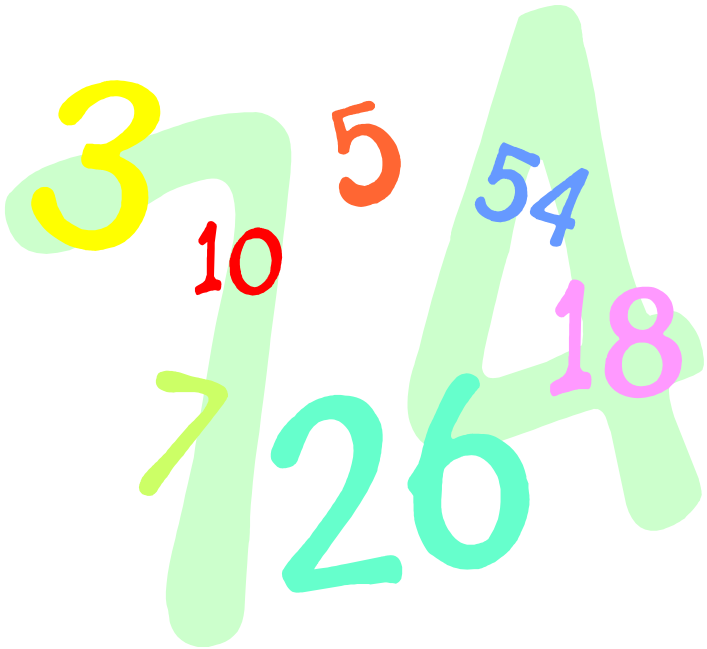
ARITHMETIC



Overview

The Arithmetic section of ACCUPLACER contains 17 multiple choice questions that measure your ability to complete basic arithmetic operations and to solve problems that test fundamental arithmetic concepts. A calculator is provided by the computer on questions where its use would be beneficial. Expect to see the following concepts covered on this portion of the test:

- Operations with whole numbers and fractions such as addition, subtraction, multiplication, division, recognizing equivalent fractions and mixed numbers, and estimating.
- Operations with decimals and percents, including addition, subtraction, multiplication, and division with decimals. Percent problems, recognition of decimals, fraction and percent equivalencies, and problems involving estimation are also given.
- Problems that involve applications and problem solving are also covered, including rate, percent, and measurement problems, simple geometry problems, and distribution of a quantity into its fractional parts.

Testing Tips

- ✓ Start the solving process by utilizing basic Arithmetic skills and formulas. Then if advanced mathematical skills are required such as Algebra, use those skills next.
- ✓ Use resources provided such as scratch paper or the calculator to solve the problem. DO NOT attempt to only solve problems in your head.
- ✓ Try putting your answer back into the original problem to confirm that your answer is correct.
- ✓ Make an educated guess if you are unsure of the answer.

Arithmetic Tips

Test takers should be familiar with the following detailed list of concepts. For additional practice exercises using these concepts, please utilize the resources listed at the end of this guide.

Whole Numbers and Money

- Rounding whole numbers and dollars and cents
- Adding (larger numbers, by regrouping, dollars and cents)
- Subtracting (larger numbers, by regrouping, dollars and cents)
- Regrouping/borrowing
- Multiplying (larger numbers, by regrouping, by zeros)
- Dividing (using long division, remainders, zero as a placeholder, larger numbers)

Fractions

- Like fractions and unlike fractions
- Adding and subtracting like fractions and unlike fractions
- Lowest common denominator (LCD)
- Estimating with mixed numbers
- Adding and subtracting mixed numbers
- Subtracting fractions from whole numbers
- Subtracting mixed numbers by regrouping
- Multiplying and dividing fractions by fractions
- Canceling to simplify multiplication
- Multiplying and dividing fractions by whole numbers or mixed numbers
- Multiplying mixed numbers by mixed numbers

Percents

- Changing a fraction to a percent
- Changing a decimal to a percent
- Changing a percent to a fraction
- Changing a percent to a decimal
- Finding the part, percent, and whole
- Finding percent increase or decrease
- Finding the original price
- Understanding simple interest
- Computing interest for part of a year

Decimals

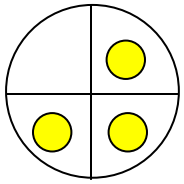
- Comparing/ordering decimal fractions
- Reading and writing mixed decimals
- Estimating with mixed decimals
- Rounding to a chosen place value
- Adding and subtracting decimals
- Using zeros as placeholders
- Multiplying decimals by whole numbers
- Multiplying decimals by decimals
- Multiplying by 10, 100, or 1,000
- Dividing decimals by whole numbers
- Dividing decimals by decimals
- Dividing by 10, 100, or 1,000

Practice Questions & Answers

Fractions – Practice Questions & Answers

Numerator*: tells how many parts you have (the number on top)* $\rightarrow 3$

Denominator*: tells how many parts in the whole (the number on the bottom)* $\rightarrow 4$

Example:  $= \frac{3}{4}$ *3 parts have a dot out of 4*

Proper fraction*: top number is less than the bottom number:* $\frac{1}{3}, \frac{7}{10}, \frac{9}{19}$

Improper fraction*: top number is equal to or larger than the bottom number:* $\frac{3}{2}, \frac{8}{8}$

Mixed Number*: a whole number is written next to a proper fraction:* $1\frac{3}{4}, 2\frac{2}{5}, 10\frac{1}{2}$

Common Denominator*: a number that can be divided evenly by all of the denominators in the problem*

Ex: $\frac{3}{4} \rightarrow \frac{3}{3} \rightarrow \frac{9}{12}$

$\frac{2}{3} \rightarrow \frac{4}{4} \rightarrow \frac{8}{12}$

$\frac{1}{2} \rightarrow \frac{6}{6} \rightarrow \frac{6}{12}$

The common denominator for these fractions will be 12. It also happens to be the least common denominator.

Reducing Fractions to Lowest Terms

Example:

$\frac{48}{64} \div \frac{8}{8} = \frac{6}{8}$ ***Step 1:*** *Find a number that divides evenly into the numerator and the denominator of the fraction. With the fraction to the left, the number that will divide evenly is 8.*

$\frac{6}{8} \div \frac{2}{2} = \frac{3}{4}$ ***Step 2:*** *Check to see whether another number divides evenly into both the numerator and denominator. Stop when there are no more numbers that can divide into the fraction.*

Changing Mixed Numbers to Improper Fractions

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

2 x 4 = 8 ***Step 1****: Multiply the denominator by the whole number.*

8 + 3 = 11 ***Step 2****: Add the result to the numerator.*

$\frac{11}{4}$ ***Step 3****: Place the total over the denominator.*

Adding and Subtracting Fractions with Different Bottom Numbers

Example 1: $\frac{3}{4}+\frac{2}{3}=\square$

Example 2: $\frac{3}{4}-\frac{3}{16}=\square$

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

$\frac{2}{3}\times\frac{4}{4}=\frac{8}{12}$

Step 1*: Find the common denominator for all fractions.*

$\frac{3}{4}\times\frac{4}{4}=\frac{12}{16}$

$\frac{3}{16}\times\frac{1}{1}=\frac{3}{16}$

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

Step 2*: Then add or subtract the fractions.*

$\frac{12}{16}-\frac{3}{16}=\frac{9}{16}$

**Remember to change improper fractions to a mixed number.*

Multiplying Fractions

$\frac{3}{4}\times\frac{5}{6}=\frac{15}{24}$

Multiply the numerators across. Then multiply the denominators across. Make sure the product is in lowest terms.

Multiplying with Mixed Numbers

Example $2\frac{2}{3} \times 1\frac{2}{5} = \square$

$2\frac{2}{3} = \frac{8}{3}$

$1\frac{2}{5} = \frac{7}{5}$

$\frac{8}{3} \times \frac{7}{5} = \frac{56}{15} = 3\frac{11}{15}$

Step 1: *Change every mixed fraction to an improper fraction.*

Step 2: *Multiply across.*

Step 3: *Then, change the improper fraction to a mixed number in lowest terms.*

Dividing Fractions

Example: $\frac{1}{4} \div \frac{1}{2} = \square$

The fraction that is right of the division sign will be multiplied by the reciprocal where $\frac{1}{2}$ becomes $\frac{2}{1}$

$$\frac{1}{4} \div \frac{1}{2} = \frac{1}{4} \times \frac{2}{1} = \frac{2}{4} = \frac{1}{2}$$

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) $\frac{114}{175}$

Decimals

Adding and Subtraction Decimals

Add: 28.5 + 44.47 + 3075.6

```
     28.50
     44.47
  + 3075.60
   3148.57
```

Step 1: Line up the decimal points.

Step 2: Then add or subtract.

Subtract: 380.53 - 75

```
  380.53
- 75.00
  305.53
```

Multiplying Decimals

Multiply 1.89 x 5.03 = ____

```
  1.89
× 5.03
   567
 94500
 9.5067
```

Step 1: *Multiply the decimals as you would do with whole numbers.*

Step 2: *Then, count the number of spaces of each factor being multiplied. Decimal places are the number of spaces to the right of the decimal point. There are two in the top factor and two in the bottom factor, so the decimal is placed four spaces from the right.*

Step 3: *Show the total number of places in your answer.*

Dividing a Decimal by a Whole Number

Example:

```
      .037
73)2.701
   219
     511
     511
       0
```

Place the decimal point directly above its position in the problem. Then divide the same way as you divide whole numbers.

Dividing a Decimal by a Decimal Number

Example: 4.374 ÷ .03 = ___

$.03\overline{)4.374}$ → $3\overline{)437.4}$

→ 2 spaces

Move the decimal point of the divisor (outside the bracket) as far right as you can go. Then move the decimal point in the dividend (inside the bracket) the same number of places as the divisor.

```
   145.8
3)437.4
  3
  13
  12
   17
   15
    24
    24
     0
```

Place the decimal point directly above its position in the problem. Then divide the same way as you divide whole numbers.

Practice:

1. 18.1
x .04

2. .97
x 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 ÷ 9

9. 7.055 ÷ 0.83

10. $2.03\overline{)4.466}$

Answers: *1)* 0.724 *2)* 5.432 *3)* 134.64 *4)* 216.9527 *5)* 0.068

6) 95.6008 *7)* 6.84 *8)* 0.0289 *9)* 8.5 *10)* 2.2

Percents

Percents are used to describe a part of something. Percents are used to figure out sales or the amount of interest someone will pay on a loan. When converting a percent to its fraction form, it will always have a denominator of 100.

Changing Decimals to Percents or Percents to Decimals

The key to changing decimals and percents is knowing where to move the decimal point. If changing from a decimal to a percent, move the decimal point two places to the right and add the percent sign.

Example: 0.35 = 35%
0.8 = 80%

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

Example: 30% = .3
0.9% = .009

Converting Fraction to Percent Form

Divide the bottom number of the fraction into the top number and move the point two places to the right.

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

$$\begin{array}{r} .75 \\ 4\overline{)3.00} \\ \underline{28} \\ 20 \\ \underline{20} \\ 0 \end{array} = .75 = 75\%$$

-or-

Multiply the fraction by 100%

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

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

Percent to Fraction

Example: 85%

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

Write the percent as a fraction with 100 as the denominator. Then reduce the fraction to lowest terms.

Percent of a Number

1) What is 25% of $6,500?

n = 25% x $6,500

n = .25 x 6500

n = $1,625

-or-

2) Change the percent to a fraction

$$n = \frac{1}{4}(6500)$$

$$n = \frac{6,500}{4}$$

n = $1,625

Finding What Percent One Number Is of Another

There are key words to remember that will help you solve a problem involving percents.
The word 'of' in the sentence means to multiply.
The word 'is' means it is equal to.

Example: 9 is what percent of 45?

↓ ↓

9 = x times (x) 45

$$\frac{9}{45} = \frac{45x}{45}$$

The variable 'x' is being multiplied by 45.

Divide by 45.

.20= x

.20=20% therefore 20% of 45 is 9

<u>Finding a Number When a Percent of It is Given</u>

Example: 20% of (what number) is 16?

$$\downarrow$$

$$.2 \times x = 16$$

$$\frac{.20x}{.20} = \frac{16}{.20}$$

$$x = 80$$

Practice:

Write the following in percent form.

1. 0.12 *2.* $\frac{6}{8}$ *3.* $\frac{2}{5}$ *4.* 0.233 *5.* 1.15

6. What is 11% of $3,000?

7. 60 is what percent of 1200?

8. 28 is 40 % of what number?

Answers: *1)* 12% *2)* 75% *3)* 40% *4)* 23.3% *5)* 115% *6)* $330

7) 5% *8)* 70%