UAS UNIVERSITY OF ALASKA SOUTHEAST

learn • engage • change

ACCUPLACER MATH TEST REVIEW

ARITHMETIC · ELEMENTARY ALGEBRA · COLLEGE ALGEBRA

The following pages are a comprehensive tool used to maneuver the ACCUPLACER UAS Math portion. This tests your mathematical capabilities and designates a class that you would receive the most benefit from. The ACCUPLACER test will consist of multiple choice questions. Scratch paper is allowed during testing, but nothing else is. Good luck!

Phone: (907) 747-7717
Email: sitka.ssc@uas.alaska.edu

ARITHMETIC REVIEW

This test measures your ability to perform basic arithmetic operations and to solve problems that involve fundamental arithmetic concepts. There are 17 questions on the Arithmetic tests, divided into three types:

- Operations with whole numbers and fractions
- Operations with decimals and percents
- Applications and problem solving

ORDER OF OPERATIONS

Solving problems with several operations requires doing each step in the correct order.

Step by Step Example 1: 7 x 14—(12+18)
Start with what is in the parentheses: 12+18=30
Solve multiplications and divisions from left to right: 7x14=98
Rewrite the problem to include what work you've done:
98– (30)= 68
Step by Step Example 2: $2(6-4)^2+10$
Start with the parentheses: (6-4)=2
Evaluate the exponential expression now: $2^2=2x2=4$
Rewrite the problem so it's clearer: 2x4+10
Solve the multiplication first and then the addition: 8+10=18

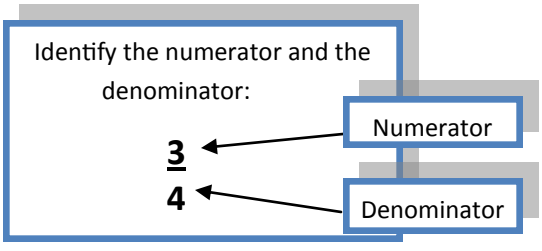
Rules for Order of Operations

1. Do all calculations within parentheses ( ), brackets [ ], or braces { } before operations outside.
2. Evaluate all exponential expressions.
3. Do all multiplications and divisions in order from left to right.
4. Do all additions and subtractions in order from left to right.

FRACTIONS: DIVIDE & CONQUER

Welcome to Fractions 101

Fractions scare most people. We use them in recipes (3/4 cup of flour), shopping (1/2 off), and construction tools (9/16 wrench). They are very uncomplicated once you get the hang of them. Fractions are a way of saying that ***out of this many, only a portion are left***.



Imagine you were eating a pizza with 8 slices total and you had already finished 3 slices. What fraction of the total pizza was left to eat?

How many pieces of pizza were there to begin with? **8 slices**
How many did you already eat? **3 slices**
How many are left? **5 slices**

How would that be written as a fraction? Out of 8 total pieces, you have eaten three. That would be written as: $\frac{3}{8}$

Any number divided by itself equals 1.

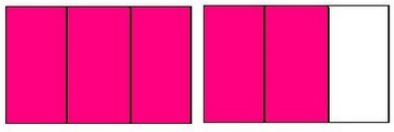
$\frac{12}{12} = 1$

Zero divided by any number = 0.

$\frac{0}{7} = 0$

Any number divided by zero is *undefined*.

$\frac{6}{0}$ = **UNDEFINED**



$1\frac{2}{3} = \frac{5}{3}$

Add & Subtract Fractions

What happens if the fractions have different denominators? Like if one pizza had 12 slices and the other pizza had 8? We can combine those too, but we have to find the *Least Common Denominator (LCD)* first. *Least Common Denominator* refers to the smallest number that has all of the denominators as factors.

Step by Step Example: $\frac{1}{3} + \frac{3}{4} =$

We want to add together these 2 fractions. First, we need to make sure the denominators (the bottom numbers) are the same. The smallest number that has both 3 and 4 as factors is 12. Before we add, we must change both of the fractions to represent the change in the denominator. The numerator (top number) must reflect the change in the denominator.

In order to get 12 as the LCD, what do you need to multiply 3 by? **4**

$\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}$

Look at the second fraction. What do you need to multiply 4 by to get to 12? **3**

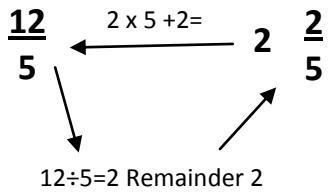
$\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$

So now we have our new fraction, which has common denominators, which means it is ready to add together.

What is 4+9? **13** → $\frac{4}{12} + \frac{9}{12} = \frac{\mathbf{13}}{\mathbf{12}}$

Mixed Numbers Vs. Improper Fractions

12/5 is the same as 2 2/5. Here's how:



Follow along in these examples of both adding and subtracting fractions.

1. $\frac{5}{6} - \frac{1}{5} = \left(\frac{5}{6} \cdot \frac{5}{5}\right) - \left(\frac{1}{5} \cdot \frac{6}{6}\right) = \frac{25}{30} - \frac{6}{30} = \frac{19}{30}$
2. $\frac{1}{3} + \frac{7}{8} = \left(\frac{1}{3} \cdot \frac{8}{8}\right) + \left(\frac{7}{8} \cdot \frac{3}{3}\right) = \frac{8}{24} + \frac{21}{24} = \frac{29}{24}$
3. $\frac{5}{7} - \frac{1}{9} = \left(\frac{5}{7} \cdot \frac{9}{9}\right) - \left(\frac{1}{9} \cdot \frac{7}{7}\right) = \frac{45}{63} - \frac{7}{63} = \frac{38}{63}$
4. $\frac{3}{14} + \frac{1}{2} = \left(\frac{3}{14} \cdot \frac{2}{2}\right) + \left(\frac{1}{2} \cdot \frac{14}{14}\right) = \frac{6}{28} + \frac{14}{28} = \frac{20}{28} = \frac{5}{7}$ REDUCED

Another Example:

the original fractions: $\frac{1}{3} + \frac{1}{2}$

with a common denominator: $\frac{2}{6} + \frac{3}{6}$

result: $\frac{5}{6}$

Here are 2 examples of questions you would see on the ACCUPLACER test:

Three people who work full-time are to work together on a project, but their total time on the project is to be equivalent to that of only one person working full-time. If one of the people is budgeted for one-half of his time to the project and a second person for one-third of her time, what part of the third worker's time should be budgeted to this project?

A. $\frac{1}{3}$
B. $\frac{3}{5}$
C. $\frac{1}{6}$
D. $\frac{1}{8}$

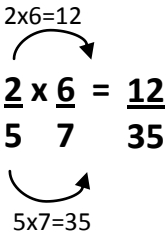
$3\frac{1}{3} - 2\frac{2}{5} =$

A. $1\frac{1}{2}$
B. $\frac{1}{15}$
C. $\frac{14}{15}$
D. $1\frac{1}{15}$

ANSWERS: C, C

Multiply & Divide Fractions

Most people find that multiplying and dividing fractions is easier than adding and subtracting them because you do not need to find a common denominator. To **multiply**, multiply the numerators together and the denominators together and then reduce if necessary.



Dividing fractions has an extra step.

First, flip the second fraction on its head:

$$\frac{2}{3} \div \frac{1}{5} \rightarrow \frac{5}{1}$$

Then, proceed as you would for multiplying fractions.

$$\frac{2}{3} \times \frac{5}{1} = \frac{10}{3}$$

Practice:

1. Change $4\frac{1}{6}$ to an improper fraction.

2. Change $\frac{42}{16}$ to a mixed number.

3. $5\frac{3}{5} + 2\frac{2}{3}$

4. $5\frac{1}{2} + 3\frac{2}{3}$

5. $9\frac{11}{13} - 2\frac{1}{2}$

6. $10\frac{7}{8} - 2\frac{3}{7}$

7. $3\frac{1}{7} \times \frac{5}{9} = \square$

8. $3\frac{3}{7} \times 2\frac{7}{9} = \square$

9. $\frac{6}{11} \div 14 = \square$

10. $3\frac{4}{5} \div 5\frac{5}{6} = \square$

Answers: 1) $\frac{25}{6}$ 2) $2\frac{5}{8}$ 3) $8\frac{4}{15}$ 4) $9\frac{1}{6}$ 5) $7\frac{9}{26}$ 6) $8\frac{25}{56}$ 7) $1\frac{47}{63}$ 8) $9\frac{11}{21}$ 9) $\frac{3}{77}$ 10) $\frac{114}{175}$

Here are 2 examples of questions you would see on the ACCUPLACER test:

Find the product: $\frac{2}{3} \times \frac{1}{5}$.

a) $\frac{3}{8}$ b) $\frac{2}{15}$ c) $\frac{3}{10}$ d) $\frac{2}{8}$

Simplify $\frac{3}{4} \div \frac{2}{9}$

a) $\frac{1}{6}$ b) $\frac{27}{8}$ c) $\frac{5}{13}$ d) $\frac{6}{36}$

ANSWERS: B, B

DECIMALS

+/ - When you **add** or **subtract** decimals, *line the decimals points up.*

$$\begin{array}{rcr} 4.2 & \rightarrow & 4.200 \\ 0.34 & \rightarrow & 0.340 \\ 5.871 & \rightarrow & 5.871 \\ +\ \ 18 & \rightarrow & 18.000 \\ \hline & & \mathbf{28.411} \end{array}$$

x When you **multiply**, first multiply as you would with whole numbers. Then count the number of places to the right of te decimal in each number and counting from the right of the answer, move the decimal that number of place to the left.

3.77 x 2.8 = ?

$$\begin{array}{rl} & 3.77 \ \text{(2 decimal places)} \\ \times & \ \ 2.8 \ \ \text{(1 decimal place)} \\ \hline & 3016 \\ & +754 \\ \hline & 10.556 \ \text{(3 decimal places)} \end{array}$$

÷To **divide**, make the divisor into a whole number by moving the decimal to the right. Then move the decimal the same amount of places in the dividend.

$$\begin{array}{r} 15 \\ 0.65\overline{)\,9.75} \\ -\,65\downarrow \\ \hline 325 \\ -\,325 \\ \hline 0 \end{array}$$

Here are 4 examples of questions you would see on the ACCUPLACER test:

2.75 + .003 + .158 =

A. 4.36
B. 2.911
C. 0.436
D. 2.938

7.86 × 4.6 =

A. 36.156
B. 36.216
C. 351.56
D. 361.56

Which of the following is closest to 27.8 × 9.6?

A. 280
B. 300
C. 2,800
D. 3,000

Which of the following is the least?

A. 0.105
B. 0.501
C. 0.015
D. 0.15

ANSWERS: B,A,C,A

Rounding Numbers

Round to the nearest hundred.

12,762.10

The number to the right of the 7, which is in the hundreds place, is 6. Since it is 6>5, round seven to the next highest number, which is 8. The new number is:

12,800.00

Rules for Rounding

1. Locate the digit in that place.
2. Consider the next digit to the right.
3. If the digit to the right is 5 or higher, round up. If the digit to the right is 4 or lower, round down.
4. Change all digits to the right of the rounding location to zeros.

Here are 2 examples of questions you would see on the ACCUPLACER test:

Tom is going on a trip. His plane ticket costs $1,596, his hotel cost is $532, and his meals cost $379. Rounding to the nearest hundred, how much did his total trip cost?

A. $2507 C. $3000

B. $2510 D. $2500

The answer to this multiplication problem will be closest to which of these whole numbers?

5.03 x .92

A. 45 C. 6

B. 5 D. 7

ANSWERS: D, B

Percents

50% = .50 = 1/2

8% = .08 = 2/25

To change a number from a percent to a decimal, move the decimal point two places to the left and rewrite without the % symbol. To change a number from a decimal to a percent, move the decimal point two places to the right and add the % symbol.

Here are 2 examples of questions you would see on the ACCUPLACER test:

32 is 40 percent of what number?

A. 12.8
B. 128
C. 80
D. 800

$\frac{7}{20}$ =

A. 0.035
B. 0.858
C. 0.35
D. 3.5

PERCENTS

Percents are used often in everyday life. We can find percents in stores, marking down a price (20% off!), determining the amount of interest someone will pay on a loan (8% interest rate), tax rates (6% sales tax rate in Sitka). When converting a percent to its fraction form, it will always have a denominator of 100.

Changing Decimals to Percents and Back Again

If changing a decimal to a percent, make sure you move the decimal point two places to the right and add the percent sign.

.42 = 42% .08 = 8% 1.23 = 123%

To change from a percent to a decimal, move the decimal point two places to the left and drop the percent sign.

60% = .6 .9% = .009 200% = 2.0

Fractions to Percents and Back Again

Divide the denominator of the fraction into the top number and move the point 2 places to the right. Or you can multiply the fraction by 100%.

Example: $\frac{3}{4}$

$$4\overline{)3.00} \quad .75 = .75 = 75\%$$

28
20
20
0

OR

Example: $\frac{3}{4}$

$$\frac{3}{\cancel{4}_{1}} \times \frac{\overset{25}{\cancel{100\%}}}{1} = \frac{75\%}{1} = 75\%$$

To get a percent back to a fraction, write the percent as a fraction with 100 as the denominator and then reduce the fraction to lowest terms.

Step by Step Example: 72%

$$72\% = \frac{72}{100} \div \frac{4}{4} = \frac{18}{25}$$

Working with Percents

Step by Step Example 1: What is 40% of $3,200?

Break down the problem from English to Math.
What=x (what we're solving for)
Is = =
40%=.4 =2/5 (whatever you're most comfortable with)
Of = multiplied

Rewrite the problem using the substitution words.
x=.40 x 3200

Solve: .40x3200= **$1,280**

Step by Step Example 2: 11 is what percent of 99?

Break down the problem from English to Math and rewrite it.

11=y x 99	'Y' is the unknown variable we're solving for. We want to get y by itself, so we need to get rid of 99.
$\frac{11}{99}$=y	Divide both sides by 99. Y is now by itself, so reduce the fraction 11/99 and you have 1/9.
$\frac{1}{9}$ = 11%	Divide the denominator by the numerator to get the number into a percentage.

Here are 4 examples of questions you would see on the ACCUPLACER test:

1. All of the following are ways to write 25 percent of N EXCEPT
   A. 0.25 N
   B. $\frac{25N}{100}$
   C. $\frac{1}{4}$ N
   D. 25 N

2. $\frac{7}{20}$ =
   A. 0.035
   B. 0.858
   C. 0.35
   D. 3.5

3. 32 is 40 percent of what number?
   A. 12.8
   B. 128
   C. 80
   D. 800

4. A soccer team played 160 games and won 65 percent of them. How many games did it win?
   A. 94
   B. 104
   C. 114
   D. 124

ANSWERS: 1.D 2.C 3.C 4.B

Applications

Much of the ACCUPLACER Arithmetic Test involves problem solving and critical thinking. You take the basic concepts and apply them to math applications.

Step by Step Example 1: Find the area of a square whose sides measure 4cm.

What do we know about squares? A square has 4 equal sides, so if 1 side of our square is 4cm long, the other 3 will be too.

What do we know about finding the area? Base x Height.

So take the base length (4cm) times the height (4cm).

$4x4=16cm^2$

Step by Step Example 2: A dieter lost 2 pounds in 3 weeks. If he continues to lose weight at this rate, how many weeks will it take him to lose 24 pounds?

Set this up as a simple ratio:

$\frac{2 \text{ lbs}}{3 \text{ weeks}} = \frac{24 \text{ lbs}}{? \text{ weeks}}$

Cross multiply to make a new equation.

$2X = 72$

Divide both sides to get x by itself.

$X = 72/2 = 36$

At the rate of 2 pounds every 3 weeks, it will take him 36 weeks to lose 24 pounds.

Step by Step Example 3: 3.04 x .27 =

$$\begin{array}{r} 304 \\ \times 27 \\ \hline 2128 \\ 6080 \\ \hline .8208 \end{array}$$

3.04 x .27 = ⟶ .8208

Move the decimal four spaces to accommodate the four spaces from the two numbers multiplied together.

Step by Step Example 4: 4 1/3 + 2 3/5 =

First, change the mixed numbers into improper fractions.

13/3 + 13/5

Next, find a common denominator. 3x5=15

65/15 + 39/15

Add the numerators together.

104/15

And change it back into a mixed number.

90 14/15

The World Almanac lists all 4-year colleges in the United States with enrollments of 600 or more. This list is 13 pages long, with an average of 89 colleges on a page.

1. Which figure best estimates the number of 4 year colleges listed? a. 157 b. 8000 c. 54000 d. 50 e. 1000

2. Estimate the minimum number of students enrolled at the colleges listed.
   a. 54,000 b. 9000 c. 600,000 d. 5,400,000 e. 6,600,000

3. If you could compare the actual number of students attending 4-year colleges to your estimate for question 2, your estimate would turn out to be:
   a. much higher b. a little higher c. much lower d. a little lower e exactly right.