

ACCUPLACER Study Guide for Pre-Algebra and Arithmetic

I. Percents

Changing Decimals to Percents

Move the decimal point two places to the right and attach a percent sign.

Example 1: $.35 = 35\%$ Example 2: $.04 = 4\%$ Example 3: $.7 = 70\%$

Changing a Percent to a Decimal

Move the decimal point two places to the left and get rid of the percent sign.

Example 1: $32\% = .32$ Example 2: $3\% = .03$ Example 3: $90\% = .9$

Convert from a Fraction to a Percent

Example: Convert $\frac{5}{8}$ to a percent.

Divide the denominator into the numerator to get a decimal. Convert this to a percent.

$$8 \overline{)5.000} \rightarrow .625 = 62.5\%$$

Convert a Percent to a Fraction

Example: Convert 85% to a fraction

Put the percentage over 100 and reduce to lowest terms.

$$\frac{85}{100} \div \frac{5}{5} = \frac{17}{20}$$

Finding the Percent of a Value

Example: What is 21% of 350?

Multiply the decimal form of the percentage by the value.

$$.21 \times 350 = 73.5$$

Basic Percentage Word Problems

Example 1: 9 is what percent of 45?

Example 2: 30% of what number is 66?

We change the sentence into an equation using key words. The word "is" changes into an equals sign. The word "of" means multiply. "What" changes into a variable (I'll use "a").

$$is \rightarrow = , of \rightarrow \times , what \rightarrow a$$

Example 1:

$$9 \text{ is what percent of } 45? \quad \rightarrow \quad 9 = a \times 45$$

$$\text{Now solve for "a" by dividing both sides by 45:} \quad \frac{9}{45} = a$$

$$\text{Now reduce and divide to get a decimal value for "a"...} \quad a = .2$$

$$\text{Now convert this decimal to a percent for the final answer } \boxed{a = 20\%}$$

Example 2:

$$30\% \text{ of what number is } 66? \quad \rightarrow \quad 30\% \times a = 66$$

$$\text{Convert this decimal to a fraction:} \quad \frac{30}{100} \times a = 66$$

$$\text{Reduce:} \quad \frac{3}{10} \times a = 66$$

$$\text{Solve for a (multiply by 10, then divide by 3)} \quad 3 \times a = 66 \times 10$$

$$\boxed{a = \frac{660}{3} = 220}$$

Practice problems:

Write as a percentage

- 0.12
- $\frac{2}{5}$
- 1.15
- What is 11% of \$3000?
- 60 is what percent of 12000?
- 28 is 40% of what number?

Answers:

- 12%
- 40%
- 115%
- \$330
- .5%
- 70

II. Order of Operations

Most people remember order of operations with the saying “Please Excuse My Dear Aunt Sally” or they just remember the acronym “PEMDAS”. Here’s what each letter stands for:

P – Parentheses – First, perform all operations inside parentheses or grouping symbols. This includes simplifying square roots and absolute values. Also, there are hidden parentheses around numerators and denominators with more than one term in them (see Example 2 below).

E – Exponents – Next, evaluate all powers.

MD – Multiply and Divide – Perform all multiplication and division from left to right.

AS – Add and Subtract - Add and subtract from left to right.

Example 1:

$$3^2 + 5 - \sqrt{4} + 4^0$$

P – No parentheses, but the square root counts as a grouping symbol...

$$3^2 + 5 - 2 + 4^0$$

E – Evaluate powers to get...

$$9 + 5 - 2 + 1$$

MD – No multiplication or division in this problem...

AS – Add and subtract...

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Example 2:

$$\frac{5 \cdot 5 - 4 \cdot 3}{2^2 - 1}$$

Don’t forget, there are parentheses around the numerator and denominator!

$$\frac{(5 \cdot 5 - 4 \cdot 3)}{(2^2 - 1)}$$

Let’s work inside the parentheses in the numerator first... no parentheses, no exponents, we need to multiply/divide:

$$\frac{25 - 12}{(2^2 - 1)}$$

Now add/subtract

$$\frac{13}{(2^2 - 1)}$$

Now let's work inside the parentheses in the denominator... no parentheses, we have an exponent:

$$\frac{13}{(4 - 1)}$$

There's no multiplication or division, so we just have to add/subtract:

$$\frac{13}{3}$$

This is an improper fraction which can be converted to a mixed number:

$$4\frac{1}{3}$$

Practice problems:

1. $(5 + 1)(4 - 2) - 3$

2. $3 \cdot 7^2$

3. $49 \div 7 - 2 \cdot 3$

4. $3 + 2(5) - |-7|$

5. $\frac{4^2 - 5^2}{(4 - 5)^2}$

6. -5^2

7. $(-5)^2$

Answers:

1. 9

2. 147

3. 1

4. 6

5. -9

6. -25

7. 25

III. Substitution

Example: Find $xyz - z^2$ if $x = 2, y = -1, z = -3$

Simply plug in the given values for x, y and z where they appear in the expression. Use order of operations to simplify. Make sure to use parentheses when plugging values in.

$$xyz - 4z^2 = (2)(-1)(-3) - 4(-3)^2 = (2)(-1)(-3) - 4(9) = 6 - 36 = -30$$

Practice Problems:

Find the following if $x = 1, y = -2, z = 4$

1. $2x - 3y$ 2. $y(x - 2z)$ 3. $\frac{5x-z}{xy}$ 4. $3y^2 - 2xz + 3$

Answers:

1. 8 2. 14 3. $-\frac{1}{2}$ 4. 7

IV. Linear equations with one variable

Example 1: Solve for x. $6x - 48 = 6$

Example 2: Solve for x. $4x - 2(1 + x) = 4$

The basic steps are:

1. Distribute to get rid of any parentheses.
2. Add and subtract to get all terms with an x on one side of the equation and everything else on the other side.
3. Multiply or divide to solve for x

Example 1:

$$6x - 48 = 6$$

Add 48 to both sides

$$6x - 48 + 48 = 6 + 48$$

$$6x = 54$$

Divide both sides by 6

$$6x/6 = 54/6$$

$$x = 9$$

Example 2:

$$4x - 2(1 + x) = 4$$

Distribute the -2

$$4x - 2 - 2x = 4$$

Add 2 to both sides

$$4x - 2 - 2x + 2 = 4 + 2$$

Combine like terms

$$2x = 6$$

Divide both sides by 2

$$x = 3$$

Practice Problems:

Solve for x!

1. $4x + 5 = 17$

2. $\frac{2}{3}x - 5 = x - 3$

3. $8 - 4(x - 1) = 2 + 3(4 - x)$

4. $y = 3x - 2$

5. $hx + 4 = y + 1$

Answers:

1. $x = 3$

2. $x = -6$

3. $x = -2$

4. $x = \frac{y+2}{3}$

5. $x = \frac{y-3}{h}$

V. Word Problems

Again, you will encounter many word problems on the Accuplacer. See the 030 review sheet for a list of key words to help translate words into math. A couple things to recall here is that the area of a rectangle is length times width ($A_{rectangle} = lw$) and the area of a triangle is $\frac{1}{2}$ length times width ($A_{triangle} = \frac{1}{2}lw$). Let's try some out!

1. 30% of the left handed people in a class of 5000 students were surveyed. 120 people were surveyed. How many left handed people are there in the class?
2. A soccer team plays in a league with a 55 game season. Their winning percentage in the 2007 season was 20%. How many games did they win in the 2007 season?
3. In 2007, there were 667 boating accidents in Florida. In 2006, there were 599. What is the percentage increase in boating accidents from 2006 to 2007?
4. Twice a number subtracted from 40 is 18. Find the number.
5. Three times a number added to 10 is 34. Find the number.
6. 550 jelly beans cost you \$11. How many jelly beans could you get for \$20?
7. One fourth of all flowering plants in the US are in danger of becoming extinct. This means 5212 flowering plants are in danger of becoming extinct. How many flowering plants are there in the US?

- The sides of a rectangle are 2.4 cm and 1.1 cm. Find the area of the rectangle.
- The area of a rectangle is 23.7 feet. If the length of the rectangle is 4.2 feet, find its width.

Answers:

- 30% of the number of lefties is 120: $\frac{30}{100} \cdot x = 120 \rightarrow x = 400$ *lefties*
- We want 20% of 55: $\frac{20}{100} \cdot 55 = 11$ *games*
- The total increase is $667 - 599 = 68$ *accidents*. What percent of 599 is 68?
$$x \cdot 599 = 68 \rightarrow x = \frac{68}{599} = .1135 = 11.35\%$$
- $40 - 2x = 18 \rightarrow 2x = 22 \rightarrow x = 11$
- $3x + 10 = 34 \rightarrow 3x = 24 \rightarrow x = 8$
- You get $\frac{550}{11} = 50$ jelly beans per dollar. So you can get $50 \cdot 20 = 1000$ jelly beans.
- $\frac{1}{4}$ of the total plants is 5212 plants. So there are $5212 \cdot 4 = 20848$ total plants.
- $(2.4)(1.1) = 2.64$ cm^2 (centimeters squared)
- $\frac{23.7}{4.2} = 5.64$ ft