | What is the sale price for a pair of socks? | |
| 3. | What is the sale price for a pair of pants? | |
| 4. | What is the discount on shirts? | |
| 5. | What is the discount on coats? | |
| 6. | What is the sale price for a skirt? | |
| 7. | What is the discount on boots? | |
| 8. | What is the sale price for a robe? | |
| 9. | What is the sale price for a sweater? | |
| 10. | What is the discount on jeans? | |
| 11. | What is the sale price of a belt? | |
| 12. | What is the discount on dresses? | |

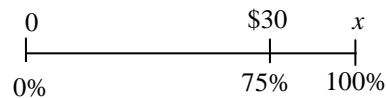
Find the amount of the discount and the sale price.

| | Regular Price | Savings | Discount | Sale Price |
|---------|----------------------|----------------|-----------------|-------------------|
| 13./14. | \$52 | 25% | | |
| 15./16. | \$80 | 20% | | |
| 17./18. | \$36.50 | 40% | | |
| 19./20. | \$17.80 | 10% | | |
| 21./22. | \$250 | 18% | | |

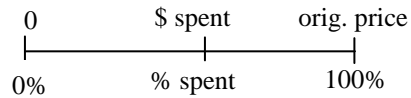
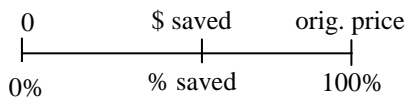
All sales and discounts can be calculated by creating either an equation or a percent line. The trickiest one is when the percent savings and the new price are given to you. See the example below:

Example: Tara bought a new coat which was on sale for \$30, which was 25% off the original price. What was the original price?

Since the \$30 is how much she paid, it is equivalent to 75% of the original price (because she saved 25%). Therefore, the equation would be: $.75 \bullet x = \$30$. A percent line would be setup as:



Your percent line will always be set up in one of two ways:



Complete the table below. Find the missing numbers by using either an equation or a percent line.

| | Today's deal | Original Price | New Price | Savings |
|--------|--------------|----------------|-----------|----------|
| 1/2. | 70% off | \$85.00 | | |
| 3/4. | 15% discount | | \$34.00 | |
| 5/6. | 65% savings | | | \$19.50 |
| 7/8. | | \$120.00 | \$72.00 | |
| 9/10. | | \$45.00 | | \$11.25 |
| 11/12. | | | \$28.00 | \$22.00 |
| 13/14. | 30% off | \$92.00 | | |
| 15/16. | 20% discount | | \$105.00 | |
| 17/18. | 75% savings | | | \$1.80 |
| 19/20. | | \$23.70 | \$18.96 | |
| 21/22. | | \$60.00 | | \$25.20 |
| 23/24. | | | \$60.00 | \$540.00 |

| | | |
|-----|--|--|
| 25. | A television set that regularly costs \$250 is advertised on sale at a 15% discount. A week later it is further reduced by 10% of the discounted price. Find a single discount that is equivalent to these two successive discounts. | |
|-----|--|--|

Solve. Use either a percent equation or a percent line.

| | | |
|-----|--|--|
| 1. | The "I Love American Idol" club has 60 members. Twenty-four of the members are younger than 12. What percent of the members are younger than 12? | |
| 2. | In Grapevine, 75% of the parks have tennis courts. If 18 parks have tennis courts, how many parks does Grapevine have altogether? | |
| 3. | There are 275 sixth graders at DIS. A survey shows that 64% of them think Mrs. Atkins is weird. How many DIS sixth graders think Mrs. Atkins is weird? | |
| 4. | In 2005, the Chicago Cubs won 79 out of 162 games. What percent of games (to the nearest tenth) did the cubs win? | |
| 5. | In the Dragon Apartments 35% of the apartments have one bedroom. If there are 63 one bedroom apartments, what is the total number of Dragon Apartments? | |
| 6. | Tony Romo has 19 passes intercepted out of 520 attempts. What percent of his passes were intercepted? Round to the nearest tenth. | |
| 7. | Vijay received a score of 96% on his math test. If he correctly answered 24 problems, how many questions were on the test? | |
| 8. | Your dinner last night contained 6 grams of fat, which is 8% of the daily value recommended by the U.S. Food and Drug Administration. How many grams of fat are recommended for a normal diet? | |
| 9. | Your dinner last night contained 500 mg of potassium, which is 14% of the daily value recommended by the U.S. Food and Drug Administration. How many milligrams of potassium are recommended for a normal diet? (nearest tenth) | |
| 10. | Landon wants to buy a new baseball cap. He finds one that normally sells for \$17.99 on sale for 20% off. Find the discount to the nearest cent. | |
| 11. | Chris wants to buy an iPod Nano. The original price was \$79 and it is on sale for 10% off. Chris has an additional coupon for 25% off the purchase of any sale item at the store. What is the price of the iPod after both discounts are applied? | |

| Original Price | Today's deal (% saved) | Savings (\$ saved) | Percent Spent | New Price (\$ spent) |
|-----------------------|-------------------------------|---------------------------|----------------------|-----------------------------|
| \$120.00 | 15% off original price | | | |
| | 35% discount | | | \$45.50 |
| | 80% discount | \$40.00 | | |
| \$800.00 | | | | \$100.00 |