Unit 3

Calculating Percentages

Percentage: means 'out of 100', a percent with a 100 as the denominator. Interprets:
-One number as a fraction
-Describes and increase or a decrease
-Comparisons

Review! ***Convert the percent to a Fraction and a Decimal:***

50% → $\frac{50}{100} \div 50 \to \frac{1}{2} \to 2\overline{)1.0}$ (.5)

20% → $\frac{20}{100} \div 20 \to \frac{1}{5} \to 5\overline{)1.0}$ (.2)

25% → $\frac{25}{100} \div 25 \to \frac{1}{4} \to 4\overline{)1.00}$ (.25), -8, 20

$33\frac{1}{3}\%$ → $3\overline{)1.0}$ (.$\overline{3}$), -9, 1 → $33.\overline{3}$

75% → $\frac{75}{100} \div 25 \to \frac{3}{4} \to 4\overline{)3.00}$ (.75), -28, 20

$66\frac{2}{3}\%$ → $3\overline{)2.0}$ (.$\overline{6}$), 18, 2 → $66.\overline{6}$

10% → $\frac{10}{100} \div 10 \to \frac{1}{10} \to 10\overline{)1.0}$ (.1)

100% → $\frac{100}{100} \div 100 \to \frac{1}{1} = 1$

Calculating a Percent of a Quantity

Example #1: Mr. Pincus has 600 dollars ($600) and decided to give 40% to charity. How much was that?

Step One: Convert the percent to a fraction OR a decimal

40% -> $\frac{40}{100} \div \frac{20}{20} \rightarrow \frac{2}{5}$ OR $40\% \rightarrow .4$

Step Two: Multiply the fraction or the decimal to the quantity (refer to multiplying an integer by a fraction notes)

$600 of (multiply) $\frac{600}{1} \times \frac{2}{5}$ OR $600 \times .4$

Step Three: Solve and Simplify Final answer! (Don't forget the unit ex. Dollar Sign)

$\frac{600}{1} \times \frac{2}{5} \div 5$ OR $600 \times .4 = 2400 = 240$

$\frac{120}{1} \times \frac{2}{1} = \frac{240}{1} = 240$

Example #2: Ms. Schaar earns $723 and had to pay 27% in tax. How much was that?

Step One: Convert the percent to a fraction OR a decimal

27% -> $27\% \rightarrow .27$

Step Two: Multiply the decimal to the quantity (refer to multiplying decimals)

$723 of .27 →

$$\begin{array}{r} 723 \\ \times .27 \\ \hline 5061 \\ 14460 \\ \hline 195.21 \end{array}$$

Step Three: Solve and Simplify Final answer! (Don't forget the unit ex. Dollar Sign)

Practice:

Calculate these amounts

a) 25% of 60kg b) 75% of 1000 litters

c) 40% of $300 d) 70% of 120g

Word Problems-Calculating Percent

Example #1: When 420 students took an examination, 80% passed.

a) How many passed? 80% (information is in the question)

b) What percentage failed? 100% (all percent are out of 100) − 80% (Percent that passed) = 20% (Percent Failed)

c) How many failed? (Quantity of a percent notes) 20% → .2 (step 1 convert to decimal or fraction) 420 × .2 = 840 = 84 students (step 2 multiply)

Example #2: The metal bronze is made from 95% copper and 5% tin.

a) What amounts of copper and tin are there in 30 grams of bronze?

Step 1: Convert

copper

95% of 30

.95 × 30 → 30 × .95 = 28.50g

tin

5% of 30

.05 × 30 → 30 × .05 = 01.50g

Check

28.5 + 1.5 = 30.0 ✓

b) What amount of copper and tin are there in one kilogram of bronze?

copper: .95 x 1 = .95 kg

tin: .05 x 1 = .05 kg

Check your work!

.95 + .05 = 1 kg

Example #3: The population of Europe is 850 million. This table gives the percentage of the population of Europe living in some of its countries.

Country	Germany	France	Spain	Sweden
% Of European Population	9.6% x 850	7.8% x 850	5.5% x 850	1.1% x 850

Step 1: Convert to fractions or decimals (move decimal twice to the left)
Step 2: Multiply by quantity

Percentage increases and decreases

Increase: become or make greater +
Decrease (reduction): become or make less −

Steps:

Example #1: Riley bought a car for 15, 800. After a year it was worth 20% less. How much was it worth after a year?

1. Calculate the increase or decrease (refer to steps of finding a percent of a quantity)

Step 1: Convert 20% : 20% or $\frac{20}{100} \to \frac{1}{5}$: .2

Step 2: Multiply by quantity: 15,800 x .2 = 3160.0 or $\frac{15800}{1} \times \frac{1}{5} = \frac{15800}{5} = 3,160$

2. Then add it or subtract it from the original amount

Keyword is 20% Less

original 15,800 − 3160 (20%) = 12,640

Example #2:

1. a) Find 15% of $60 b) Increase/Decrease $60 by 15%

Step 1: Convert 15% or $\frac{15 \div 5}{100 \div 5} = \frac{3}{20}$

Step 2: Multiply: 15 x 60 = 900 or $\frac{3}{20} \times \frac{60}{1} = \frac{180}{20} = 9$

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

Increase: 60 + 9 = 69

Decrease: 60 − 9 = 51

Finding Percentages

What are some examples when you need to write a number as a percentage of another?

- Surveys
- data collection
- test scores
- population
- at a store

STEPS

Example#1: There are 752 (total) students in a college. 419 are female.

A) What Percentage of the students are female?

Step One: Write the numbers in form of a fraction (smaller number over the total) and simplify

$$\frac{419}{752}$$

Step Two: Convert the fraction to a percentage (convert to a decimal first with division OR make denominator to a hundred if possible)

$$752\overline{)419.00} = .557$$

3760
4300
-3760
5400
5264

→ .557 → .56 → 56%

Round to 2 DP

Convert to percent

B) What percentage of the students are male?

total percent of student − Percent of Female = 44% males

100% − 56% = 44% males

↑ subtract to find difference, which equals male

Example #2: Howard's test marks are shown below. Change each of them to a percent

a) Science 7 out of 10 $\frac{7}{10} \rightarrow 10\overline{)7} \rightarrow .7 \rightarrow 70\%$

b) History 17 out of 20 $\frac{17}{20} \rightarrow 20\overline{)17} \rightarrow .85 \rightarrow 85\%$

c) Geography 21 out of 40 $\frac{21}{40} \rightarrow 40\overline{)21} \rightarrow .525 \rightarrow 52.5\%$

d) English 37 out of 50 $\frac{37}{50} \rightarrow 50\overline{)37} \rightarrow .74 \rightarrow 74\%$

e) Math 67 out of 80 $\frac{67}{80} \rightarrow 80\overline{)67} \rightarrow .8375 \rightarrow 83.75\%$

f) Art 17 out of 30 $\frac{17}{30} \rightarrow 30\overline{)17} \rightarrow .56\overline{6} \rightarrow 56.6\%$

Set up — divide — Find decimal — Convert to perct (move decimal twice to the right)

***When the total isn't given follow these steps:

Example 3) There are 24 males and 36 females in choir. gives male + female but not total

a) What percentage of the choir are males?

Step #1: Add both numbers $24 + 36 = 60$

Step #2: Set Up the fraction with the number needed as the numerator and the total from step #2 as the denominator

b) What percentage are females? $\frac{36}{60}$ (36 females / 60 total) $\rightarrow \frac{36 \div 12}{60 \div 12} \rightarrow \frac{3}{5} \times \frac{20}{20} = \frac{60}{100} = 60\%$

simp — multiply by something to get 100