
Math Mammoth Percent

Contents

Introduction	4
Percent	7
What Percentage...?	11
Percentage of a Number	13
Percentage of a Number: Using Decimals	17
Discounts	20
Sales Tax	22
Practice with Percent	24
“Backwards” Questions with Percent	27
Tenth of a Percent	28
Ratios, Fractions, and Percents	30
Review	33
Circle Graphs	34
Percent of Change	36
Percent of Change, Part 2	39
Percent of Change: Applications	41
Comparisons with Percent	43
Review: Percent	47
Answers	51
More from Math Mammoth	65

Introduction

Math Mammoth Percent teaches students the concept of percent, percentage of a number, discounts, sales tax, percent of change, circle graphs, and percent of comparison. It is suitable for 6th-8th grade (middle school).

The concept of percent builds on a student's understanding of fractions and decimals. Specifically, students should already be very familiar with the idea of finding a fractional part of a whole (such as finding $\frac{3}{4}$ of \$240). Students who have used Math Mammoth have been practicing that concept since 4th grade, and one reason why I have emphasized finding a fractional part of a whole so much in the division and fraction materials in the earlier grades is specifically to lay a groundwork for the concept of percent.

Assuming the student has mastered how to find a fractional part a whole, and can easily convert fractions to decimals, studying percent should not be difficult.

The first lesson, *Percent*, practices the concept of percent as $\frac{1}{100}$, and how to write fractions and decimals as percentages. Next we study *What Percentage?* in order to cement the basic idea of questions where percentage (or how many percent) is asked: students write the asked part first as a fraction, and then convert that to a percentage.

The lesson that follows, *Percentage of a Number*, teaches how to find a certain percentage of a quantity using mental math techniques. For example, students find 10% of \$400 by dividing \$400 by 10. In the next lesson, students find a percentage of a quantity using decimal multiplication, including using a calculator. For example, to find 17% of 45 km, students multiply 0.17×45 km.

Then follow lessons about discounts and sales tax, important applications in everyday life. Next we go on to the lesson *Practice with Percent*, which contrasts the two types of problems: questions that ask for a certain percentage of a number (the percentage is given), and questions that ask for the percentage. For example, the first type of question could be “*What is 70% of \$380?*”, and the second type could be “*What percentage is \$70 of \$380?*”

I also present one optional lesson titled *Backwards questions with percent*, where students need to figure out “the whole” when a partial amount and a percentage are given. For example: “Three-hundred twenty students, which is 40% of all students, take additional PE. How many students are there in total?”

Then follows one lesson concentrating on tenth of a percent. Thus far, all the material has been with whole percents. From this lesson on, we will also use tenth of a percent (such as 13.4%). We go on to compare ratios, fractions, and percent in one lesson. Next, students study how to make a circle graph.

The last major topic is percent of change. This deals of course with decreases and increases in quantities (such as prices). We also study how to find the percent of change when the original and new amount are known.

Tying in with percent of change, there is one lesson on *Comparisons with Percent*. It ties in, because the way to solve comparisons involving percent (such as how many percent less/more is one thing than another) is identical to finding percent of change.

I wish you success in your math teaching!

Maria Miller, the author

Helpful Resources on the Internet

Use these free online resources to supplement the “bookwork” as you see fit.
You can access an up-to-date online version of this list at
www.mathmammoth.com/weblinks/percent.htm

Games & Tools

Virtual Manipulative: Percentages

Interactive tool where you fill in any two of the three 'boxes' (whole, part, and percent) and it will calculate the missing part and show the result visually in two ways.

http://matti.usu.edu/nlvm/nav/frames_asid_160_g_2_t_1.html

Mission: Magnetite

Hacker tries to drop magnetite on Motherboard. To stop him, match up percentages, fractions, and images showing fractional parts.

<http://pbskids.org/cyberchase/games/percent/percent.html>

Fractions and Percent Matching Game

A simple matching game: match fractions and percentages.

http://www.mathplayground.com/matching_fraction_percent.html

Fraction/Decimal/Percent Jeopardy

Answer the questions correctly, changing between fractions, decimals, and percentages.

<http://www.quia.com/cb/34887.html>

Percents-Fractions-Decimals Challenge Exercise

An online quiz where two of the three—fraction, decimal, or percent—are given, and you fill in the missing one.

http://www.mathgoodies.com/lessons/vol4/challenge_vol4.html

Flower Power

Grow flowers and harvest them to make money in this addictive order-'em-up game. Practice ordering decimals, fractions, and percentages. The game starts with ordering decimals (daisies), and proceeds into fractions (tulips or roses).

<http://www.mangahigh.com/games/flowerpower>

Percent Shopping

Choose toys to purchase. In level 1, you find the sale price when the original price and percent discount are known. In level 2, you find the percent discount when the original price and the sale price are known.

http://www.mathplayground.com/percent_shopping.html

Penguin Waiter

Simple game where you calculate the correct tip to leave the penguin waiter.

<http://www.funbrain.com/penguin/>

Comparing Fractions, Decimals, and Percentages

Factsheets, a nice matching pairs game, online quiz, and printable worksheets.

<http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/comparing/comparingall3/>

Proportioner

An interactive tool (Java). Manipulate images and compare their dimensions to the dimensions of other images. Specify image dimensions graphically, numerically or using a scale factor.

http://seeingmath.concord.org/resources_files/Proportioner.html

Worksheets

Percent worksheets

Create an unlimited number of free customizable percent worksheets to print.

www.homeschoolmath.net/worksheets/percent-decimal.php

www.homeschoolmath.net/worksheets/percent-of-number.php

www.homeschoolmath.net/worksheets/percentages-words.php

Worksheets & quizzes for percentages, ratios, and proportions

Several online quizzes and a few PDF worksheets for these topics.

www.math4children.com/Topics/Percentages

Tutorials

A Conceptual Model for Solving Percent Problems

Explanation of how to use a 10 x 10 grid to explain basic concept of percent, AND solve various types of percent problems.

<http://illuminations.nctm.org/LessonDetail.aspx?id=L249>

PERCENTAGE from Maisonet Math

Includes PDF worksheets, online quizzes, and videos about various percent topics.

http://www.mrmaisonet.com/Menu_Pages/percentage_page.htm

Meaning of Percent -- Writing Fractions as Percents

Free percent lessons from Math Goodies.

http://www.mathgoodies.com/lessons/vol4/meaning_percent.html

http://www.mathgoodies.com/lessons/vol4/fractions_to_percents.html

Money Math

Crystal clear tutorial on interest.

<http://www.intmath.com/Money-Math/Money-Maths.php>