# Using Decimals & Fractions as Percents

Percent means out of 100.

In math *"of"* means multiply.

To find the "percent of" a number:

1) Change the percent to a decimal and then multiply.

2) **OR** Turn the percent into a fraction and then multiply.

100% means 1 whole.  Therefore 100% of 85 is 85.  That's just like changing 100% to its equivalent decimal, 1, and multiplying by 85.  If you have less than 100% of a number, the solution is less than the original number.

## Example:

Find 75% of 36.

| OPTION 1 | OPTION 2 |
|---|---|
| (Change the percent to a decimal) | (Change the percent to a fraction) |
| .75<br>x 36<br>450<br>2250<br>27.00 | $\dfrac{75}{100} \cdot \dfrac{36}{1} = \dfrac{3}{4} \cdot \dfrac{\cancel{36}^{\,9}}{1} = 27$ <br> $1$ |
| Therefore, 75% of 36 is 27. ||

**TIP:**  Always, always, always check your answer to see if it is reasonable.  (Does it make sense?)  75% is less than 100% so 27 should be less than 36.  75% is greater than 50% so 27 should be greater than half of 36, which is 18.  If those things are true, you are probably on the right track!

## You Try:

*For each problem below, circle the ONLY reasonable answer based on what you know.*

| Problem | Circle the ONLY reasonable answer | | | |
|---|---|---|---|---|
| 90% of 40 | 9 | 36 | 17 | 57 |
| 25% of 72 | 18 | 54 | 2.5 | 70 |
| 50% of 1600 | 56 | 16 | 1650 | 800 |
| 110% of 55 | 1.5 | 115 | 60.5 | 25 |
| 5% of 80 | 58 | 4 | 804 | 85 |

# Find the "percent of" for each of the problems below.

| | | |
|---|---|---|
| 1) 50% of 12 | 2) 20% of 45 | 3) 15% of 100 |
| 4) 5% of 40 | 5) 150% of 92 | 6) 25% of 90 |

| | |
|---|---|
| 7) 100% of 183 | 8) Eddie's mystery number is 45% of 200. What is his mystery number? |

9) "Arachibutyrophobia" is the fear of peanut butter getting stuck to the roof of your mouth. In a survey of 150 people, 2% of them have arachibutyrophobia. How many people surveyed have this fear?

10) When making peanut butter and jelly sandwiches, 20% of people put the peanut butter on first. Out of 75 people, how many people would NOT put peanut butter on first?

11) At ECMS, about 25% of the 6th graders made an A in math. If there are 416 6th graders, how many made an A?

12) Last year, ECMS had 1280 students. If we have 110% of that amount this year, how many students are at ECMS this year?

# Using a Table to Find Percents

<u>**Example:**</u>

There are 14 candies in a bag that is 20% full.  How many candies are in a full bag?

## USE A TABLE

| Percentage | 0% | 20% | 40% | 60% | 80% | 100% |
|---|---|---|---|---|---|---|
| Part | 0 | 14 | 28 | 42 | 56 | 70 |

<u>**You Try:**</u>

*Use a table to solve the percent problems below.*

1) 16 is 80% of what number?

| Percentage | | 16 | |
|---|---|---|---|
| Part | 20% | 80% | 100% |

2) Peyton made a 90% on her math test.  If she got 27 questions correct, how many total questions were on the test?

| Percentage | | | |
|---|---|---|---|
| Part | | | |

3) 64% of the students in a classroom are girls.  If there are 16 girls, how many total students are in the class?

| Percentage | | | |
|---|---|---|---|
| Part | | | |

# The Percent Proportion

You can use a percent proportion to solve for any one piece when given the other 3.

$$\frac{is}{of} = \frac{\%}{100} \quad \text{or} \quad \frac{part}{whole} = \frac{\%}{100}$$

## Example:

<table>
<tr><td>

Finding a percent (part) of a number (whole):

What is 20% of 240?

First, set up your proportion:

$$\frac{x}{240} = \frac{20}{100}$$

Then solve by cross multiplying:

$$\frac{x}{240} = \frac{20}{100}$$

$$x \bullet 100 = 240 \bullet 20$$

$$x \bullet 100 = 4800$$

$$x = \frac{4800}{100}$$

$$x = 48$$

48 is 20% of 240.

</td><td>

Finding the whole given the percent (part):

60 is 75% of what number?

First, set up your proportion:

$$\frac{60}{x} = \frac{75}{100}$$

Then solve by cross multiplying:

$$\frac{60}{x} = \frac{75}{100}$$

$$60 \bullet 100 = x \bullet 75$$

$$6000 = x \bullet 75$$

$$x = \frac{6000}{75}$$

$$x = 80$$

60 is 75% of 80.

</td></tr>
</table>

## You Try:

Use one of the methods you have learned to solve the following problems.

| 1) What is 5% of 200? | 2) 8 is 40% of what number? | 3) What is 15% of 80? |
|---|---|---|
| | | |

| 4) 18 is 25% of what number? | 5) What is 25% of 60? | 6) 62 is 50% of what number? |
|---|---|---|
|  |  |  |

7) Martha put 20% of her paycheck in the bank. If her paycheck was $150, how much did she put in the bank?

    a) Should your answer be **MORE** or **LESS** than $150?

    b) Solution = _____

    c) Write your answer in a complete sentence:

8) Ethan got 90% of the problems correct on a quiz. If he got 27 problems correct, how many problems were on the quiz?

    a) Should your answer be **MORE** or **LESS** than 27?

    b) Solution = _____

    c) Write your answer in a complete sentence:

9) Whitney bought a pair of jeans that cost $25. If tax is 5%, how much will she pay for the jeans?

    a) Should your answer be **MORE** or **LESS** than $25?

    b) Solution = _____

    c) Write your answer in a complete sentence:

10) Ellis' bill at Red Lobster was $18.50. If he gives his server a 20% tip, how much tip will he leave?

    a) Should your answer be **MORE** or **LESS** than $18.50?

    b) Solution = _____

    c) Write your answer in a complete sentence:

# Using Decimals & Fractions as Percents

Percent means out of 100.

In math *"of"* means multiply.

To find the "percent of" a number:

1) Change the percent to a decimal and then multiply.

2) **OR** Turn the percent into a fraction and then multiply.

100% means 1 whole.  Therefore 100% of 85 is 85.  That's just like changing 100% to its equivalent decimal, 1, and multiplying by 85.  If you have less than 100% of a number, the solution is less than the original number.

**Example:**

Find 75% of 36.

| OPTION 1 | OPTION 2 |
|---|---|
| (Change the percent to a decimal) | (Change the percent to a fraction) |
| .75 <br> x 36 <br> 450 <br> 2250 <br> 27.00 | $\dfrac{75}{100} \cdot \dfrac{36}{1} = \dfrac{3}{\cancel{4}} \cdot \dfrac{\cancel{36}^{9}}{1} = 27$ <br> $1$ |
| Therefore, 75% of 36 is 27. ||

**TIP:**  Always, always, always check your answer to see if it is reasonable.  (Does it make sense?)  75% is less than 100% so 27 should be less than 36.  75% is greater than 50% so 27 should be greater than half of 36, which is 18.  If those things are true, you are probably on the right track!

**You Try:**

*For each problem below, circle the ONLY reasonable answer based on what you know.*

| Problem | Circle the ONLY reasonable answer | | | |
|---|---|---|---|---|
| 90% of 40 | 9 | (36) | 17 | 57 |
| 25% of 72 | (18) | 54 | 2.5 | 70 |
| 50% of 1600 | 56 | 16 | 1650 | (800) |
| 110% of 55 | 1.5 | 115 | (60.5) | 25 |
| 5% of 80 | 58 | (4) | 804 | 85 |

*Find the "percent of" for each of the problems below.*

| 1) 50% of 12 **6** | 2) 20% of 45 **9** | 3) 15% of 100 **15** |
|---|---|---|
| 4) 5% of 40 **2** | 5) 150% of 92 **138** | 6) 25% of 90 **22.5** |

| 7) 100% of 183 **183** | 8) Eddie's mystery number is 45% of 200. What is his mystery number? **Eddie's Mystery Number is 90.** |
|---|---|

9) "Arachibutyrophobia" is the fear of peanut butter getting stuck to the roof of your mouth. In a survey of 150 people, 2% of them have arachibutyrophobia. How many people surveyed have this fear? **3 people surveyed have Arachibutyrophobia.**

10) When making peanut butter and jelly sandwiches, 20% of people put the peanut butter on first. Out of 75 people, how many people would NOT put peanut butter on first? **60 people would NOT put peanut butter on first.**

11) At ECMS, about 25% of the 6th graders made an A in math. If there are 416 6th graders, how many made an A? **104 of the 6th graders made an A.**

12) Last year, ECMS had 1280 students. If we have 110% of that amount this year, how many students are at ECMS this year? **ECMS has 1408 students this year.**

# Using a Table to Find Percents

**Example:**

There are 14 candies in a bag that is 20% full. How many candies are in a full bag?

## USE A TABLE

| Percentage | 0% | 20% | 40% | 60% | 80% | 100% |
|---|---|---|---|---|---|---|
| Part | 0 | 14 | 28 | 42 | 56 | 70 |

**You Try:**

*Use a table to solve the percent problems below.*

1) 16 is 80% of what number?  **16 is 80% of 20.**

| Percentage | **4** | 16 | **20** |
|---|---|---|---|
| Part | 20% | 80% | 100% |

2) Peyton made a 90% on her math test. If she got 27 questions correct, how many total questions were on the test?  **There were 30 questions on the test.**

| Percentage | **3** | **27** | **30** |
|---|---|---|---|
| Part | **10** | **90** | **100** |

3) 64% of the students in a classroom are girls. If there are 16 girls, how many total students are in the class?  **There are 25 students in the class.**

| Percentage | **1** | **16** | **25** |
|---|---|---|---|
| Part | **4** | **64** | **100** |

# The Percent Proportion

You can use a percent proportion to solve for any one piece when given the other 3.

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100} \quad \text{or} \quad \frac{\text{part}}{\text{whole}} = \frac{\%}{100}$$

**Example:**

| Finding a percent (part) of a number (whole): | Finding the whole given the percent (part): |
|---|---|
| What is 20% of 240? | 60 is 75% of what number? |
| First, set up your proportion: | First, set up your proportion: |
| $$\frac{x}{240} = \frac{20}{100}$$ | $$\frac{60}{x} = \frac{75}{100}$$ |
| Then solve by cross multiplying: | Then solve by cross multiplying: |
| $$\frac{x}{240} = \frac{20}{100}$$ | $$\frac{60}{x} = \frac{75}{100}$$ |
| $x \bullet 100 = 240 \bullet 20$ | $60 \bullet 100 = x \bullet 75$ |
| $x \bullet 100 = 4800$ | $6000 = x \bullet 75$ |
| $x = \dfrac{4800}{100}$ | $x = \dfrac{6000}{75}$ |
| $x = 48$ | $x = 80$ |
| 48 is 20% of 240. | 60 is 75% of 80. |

**You Try:**

Use one of the methods you have learned to solve the following problems.

| 1)  What is 5% of 200?  **10** | 2)  8 is 40% of what number?   **20** | 3)  What is 15% of 80?  **12** |
|---|---|---|
| | | |

| 4) 18 is 25% of what number?<br><br>**72** | 5) What is 25% of 60? **15** | 6) 62 is 50% of what number?<br><br>**124** |
|---|---|---|

7) Martha put 20% of her paycheck in the bank.  If her paycheck was $150, how much did she put in the bank?

   a)  Should your answer be **MORE** or **LESS** than $150?

   b)  Solution = **$30**

   c)  Write your answer in a complete sentence:
     **Martha will put $30 in the bank.**

8) Ethan got 90% of the problems correct on a quiz.  If he got 27 problems correct, how many problems were on the quiz?

   a)  Should your answer be **MORE** or **LESS** than 27?

   b)  Solution = **30**

   c)  Write your answer in a complete sentence:
     **There were 30 questions on the quiz.**

9) Whitney bought a pair of jeans that cost $25.  If tax is 5%, how much will she pay for the jeans?

   a)  Should your answer be **MORE** or **LESS** than $25?

   b)  Solution = **$26.25**

   c)  Write your answer in a complete sentence:
     **Whitney will pay $26.25 for the jeans with tax.**

10) Ellis' bill at Red Lobster was $18.50.  If he gives his server a 20% tip, how much tip will he leave?

   a)  Should your answer be **MORE** or **LESS** than $18.50?

   b)  Solution = **$3.70**

   c)  Write your answer in a complete sentence:
     **Ellis will pay $3.70 in tip.**