Answer Key

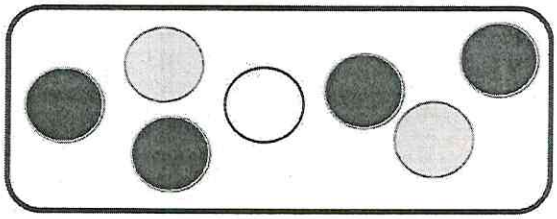
# Simple Probability

## Using Probabilities and Sums

*The sum of all the different probabilities in an event must be equal to this decimal, fraction, and percent: 1, 1/1, and 100%.

| | |
|---|---|
| 1. There are three choices of jellybeans: grape, cherry, and orange. If the probability of getting a grape is $\frac{3}{10}$ and the probability of getting a cherry is $\frac{1}{5}$, what is the probability of getting orange? | $\frac{3}{10} + \frac{1}{5} = \frac{3}{10} + \frac{2}{10} = \frac{5}{10}$<br>$\frac{10}{10} - \frac{5}{10} = \frac{5}{10} = \boxed{\frac{1}{2}}$ |
| 2. There are four different type of marbles to choose. If the probability of getting a blue is 45%, red is .17 and yellow is 3%. What is the probability of getting the final color of marble? | $0.17 = 17\%$<br>$45\% + 17\% + 3\% = 65\%$<br>$100\% - 65\% = \boxed{35\%}$ |
| 3. There are four flavors of starburst inside a bag: lemon, orange, cherry, and strawberry. The probability of choosing a strawberry is $\frac{1}{8}$, the probability of choosing a lemon is .25, and probability of choosing a cherry is 37.5%, what is the probability of choosing an orange starburst? | $\frac{1}{8} = 0.125$ $37.5 = 0.375$<br>$0.125 + 0.375 + 0.25$<br>$= 0.75$<br>$1 - 0.75 = \boxed{0.25}$ |

The container below contains 2 gray, 1 white and 4 black marbles:



Without looking, Eric chooses a marble from the container:

a. P(white) = 1/7
b. P (not gray) = 5/7
c. P (black or white) 5/7
d. Supposed you picked 50 times out the container: What is probability you would choose a white? $1/7 \times 50 = \boxed{7\frac{1}{7} \text{ times}}$

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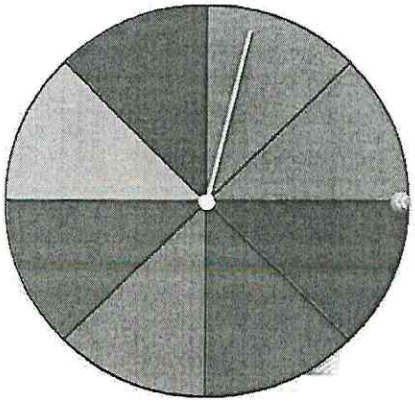
Use the spinner for the following questions:



a. P(blue) $\frac{2}{8} = \boxed{\frac{1}{4} = 0.25 = 25\%}$

b. Suppose you spin the spinner 200 times: What is the probability of spinning green?
$\frac{3}{8} \times 200 = \boxed{75 \text{ times}}$

c. Spin 30 times: What is the P(red)
$\frac{2}{8} = \frac{1}{4}$ $\frac{1}{4} \times 30 = \boxed{7.5 \text{ times}}$

Answer Key

# Compound Probability

**Theoretical Probability:** the likelihood of an event occuring; theoretical probability $= \frac{\#\text{ of favorable outcomes}}{\text{total possible outcomes}}$

**Compound event:** the probability of two or more events happening at once → find the probability of each event and then multiply probabilities

**Independent event:** the second event is not affected by the first

**Dependent event:** the second event is affected by the first

Hudson draw a marble from a bag without looking. He replaces the marble and then draws another marble. What is the probability he draws a white marble both times? Independent or Dependent?

* Independent

1st $\frac{3}{10}$ × 2nd $\frac{3}{10}$ = $\frac{9}{100} = 0.09 = 9\%$

Carlos picks a scrabble tile without looking. Then he picks another tile without replacing. What is the probability that he will pick a "T" and then pick an "O"? Independent or Dependent?


1st $\frac{2}{10}$ × 2nd $\frac{2}{9}$ = $\frac{4}{90} = 0.04 = 4\%$

1. There are 4 green marbles, 3 red marble, 7 blue marbles, and 6 yellow marbles in a bag. Lily draws a marble from the bag and then replaces it and draws another marble. What is the probability that she draws a blue marble then a yellow marble? Independent or Dependent?

4+3+7+6 = 20 total

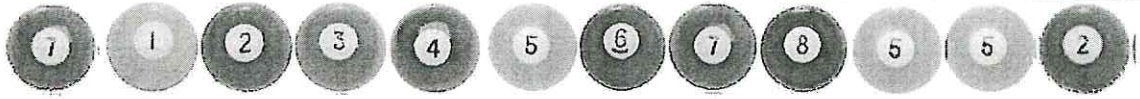
1st $\frac{7}{20}$ × 2nd $\frac{6}{20} = \frac{3}{10}$

probability = $\frac{7}{20} \times \frac{3}{10} = \frac{21}{200} = .105 = 10.5\%$

2. Ruby writes down each letter of the alphabet on its own card. She picks a card from the hat without looking and without replacing the card she picks another card. What is the probability that she will pick a vowel then another vowel? (a,e,i,o,u). Independent or Dependent?

1st $\frac{5}{26}$ × 2nd $\frac{4}{25}$ = $\frac{2}{65} = 0.03 = 3\%$

3.




= 12 total

A. Cara selects a pool ball without looking and then replaces the ball. What is the probability she picks an 8 and then a 2? independent

1st $\frac{1}{12}$ × 2nd $\frac{2}{12}$ = $\frac{1}{72} = 0.01 = 1\%$

B. Vicki selects a pool ball without looking then does NOT replace the ball. What is the probability that she pick a 5 both times?

1st $\frac{3}{12}$ × 2nd $\frac{2}{11}$ *dependent = $\frac{1}{22} = 0.05 = 5\%$

C. Frank selects a pool ball without looking. Without replacement what is the probability that he selects a 7 then a 2 * dependent

1st $\frac{2}{12}$ × 2nd $\frac{2}{11}$ = $\frac{1}{33} = 0.03 = 3\%$

**Probability Review Worksheet** Name: _____

1. Use the table to the right to answer the following question: If a student is chosen at random, what is the likelihood that the student earned an A on the math test?

   a. Unlikely
   b. Likely
   c. Equally likely as unlikely

| Letter Grade | Number of Students |
|---|---|
| A | 8 |
| B | 7 |
| C | 6 |
| D | 3 |
| F | 1 |

2. Andy rolled a number cube labeled 1 through 6. He rolled the number cube 500 times and recorded the results of each roll. ***About*** how many times could Andy expect to roll a 5?

3. A jar contains 27 marbles. There are 4 blue marbles and the rest are red. If a marble is chosen at random, what is the probability it will be red. **Write your answer as a fraction and as a percent.**

4. Kristy rolled 2 number cubes, each labeled 1 through 6. She rolled the cubes 400 times, added the two numbers showing, and recorded the results. ***About*** how many times should Kristy expect a sum of 8?

5. A computer randomly selects 2 visitors to the zoo out of every 225 visitors to win a free ticket to the zoo for another day. The zoo had 5,502 visitors this season. Which number is closest to the number of visitors who received a free ticket to the zoo this season?

6. At a middle school, 1/5 of the students have a cell phone. If a student is chosen at random, what is the probability the students DOES NOT have a cell phone? Write your answer as a percent.

7. A jar contains pink, white, purple, and yellow jellybeans. The probability of choosing three of the four colors is shown in the table to the right. If a student pulls out a jellybean without looking, what is the probability that the jellybean will be yellow?

| Color of Jelly Bean | Probability of Choosing Color |
|---|---|
| pink | $\frac{2}{5}$ |
| white | $\frac{1}{8}$ |
| purple | $\frac{3}{8}$ |

8. Amanda has a jar full of marbles. The probability of randomly selecting a blue marble is $\frac{1}{18}$, a red marble is $\frac{1}{9}$, a green marble is $\frac{1}{3}$, and a yellow marble is $\frac{1}{2}$. Which marble is Amanda ***least likely*** to randomly select?

# Unit Rates - Complex Fractions

Complex Fractions: A complex fraction is a fraction in which the numerator denominator or both are fractions. So it is like a fraction in a fraction. To simplify a complex fraction – you divide the numerator by the denominator.

Now let's calculate a unit rate that involves a complex fraction:

Ex. 1: It takes Ms. Johnson $\frac{1}{4}$ of an hour to run $1\frac{1}{2}$ miles. What is her unit rate in miles per hour?

$\frac{1\frac{1}{2}\text{ mi}}{\frac{1}{4}\text{ hr}} = \frac{6\text{ miles}}{1\text{ hr}}$ $\quad 1\frac{1}{2} \times 4$ $\quad \frac{3}{2_1} \times \frac{4^2}{1} = 6$

Ex. 2: Brianna's Chocolate Chip Cookie recipe will make about 3 dozen chocolate chip cookies. The recipe calls for 2 ¼ cups of flour and 3/8 table spoon of baking soda. If Brianna was to adjust the recipe to include 1 tablespoon of baking soda, how many cups of flour would she need to use?

$\div\frac{2\frac{1}{4}\text{ c. flour}}{\frac{3}{8}\text{ T baking soda}} = \frac{6\text{ c. flour}}{1\text{ T}}$ (÷ 3/8 on both sides)

$\frac{9^3}{1_4} \times \frac{8^2}{3_1} =$

Find the unit rate for each scenario below:

1. $2.50 per 5 cans, find price per can

$\frac{\$2.50}{5\text{ cans}} = \frac{\$.50}{1\text{ can}}$ (÷5 on both sides)

2. $5 for 4 candy bars, price per candy bar

$\frac{\$5}{4\text{ candy bars}} = \frac{\$1.25}{1\text{ candy bar}}$ (÷4 on both sides)

3. There $\frac{3}{4}$ cups of juice per $\frac{2}{3}$ cup sugar, find how much juice is in 1 cup of sugar.

$\div\frac{\frac{3}{4}\text{ juice}}{\frac{2}{3}\text{ sugar}} = \frac{1\frac{1}{8}\text{ juice}}{1\text{ c. sugar}}$ (÷ 2/3 on both sides)

$\frac{3}{4} \times \frac{3}{2} = \frac{9}{8}$

4. The aquarium pumps $5\frac{2}{3}$ gallons of water every ¾ of an hour, find gallons per hour.

$\div\frac{5\frac{2}{3}\text{ g}}{\frac{3}{4}\text{ hr}} = \frac{7\frac{5}{9}\text{ g}}{1\text{ hr.}}$ (÷ 3/4 on both sides)

$\frac{17}{3} \times \frac{4}{3} = \frac{68}{9}$

Keep change x flip

**TABLE CHALLENGE**

1. While remodeling his kitchen, Arthur paints the cabinets. He estimates that he paints 30 square feet every half-hour. How many square feet does Arthur paint per hour?
*HINT: a half hour = ½ hour

$\frac{30\text{ ft}^2}{\frac{1}{2}\text{ hr}} \times 2 = \frac{60\text{ ft}^2}{1\text{ hr.}}$

2. Paige mows $\frac{1}{6}$ acre in 2/3 hour. How many acres does Paige mow per hour?

$\frac{\frac{1}{6}\text{ acre}}{\frac{2}{3}\text{ hr}} = \frac{\frac{1}{4}\text{ acre}}{1\text{ hr.}}$ (÷ 2/3 on both sides)

$\frac{1}{6_2} \times \frac{3^1}{2} = \frac{1}{4}$

3. Two containers filled with water are leaking. Container **A** leaks at a rate of $\frac{2}{3}$ gallon every 2/5 hour.
Container **B** leaks at a rate of $\frac{3}{4}$ gallon every 1/3 hour.
Determine which container is leaking water more rapidly.

A: $\div\frac{\frac{2}{3}\text{ g}}{\frac{2}{5}\text{ hr}} = \frac{1\frac{2}{3}\text{ gal}}{1\text{ hr.}}$ (÷ 2/5 on both sides)

$\frac{5^1}{3} \times \frac{5}{2_1} = \frac{5}{3} = 1\frac{2}{3}$

B: $\frac{\frac{3}{4}\text{ g}}{\frac{1}{3}\text{ hr}} = \frac{2\frac{1}{4}\text{ gal}}{1\text{ hr}}$ ← more rapidly

$\frac{3}{4} \times 3 = \frac{9}{4} = 2\frac{1}{4}$

4. Two liquid storage containers are being filled. Liquid enters the **first** container at a rate of 2/3 gallon per $\frac{1}{4}$ minute. Liquid pours into the **second** storage container at a rate of $\frac{3}{5}$ gallon per 2/3 minute. Determine which container is being filled faster.

#1 $\frac{\frac{2}{3}\text{ g}}{\frac{1}{4}\text{ min}} = \frac{2\frac{2}{3}\text{ gal}}{1\text{ min}}$

$\frac{2}{3} \times 4 = \frac{8}{3} = 2\frac{2}{3}$

#2 $\frac{\frac{3}{5}\text{ gal}}{\frac{2}{3}\text{ min}} = \frac{\frac{9}{10}\text{ gal}}{1\text{ min}}$

$\frac{3}{5} \times \frac{3}{2} = \frac{9}{10}$

container 1 fills faster

# Using Units Rates with Fractions

Name:

**Solve each problem. Answer as a mixed number (if possible).**

1) A cookie recipe called for $2\frac{1}{2}$ cups of sugar for every $\frac{2}{5}$ cup of flour. If you made a batch of cookies using 1 cup of flour, how many cups of sugar would you need?

2) A bucket of water was $\frac{1}{6}$ full, but it still had $2\frac{3}{4}$ gallons of water in it. How much water would be in one fully filled bucket?

3) A chef had to fill up $\frac{4}{5}$ of a container with mashed potatoes. He ended up using $2\frac{4}{6}$ pounds of mashed potatoes. How many pounds would he use if he had to fill up the entire container?

4) A bag with $2\frac{1}{6}$ ounces of peanuts can make $\frac{2}{5}$ of a jar of peanut butter. It can make one full jar with how many ounces of peanuts?

5) A carpenter goes through $2\frac{3}{5}$ boxes of nails finishing $3\frac{1}{2}$ rooves. How much would he use finishing 8 rooves?

6) A water faucet leaked $3\frac{2}{4}$ liters of water every $\frac{1}{6}$ of an hour. It leaked at a rate of how many liters per hour?

7) A machine made $2\frac{2}{6}$ pencils in $3\frac{3}{4}$ minutes. How many pencils would the machine have made after 9 minutes?

8) It takes $2\frac{1}{2}$ kilometers of thread to make $3\frac{1}{4}$ boxes of shirts. How many kilometers of thread will it take to make 3 boxes?

9) A tire shop had to fill $3\frac{1}{2}$ tires with air. It took a small air compressor $3\frac{3}{5}$ seconds to fill them up. How long would it take to fill 3 tires?

10) It takes $3\frac{1}{2}$ spoons of chocolate syrup to make $3\frac{3}{5}$ gallons of chocolate milk. How many spoons of syrup would it take to make 6 gallons of chocolate milk?

**Answers**

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____



| 1-10 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|

# Comparing Rates

Answer Key

1.) Riley uses the equation $y = 10x$ to calculate the amount of money he earns after working $x$ hours. The table below shows the amount of money Mandy earns after working different numbers of hours.

**Mandy's Earnings**

| Hours Worked | Amount Earned | $\frac{y}{x}$ |
|---|---|---|
| 9 | $81 | 9 |
| 12 | $108 | 9 |
| 15 | $135 | 9 |

a.) How much does Riley earn per hour?

$10 per hour

b.) How much does Mandy earn per hour?

$9 per hour

c.) Who earns more and how much more?

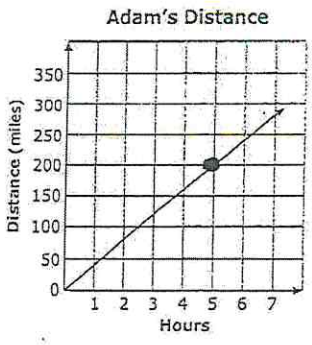
Riley earns more by $1 an hour

d.) On a graph, which person would have a steeper line?

Riley



2. Sheila and Adam each drove their own car home for the holidays. The equation $y = 50x$ represents the average distance Sheila drove after $x$ hours. The graph below shows the average distance Adam drove.




a.) How fast is Adam driving?

200 miles ÷ 5 hours = 40 miles/hr

b.) How fast is Sheila driving?

50 miles/hour

c.) What is the difference between how fast Adam and Sheila are driving?

10 miles per hour

d.) After 3 hours, who drove the farthest and by how much?

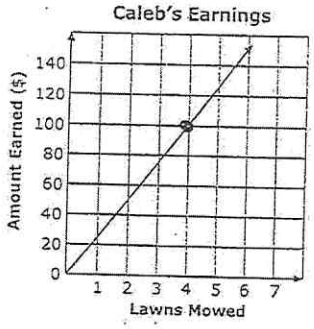
$y = 50(3) = 150$ ← Sheila

$y = 40(3) = 120$ ← Adam

Sheila drove farthest by 30 miles



3. Taylor uses the equation $y = 20x$ to calculate the amount she earns mowing $x$ lawns. The graph below shows the amount Caleb earns mowing lawns.




a.) How much does Caleb earn per lawn?

$100 ÷ 4 lawns = $25 per lawn

b.) How much does Taylor earn per lawn?

$20 per lawn

c.) After mowing 3 lawns, who has earned more and how much more?

20(3) = 60 25(3) = 75 Caleb by $25

d.) Write an equation that could represent Caleb's earnings.

$y = 25x$

$y$ = earning, $x$ = lawns mowed



4. Abby uses the equation $y = 0.50x$ to calculate the amount she will earn selling $x$ cups of lemonade. The table below shows the amount of money Jacob will earn from selling cups of lemonade.

**Jacob's Lemonade Sales**

| Number of Cups | Amount Earned | $\frac{y}{x}$ |
|---|---|---|
| 5 | $3.75 | $0.75 |
| 8 | $6.00 | $0.75 |
| 12 | $9.00 | $0.75 |

a.) How much is does Jacob charge for 1 cup of lemonade?

$0.75

b.) How much does Abby charge for 1 cup of lemonade?

$0.50

c.) What is the difference between what Abby and Jacob charge for 1 cup of lemonade?

$0.75 - $0.50 = $0.25

d.) After selling 9 cups of lemonade, who will have earned more and by how much?

Abby = $0.50(9) = $4.50

Jacob = $0.75(9) = $6.75

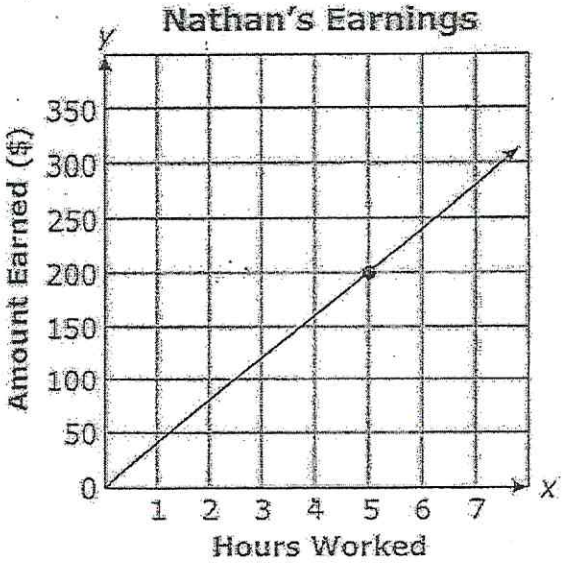
6.75 - 4.50 = $2.25

Jacob by $2.25

# Comparing rates

name : _____

(1) Evan and Nathan are electricians. Evan uses the equation $y = 30x$ to calculate the amount he earns for $x$ hours of work. The graph below shows the amount Nathan earns for work.




What is the difference in the amounts Evan and Nathan earn per hour?

A. $30

B. $20

C. $10

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(2) Reliable Auto Care uses the equation $y = 55x$, where $y$ represents the labor cost for a car repair based on $x$ hours of work. The table below shows the labor cost at City Auto Repair for different numbers of hours worked.

**City Auto Repair**

| Hours Worked | Labor Cost |
|---|---|
| 2 | $100 |
| 4 | $200 |
| 6 | $300 |

Which statement is true?

A. Reliable Auto Care charges $5 more per hour for labor than City Auto Repair.

B. City Auto Repair charges $5 more per hour for labor than Reliable Auto Care.

C. City Auto Repair charges $45 more per hour for labor than Reliable Auto Care.

(3) Two stores sell gasoline.

- Store W uses the equation $y = 3.69x$ to calculate the cost of $x$ gallons of gasoline.
- At Store Z, the cost of 8 gallons of gasoline is \$30.08, and the cost of 15 gallons of gasoline is \$56.40.

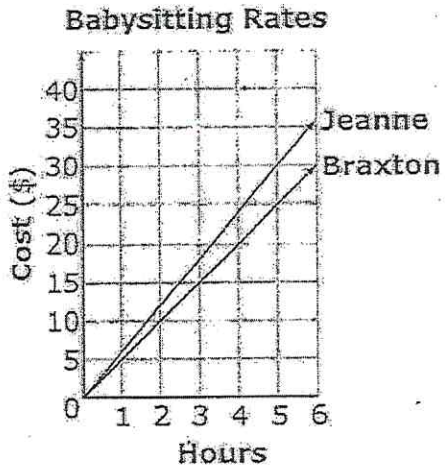
If a customer needs 12 gallons of gas, which store will cost less and by how much?

A. Store W will cost \$0.07 less than Store Z.

B. Store Z will cost \$0.84 less than Store W.

C. Store W will cost \$0.84 less than Store Z.

(4) The amount per hour charged by two babysitters, Jeanne and Braxton, is shown in the graph below. A third babysitter, Emilia, charges according to the equation $y = 6x$, where $y$ represents the total cost for $x$ hours of babysitting.




How does Emilia's babysitting rate compare to Jeanne's and Braxton's rate?

A. Emilia charges the same rate as Jeanne.

B. Emilia charges less than both Jeanne and Braxton.

C. Emilia charges more than both Jeanne and Braxton.

D. Emilia charges more than Braxton and less than Jeanne.

(5) Savannah and Trey are playing tennis over the summer. The city park charges \$3 per hour to use the tennis courts. The table below shows how much the county park charges to use the tennis courts.

| Hours | 2 | 3 | 5 |
|---|---|---|---|
| Rental Cost | \$6.50 | \$9.75 | \$16.25 |

They plan to play tennis for 8 hours this week. How much will Savannah and Trey save by choosing the least expensive park to play at this week?

A. \$0.25

B. \$1.00

C. \$2.00

D. \$3.50

EOG Review: Percent Name: Answer Key

| Type of Problem | How to Solve | Example |
|---|---|---|
| **markup** (tax, tip, ...) | Add the percent to 100, move the decimal two places to the left, and multiply | Claire purchased a soccer ball priced at $27.99 plus 7.5% sales tax. What was the total price of the ball?<br>100% + 7.5% = 107.5% = 1.075<br>27.99 × 1.075 = $30.09 |
| **markdown** (discount, sale, coupon) | Subtract the percent from 100, move the decimal two places to the left, and multiply | Carlos is going to buy a Keurig coffee maker priced at $129.99, and he has a 20% off coupon. What is the sale price of the coffee maker?<br>100% − 20% = 80% = 0.80<br>129.99 × 0.80 = $103.99 |
| **Interest** (We didn't really practice this but just in case you see it) | Move the decimal two places left, multiply by money amount, then by the number of years. *If asked to find total amount in account, add answer to the amount of money you started with. | Maryann invested $1500 into an account with a 3% interest rate. How much interest will she earn in 4 years?<br>1000 × 0.03 = $45<br>$45 × 4 years = $180 |
| **percent change** | Find the difference between your two amounts. Then, divide the difference by the original amount and multiply by 100. | In 2000, there were 835 students enrolled at WAMS. This year we have approximately 920 students. What is the percent increase in student population?<br>920 − 835 = 85<br>$\frac{85}{835} \times 100 =$ 10.18% |
| **commission** | Move the decimal two places to the left then multiply. (You are just finding a percent of a number | A car salesman makes 4% commission on his sales. If he makes a sale of $31,000, how much commission does he earn?<br>31,000 × 0.04 = $1,240 |
| **working backwards** | Substitute the values you know into the percent equation, then divide to get your answer. | An Otterbox was on sale 20% off. If the sale price was $47.99, what was the original price?<br>100% − 20% = 80% = 0.80<br>0.80p = 47.99<br>÷0.8 ÷0.8<br>p = $59.99 |

# What Do You Get If a Box of Pampers Falls in the Fire?

Cross out the letter next to each correct answer. The answer to the title question will remain.

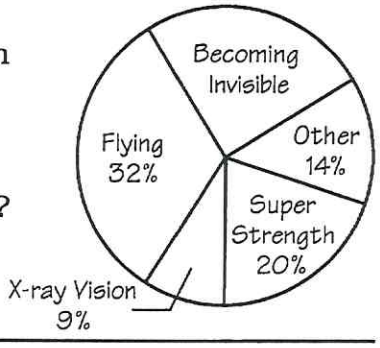
| | |
|---|---|
| H | $12.65 |
| S | 45.7% |
| T | 28.5 cm$^2$ |
| H | 36 |
| A | $31.15 |
| N | $1684.50 |
| K | $352 |
| S | 25% |
| G | 44.2% |
| I | $102.70 |
| V | 28% |
| E | $37,500 |
| B | $340 |
| A | 128 |
| R | $1682.70 |
| I | $38,200 |
| P | 262.5% |
| O | $104.50 |
| E | $240 |
| T | 275% |
| R | 35.3% |
| Y | 27.8 cm$^2$ |
| D | $13.35 |

**1** In a survey, 400 students were asked which superpower they would most like to have. Based on the graph:

**a.** How many students said "flying"?

**b.** How many students said "X-ray vision"?

**c.** What percent of the students said "becoming invisible"?




**2** Zarat Zim sells refrigerators. He earns an 8% commision on sales. How much does he earn on sales of $3000?

**3** Kenya Kon sells dishwashers. He earns an 8% commision on sales. How much must he sell in order to earn $3000?

**4** The regular price of a Stellar 9 video game is $44.50, but it is on sale at a 30% discount

**a.** How much is the discount?

**b.** What is the sale price?

**5** Dr. Sox paid $1580 for a new computer system. She also paid a 6.5% sales tax.

**a.** How much was the tax?

**b.** What was the total cost?

**6** For each player in the table, find what percent of his shots were baskets. What is the highest of the three shooting percentages?

| Player | Shots | Baskets | Percent |
|---|---|---|---|
| Huey | 29 | 12 | |
| Dewey | 48 | 20 | |
| Louie | 35 | 16 | |

**7** The area of the heart is 20 cm$^2$. If this is 72% of the area of the square, what is the area of the square?

**8** The value of a certain rare stamp is 160% of its value three years ago. If the stamp was worth $220 then, what is it worth today?

**9** With all other variables held constant, the stopping distance for a car depends on the speed of the car. Based on the graph, find the following:

**a.** The 30 mph stopping distance is what percent of the 60 mph stopping distance?

**b.** The 40 mph stopping distance is what percent of the 20 mph stopping distance?