ACCUPLACER Study Guide for Arithmetic Review

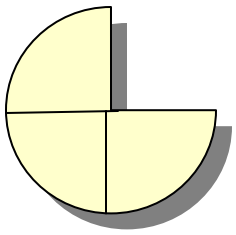
1. Fractions

Vocabulary

Numerator: The top part of a fraction – tells us how many equal pieces we have.

Denominator: The bottom part of the fraction – tells us how many equal pieces are in the whole.

Example:



We have 3 equal pieces. The whole pie had 4 equal pieces. So we have $\frac{3}{4}$ of a pie!

Proper Fractions: When the numerator is smaller than the denominator

Examples: $\frac{1}{3}, \frac{7}{9}, \frac{10}{17}$

Improper Fractions: When the numerator is bigger than or equal to the denominator

Examples: $\frac{3}{2}, \frac{9}{4}, \frac{11}{11}$

Mixed Number: The sum of a whole number and a proper fraction

Examples: $2\frac{1}{3}, 4\frac{7}{9}, 8\frac{1}{2}$

Common Denominator: A number that can be divided evenly by all denominators in the problem

Example: A common denominator of the fractions $\frac{1}{3}, \frac{3}{4}, \frac{5}{2}$ is 12.

$\frac{1}{3} \rightarrow \frac{4}{12}, \frac{3}{4} \rightarrow \frac{9}{12}, \frac{5}{2} \rightarrow \frac{30}{12}$

Note: 24 is also a common denominator of the fractions. In this case, 12 is called the least common denominator.

Changing Mixed Numbers into Improper Fractions

Example: Change $2\frac{3}{4}$ into an improper fraction.

1. Multiply the whole number by the denominator of the fraction.
2. Add this to the numerator of the fraction.
3. This result is the numerator of the improper fraction. The denominator stays the same.

1. $2 \times 4 = 8$
2. $8 + 3 = 11$
3. Answer: $\frac{11}{4}$

Changing an Improper Fraction Into a Mixed Number

Example: Change $\frac{14}{3}$ into a mixed number

1. Long divide the numerator by the denominator.
2. The quotient becomes the whole number and the remainder becomes the numerator of the fraction. The new denominator is the same as that of the original improper fraction.

1. $3\overline{)14}$ $\quad 4$

   $\underline{12}$

   2

2. $4\frac{2}{3}$

Reducing Fractions to Lowest Terms

Example: Reduce $\frac{48}{64}$ to lowest terms

1. Divide both the numerator and denominator by a common factor.

2. Repeat until the numerator and denominator have no more common factors.

Example:

1. $\frac{48}{64} \div \frac{8}{8} = \frac{6}{8}$

2. $\frac{6}{8} \div \frac{2}{2} = \frac{3}{4}$

Multiplying Fractions

Example: Multiply $\frac{6}{7} \cdot \frac{3}{4}$

1. Multiply numerators and denominators straight across.
2. Reduce the fraction to lowest terms.

1. $\frac{6}{7} \cdot \frac{3}{4} = \frac{18}{28}$

2. $\frac{18}{28} \div \frac{2}{2} = \frac{9}{14}$

Dividing Fractions

Example: Divide $\frac{6}{7} \div \frac{3}{4}$

1. Take the reciprocal of the fraction on the right and change the division sign to a multiplication sign.
2. Follow the rules of multiplication.

1. $\frac{6}{7} \div \frac{3}{4} = \frac{6}{7} \cdot \frac{4}{3}$

2. $\frac{6}{7} \cdot \frac{4}{3} = \frac{24}{21} \rightarrow \frac{24}{21} \div \frac{3}{3} = \frac{8}{7} \rightarrow \frac{8}{7} = 1\frac{1}{7}$

Adding and Subtracting Fractions

1. Find a common denominator for all fractions.
2. Add/Subtract the numerators of these fractions, keeping the same denominator in your answer.

Example 1:

$\frac{2}{3} + \frac{3}{4}$

1. $\frac{2}{3} \cdot \frac{4}{4} + \frac{3}{4} \cdot \frac{3}{3} = \frac{8}{12} + \frac{9}{12}$

2. $\frac{8}{12} + \frac{9}{12} = \frac{17}{12} = 1\frac{5}{12}$

Example 2:

$\frac{3}{4} - \frac{2}{5}$

$\frac{3}{4} \cdot \frac{5}{5} - \frac{2}{5} \cdot \frac{4}{4} = \frac{15}{20} - \frac{8}{20}$

$\frac{15}{20} - \frac{8}{20} = \frac{7}{20}$

NOTE: To multiply/divide/add/subtract mixed numbers, you must first change them into improper fractions!

Example 1:

Add $3\frac{1}{2}+2\frac{2}{3}$

1. Change both mixed numbers to improper fractions, and find a common denominator.

2. Add and reduce

1. $3\frac{1}{2}=\frac{7}{2} \rightarrow \frac{7}{2}\cdot\frac{3}{3}=\frac{21}{6}$

   $2\frac{2}{3}=\frac{8}{3} \rightarrow \frac{8}{3}\cdot\frac{2}{2}=\frac{16}{6}$

2. $3\frac{1}{2}+2\frac{2}{3}=\frac{21}{6}+\frac{16}{6}=\frac{37}{6}$ *or* $6\frac{1}{6}$

Practice Problems:

1. $\frac{6}{5}+\frac{2}{3}$ **2.** $2\frac{1}{2}+4\frac{2}{3}$ **3.** $2\frac{4}{7}\times 4\frac{2}{3}$ **4.** $\frac{4}{5}\div\frac{2}{7}$

5. $1\frac{2}{3}+4+2\frac{1}{2}$ **6.** $\frac{5}{3}-\frac{6}{7}$ **7.** $\frac{2}{3}-\frac{1}{6}$

8. Which of the following is not equivalent to $\frac{3}{5}$?

a. $\frac{30}{50}$ b. $\frac{9}{15}$ c. $\frac{60}{100}$ d. $\frac{36}{60}$ e. $\frac{8}{20}$

Answers:

1. $\frac{28}{15}$ or $1\frac{13}{15}$ **2.** $\frac{43}{6}$ or $7\frac{1}{6}$ **3.** 12 **4.** $\frac{14}{5}$ or $2\frac{4}{5}$

5. $\frac{49}{6}$ or $8\frac{1}{6}$ **6.** $\frac{17}{21}$ **7.** $\frac{1}{2}$ **8.** e

2. Decimals

Adding and Subtracting Decimals

Example 1 : Add $28.5 + 2.64 + 105.3$ Example 2: Subtract $230.43 - 25.1$

To add/subtract decimals, we line up the decimal points, then add/subtract

Example 1:

$$\begin{array}{r} 28.50 \\ 2.64 \\ +\ 105.30 \\ \hline 136.44 \end{array}$$

Example 2:

$$\begin{array}{r} 230.43 \\ -\ 25.10 \\ \hline 205.33 \end{array}$$

Multiplying Decimals

Example 1: Multiply 1.57×32.1 Example 2: Multiply $4.1 \times .23$

To multiply decimals, you don't have to line up the decimals. Just multiply the two numbers as you would without any decimals. Then count the number of digits to the right of all decimals in the problem. This number is the same as the number of digits to the right of the decimal in your answer!

Example 1:

$$\begin{array}{r} 1.57 \\ \times\ 32.1 \\ \hline 157 \\ 3140 \\ 47100 \\ \hline 50.397 \end{array}$$

Example 2:

$$\begin{array}{r} 4.1 \\ \times\ .23 \\ \hline 123 \\ 820 \\ \hline .943 \end{array}$$

Dividing a Decimal By a Whole Number

Example: Divide $2.701 \div 73$

To divide a decimal, put a decimal directly above the position of the decimal in the problem. Divide like normal filling in any gaps with zeros.

$$\begin{array}{r} .037 \\ 73\overline{)2.701} \\ -\ 219 \\ \hline 511 \\ -511 \\ \hline 0 \end{array}$$

Dividing a Decimal By a Decimal

Example: Divide $4.374 \div .03$

To divide by a decimal, move the decimal point of the divisor (outside the brackets) to the right until it is no longer needed. Then move the decimal of the dividend (inside the brackets) the same number of places to the right. Now, divide like normal.

$.03\overline{)4.374} \rightarrow 3\overline{)437.4}$ We moved the decimal 2 places to the right.

$$
\begin{array}{r}
145.8 \\
3\overline{)437.4} \\
-3 \\
\hline
13 \\
-12 \\
\hline
17 \\
-15 \\
\hline
24 \\
-24 \\
\hline
0
\end{array}
$$

Practice Problems:

1.	$18.1 \times .04$	**2.**	$.97 \times 5.6$	**3.**	$123 + 2.6 + 9.04$
4.	$83.0097 + 124.9 + 9.043$	**5.**	$.07 - .002$	**6.**	$96 - .3992$
7.	$4\overline{)27.36}$	**8.**	$0.2601 \div 9$	**9.**	$7.055 \div 0.83$

Answers:

1.	.724	**2.**	5.432	**3.**	134.64
4.	216.9527	**5.**	.068	**6.**	95.6008
7.	6.84	**8.**	.0289	**9.**	8.5

3. Word Problems

A good percentage of accuplacer math problems are word problems. It's important to know that you're probably more likely to see a problem phrased

"You have 3 pizzas. Bill eats $1\frac{1}{4}$ *pizzas and Tom eats* $\frac{2}{3}$ *of a pizza. How much pizza is left?"*

than you are to see the same problem worded

"Find $3 - 1\frac{1}{4} - \frac{2}{3}$ *."*

Solving word problems just takes a lot of practice, focus, and critical thinking. Many students like to use a list of "key words" to help them translate words into math. Here is a chart of some key words:

Addition (+)	Subtraction (-)	Multiplication (·)	Division (÷)	Equality (=)
Sum	Difference	Of	Quotient	Equals
Plus	Minus	Times	Divide	Is equal to
Added to	Subtracted from	Multiply	Shared equally among	Is/was
More than	Less Than	Twice	Per	Yields
Increased by	Decreased by	Product	Divided by	Amounts to
Total	Less	Double/triple	Divided into	gives

Of course, these key words won't help in every problem, so we have to think hard about what each problem gives us and what it is asking for. Let's try some out!

1. A 127.42 acre area of rain forest is beginning to be cut down. So far, 82.5 acres have been removed. How many acres of this area of rain forest are left?

2. Heather is collecting money for a charity bike ride. So far, she's been given donations of $12.50, $9.25, and $44. $10 of this money goes to fund the event and the rest goes to charity. How much of her collected money will go to charity?

3. The number of people that hiked Mt. Evans in 2006 was 2/3 the number of people that hiked Mt Evans in 2005. 12,000 people hiked Mt. Evans in 2005. How many people hiked Mt. Evans in 2006?

4. Chuck gets paid an hourly rate of $7.15/hr. If he works 4.3 hours, how much is he paid?

5. Terry purchaces 2 packages of ground beef. One package weighs $2\frac{1}{3}$ pounds. The other weighs $1\frac{4}{5}$ pounds. How many pounds of ground beef did Terry buy?

6. Marty's Indian Head penny is made of copper and nickel only. If $\frac{5}{32}$ of the coin is nickel, what fraction of the coin is copper?

Answers:

1. $127.42 - 82.5 = 44.92\ acres$
2. $12.50 + 9.25 + 44 - 10 = \$55.75$
3. $12000 \cdot \frac{2}{3} = 8000\ people$
4. $7.15 \cdot 4.3 = \$30.745\ rounds\ to\ \$30.75$
5. $2\frac{1}{3} + 1\frac{4}{5} = \frac{7}{3} + \frac{9}{5} = \frac{35}{15} + \frac{27}{15} = \frac{62}{15}\ pounds$ or $4\frac{2}{15}\ pounds$
6. $1 - \frac{5}{32} = \frac{32}{32} - \frac{5}{32} = \frac{27}{32}$ of the coin is copper.