

ACCUPLACER

Testing & Study Guide



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*Thank you to Johnston Community College staff
for giving permission to revise and adapt their study guide.
A special thanks to Professor Fred White for his leadership on this project.*

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ACCUPLACER Testing Information

What is the ACCUPLACER?

The ACCUPLACER is an assessment test that assesses your level of skill and readiness for a certain educational course path. At Goodwin College, the ACCUPLACER is used as a part of the admissions process to determine your level of readiness for college-level courses in the areas of English and math. A student taking the assessment will be tested on **math**, **reading**, and **English**. The test has the following characteristics:

- Computer based
- Multiple choice
- Non-timed
- Computer adaptive or based on your level of ability

How does ACCUPLACER work?

The ACCUPLACER is a non-timed, computerized multiple choice test that is taken on a computer. The test presents one question per test screen with a set of answer choices. After choosing your answer, the test will immediately move to the next question. The ACCUPLACER grades each question after it is answered. Therefore, once you have answered a question and moved on to the next question, you will not be able to go back and change your answer. The test is also computer adaptive, meaning that the test administers questions based on how you are performing on each question. This allows ACCUPLACER to accurately score and provide a placement based on your results.

You are required to take all parts of the placement test as part of Goodwin College's admissions process if you are enrolling in a degree or diploma curriculum program,

ACCUPLACER Test Setup

At Goodwin College, students take the following sections: Elementary Algebra, Arithmetic (score dependent), Reading Comprehension, and Sentence Skills (English). Below is a breakdown of the sections:

Elementary Algebra	12 questions
Arithmetic	17 questions
Reading Comprehension	20 questions
Sentence Skills	20 questions

The ACCUPLACER is graded on a scale of 20-120. Because the test helps determine whether you are ready for college-level courses, a student cannot pass or fail the examination. Depending on how you score, you may be required to take developmental course to help prepare you for college-level courses.

When do I take ACCUPLACER?

You will take the ACCUPLACER as part of the admission's process. Your admissions officer will work with you to schedule the test. Your scores will be available immediately after you completed the test. Those scores will be used to determine your first semester schedule.

You may use this study guide to study for the test, and you may use additional resources available from the college website. You can also Google: ACCUPLACER online sample questions or algebraic review questions, etc.

Test Waiver (Students to not need to take the test):

You are not required to take ACCUPLACER if one of the following are met:

- If you already earned college credit for a transferable English composition and a mathematics course higher than elementary Algebra (e.g., earned a C or better).
- If you have at least a four-year degree from an accredited college and can provide an official transcript.
- If you have a recent, documented SAT Writing or Critical Reading score of ≥ 450 , then you do not have to take the ACCUPLACER and may be placed directly into English 101. Students with a recent documented SAT Math score ≥ 500 do not have to take the Math/Algebra ACCUPLACER and can be placed directly into a college level math course such as Math 125, Math 130 or Math 135. SAT SCORES ARE GOOD FOR THREE YEARS.

Please have an official copy of your scores from these tests sent to Goodwin College's admissions office. For courses taken at another college, have your transcripts sent to the Goodwin College admissions office.

What should you expect?

Before the test, you will need a written testing slip signed by your admissions officer. Then you will need to proceed to the library and sign in. The library staff will provide you with any additional instructors needed to start the test.

You may not bring any of the following items into the library:

Food, Formulas, Notes, Calculator, Textbooks, Electronic Devices: Mp3 players, iPods, Bluetooth devices, laptops, digital cameras, headphones

****If you bring a cell phone, you will be asked to turn it off during testing****

After the test, the results are available immediately. The next step is for you to work with your admissions officer or academic advisor to select your first semester of classes.

General Test Taking Tips

- Relax! The ACCUPLACER was designed to help you succeed in school. Your score helps you and your advisor to determine which courses are most appropriate for your current level of knowledge and skills. Once you identify your academic strengths and needs, you will get the help you need to improve underdeveloped skills before they can interfere with your learning.
- Know what items you can and cannot bring with you.
- To avoid experiencing test anxiety, approach the test with a positive attitude. Negative self-talk can ruin your ability to do well on a test.
- You will be able to concentrate better on the test if you get plenty of rest and eat properly prior to testing. You should give yourself some time to find the testing area, bathrooms, etc. and to gather your thoughts before the test begins.
- Listen carefully to all pre-test instructions prior to starting your test.
- Carefully read all test questions and instructions presented.
- Utilize materials given during the test such as scratch paper.
- Deal with test anxiety by preparing in advance, taking your time, and pacing yourself throughout the assessment.
- During testing, read the entire question and all choices before attempting to answer.
- The ACCUPLACER is a multiple choice test. For multiple choice questions, eliminate choices that you know are incorrect first. Then attempt to find and choose the answer.
- If you are unsure of the answer, make an educated guess.
- Usually your first choice of the answer is the right one. Don't second guess yourself.

Now that you have an idea of what the test is and how it works, take some time to review some of the sample questions provided in this study guide.

Elementary Algebra Overview

Overview

The Elementary Algebra section of ACCUPLACER contains 12 multiple choice Algebra questions that are similar to material seen in a Pre-Algebra or Algebra I pre-college course. A calculator is provided by the computer on questions where its use would be beneficial. On other questions, solving the problem using scratch paper may be necessary. Expect to see the following concepts covered on this portion of the test:

- Operations with integers and rational numbers, computation with integers and negative rationals, absolute values, and ordering.
- Operations with algebraic expressions that must be solved using simple formulas and expressions, adding and subtracting monomials and polynomials, multiplying and dividing monomials and polynomials, positive rational roots and exponents, simplifying algebraic fractions, and factoring.
- Operations that require solving equations, inequalities, and word problems, solving linear equations and inequalities, using factoring to solve quadratic equations, solving word problems and written phrases using algebraic concepts, and geometric reasoning and graphing.

Testing Tips

- Use resources provided such as scratch paper or the calculator to solve the problem. DO NOT attempt to only solve problems in your head.
- Start the solving process by writing down the formula or mathematic rule associated with solving the particular problem.
- Put 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.

Algebra Tips

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

- | | | |
|--|---|---------------------------------------|
| ■ Understanding a number line | ■ Understanding algebraic terms and expressions | ■ Multiplying binomials |
| ■ Add, subtract, multiply, and divide negative numbers | ■ Using parentheses | ■ Using proportions to solve problems |
| ■ Exponents | ■ Absolute value | ■ Evaluating formulas |
| ■ Square roots | ■ Combining like terms | ■ Solving equations (+, -, x, ÷) |
| ■ Order of Operations | ■ Simplifying algebraic expressions | ■ Solving linear equations |

PRACTICE QUESTIONS

Order of Operations

Evaluate:

1. $3 \cdot 7^2$

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

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

Simplify:

4. $3(2x + 2) + 2 \cdot 5 - x$

5. $|-4x| + |-4^2| - 10x$

6. $2(x - 2) - 5(3x - 4)$

Scientific Notation

Convert the following expanded form to scientific notation.

7. 0.0000000000000523

Convert the following scientific notation to expanded form.

8. 6.02×10^{23}

Simplify. Write answers in scientific notation.

9. $(3 \times 10^3)(5 \times 10^6)$

10. $\frac{6 \times 10^9}{3 \times 10^4}$

Substitution

Find each value if $x = 3$, $y = -4$, and $z = 2$.

11. $xyz - 4z$

12. $\frac{5x - z}{xy}$

Operations with Negative Numbers

Evaluate:

13. $14 + (-20)$

14. $-17 - 32$

15. $-22 - (-32)$

16. $-15 + 27$

17. $(-3)(6)$

18. $7(-6)$

19. $(-2)(-15)$

20. $(-2)(-1)(2)(-1)(-2)(2)(-1)$

21. $(-81) \div 9$

22. $\frac{-45}{-15}$

23. $3\frac{1}{3} - 14\frac{5}{6}$

24. $(-3\frac{1}{3})(2\frac{2}{5})$

25. $(3.2)(-50.7)$

Exponents

Evaluate:

26. 7^2

27. 14^0

28. 15^1

29. 2^5

Simplify:

30. $x^2 x^3 x x^4$

31. $x \cdot y^3 \cdot x^3 \cdot y \cdot x^6 \cdot y^5$

Formulas

32. Solve $PV = nRT$ for T .
33. Solve $y = hx + 4x$ for x .

Word Problems

34. One number is 5 more than twice another number. The sum of the numbers is 35. Find the numbers.
35. John was twice Bill's age in the year 2000. Their combined age in 2010 is 71. How old were John and Bill in 2000?

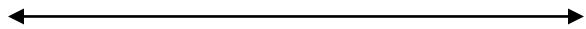
Inequalities

Solve and graph on the number line.

36. $2x - 7 \geq 3$



37. $3(x - 4) - (x + 1) < -12$

**Linear Equations in One Variable**

Solve the following for x :

38. $6x - 48 = 6$

39. $50 - x - (3x + 2) = 0$

40. $3(3x + 4) - 2(6x - 2) = 22$

41. $x^2 = |-4|$

42. $x^2 = -|-4|$

Multiplying Simple 1st degree Binomials

Simplify the following:

43. $(x + 5)(x + 7)$

44. $(2x - 3)(-4x + 2)$

45. $(6x + 6)(4x - 7)$

46. $(-3x - 8)(-2x + 9)$

Factoring

Factor out the following polynomials:

47. $x^2 + 5x - 6$

48. $64x^4 - 4y^4$

49. $4x^2 - 36$

50. $49y^2 + 84y + 36$

Exponents and Polynomials

Simplify and write answers with only POSITIVE exponents:

51. $(3x^2 - 5x - 6) + (5x^2 + 4x + 4)$

52. $\frac{24x^4 - 32x^3 + 16x^2}{8x^2}$

53. $(5a + 6)^2$

54. $\frac{4x^3 \cdot 3x^{-2} \cdot x^5}{2x^5 \cdot 3x^{-3}}$

55. $\frac{15x^{-2}}{5x^5}$

Quadratic Equations

Solve for the variable, which will have two solutions:

56. $4a^2 + 9a + 2 = 0$

57. $(3x + 2)^2 = 16$

Rational Expressions

Perform the following operations and simplify where possible. If given an equation, solve for the variable.

58. $\frac{4}{2a - 2} + \frac{3a}{a^2 - a} = 5$

59. $\frac{16 - x^2}{x^2 + 2x - 8} \div \frac{x^2 - 2x - 8}{4 - x^2}$

Graphing Linear Equations in Two Variables

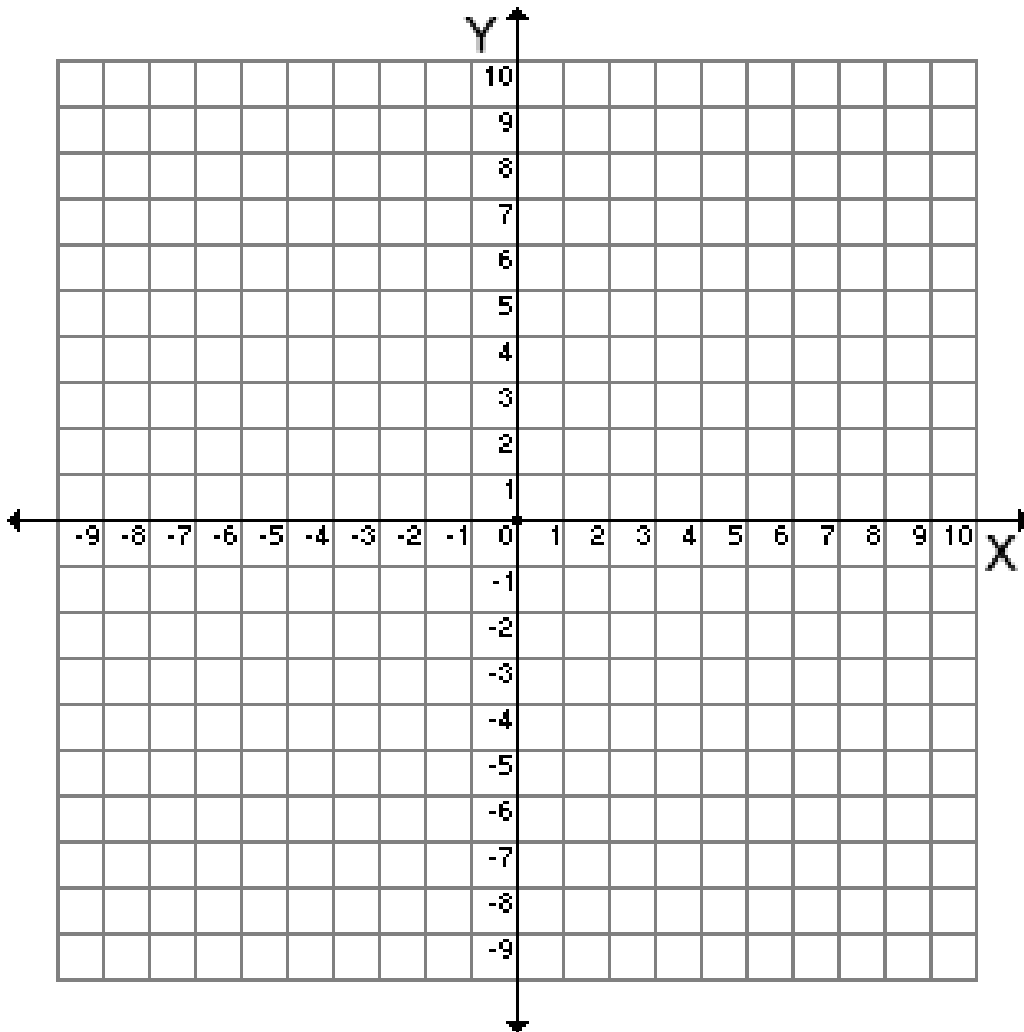
Graph the solution to each equation on the (x, y) coordinate axis, also known as a Cartesian Graph:

60. $3x - 2y = 6$

61. $x = -3$

62. $y = 0$

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



Systems of Equations

Solve the following systems of equations.

$$\begin{aligned} 64. \quad & 2x - 3y = -12 \\ & x - 2y = -9 \end{aligned}$$

$$\begin{aligned} 65. \quad & 2x - 3y = -4 \\ & y = -2x + 4 \end{aligned}$$

Square Roots and Radicals

What are the square roots of the following numbers (answers will be whole numbers):

$$66. \quad \sqrt{49}$$

$$67. \quad \sqrt{121}$$

Simplify the following radical expressions using the rules of radicals:

$$68. \quad (\sqrt{8})(\sqrt{10})$$

$$69. \quad 2\sqrt{18} - 5\sqrt{32} + 7\sqrt{162}$$

$$70. \quad \sqrt{\frac{12}{18}} * \sqrt{\frac{15}{40}}$$

$$71. \quad (2\sqrt{3} + 5\sqrt{2}) (3\sqrt{3} - 4\sqrt{2})$$

ANSWERS

Order of Operations

1. $3 \cdot 49 = 147$

2. $3 + 2(5) - |-7| = 3 + 10 - 7 = 6$

3. $\frac{4^2 - 5^2}{(4 - 5)^2} = \frac{16 - 25}{(-1)^2} = \frac{-9}{1} = -9$

4. $3(2x + 2) + 2 \cdot 5 - x = 6x + 6 + 2 \cdot 5 - x = 6x + 6 + 10 - x = 5x + 16$

5. $|-4|x + |-4^2| - 10x = 4x + |-16| - 10x = -6x + 16$

6. $2(x - 2) - 5(3x - 4) = 2x - 4 - 15x + 20 = -13x + 16$

Scientific Notation

All numbers in scientific notation have the following form:

First non zero digit.rest of number X 10^{power equaling number of places decimal moved}

7. $0.0000000000000523 = 5.23 \times 10^{-13}$

8. $6.02 \times 10^{23} = 602,000,000,000,000,000,000,000$

9. $(3 \times 10^3)(5 \times 10^6) = 15 \times 10^9 = 1.5 \times 10^{10}$

10. $\frac{6 \times 10^9}{3 \times 10^4} = 2 \times 10^5$

Substitution

Find each value if $x = 3$, $y = -4$, and $z = 2$.

11. $xyz - 4z = (3)(-4)(2) - 4(2) = -24 - 8 = -32$

12. $\frac{5x - z}{xy} = \frac{5(3) - 2}{(3)(-4)} = \frac{15 - 2}{-12} = -\frac{13}{12}$

Operations with Negative Numbers

Evaluate:

13. $14 + (-20) = -6$

14. $-17 - 32 = -49$

15. $-22 - (-32) = 10$

16. $-15 + 27 = 12$

17. $(-3)(6) = -18$

18. $7(-6) = -42$

19. $(-2)(-15) = 30$

20. $(-2)(-1)(2)(-1)(-2)(2)(-1) = -16$

21. $(-81) \div 9 = -9$

22. $\frac{-45}{-15} = 3$

23. $3\frac{1}{3} - 14\frac{5}{6} = 3\frac{2}{6} - 14\frac{5}{6} = -11\frac{3}{6} = -11\frac{1}{2}$

24. $(-3\frac{1}{3})(2\frac{2}{5}) = (-\frac{10}{3})(\frac{12}{5}) = (-\frac{2}{1})(\frac{4}{1}) = -8$

25. $(3.2)(-50.7) = -162.24$

Exponents

Evaluate:

26. $7^2 = 7 \times 7 = 49$

27. $14^0 = 1$

28. $15^1 = 15$

29. $2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$

Simplify:

30. $x^2 x^3 x x^4 = x^{10}$

31. $x \cdot y^3 \cdot x^3 \cdot y \cdot x^6 \cdot y^5 = x^{10} y^9$

Formulas

Use the Rules of Equality

32. Solve $PV = nRT$ for T .

$$\frac{PV}{nR} = \frac{\cancel{nRT}}{\cancel{nR}} \quad T = \frac{PV}{nR}$$

33. Solve $y = hx + 4x$ for x .

$$y = x(h + 4)$$

$$\frac{y}{(h + 4)} = \frac{x \cancel{(h + 4)}}{\cancel{(h + 4)}}$$

$$\frac{y}{h + 4} = x$$

Word Problems

34. One number is 5 more than twice another number. The sum of the numbers is 35. Find the numbers.

Let x = "another number", which forces "One number" to be $2x + 5$. Since the sum of both numbers must be 35, then $[2x + 5] + [x] = 35$. Solve the equation (combine like terms and use Rules of Equality):

$$\begin{aligned} [2x + 5] + [x] &= 35 && \text{Combine like terms} \\ 3x + 5 &= 35 \\ 3x + 5 - 5 &= 35 - 5 && \text{Rule of Equality} \\ 3x &= 30 \\ \frac{3x}{3} &= \frac{30}{3} && \text{Rule of Equality} \\ x &= 10 \end{aligned}$$

So, "another number" $x = 10$ and "One number" $2x + 5 = 25$

35. John was twice Bill's age in the year 2000. Their combined age in 2010 is 71. How old were John and Bill in 2000?

Let's say Bill's age in 2000 is x . Therefore John's age in 2000 is $2x$. By 2010, their combined ages are 71. Also, by 2010, their ages each increase by 10 years. So Bill's age in 2010 is $(x + 10)$, and John's age is $(2x + 10)$. Therefore, in 2010, the following formula is true:

$$(x+10)+(2x+10)=71 \quad \text{Combine like terms}$$

$$3x + 20 = 71$$

$$3x + 20 - 20 = 71 - 20 \quad \text{Rule of Equality}$$

$$3x = 51$$

$$\frac{3x}{3} = \frac{51}{3} \quad \text{Rule of Equality}$$

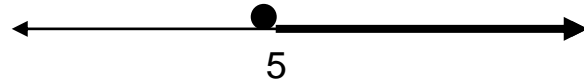
$$x = 17$$

Therefore, in 2000, Bill was 17, and John was 34.

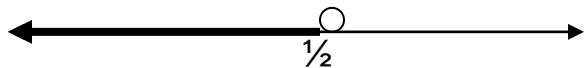
Inequalities

Solve and graph on the number line.

36. $2x - 7 \geq 3$
 $2x - 7 + 7 \geq 3 + 7$
 $2x \geq 10$
 $\frac{2x}{2} \geq \frac{10}{2}$
 $x \geq 5$



37. $3(x - 4) - (x + 1) < -12$
 $3x - 12 - x - 1 < -12$
 $2x - 13 < -12$
 $2x - 13 + 13 < -12 + 13$
 $2x < 1$
 $\frac{2x}{2} < \frac{1}{2}$
 $x < \frac{1}{2}$



Linear Equations in One Variable

Solve the following for x: (again, combine like terms, use Rules of Equality)

38. $6x - 48 = 6$
 $6x - 48 + 48 = 6 + 48$
 $6x \div 6 = 54 \div 6$
 $x = 9$

39. $50 - x - (3x + 2) = 0$ combine like terms
 $-4x + 48 = 0$
 $-4x + 48 - 48 = 0 - 48$ rules of equality
 $-4x = -48$
 $\underline{-4x = -48}$
 $\underline{-4} \quad \underline{-4}$ rules of equality
 $x = 12$

40. $3(3x + 4) - 2(6x - 2) = 22$ multiply following order of operations
 $9x + 12 - 12x + 4 = 22$ combine like terms
 $-3x + 16 = 22$
 $-3x + 16 - 16 = 22 - 16$ rules of equality
 $-3x = 6$
 $\underline{-3x = 6}$
 $\underline{-3} \quad \underline{-3}$ rules of equality
 $x = -2$

41. $x^2 = |-4|$
 $x^2 = 4$

$x = 2$ or $x = -2$
Two solutions work as an answer!

42. $x^2 = -|-4|$
 $x^2 = -4$

No solution is possible!
Neither the square of a positive nor a negative number can ever equal a negative number!

Combining like terms only applies to **addition** and **subtraction** of algebraic terms of *the same degree* (same variable with same exponent – coefficient doesn't matter) or to constants.

Only LIKE terms may be added or subtracted. UNLIKE terms cannot be added or subtracted, *but may be multiplied or divided.*

Ex:

$2x^2 + x^2 = 3x^2$ like terms can add

$2x^2 + x + 3$ unlike terms cannot

unlike terms CANNOT be added

together, however:

$2x^2 \cdot x \cdot 3 = 6x^3$

they CAN be multiplied !

Multiplying Simple 1st degree Binomials

Simplify the following (the FOIL method of multiplying binomials works here):

$$\begin{aligned} 43. \quad & (x + 5)(x + 7) \\ & = x^2 + 5x + 7x + 35 \\ & = x^2 + 12x + 35 \end{aligned}$$

$$\begin{aligned} 44. \quad & (2x - 3)(-4x + 2) \\ & = -8x^2 + 12x + 4x - 6 \\ & = -8x^2 + 16x - 6 \end{aligned}$$

$$\begin{aligned} 45. \quad & (6x + 6)(4x - 7) \\ & = 24x^2 + 24x - 42x - 42 \\ & = 24x^2 - 18x - 42 \end{aligned}$$

$$\begin{aligned} 46. \quad & (-3x - 8)(-2x + 9) \\ & = 6x^2 + 16x - 27x - 72 \\ & = 6x^2 - 11x - 72 \end{aligned}$$

FOIL method: (First, Outer, Inner, Last)

Example:

Multiply First terms first

$$(a + b)(c + d) = ac$$

then Outer terms

$$(a + b)(c + d) = ac + ad$$

then Inner terms

$$(a + b)(c + d) = ac + ad + bc$$

Last terms last

$$(a + b)(c + d) = ac + ad + bc + bd$$

Then combine like terms where possible.

Factoring

Steps to factoring:

- Always factor out the Greatest Common Factor if possible
- Factor the first and third term
- Figure out the middle term

Factor out the following polynomials:

$$47. \quad x^2 + 5x - 6 = (x + 6)(x - 1)$$

$$\begin{aligned} 48. \quad & 64x^4 - 4y^4 \quad \text{Factor out GCF (4) first} \\ & = 4(16x^4 - y^4) \quad \text{Then factor } 16x^4 - y^4 \\ & = 4(4x^2 - y^2)(4x^2 + y^2) \quad \text{Then factor } 4x^2 - y^2 \\ & = 4(2x - y)(2x + y)(4x^2 + y^2) \\ & \text{Note: Cannot factor out } (4x^2 + y^2) \end{aligned}$$

$$\begin{aligned} 49. \quad & 4x^2 - 36 \\ & = 4(x^2 - 9) \\ & = 4(x + 3)(x - 3) \end{aligned}$$

$$\begin{aligned} 50. \quad & 49y^2 + 84y + 36 \\ & = (7y + 6)(7y + 6) \\ & = (7y + 6)^2 \end{aligned}$$

Exponents and Polynomials

Add and subtract like terms where possible.

Remember $x^{-1} = 1/x$, $x^{-2} = 1/x^2$, and so on. Also $x^a \cdot x^b = x^{a+b}$

Simplify and write answers with only POSITIVE exponents:

$$\begin{aligned} 51. \quad & (3x^2 - 5x - 6) + (5x^2 + 4x + 4) \\ & = 8x^2 - x - 2 \end{aligned}$$

$$\begin{aligned} 52. \quad & \frac{24x^4 - 32x^3 + 16x^2}{8x^2} \\ & = 3x^2 - 4x + 2 \end{aligned}$$

$$\begin{aligned} 53. \quad & (5a + 6)^2 \\ & = (5a + 6)(5a + 6) \\ & = 25a^2 + 30a + 30a + 36 \\ & = 25a^2 + 60a + 36 \end{aligned}$$

$$\begin{aligned} 54. \quad & \frac{4x^3 \cdot 3x^{-2} \cdot x^5}{2x^5 \cdot 3x^{-3}} \\ & = \frac{12x^6}{6x^2} \\ & = 2x^4 \end{aligned}$$

$$\begin{aligned} 55. \quad & \frac{15x^{-2}}{5x^5} \\ & = \frac{3}{x^7} \end{aligned}$$

Quadratic Equations

Steps:

- Get zero alone on one side of the equal sign
- Factor out the resulting equation
- Set each factor to equal zero
- Solve each resulting factor equation – the variable may have more than one solution

Solve for the variable, which will have two solutions:

$$\begin{aligned} 56. \quad & 4a^2 + 9a + 2 = 0 \\ & (4a + 1)(a + 2) = 0 \text{ factor out the equation (already set to zero)} \\ & 4a + 1 = 0 \quad a = -1/4 \\ & a + 2 = 0 \quad a = -2 \text{ Set each factor to equal zero, then solve each} \\ & \mathbf{a \text{ equals } -1/4 \text{ or } -2} \end{aligned}$$

If the quadratic equation is in the form of $ax^2 + bx + c = 0$, and the equation is difficult or impossible to factor, then use the QUADRATIC FORMULA. It always works.

\pm means
$+$ or $-$

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

57. $(3x + 2)^2 = 16$
 $(3x + 2)(3x + 2) = 16$
 $9x^2 + 12x + 4 = 16$
 $9x^2 + 12x + 4 - 16 = 16 - 16$
 $9x^2 + 12x - 12 = 0$
 Factor
 $(3)(3x - 2)(x + 2) = 0$
 Solve factors for zero
 $3x - 2 = 0 \quad x = 2/3$
 $x + 2 = 0 \quad x = -2$

$x = 2/3$ or $x = -2$

OR USE Quadratic Formula method (See above)

$9x^2 + 12x - 12 = 0$ $a = 9$ $b = 12$ $c = -12$

$$x = \frac{-12 \pm \sqrt{144 + 432}}{18}$$

$$\frac{-12 \pm \sqrt{576}}{18}$$

$$\frac{-12 \pm 24}{18} = 2/3 \text{ OR } -2$$

Rational Expressions

Perform the following operations and simplify where possible. If given an equation, solve for the variable.

58. $\frac{4}{2a-2} + \frac{3a}{a^2-a} = 5$ This is an equation that can be solved for "a".

Like adding fractions, you need to find a common denominator. Factor the denominators to see what you need:

$$\frac{4}{2(a-1)} + \frac{3a}{a(a-1)} = 5$$

Both denominators share (a - 1). Multiply the first expression by a/a and the second by 2/2.

$$\frac{4}{2(a-1)} \cdot \frac{a}{a} + \frac{3a}{a(a-1)} \cdot \frac{2}{2} = 5$$

$$\frac{4a}{2a(a-1)} + \frac{6a}{2a(a-1)} = 5$$

Both denominators are the same now. Just add the numerators.

$$\frac{10a}{2a(a-1)} = 5$$

Reduce by dividing expression by 2a/2a

$$\frac{5}{a-1} = 5$$

Solve for "a"

$$\frac{5}{a-1} \cdot (a-1) = 5 \cdot (a-1)$$

Use Rules of Equality

Multiply both sides by a - 1

$$5 = 5(a-1)$$

Divide both sides by 5

$$\frac{5}{5} = \frac{5(a-1)}{5}$$

$$1 = a - 1$$

Add 1 to both sides

$$1 + 1 = a - 1 + 1$$

$$2 = a$$

An **equation** can be solved for the variable because there is an equal sign (=) with at least one algebraic term *on both sides*. Ex: $2x = 4$
 An algebraic term may merely be a number, and it is then called a **constant**.
 An **expression** can only be simplified, NOT solved for the variable, because there is no equal sign with algebraic terms on both sides. Ex: $7x + 5x - 2$

59. $\frac{16 - x^2}{x^2 + 2x - 8} \div \frac{x^2 - 2x - 8}{4 - x^2}$ This is NOT an equation that can be solved for "x"
it can only be simplified.

Division of rational expressions like with fractions is the same process as multiplication with one extra step – invert the divisor (on the right) then multiply.

Remember: $(x + 1) = (1 + x)$ commutative property of addition

Important factoring **hint** to remember: $(1 - x) = -1(x - 1)$

$\frac{16 - x^2}{x^2 + 2x - 8} \times \frac{4 - x^2}{x^2 - 2x - 8}$ Now factor out all polynomials

$\frac{(4 - x)(4 + x)}{(x - 2)(x + 4)} \times \frac{(2 - x)(2 + x)}{(x - 4)(x + 2)}$

Use factoring with -1 hint from above

$\frac{-1(x - 4)(4 + x)}{(x - 2)(x + 4)} \times \frac{-1(x - 2)(2 + x)}{(x - 4)(x + 2)}$

$\frac{-1(x - 4)(4 + x)}{(x - 2)(x + 4)} \times \frac{-1(x - 2)(2 + x)}{(x - 4)(x + 2)}$ Then cancel
Remember Commutative property

$\frac{-1(x - 4)}{(x - 2)} \times \frac{-1(x - 2)}{(x - 4)}$ Then cancel more

$(-1)(-1) = 1$ **Simplified answer is ONE**

Graphing Linear Equations in Two Variables

Graph the solution to each equation on the (x, y) coordinate axis, also known as a Cartesian Graph.

For every different value of x , there will a different value of y , and vice versa. Therefore, there are an infinite number of solutions, consisting of pairs of values for x and y , called ordered pairs (x,y) . Try to select values that will stay within your graph.

The y -intercept is wherever the graph intersects the y axis.

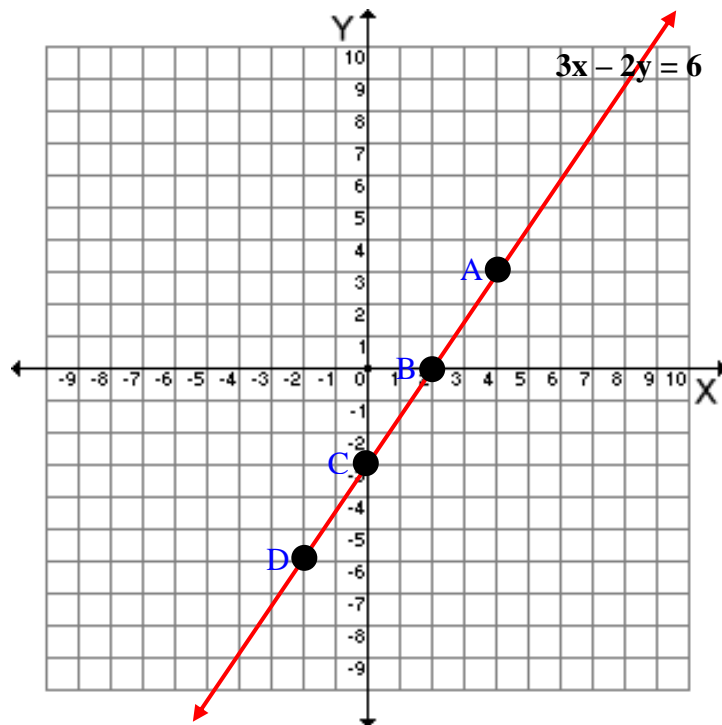
The x -intercept is wherever the graph intersects the x axis,

Create a table of values (at least three ordered pairs), and plot each point (x,y) on the graph. You plot a point by finding where the x and y values intersect based on their location on the x axis (horizontal) and y axis (vertical).

Draw a straight line through the points. Every point on the line is a solution to the equation.

60. $3x - 2y = 6$

point	x	y
A	4	3
B	2	0
C	0	-3
D	-2	-6

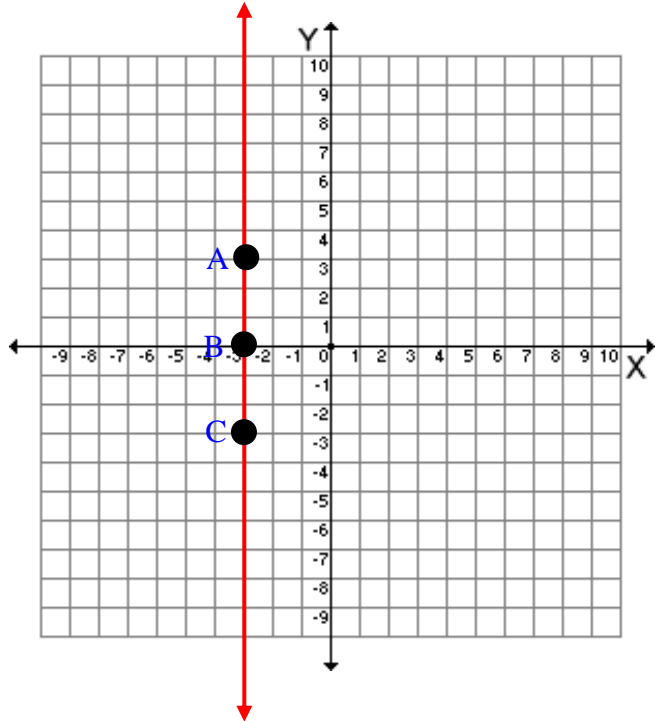


61. $x = -3$

This type of linear equation means that x must always equal -3 , no matter what the value of y .

It creates a solution line parallel to the y axis at $x = -3$.

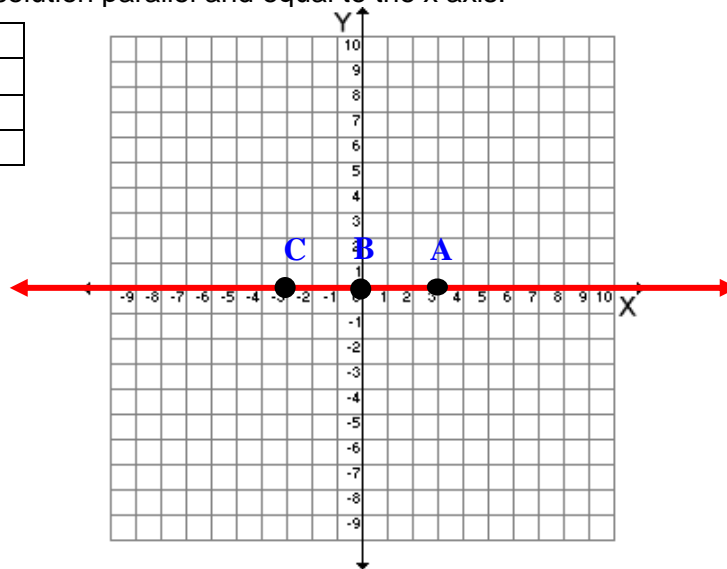
point	x	y
A	-3	3
B	-3	0
C	-3	-3



62. $y = 0$

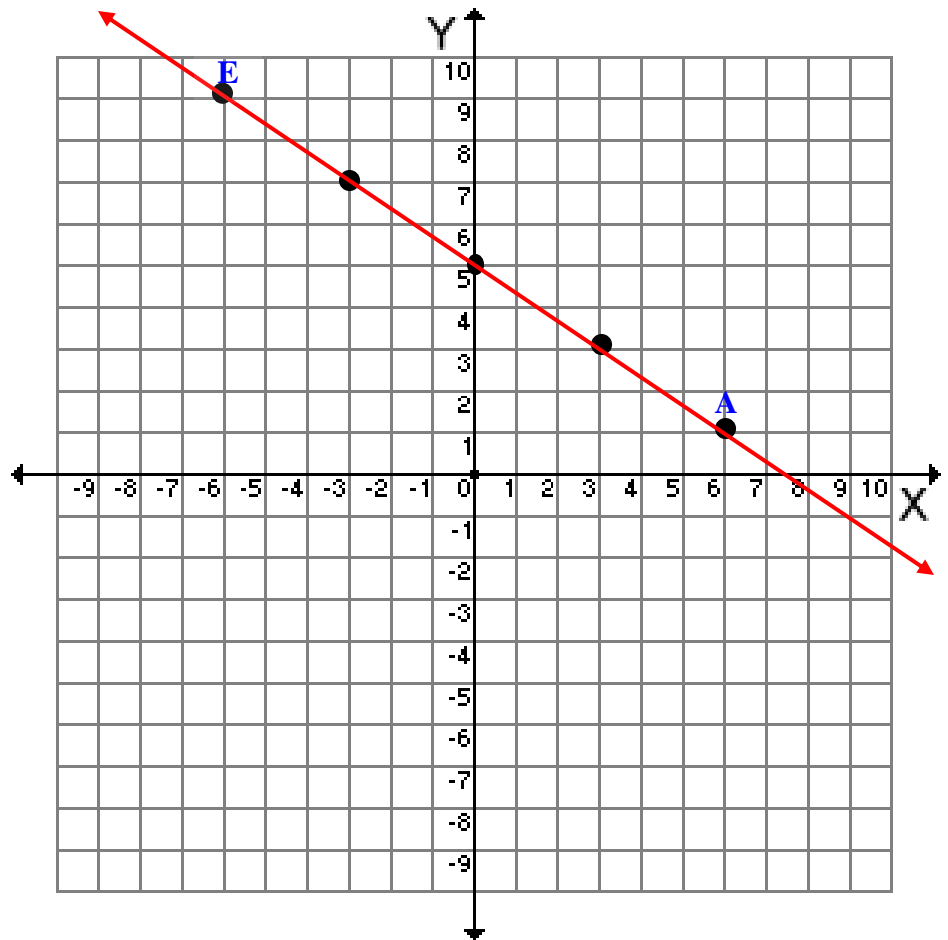
This type of linear equation means that y must always equal 0 , no matter what the value of x . It creates a solution parallel and equal to the x axis.

point	x	y
A	3	0
B	0	0
C	-3	0



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

Point	x	y
A	6	1
B	3	3
C	0	5
D	-3	7
E	-6	9



Systems of Equations

The following are 2 dimensional linear equations, and each represents a line that can be graphed on the coordinate plane. The solution to a system of equations is where the lines representing each linear equation will intersect. This can actually be accomplished without graphing in the following manner.

64. $2x - 3y = -12$
 $x - 2y = -9$ ← multiply by -2, you get $-2x + 4y = 18$

First, try to figure out what to multiply each term in one equation by in order to identically match a like term in the other equation, but with an opposite sign. If we multiply the second equation by -2, then the "x" term will become -2x, the opposite of 2x in the first equation.

Then combine the like terms between each equation. The 2x and the -2x will cancel out, allowing you to solve for y.

$$\begin{array}{r} 2x - 3y = -12 \\ -2x + 4y = 18 \\ \hline y = 6 \end{array}$$

Now plug the discovered value $y = 6$ into either of the original formulas and solve to determine the value of x. Both formulas should give the same value for x.

$$2x - 3(6) = -12 \quad x - 2(6) = -9$$

$$2x - 18 = -12 \quad x - 12 = -9$$

$$2x = 6 \quad x = 3$$

$$x = 3$$

The answer is $x = 3$ and $y = 6$. If you had graphed each equation carefully, they would intersect at point (3, 6).

65. $2x - 3y = -4$
 $y = -2x + 4$

First rearrange the second equation to line up like terms

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

$$2x + y = 4$$

Now multiply the second equation by -1, so the "2x" terms in each equation will have opposite signs.

$$2x + y = 4 \quad \leftarrow \text{multiply by -1, you get } -2x - y = -4$$

Combine the like terms of each equation. The 2x and -2x will cancel out.

$$\begin{array}{r} 2x - 3y = -4 \\ -2x - y = -4 \\ \hline -4y = -8 \\ y = 2 \end{array}$$

Plug the value of $y = 2$ into each original formula and solve for x.

$$2x - 3(2) = -4 \quad 2 = -2x + 4$$

$$x = 1 \quad x = 1$$

The answer is $x = 1$ and $y = 2$.

Square Roots and Radicals

What are the square roots of the following numbers (answers will be whole numbers):

$$66. \quad \sqrt{49} = 7$$

$$67. \quad \sqrt{121} = 11$$

Simplify the following radical expressions using the rules of radicals:

$$68. \quad (\sqrt{8})(\sqrt{10}) = (\sqrt{2}\sqrt{2}\sqrt{2}\sqrt{2}\sqrt{5}) = 2 \cdot 2 \cdot \sqrt{5} = 4\sqrt{5}$$

$$\begin{aligned} 69. \quad & 2\sqrt{18} - 5\sqrt{32} + 7\sqrt{162} \\ &= 2\sqrt{2}\sqrt{9} - 5\sqrt{2}\sqrt{16} + 7\sqrt{2}\sqrt{81} \\ &= 6\sqrt{2} - 20\sqrt{2} + 63\sqrt{2} = 49\sqrt{2} \end{aligned}$$

Knowledge of multiplication table, prime numbers and prime factoring can be helpful here

$$\begin{aligned} 70. \quad & \sqrt{\frac{12}{18}} \bullet \sqrt{\frac{15}{40}} \\ & \frac{2\sqrt{3}}{3\sqrt{2}} \bullet \frac{\sqrt{3}\sqrt{5}}{\sqrt{4}\sqrt{2}\sqrt{5}} \\ & \frac{6\sqrt{5}}{12\sqrt{5}} = \mathbf{1/2} \end{aligned}$$

$$71. \quad (2\sqrt{3} + 5\sqrt{2})(3\sqrt{3} - 4\sqrt{2})$$

Use the FOIL method

$$18 - 8\sqrt{6} + 15\sqrt{6} - 40 = \mathbf{-22 + 7\sqrt{6}}$$

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. 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

- Prime and composite numbers, prime factoring
- Like fractions and unlike fractions
- Reducing and raising fractions
- Converting between mixed numbers and improper fractions
- Adding and subtracting like fractions with mixed and whole numbers
- Lowest Common Denominator (LCD)
- Adding and subtracting unlike fractions with mixed and whole numbers
- Borrowing with subtraction of fractions with mixed and whole numbers
- Multiplying and dividing with fractions, mixed numbers, and whole numbers
- Canceling to simplify multiplication
- Solving proportions
- Creating and solving proportions in word problems

Decimals

- Comparing / ordering decimal fractions
- Reading and writing mixed decimals
- Estimating with mixed decimals
- Adding and subtracting decimals
- Rounding to a chosen place value
- Using zeros as placeholders
- Multiplying decimals by whole numbers
- Multiplying decimals by decimals
- Multiplying by 10, 100, or 1000
- Dividing decimals by whole numbers
- Dividing decimals by decimals
- Dividing by 10, 100, or 1000
- Converting decimals to fractions
- Converting fractions to decimals

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

PRACTICE QUESTIONS

Whole Numbers

Place Value

184, 276, 091

Which digit in the number above holds the following place values?

1. ten thousands _____
2. hundreds _____
3. hundred millions _____
4. tens _____
5. millions _____
6. hundred thousands _____

Addition

7. $345 + 72 + 1,029 =$

8.
$$\begin{array}{r} 72,928 \\ 27,135 \\ + 6,902 \\ \hline \end{array}$$

Subtraction

9.
$$\begin{array}{r} 79,582 \\ - 53,753 \\ \hline \end{array}$$

10.
$$\begin{array}{r} 920,058 \\ - 275,362 \\ \hline \end{array}$$

Multiplication

11. $17 \times 235 =$

12.
$$\begin{array}{r} 375 \\ \times 9 \\ \hline \end{array}$$

13.
$$\begin{array}{r} 32,508 \\ \times 36 \\ \hline \end{array}$$

14.
$$\begin{array}{r} 4,369 \\ \times 508 \\ \hline \end{array}$$

Division

15. $456 \div 4 =$

16. $6782 \div 22 =$

ANSWERS

1. 7
2. 0
3. 1
4. 9
5. 4
6. 2
7. 1,446
8. 106,965
9. 25,829
10. 644,696
11. 3,995
12. 3,375
13. 1,170,288
14. 2,219,452
15. 114
16. 308 Remainder 6

Prime vs. Composite Numbers and Prime Factoring

Prime Number - an integer that **can only be divided by one and itself without a remainder**

Composite Number - an integer that is **not prime**, and can be divided into **prime factors**

Prime factors - the multiplication factors of a composite number that are prime themselves

17. Write down the first six prime numbers in order below

_____ , _____ , _____ , _____ , _____ , _____

For the following questions, indicate whether the number is **prime** or **composite**. If it is a composite number, then break it down into its prime factors. If it is a prime number, just write the word **prime**:

18. 24 _____

19. 31 _____

20. 35 _____

21. 39 _____

22. 30 _____

23. 23 _____

ANSWERS

17. 2,3,5,7,11,13

18. $2 \times 2 \times 2 \times 3$

19. prime

20. 5×7

21. 3×13

22. $2 \times 3 \times 5$

23. prime

Fractions

Numerator: tells how many parts you have (the number on top) \longrightarrow $\frac{3}{4}$

Denominator: tells how many parts in the whole (the number on the bottom) \rightarrow $\frac{3}{4}$

Proper fraction: top number is less than the bottom number: $\frac{2}{3}$ $\frac{6}{7}$ $\frac{11}{15}$

Improper fraction: top number is equal to or larger than the bottom number $\frac{4}{4}$ $\frac{9}{2}$

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

Common Denominator: is a number that can be divided evenly by all of the denominators in the problem. For $\frac{2}{3}$ $\frac{3}{4}$ some common denominators are 12, 24, 36, 48. The **lowest common denominator (LCD)** would be 12.

Reducing Fractions

Any time **both the numerator and denominator** of a fraction can be divided by the **same number**, then the fraction can **BE REDUCED** (even when part of a mixed number – just leave the whole number alone)! A fraction in lowest terms is a fraction that cannot be reduced any further.

$$\text{EX: } \frac{56}{70} = \frac{56 \div 2}{70 \div 2} = \frac{28}{35} = \frac{28 \div 7}{35 \div 7} = \frac{4}{5} \quad \text{Reduced to lowest terms}$$

$$\text{ALT Prime Factoring EX: } \frac{56}{70} = \frac{2 \times 2 \times 2 \times 7}{2 \times 5 \times 7} = \frac{\cancel{2} \times \cancel{2} \times 2 \times \cancel{7}}{\cancel{2} \times 5 \times \cancel{7}} = \frac{4}{5}$$

The alternate prime factoring method involves breaking both the numerator and the denominator into prime factors, then canceling any factors they both share one to one. Whatever remains is the reduced fraction. This method is valuable with larger and trickier fractions.

Reduce the following fractions:

24. $\frac{6}{8}$

25. $\frac{14}{28}$

26. $\frac{15}{35}$

27. $9 \frac{12}{30}$

ANSWERS

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

25. $\frac{1}{2}$

26. $\frac{3}{7}$

27. $9 \frac{2}{5}$

Raising Fractions

Raising a fraction to higher terms to create an equivalent fraction is the same thing in reverse (AGAIN – even when part of a mixed number)! **You have to multiply the numerator and denominator by the same number**, and then you will have an equivalent raised fraction.

$$\text{EX: } \frac{4}{5} = \frac{4 \times 7}{5 \times 7} = \frac{28}{35} = \frac{28 \times 2}{35 \times 2} = \frac{56}{70} \quad \begin{array}{l} \text{raised} \\ \text{higher equivalent} \\ \text{fractions} \end{array}$$

Simple as that! Of course, YOU have to see what you can divide by to reduce, or choose what to multiply by to raise! Better know your prime numbers and multiplication table perfectly!

SO, when you have to raise a fraction to a higher equivalent fraction with a given denominator (such as an LCD), do this:

$$\text{EX: } \frac{3}{7} = \frac{?}{56}$$

- Figure out how many times the old denominator (7) goes into the new denominator (56)

$$\frac{3}{7} \times 8 = \frac{?}{56}$$

- Then take that factor (8 in this case), and multiply it times the old numerator to get the new numerator!!

$$\frac{3 \times 8}{7 \times 8} = \frac{24}{56}$$

$$\text{so } 3/7 = 24/56 !!$$

Easy as that!

Raise the following fractions by finding new numerator:

28. $\frac{3}{4} = \frac{?}{12}$

29. $\frac{7}{8} = \frac{?}{56}$

30. $\frac{4}{5} = \frac{?}{45}$

ANSWERS

28. 9
29. 49
30. 36

Converting Mixed Numbers and Improper Fractions

An improper fraction is any fraction that is equal to 1 or higher:

EX: $2/2$, $9/8$, $5/3$

A proper fraction is always less than 1!

EX: $1/2$, $7/8$, $11/12$

A mixed number is any combination of a whole number and a fraction:

EX: $3 \frac{1}{2}$, $4 \frac{3}{4}$, $2 \frac{5}{4}$, $3 \frac{1}{4}$

p.s: Remember, a mixed number really means the whole number PLUS the fraction! $3 \frac{1}{2} = 3 + \frac{1}{2}$!!!

Mixed numbers can have equivalent improper fractions, and vice versa. You must be able to convert back and forth!

- To convert a mixed number to an equivalent improper fraction:**

EX: $8 \frac{3}{4}$

- Keep the denominator $\frac{?}{4}$
- Multiply the whole number (8) times the denominator (4)
This tells you how many fourths are in 8 alone!
 $4 \times 8 = 32$
- Next, add that 32 to the old remaining numerator (3)
This tells you how many fourths are in $8 \frac{3}{4}$!
 $32 + 3 = 35$

- Place the 35 above 4 as the new numerator, and you have your equivalent improper fraction!

$$\frac{35}{4}$$

- $8 \frac{3}{4} = \frac{35}{4}$

Convert the following mixed numbers into improper fractions:

31. $5 \frac{1}{4}$

32. $8 \frac{1}{2}$

33. $6 \frac{2}{3}$

34. $9 \frac{5}{7}$

ANSWERS

31. $21/4$

32. $17/2$

33. $20/3$

34. $68/7$

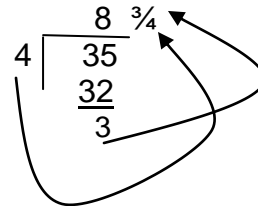
- To convert an improper fraction back to an equivalent mixed number (or whole number):**

EX: $\frac{35}{4}$ numerator
4 denominator

- You must **divide the numerator by the denominator** using long division, and any remainder becomes the new numerator over the old denominator/divisor!

This is what REALLY happens to remainders in division!!!

$$35 \div 4 = 8 \text{ R}3 = 8 \frac{3}{4}$$



Convert the following improper fractions back into mixed numbers. If the resulting mixed number has a fraction that can be reduced, then reduce it:

35. $15 / 7$

36. $24 / 6$

37. $10 / 4$

38. $37 / 3$

ANSWERS

35. $2 \frac{1}{7}$

36. 4

37. $2 \frac{1}{2}$

38. $12 \frac{1}{3}$

Equivalent Mixed Numbers – Intro to Borrowing

Seemingly different mixed numbers can be equivalent (equal), and you can determine this as long as you remember that a mixed number is actually a form of addition
 $(2 \frac{2}{5} = 2 + \frac{2}{5})$

Borrowing Example (needed later for subtraction of mixed fractions):

$2 \frac{2}{5} = 1 + 1 + \frac{2}{5} = 1 + \frac{7}{5} = 1 \frac{7}{5}$ **$1 + \frac{7}{5} = \frac{5}{5} + \frac{7}{5} = \frac{12}{5}$**

1) Borrow 1 from the whole number 2 in the mixed number

1) Now separate the remaining whole number 1 in the mixed number

2) Take that 1, add it to the $\frac{2}{5}$ that was already there originally, and then convert the $1 \frac{2}{5}$ to $\frac{7}{5}$ ($1 = \frac{5}{5}$)
 $1 \frac{2}{5} = \frac{5}{5} + \frac{2}{5} = \frac{7}{5}$

2) Again, Take that 1, and convert it to $\frac{5}{5}$, and add it to the $\frac{7}{5}$ that was there originally
 $\frac{5}{5} + \frac{7}{5} = \frac{12}{5}$

SO, you can see that
 $2 \frac{2}{5} = 1 \frac{7}{5} = \frac{12}{5}$
They are equivalent, or EQUAL ! Same value!

Convert the following mixed numbers into equivalent mixed numbers as indicated:

39. $5 \frac{1}{3} = 4 \frac{?}{3}$

40. $12 \frac{2}{5} = 11 \frac{?}{5}$

41. $65 \frac{9}{11} = 64 \frac{?}{11}$

ANSWERS

39. $4 \frac{4}{3}$
 40. $11 \frac{7}{5}$
 41. $64 \frac{20}{11}$

Adding and Subtracting Like Fractions

“Like” fractions merely refer to fractions that have the **same denominator**. It includes mixed numbers whose fractions have the same denominator.

Fractions which have the same denominator are the easiest to add and subtract, because all that is necessary is to add (or subtract) their respective numerators. The denominator remains the same.

$$\text{EX: } 3/7 + 1/7 = 4/7$$

$$5/11 + 3/11 = 8/11$$

$$4/5 - 1/5 = 3/5$$

$$11/15 - 7/15 = 4/15$$

When adding or subtracting mixed numbers and fractions with like denominators, you can just add (or subtract) the whole numbers and fractions separately, and combine them at the end.

$$\text{EX: } 7 \frac{3}{7} + 8 \frac{1}{7} = 15 \frac{4}{7}$$

$$11 \frac{5}{11} + 13 \frac{3}{11} = 24 \frac{8}{11}$$

$$25 \frac{4}{9} + 1/9 = 25 \frac{5}{9}$$

$$15 \frac{2}{17} + 3/17 + 20 \frac{5}{17} = 35 \frac{10}{17}$$

$$22 \frac{4}{5} - 9 \frac{1}{5} = 13 \frac{3}{5}$$

$$41 \frac{11}{15} - 20 \frac{7}{15} = 21 \frac{4}{15}$$

$$35 \frac{7}{11} - 4/11 = 35 \frac{3}{11}$$

Occasionally, when you add (or subtract) fractions, your answer results in an improper fraction and/or an unreduced fraction. Generally, when this happens, you **MUST** clean up your answer. If possible, you **MUST** convert the improper fraction back to a mixed or whole number. If the resulting mixed number's fraction can be reduced, you **MUST** reduce it.

$$\text{EX: } 3/7 + 4/7 = 7/7 = 1$$

$$5/8 + 4/8 = 9/8 = 1 \frac{1}{8}$$

$$5/8 + 5/8 = 10/8 = 1 \frac{2}{8} = 1 \frac{1}{4} \text{ (needed to reduce } 2/8 \text{ to } 1/4)$$

$$9/10 - 3/10 = 6/10 = 3/5 \text{ (needed to reduce } 6/10 \text{ to } 3/5)$$

If the answer results in a mixed number containing an improper fraction, that **MUST** be corrected also.

$$\text{EX: } 10 \frac{3}{5} + 6 \frac{4}{5} + 3 \frac{2}{5} = 19 \frac{9}{5} = 20 \frac{4}{5} \text{ (} 9/5 = 1 \frac{4}{5}$$

$$22 \frac{7}{9} + 4/9 + 8 \frac{7}{9} = 30 \frac{18}{9} = 32 \text{ (} 18/9 = 2)$$

Add or subtract the following like fractions as indicated. If your answer results in an unreduced fraction or improper fraction, correct it:

42. $\frac{3}{5} + \frac{4}{5} + \frac{2}{5} =$
43. $\frac{7}{15} + \frac{11}{15} + \frac{4}{15} =$
44. $\frac{7}{8} - \frac{3}{8} =$
45. $10 \frac{8}{9} - 5 \frac{5}{9} =$
46. $15 \frac{5}{6} + 5 \frac{1}{6} + 10 \frac{5}{6} =$
47. $\frac{11}{14} + 7 \frac{3}{14} =$
48. $99 \frac{11}{18} - \frac{4}{18} =$

ANSWERS

42. $1 \frac{4}{5}$
43. $1 \frac{7}{15}$
44. $\frac{1}{2}$
45. $5 \frac{1}{3}$
46. $31 \frac{5}{6}$
47. 8
48. $99 \frac{7}{18}$

Subtracting Fractions from Whole and Mixed Numbers – Borrowing

Sometimes when you subtract, you run into some new problems. The first problem arises when you subtract a fraction from a whole number.

$15 - \frac{7}{8} =$ what do you subtract the $\frac{7}{8}$ from? There is no like fraction.

If you need a like fraction, you MAKE one by borrowing one from the whole number. You never need to borrow more than 1. Once you borrow that 1, you make it into a like fraction with the denominator you need!

The number 1 can be made into any fraction you want, as long as the numerator and denominator stay the same.

EX: $1 = \frac{1}{1} = \frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \frac{5}{5} = \frac{6}{6} = \frac{7}{7} \dots$ and so on. Get the idea?

So let's look at our problem again. What if we borrow 1 from the 15, and make it into $\frac{8}{8}$? Watch!

$15 = 14 \frac{8}{8}$ by borrowing, we can now solve the problem above.

$$15 - \frac{7}{8} = 14 \frac{8}{8} - \frac{7}{8} = 14 \frac{1}{8}$$

Same thing for subtracting mixed numbers from whole numbers.

EX: $75 - 22 \frac{4}{7} = 74 \frac{7}{7} - 22 \frac{4}{7} = 52 \frac{3}{7}$

The second problem can sometimes arise when subtracting mixed numbers.

$25 \frac{2}{7} - 18 \frac{5}{7} =$ You can't subtract $\frac{2}{7} - \frac{5}{7}$!! But you can BORROW!

Borrow 1 from the 25, make it $7/7$, and then add it to the $2/7$ that is already there.

$$25 \frac{2}{7} = 24 \frac{9}{7} !!$$

Remember you did this earlier in the study guide? This is where you really need it!

Borrowing is your best friend when subtracting with fractions!

Now let's complete the problem.

$$25 \frac{2}{7} - 18 \frac{5}{7} = 24 \frac{9}{7} - 18 \frac{5}{7} = 6 \frac{4}{7}$$

There is another alternative to borrowing, *but it doesn't always work easily* –

Make mixed numbers (or whole number and mixed number) into improper fractions first, then subtract, then clean up your answer.

$$\text{EX: } 25 \frac{2}{7} - 18 \frac{5}{7} = \frac{177}{7} - \frac{131}{7} = \frac{46}{7} = 6 \frac{4}{7}$$

$$\text{EX: } 15 - 4 \frac{4}{9} = \frac{135}{9} - \frac{40}{9} = \frac{95}{9} = 10 \frac{5}{9}$$

This method becomes more difficult as the whole numbers involved get larger, whereas borrowing will NEVER let you down!

Which method would YOU use to solve $789 \frac{3}{14} - 575 \frac{11}{14}$?

Do I really have to ask? I think you get the idea. BORROWING is the way to go!!!

$$789 \frac{3}{14} - 575 \frac{11}{14} = 788 \frac{17}{14} - 575 \frac{11}{14} = 213 \frac{6}{14} = 213 \frac{3}{7} \text{ (reduce!)}$$

Now you try it. Subtract the following like fractions as indicated. If your answer results in an unreduced fraction or improper fraction, correct it:

49. $35 - 11/18 =$

50. $18 - 9 \frac{17}{20} =$

51. $151 \frac{5}{13} - 84 \frac{10}{13} =$

52. $81 - 50 \frac{9}{14} =$

ANSWERS

49. $34 \frac{7}{18}$

50. $8 \frac{3}{20}$

51. $66 \frac{8}{13}$

52. $30 \frac{5}{14}$

**REMEMBER – BORROWING IS ONLY NEEDED FOR SUBTRACTION !!
AND ONLY SOME OF THE TIME! LEARN TO RECOGNIZE WHEN YOU NEED IT!**

Adding and Subtracting Unlike Fractions With Different Denominators

You CANNOT add or subtract unlike fractions or mixed numbers which have different denominators!! You must FIND a common denominator (hopefully the LOWEST common denominator), and convert the fractions into that common denominator FIRST!

- **If the denominators are different, you MUST find the least common denominator (LCD), and convert all fractions (even in mixed numbers) to that LCD before adding or subtracting!**

Remember – a common denominator is a number that all the denominators of the fractions being added or subtracted together can be divided into evenly with no remainder.

The method of converting the fractions to the new common denominator was already shown to you in RAISING FRACTIONS. You had better review that right now if you have forgotten. But what we haven't done is discuss how to FIND the lowest common denominator first. There are many methods.

The easiest method is to just multiply all the denominators together. That will always give you a common denominator, but rarely the lowest.

Another method is to keep creating multiples of each denominator until a common multiple is found. EX: $1/6, 1/10$ the LCD is 30

6 > 6, 12, 18, 24, **30**

10 > 10, 20, **30**

The best method involves **prime factoring**. Remember that? You can use it.

Finding LCD (Lowest or Least Common Denominator):

- Place each denominator in a column, one below the next, with an empty row next to each denominator.
- Factor out each denominator into its *PRIME* factors from *lowest to highest*, and place them in order in the empty row next to the denominator. Identical factors must be stacked in the same column once per row whenever possible. **Arrange carefully! Do NOT place different factors in the same column. Do NOT allow non-prime composite factors to be placed in the grid.**

$$1/2 + 1/8 + 1/10 + 1/15$$

2 =	2					
8 =	2 X	4	2 X	2		
10 =	2 X				5	
15 =	3 X			3 X	5	
LCD =	2 X	2 X	2 X	3 X	5	= 120

- Finally, in the bottom row multiply the common factor of each column together to get LCD

EXAMPLES (LOOK CAREFULLY!!!!!!):

$1/3 + 1/6 + 1/14$

3 =		3		
6 =	2 X	3		
14 =	2 X		7	
LCD =	2 X	3 X	7	= 42

$1/4 + 1/6 + 1/9 + 1/10$

4 =	2 X	2				
6 =	2 X		3			
9 =			3 X	3		
10 =	2 X				5	
LCD =	2 X	2 X	3 X	3 X	5	= 180

$1/2 + 1/4 + 1/8$

2 =	2			
4 =	2 X	2		
8 =	2 X	2 X	2	
LCD =	2 X	2 X	2 X	= 8

Now you try it.

Find the lowest common denominator for the following sets of fractions:

53. $1/6, 3/8, 7/20$

54. $2/3, 5/6, 4/9$

55. $1/3, 3/4, 2/7, 11/14$

56. $1/4, 1/5, 1/6, 3/10, 4/15$

ANSWERS

- 53. 120
- 54. 18
- 55. 84
- 56. 60

REMINDER - RAISING FRACTIONS:

Next, you have to raise fractions to a higher equivalent fraction with a given denominator (LCD) in order to ADD OR SUBTRACT, for example: $2 \frac{3}{7} + \frac{11}{56}$ (LCD=56)

EX: $\frac{3}{7} = \frac{?}{56}$ (LCD)

- Figure out how many times the old denominator (7) goes into the new denominator (56)

$$\frac{3}{7} \times 8 = \frac{?}{56}$$

- Then take that factor (8 in this case), and multiply it times the old numerator to get the new numerator!!

$$\frac{3 \times 8}{7 \times 8} = \frac{24}{56}$$

so $3/7 = 24/56$!! then $2 \frac{24}{56} + 11/56 = 2 \frac{35}{56} = 2 \frac{5}{8}$

Easy as that!

NOW YOU ARE READY!

When **adding (or subtracting)** fractions or mixed numbers with different denominators, they *must be changed* so that they have the SAME denominators! This is why **LCD** is so important – it is the LOWEST or LEAST common denominator necessary to convert them to! IT SAVES HEADACHES!

EX: $3/8 + 5/6$

First, determine the **LCD (method shown in previous pages)**, which is **24**

Second, **convert** the fractions into equivalent fractions with the same LCD

$$9/24 + 20/24$$

Third, now that they have the same denominator, **just add the numerators**, leave the denominator alone!

$$9/24 + 20/24 = 29/24$$

Fourth, if your answer is an improper fraction, it should be changed into its equivalent mixed number, and reduced if necessary

$$29/24 = 1 \frac{5}{24}$$
 the fraction $5/24$ cannot be reduced

*****NOTE: When adding (or subtracting) with mixed numbers, you DON'T need to convert to improper fractions at all, just add (or subtract) the whole numbers and fractions separately! First just convert the fractions within the mixed numbers to the LCD!**

EX: $235 \frac{11}{14} + 65 \frac{5}{6}$

First, determine the **LCD**, which is **42**

Second, convert the **fractions *only*** into equivalent fractions with the same LCD

$$235 \frac{33}{42} + 65 \frac{35}{42}$$

Third, now that the fractions have the same denominator, **just add the whole numbers and the fractions *separately***

$$235 \frac{33}{42} + 65 \frac{35}{42} = 300 \frac{68}{42}$$

Fourth, if your answer is a mixed number with an improper fraction in it, you must **convert the improper fraction into a mixed number, and add this to the whole number!** Then reduce if necessary

$$300 \frac{68}{42} = 300 + \frac{68}{42} = 300 + 1 \frac{26}{42} = 301 \frac{26}{42}$$

now reduce!

$$301 \frac{26}{42} = \boxed{301 \frac{13}{21}} \text{ correct answer! ☺}$$

AND DON'T FORGET BORROWING!

For example, when you are subtracting $251 \frac{1}{6} - 130 \frac{7}{8}$

First, you **convert only the fractional part of each mixed number** to fractions with the same **LCD** (lowest common denominator):

$$251 \frac{1}{6} - 130 \frac{7}{8} = 251 \frac{4}{24} - 130 \frac{21}{24}$$

Afterward, however, you discover that you **can't** subtract $\frac{4}{24} - \frac{21}{24}$! **BUT** you **can** borrow 1 from the 251 and add it to the fraction $\frac{4}{24}$ to make it bigger!!! This makes it an equivalent improper mixed number!

- **Take 1 from the 251, leaving 250**
- **That 1 is actually equal to $\frac{24}{24}$, right? Change it to 24ths!! Then add it to the $\frac{4}{24}$ that is already there!!**

$$251 - 1 = 250 \quad 1 = \frac{24}{24} \quad !!!$$



$$1 + \frac{4}{24} = \frac{24}{24} + \frac{4}{24} = \frac{28}{24} \quad !!!$$

- **Then attach the new raised fraction to the 250 !!!**

$$\boxed{251 \frac{4}{24} = 250 \frac{28}{24}}$$

- Then you can subtract the whole numbers and the fractions separately with your new improved improper mixed number!

$$250 \frac{28}{24} - 130 \frac{21}{24} = 120 \frac{7}{24}$$

You NEVER *really* need to convert mixed or whole numbers entirely to improper fractions when you are adding/subtracting! Only when you are multiplying/dividing!

Now you try it. Add and subtract the following fractions. Make sure your answers are not improper fractions and are reduced:

57. $\frac{5}{6} + \frac{7}{9} =$

58. $\frac{1}{2} + \frac{3}{4} + \frac{3}{8} =$

59. $17 \frac{1}{3} + \frac{7}{15} + 8 \frac{1}{6} =$

60. $\frac{17}{21} - \frac{4}{15} =$

61. $55 \frac{5}{8} - 25 \frac{3}{10} =$

62. $172 \frac{2}{9} - 91 \frac{5}{6} =$

63. $70 \frac{1}{10} - 28 \frac{3}{4} =$

ANSWERS

57. $1 \frac{11}{18}$

58. $1 \frac{5}{8}$

59. $25 \frac{29}{30}$

60. $\frac{19}{35}$

61. $30 \frac{13}{40}$

62. $80 \frac{7}{18}$

63. $41 \frac{7}{20}$

Multiplication and Division of Fractions

Multiplication and division of fractions is ENTIRELY different than adding and subtracting, mainly because [1] you do NOT need to convert the fractions to a lowest common denominator and [2] you DO need to convert any mixed numbers to improper fractions first (in fact, right away!).

When you have a multiplication problem, such as $3 \frac{3}{4} \times 8$:

Step 1: Convert any mixed numbers to improper fractions, and even whole numbers should be converted to improper fractions:

$$\frac{15}{4} \times \frac{8}{1}$$

$$3 \frac{3}{4} = \frac{15}{4}$$

$$8 = \frac{8}{1}$$

Step 2: Canceling! Any numerator on top and denominator on the bottom that can be evenly divided by the same number, should be divided:

$$\frac{15}{4} \times \frac{8^2}{1}$$

$$8 \div 4 = 2$$

$$4 \div 4 = 1$$

$$\frac{15}{1} \times \frac{2}{1}$$

You should continue canceling until it cannot be done any more!

EX:

$$\frac{\cancel{7}^4}{\cancel{6}^3} \times \frac{\cancel{5}^1}{14} \times \frac{\cancel{6}^3}{15}$$

$$\frac{\cancel{7}^1}{4} \times \frac{\cancel{5}}{\cancel{14}_2} \times \frac{\cancel{3}}{15}$$

$$\frac{1}{4} \times \frac{\cancel{5}^1}{2} \times \frac{\cancel{3}}{\cancel{15}_3}$$

$$\frac{1}{4} \times \frac{1}{2} \times \frac{\cancel{3}^1}{\cancel{3}^1} = \frac{1}{4} \times \frac{1}{2} \times \frac{1}{1}$$

Step 3: Just multiply the remaining numerators together, and then multiply the remaining denominators together.

$$\frac{1}{4} \times \frac{1}{2} \times \frac{1}{1} = \frac{1}{8}$$

from previous example > $\frac{15}{1} \times \frac{2}{1} = \frac{30}{1} = 30$

If you have cancelled *completely*, you will not need to reduce your answer to lowest terms. ☺ But you should check anyway!

Division

Division is the same as multiplication, except you must invert (turn upside down) the divisor on the right *after Step 1 and before Step 2*. Then *just continue on as if you were multiplying*. Turning a fraction upside down is creating its *reciprocal*.

EX: $3 \frac{3}{4} \div 2 \frac{1}{4}$

Step 1: $\frac{15}{4} \div \frac{9}{4}$ convert mixed numbers to improper fractions

STEP 1A:

$$\frac{15}{4} \times \frac{4}{9}$$

invert divisor, change to multiplication

Step 2:

$$\frac{\cancel{15}^5}{4_1} \times \frac{\cancel{4}^1}{9_3}$$

thorough canceling

Step 3:

$$\frac{5}{1} \times \frac{1}{3}$$

= $\frac{5}{3}$ multiply remaining numerators and denominators

= 1 2/3 don't leave answer as improper fraction

Now you try it. Multiply and divide the following fractions and/or mixed numbers.

64. $7/8 \times 10/21 =$

65. $\frac{3}{4} \times \frac{5}{9} \times \frac{8}{22} \times \frac{11}{15} =$

66. $3 \frac{3}{4} \times 3 \frac{3}{5} =$

67. $2 \frac{1}{10} \times 100 =$

68. $3 \frac{3}{8} \times 4 \frac{4}{9} =$

69. $3/4 \div 9/16 =$

70. $8 \frac{2}{3} \div 2 \frac{1}{6} =$

71. $5 \frac{5}{6} \div 1 \frac{17}{18} =$

72. $7 \frac{1}{7} \div 100 =$

ANSWERS

64. $5/12$

65. $1/9$

66. $13 \frac{1}{2}$

67. 210

68. 15

69. $1 \frac{1}{3}$

70. 4

71. 3

72. $1/14$

Ratios and Proportions

Solving a double-ratio or **proportion** problem with one unknown involves **cross-multiplication**, and then **solving the resulting equation** (as in basic algebra).

EX: $\frac{N}{10} = \frac{15}{75}$

$N = ?$

$\frac{N}{10} = \frac{15}{75}$
cross-multiply

$$\begin{aligned} 75N &= (10)(15) \\ 75N &= 150 \\ \frac{75N}{75} &= \frac{150}{75} \\ N &= 2 \end{aligned}$$

REMEMBER!

You can't **CANCEL** like you do in multiplying/dividing fractions! These are proportions, with an = sign in between!
JUST CROSS MULTIPLY AND SOLVE!

The variable may be anywhere in the ratio/proportion, just use the same procedure:

EX: $\frac{3}{X} = \frac{18}{90}$

$$\begin{aligned} 18X &= (3)(90) \\ 18X &= 270 \\ \frac{18X}{18} &= \frac{270}{18} \\ X &= 15 \end{aligned}$$

***If the answer does not come out evenly as a whole number, use the remainder in the division to create a *mixed number* as the answer:

EX: $\frac{7}{9} = \frac{18}{P}$ $7P = (9)(18)$
 $7P = 162$
 $\frac{7P}{7} = \frac{162}{7}$
 $P = 23 \frac{1}{7}$

$$\begin{array}{r} 23 \frac{1}{7} \\ 7 \overline{) 162} \\ \underline{14} \\ 22 \\ \underline{21} \\ 1 \end{array}$$

Not as hard as you think! ☺

Some proportion problems:

$$73. \quad \frac{15}{35} = \frac{N}{70}$$

$$74. \quad \frac{9}{N} = \frac{45}{70}$$

$$75. \quad \frac{N}{63} = \frac{7}{9}$$

$$76. \quad \frac{7}{9} = \frac{30}{N}$$

ANSWERS

$$73. \quad N = 30$$

$$74. \quad N = 14$$

$$75. \quad N = 49$$

$$76. \quad N = 38 \frac{4}{7}$$

$$77. \quad \frac{3}{20} = \frac{N}{2600}$$
$$N = 390$$

$$78. \quad \frac{6}{200} = \frac{N}{4500}$$
$$N = 135$$

$$79. \quad \frac{9}{11} = \frac{N}{484}$$
$$N = 396$$

Proportion word problems:

- 77.** If 3 in 20 people are left-handed, how many left-handed people would there be in a group of 2600 people?
- 78.** In the Amazon River, 6 of every 200 fish species will become extinct this year. If there are 4500 species of fish in the Amazon now, how many will become extinct this year?
- 79.** Nine out of eleven students who enter high school successfully graduate at the end of four years. In a high school with 484 entering students, how many may be expected to graduate successfully?

DECIMALS

Adding and Subtracting Decimals

To add or subtract decimals:

1) Line up the decimal points

2) Add or subtract normally

3) Remember, whole numbers line up on the left of the decimal point

$$\text{EX: } 345.07 + 25 + 17.375 =$$

$$\begin{array}{r} 345.07 \\ 25. \\ + 17.375 \\ \hline 387.445 \end{array}$$

$$\text{EX: } 345.729 - 72.251 =$$

$$\begin{array}{r} 345.729 \\ - 72.251 \\ \hline 273.478 \end{array}$$

NOTE: When subtracting, if one decimal is longer than the other, add zeros to the right and make them the same length before subtracting.

$$\text{EX: } 758.839 - 45.0927 =$$

$$\begin{array}{r} 758.8390 \\ - 45.0927 \\ \hline 713.7463 \end{array}$$

Rounding Numbers

Rounding is not that tough. The **FIRST THING** you have to know is *place value*, because you will be asked to round to a particular place in the number:

Whole Number Places

ones or units-----
 tens-----
 hundreds-----
 thousands-----
 ten thousands-----
 hundred thousands-----
 millions-----
 ten millions-----
 hundred millions-----

Decimal Places (end in -th)

tenths
 hundredths
 thousandths
 ten thousandths
 hundred thousandths
 millionths

345,976,021.982595

ROUNDING TO THE WHOLE NUMBER PLACES

1. Round the above number to the thousands:

The **6** is in the **thousands** place, so we must look at the number AFTER it: the **0**.

- If the number after the 6 is "5 to 9", you raise the 6 to 7 (**round up**)
- If the number after the 6 is "0 to 4", you leave the 6 alone! (**round down**)

Since the number after the 6 is a 0, we leave the 6 alone! (round down)

Next, we **replace** all the numbers after the 6 **with zeros up to the decimal point!**

Answer: **345,976,000**

2. Round the above number to the hundred thousands:

The **9** is in the **hundred thousands** place, so we look at the number AFTER it: the **7**.

- Since the 7 is between "5 to 9", we **raise the 9** before it **to a 10!** When we do that, the 9 becomes a 0, and the 5 in front of the 9 gets 1 added to it, to become a 6! Replace all numbers after the rounded place with zeros up to the decimal point.

Answer: **346,000,000**

So, watch out for those 9's, they might become 10's!

ROUNDING TO THE DECIMAL PLACES

3. Round the above number to the tenths:

The **9** is in the **tenths** place, so we look at the number AFTER it: the **8**.

- Since the 8 is between "5 to 9", we **raise the 9** before it **to a 10!** When we do that, the 9 becomes a 0, and the 1 in front of the 9 gets 1 added to it, to become a 2! We leave a zero in the tenths place.

Answer: **345,976,022.0**

345, 976, 021.982595

ROUNDING TO THE DECIMAL PLACES

4. Round the above number to the thousandths:

The **2** is in the **thousandths** place, so we look at the number **AFTER** it: the **5**.

- Since the 5 is between “5 to 9”, we **raise the 2 before it to a 3!** We do not need to attach any zeros after the 3, because we were rounding to the thousandths place, and additional zeros are **not needed** after the rounded place in decimal places (to the right of the decimal point).

Answer: **345, 976, 021.983**

*****GENERAL RULE FOR ROUNDING**

Always look at the digit AFTER the place to be rounded:

- If it is between “5 to 9”, **ROUND UP** (add 1) the place to be rounded!
- If it is between “0 to 4”, **ROUND DOWN** (leave it alone) the place to be rounded!
 - If you are rounding to a whole number place, fill zeros in **UP TO THE DECIMAL POINT** as necessary
 - If you are rounding to a decimal place, there is no need to add zeros beyond the place being rounded
 - If a 9 digit rounds up to a 10, you **MUST** add one to the digit on the **LEFT SIDE** and leave a zero where the 9 was. This only happens with 9s!!

Now you try it.

2 3 , 5 9 9 . 6 2 5 1

Round this number to the place value indicated:

- 80.** thousandths _____
- 81.** hundredths _____
- 82.** tenths _____
- 83.** ones (units) _____
- 84.** tens _____
- 85.** hundreds _____
- 86.** thousands _____

ANSWERS

- 80. 23599.625
- 81. 23599.63
- 82. 23599.6
- 83. 23600
- 84. 23600
- 85. 23600
- 86. 24000

Multiplying Decimals

Multiplying with decimals is almost identical to multiplying whole numbers. You **DO NOT** have to line up the decimal points. You don't even have to look at the decimal points until you have finished the multiplying.

First, just multiply normally. Ignore the decimal points.

$$\begin{array}{r} 7.251 \\ \times 3.2 \\ \hline 14502 \\ 21753 \\ \hline 232032 \end{array}$$

Second, go back and count the decimal places (places to the right of the decimal point) in each number you were multiplying with.

$$\begin{array}{r} 7.251 \\ \times 3.2 \\ \hline \end{array}$$

← had 3 decimal places
← had 1 decimal place
Total 4 decimal places

Third, go to your answer, and move the decimal to the left from the right the total number of spaces equaling the decimal places you counted (4 in this case)

$$\begin{array}{r} 7.251 \\ \times 3.2 \\ \hline 14502 \\ 21753 \\ \hline 23.2032 \\ \leftarrow 4\ 3\ 2\ 1 \end{array}$$

That's it – answer is 23.2032

Now you try it. Multiply the following:

87. $2.56 \times .17$

88. 4.6×54.18

89. $.38 \times 1.3709$

ANSWERS

87. 0.4352

88. 249.228

89. 0.520942

Dividing Decimals

Dividing with decimals is the same as dividing with whole numbers, except you must **move the decimal points in the *divisor* and the *dividend* the same number of spaces in the same direction before you begin dividing! *Look at the divisor first! It controls!***

You move the decimal points to the right to remove any decimal point in the divisor:

EX: $4567.458 \div 2.2$ round answer to hundredth

$$2.2 \overline{) 4567.458} \quad \text{move all decimals one place right}$$

$$22 \overline{) 45674.580} \leftarrow \quad \approx 2076.12 \text{ answer}$$

add a zero so your answer can be rounded to the *hundredth*

$$\begin{array}{r} 2076.12 \\ 22 \overline{) 45674.580} \\ \underline{44} \\ 16 \\ \underline{0} \\ 167 \\ \underline{154} \\ 134 \\ \underline{132} \\ 25 \\ \underline{22} \\ 38 \\ \underline{22} \\ 160 \\ \underline{154} \\ 6 \end{array}$$

If the dividend is a whole number, you must **STILL** move its decimal point!

EX: $489 \div 3.3$ round to thousandth

$$3.3 \overline{) 489} \quad \text{move all decimals one place right}$$

$$33 \overline{) 4890.0000} \leftarrow \quad \approx 148.182 \text{ answer}$$

add four zeros so you can round to the thousandth

$$\begin{array}{r} 148.182 \\ 33 \overline{) 4890.0000} \\ \underline{33} \\ 159 \\ \underline{132} \\ 270 \\ \underline{264} \\ 60 \\ \underline{33} \\ 270 \\ \underline{264} \\ 60 \\ \underline{33} \\ 270 \\ \underline{264} \\ 6 \end{array}$$

You can move the decimal points to the LEFT to get rid of zeros on the end of the divisor:

EX: $3468.4 \div 200$ no rounding, divide until remainder is 0

$200 \overline{) 3468.4}$ move both decimals two spaces to the left

$$\begin{array}{r}
 17.342 \\
 2 \overline{) 34.684} \\
 \underline{2} \\
 14 \\
 \underline{14} \\
 06 \\
 \underline{6} \\
 08 \\
 \underline{8} \\
 04 \\
 \underline{4} \\
 0
 \end{array}$$

= 17.342 answer

It's easier to divide by 2 than 200, right?

That's all!

Now you try it. Perform the following division problems. Round all answers to the **hundredth**.

90. $3.75 \div 1.2$

91. $.796 \div .32$

92. $63.25 \div 200$

Now round answers to the **tenth**.

93. $83.6 \div 5.5$

94. $.25 \div .125$

95. $322.1 \div 50$

ANSWERS

90. 3.13

91. 2.49

92. 0.32

93. 15.2

94. 2.0

95. 6.4

Converting Between Decimal and Fraction

- **Fraction to Decimal**

If the fraction is a mixed number, leave the whole number alone!!
Just worry about the fraction part!!

Convert any fraction to a decimal by DIVIDING THE NUMERATOR BY THE DENOMINATOR, USING LONG DIVISION AND CARRYING THE DIVISION OUT TO AS MANY DECIMAL PLACES AS NECESSARY!!

EX: $3 \frac{7}{20}$

Divide 7 by 20 or $7 \div 20 =$

$$\begin{array}{r} 0.35 \\ 20 \overline{) 7.00} \\ \underline{60} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

Answer = 3.35

Note: sometimes you may need to round!

- **Decimal to Fraction**

First, convert the decimal to its most obvious unreduced fraction or mixed number based on multiples of ten (which decimals are!!)

Second, REDUCE the fraction if necessary

EX: 7.28

$$7 \frac{28}{100} \div 4 = 7 \frac{7}{25} \quad \text{Answer} = 7 \frac{7}{25}$$

EX: 0.0035

$$\frac{35}{10,000} \div 5 = \frac{7}{2,000} \quad \text{Answer} = 7/2000$$

Never confuse this with percent conversions !!!

Convert the following fractions to decimals. Round the answer to the **thousandth** if necessary.

96. $\frac{3}{5}$

97. $7\frac{1}{2}$

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

99. $12\frac{3}{8}$

100. $\frac{5}{6}$

Convert the following decimals to fractions. **Reduce answer.**

101. .17

102. 7.2

103. .025

104. 75.32

105. .008

ANSWERS

96. 0.6

97. 7.5

98. 0.667

99. 12.375

100. 0.833

101. $\frac{17}{100}$

102. $7\frac{1}{5}$

103. $\frac{1}{40}$

104. $75\frac{8}{25}$

105. $\frac{1}{125}$

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.

Percents are always based on 100ths. 50 % means 50/100 of something. That is why whenever we convert between percents and non-percents (whether fraction, decimal, or whole number), we are always dividing or multiplying by 100 (or moving the decimal point two places left or right, which is the same thing!)

Moving the decimal point is easy, but you can't always use the easy way. It depends on the problem. That is why you had better **remember how to divide and multiply fractions by 100**, and decimals, too. Remember everything you learned about fractions and decimals. You'll need it!

A good rule of thumb is to remember that $1 = 100\%$. It will keep your head on straight if you get lost. 😊

PERCENT CONVERSION IN A NUTSHELL

Never confuse this with fraction/decimal conversions !!!

NON % $\xrightarrow[\text{or multiply by 100}]{\text{move decimal 2 spaces right}}$ %

$$0.02 = 2\%$$

$$2.5 = 250\%$$

$$1 = 100\%$$

$$\frac{1}{4} = 25\%$$

$$5 \frac{1}{8} = 512.5\%$$

$$\text{or } 512\frac{1}{2} \%$$

NON % $\xleftarrow[\text{or divide by 100}]{\text{move decimal 2 spaces left}}$ %

Converting Decimal or Fraction to a Percent

Converting a Decimal or Fraction (NON%) to a Percent % requires MULTIPLYING IT BY 100, but there two different ways of doing this, depending on what type of percent you have, and what you are converting it to:

1. Move the decimal point two places to the RIGHT:

- Decimal to Percent

JUST MOVE THE DECIMAL POINT TWO SPACES TO THE RIGHT (This is the same as multiplying by 100)!!

EX: $3.25 = 325\%$ $0.032 = 3.2\%$ $75 = 7500\%$

2. Multiply by 100 or 100/1:

- Fraction to Percent

Just multiply the fraction by 100. If it is a mixed number, change it to an improper fraction, then multiply by 100. Reduce as necessary.

EX: $3/4 = 3/4 \times 100\% = 300/4\% = 75\%$

EX: $5 \frac{3}{5} = 28/5 = 28/5 \times 100\% = 2800/5\% = 560\%$

EX: $1/6 = 1/6 \times 100\% = 100/6\% = 16 \frac{2}{3}\%$

***you can cancel during the multiplication, too, because you are multiplying fractions, and this will reduce your answer:

EX: $5 \frac{3}{5} = 28/5 = \frac{28}{5} \times \frac{100}{1}\% = 560\%$

Converting Percent to Decimal or Fraction

Converting a Percent to a Decimal or a Fraction (NON %) requires DIVIDING IT BY 100, but there two different ways of doing this, depending on what type of percent you have, and what you are converting it to:

3. Move the decimal point two places to the LEFT:

- Percent to Decimal

If the percent is a whole number or a decimal number, JUST MOVE THE DECIMAL POINT TWO SPACES TO THE LEFT! (This is the same as dividing by 100!)

EX: $45\% = .45$ $3.02\% = 0.0302$ $220\% = 2.2$

- If the percent is a fraction, convert the fraction to a decimal, then move the decimal point two spaces to the left!

EX: $3 \frac{3}{4} \% = 3.75\% = 0.0375$

*You may have to round the decimal if instructed!

EX: $2 \frac{2}{3} \% = 2.6666666... \% = 0.026666666...$
rounded to the thousandth $\approx .027$

4. Multiply by 1/100 or divide by 100:

- Percent to Fraction

Usually, you just multiply the percent times 1/100 (which is the same as dividing by 100!) then reduce:

EX: $25\% = 25/1 \times 1/100 = 25/100$

Reduce! $\frac{25}{100} \div \frac{25}{25}$

$= 1/4$

If you have a fractional percent, just multiply by 1/100:

EX: $3/4\% = 3/4 \times 1/100 = 3/400$ (can't reduce this)

BUT, IF you have a mixed number fractional percent, you must *change the mixed number to an improper fraction first*, then multiply by 1/100, then reduce if necessary:
reduce

EX: $8 \frac{1}{3} \% = 25/3 \% = 25/3 \times 1/100 = 25/300 = 1/12$

***you can cancel during the multiplication, too, because you are multiplying fractions, and this will reduce your answer:

EX: $8 \frac{1}{3} \% = 25/3 \% = \frac{25}{3} \times \frac{1}{100} = 1/12$

IF you have a decimal percent, *change the decimal to a fraction or improper fraction first*, then multiply by 1/100, then reduce if necessary:

EX: $2.75\% = 2 \frac{75}{100} \% = 2 \frac{3}{4} \% = 11/4 \% = 11/4 \times 1/100 = 11/400$ (can't reduce this)

EX: $0.28\% = 28/100 \% = \frac{28}{100} \times \frac{1}{100} = \frac{7}{2500}$ used canceling to reduce! ☺

Now you try it. Convert between percent and non-percent as instructed. Convert answers to fraction or decimals as instructed.

Convert the following percents to decimal non-percents:

106. 75 %

107. 1.2 %

108. .09 %

109. 89.3 %

110. 550 %

111. $3/5$ %

Convert the percents to fractional non-percents:

112. 35 %

113. 212 %

114. $7\frac{1}{2}$ %

115. $7/8$ %

116. 62.5 %

ANSWERS

106. 0.75

107. .012

108. .0009

109. .893

110. 5.5

111. .006

112. $7/20$

113. $2\frac{3}{25}$

114. $3/40$

115. $7/800$

116. $5/8$

117. 250 %

118. 33.33 %

119. 8200 %

120. 46 %

121. 80 %

122. 12500 %

Convert the following non-percents to percents. The result can be decimal or fraction. It is your choice. Round decimal answers to the hundredth if necessary.

117. 2.5

118. $1/3$

119. 82

120. .46

121. $4/5$

122. 125

Solving Percent Word Problems

Percent problems **can always be solved using the proportion method shown earlier**. Usually, the biggest problem for students is the setup. This method may help keep things straight..

A simple formula structure (proportion) can be used to attack percent problems:

$$\begin{array}{ccc} & \text{Left } \underline{\text{data}} & \text{right } \underline{\%} \\ \text{top } \text{partial (part)} & \frac{\quad}{\quad} = & \frac{\quad}{\quad} \\ & & \text{100\%} \\ \text{bottom } \text{total (whole)} & & \end{array}$$

The left side (top and bottom) should have raw (non %) data, and the right side (top and bottom) should have the percents.

The top row (left and right) should have the partial data and percent. The bottom row (left and right) should have the total data and percent. **Arrange the data and percents in a *linear* manner.**

Although the problem will not mention 100%, it must be included in the lower right corner! 100% is implied! The data to the left of it should correspond to whichever data represents the whole or total involved.

Therefore, you will have three blanks to fill in – two blanks with numbers, and one blank will be the unknown (N) which you are looking for!

1) EX: What is 30% of 150?

150 is the total. You are looking for the part of it that is 30%.

Formula: $\frac{\text{part}}{\text{whole}} = \frac{\text{N}}{150} = \frac{30\%}{100\%}$ Cross multiply to solve: $100N = (30)(150)$
 $100N = 4500$
 $N = 45$

2) EX: 45 is 30% of what number?

45 is the part. You are looking for the total of which 45 is 30%.

Formula: $\frac{\text{part}}{\text{whole}} = \frac{45}{N} = \frac{30\%}{100\%}$ $30N = (45)(100)$
 $30N = 4500$
 $N = 150$

3) EX: 45 is what percent of 150?

45 is the part. 150 is the total whole. You are looking for the percent.

Formula: $\frac{\text{part}}{\text{whole}} = \frac{45}{150} = \frac{N\%}{100\%}$ $150N = (45)(100)$
 $150N = 4500$
 $N = 30\%$

4) EX: A salesman receives a 4% commission on everything he sells. In one week, the salesman sold \$ 5000 worth of goods. What is his commission?

Formula: $\frac{\text{commission(part)}}{\text{total sales}} = \frac{N}{\$5000} = \frac{4\%}{100\%}$ $100N = (4)(5000)$
 $100N = 20000$
 $N = \$200$

Now you try it. Solve the following percent word problems. Round to the tenth when necessary.

123. Joyce is a real estate salesperson. She just sold 2 houses for a total of \$550,000. She receives a 5% commission. What is her commission for the sale of the houses?
124. The speed limit on a particular highway is 65 miles per hour. Jack received a speeding ticket. He was driving at 140% of the speed limit. How fast was he driving?
125. George had just won the lottery. He had \$ 1,200,000 in the bank. In the space of three weeks, he had spent \$720,000. What percent of his money did he spend?
126. A local college has 4200 students. 40% of the students are male. How many students are female?

ANSWERS

$$123. N / \$550,000 = 5\% / 100\% \\ N = \$27,500$$

$$124. N / 65 = 140\% / 100\% \\ N = 91 \text{ mph}$$

$$125. \frac{\$720,000}{\$1,200,000} = \frac{N}{100\%} \\ N = 60\%$$

$$126. N / 4200 = 60\% / 100\% \\ N = 2520 \text{ women}$$

Reading Overview

The Reading Comprehension section of ACCUPLACER contains multiple choice questions that fall into two categories:

1. A reading passage followed by a question based on the text. Both short and long passages are provided.
2. Two sentences followed by a question about the relationship between these two sentences.

Testing Tips

- Do not rush. Take your time and make sure you understand what you are reading.
- Read carefully. Sometimes one word in the passage can change the entire meaning.
- Double check your answer before clicking the submit button.
- Understand what the test question is asking about the passage before attempting to answer the question. In many cases, reviewing the passage before answering will help.

Practice Questions

Six skills prepare students to become better readers and for college-level courses:

1. Recognizing main ideas
2. Identifying supporting details
3. Recognizing implied main ideas and the central point
 - a. Understanding relationships that involve additional information and time
4. Understanding relationships that involve illustration, comparison or contrast, and cause and effect
5. Understanding purpose and tone

Main Idea

In order to become a better and faster reader, recognizing the main idea is the most important skill you can develop.

Think of the **main idea** as an umbrella—that is, it is the author’s primary point about a topic. All other material in the paragraph fits under the main idea. In a paragraph, authors often present the main idea to readers in a single sentence called the **topic sentence**.

Consider this example:

TV violence does affect people in negative ways. Frequent TV watchers are more fearful and suspicious of others. Habitual TV watchers are less upset about real-life violence than non-TV watchers. TV violence increases aggressive behavior in children.

The **main idea** of this passage: TV violence.

The **topic sentence**: TV Violence does affect people in negative ways

Supporting Details

Supporting details are reasons, examples, steps, or other kinds of factual evidence that authors use to explain a main idea.

Consider this example:

Main idea: Our government should phase out the penny in the economy.

Supporting detail 1: Pennies take up more space than they are worth.

Supporting detail 2: Pennies are a nuisance to the business community.

Supporting detail 3: Pennies cost the nation as a whole.

In this case the supporting details give reasons to support the main idea—that is, the supporting details explain why our government should phase out the penny.

Recognizing Implied and Stated Ideas

Sometimes a selection lacks a topic sentence, but that does not mean it lacks a main idea. The author has simply decided to let the details of the selection suggest the main idea. You must figure out what that implied main idea is by reading all of these details and then deciding what they have in common or how they relate to each other.

Passages that imply an idea give supporting details first. The reader must make an educated guess in order to understand the main idea. In these sorts of passages, the

main idea is the general statement that all of the details make when they are considered as a whole. The main idea must be general enough that **all** of the details fit into it.

Consider this example:

1. The smaller a group is the more opportunities we have to get to know other people well and to establish close ties with them.
2. Two-person groups are the setting for many of our most intense and influential relationships.
3. In three-person groups, coalitions become possible, with two members joining force against a third member.
4. Five-person groups are large enough so that people feel they can express their emotions freely and even risk antagonizing one another, yet they are small enough so that members show regard for one another's feelings and needs.

Which statement best expresses the unstated main idea of the above sentences?

- a. Two-person groups are an important part of our lives.
- b. A five-person group is better than a two-person group.
- c. The number of people in a group affects relationships within the group.
- d. Groups play a central part in every human institution—that is, within the family, the workplace, and the government.

Explanation:

- a. Answer a is too narrow to be the implied idea. It is based on only one of the four supporting details.
- b. Answer b covers only statements 2 and 4; therefore it is too narrow to be the implied main idea. In addition, it is a conclusion that is not based on the given facts, which say nothing about one group always being better than another.
- c. Answer c is a general statement about the number of people in a group and how that number affects a group. It is illustrated by all four of the supporting details. **So answer c is the implied main idea.**
- d. Answer **d** is true, but it is not what the supporting details are about. The supporting details do not address the part that groups play in society.

If you have trouble focusing in on an implied main idea, remember that finding the topic may help. For instance, you probably soon realized that the topic of the supporting ideas above is the number of people in a group. Then you could have asked yourself, "What are the supporting details saying about the number of people in a group?" As you

thought about the four statements, you would try to find a point about the number of people in a group that is general enough to cover all of the specific details.

Transitions and Patterns of Organizations

To help readers understand the main points, authors use two common methods to show relationships among ideas and to make ideas clear. These two methods are **transitions** and **patterns of organization**.

Transitions are words or phrases that show relationships between ideas.

Five types of transition words:

1. Additional information
2. Contrast
3. Exception
4. Time
5. Sequence

Additional information words

These words add another point to the discussion. Writers present one or more ideas that continue along the same line of thought as a previous idea.

Additional information words include: furthermore, additionally, next, in addition, etc.

Contrast words

These words show differences between two or more items being compared.

Contrast words include: on the other hand, in contrast, despite, although, though, even though.

Exception words

These words point out an unusual or unique feature of one item that is otherwise part of the same main category.

Exception words include: however, nevertheless, nonetheless, with the exception of, in the case of.

Time words

These words provide chronological organization to writing.

Time words include: later, during a specific time period such as a decade, a year, a month, a week, or a century such as the 90.s, the nineteenth century.

Sequential words

These words provide step-by-step organization to writing.

Sequential words include: next, first, second, then, after, before.

Understanding Relationships that Involve Examples, Compare or Contrast, and Cause and Effect

Examples (Illustrations) are used to clarify ideas. Writers often use examples and illustrations to demonstrate the point they are trying to make. These examples are often introduced with phrases such as “for example” or “for instance.”

Which of these two statements is easier to understand?

1. Even very young children can do household chores. They can run a duster along baseboards or fold napkins for dinner.
2. Even very young children can do household chores. For instance, they can run a duster along baseboards or fold napkins for dinner.

The second item is easier to understand because the phrase "For instance" tells the reader that there is a relationship between the first and second sentence. The second sentence offers an example of the point the author makes in the first sentence.

Compare or Contrast

Comparison shows similarities. Contrast shows differences. Writers often use comparison and contrast together as a way of explaining and or analyzing the relationship between and among items, ideas, or people.

Consider the relationship among these sentences as an example of how comparison and contrast can be used together and notice the role that the underlined transitional words play in making this relationship clear to the reader:

1. Advertising is part of the strategy manufacturers use to sell their products.
2. Manufacturers use advertising as a way to advertise established products as well as new products.
3. New products are generally advertised differently from established products.
4. New products are often introduced with "informational" advertising telling what the products are, why they are needed, and where they are available.
5. Established products on the other hand can rely on "reminder"

advertisements, which provide little hard information about the product.

The first sentence gives the general, or main, idea. The second sentence uses "as well as" to signal that the writer is showing a similarity between the way new and established products are advertised. The word "differently" in the third sentence and "on the other hand" in the fifth sentence show that the writer is also showing differences in the way these two types of products are advertised.

Cause and Effect

Information that falls into a cause-effect pattern addresses the question "Why does an event happen?" and "What are the results of an event?" Often authors try to tell readers about events in a way that explains both what happened and why.

Consider how this passage reflects the relationship between cause and effect:

In 1970 about sixty small and medium-sized factories in the United States adopted a four-day workweek. According to the plan, workers worked forty hours but instead of the usual five-day week, they now worked only four days. Workers were enthusiastic about the three-day weekly vacation. According to management, productivity has increased about 18% since the inception of the new plan. Absenteeism has dropped by 69% and lateness is almost non-existent.

What are the effects being discussed in this passage?

- A) Shorter work weeks
- B) Sixty small and medium-sized factories decided to try the four-day work week
- C) The seventies were a time of change
- D) Increased productivity and decreases in absenteeism and tardiness

Explanation:

1. Answer A gives the topic of the passage but does not discuss cause or effect.
2. Answer B explains who was involved in this experiment, but does not show a cause/effect relationship.
3. Answer C is true, but is not discussed in this passage.
4. Answer **D** explains the results of the four-day workweek (correct answer).

Tone

A writer's tone reveals the attitude he or she has toward a subject. Tone is expressed

through the words and details the author selects. Just as a speaker's voice can project a range of feelings, a writer's voice can project one or more tones or feelings: anger, sympathy, hopefulness, sadness, respect, dislike, and so on. Understanding tone is an important part of understanding the meaning of a passage.

To illustrate the differences a writer can express in tone, consider the following comments made by workers in a fast food restaurant.

"I hate this job. The customers are rude, the managers are idiots, and the food smells like dog chow." (Tone: bitter, angry)

"I have no doubt skipping class and video games will prepare me for a top position on Wall Street." (Tone: mocking, sarcastic)

"I love working at Chicken Barn. I meet interesting people, earn extra money, and get to eat all the chicken nuggets I want when I go on break." (Tone: enthusiastic, positive)

Words that express tone reflect a feeling or judgment. Some words that describe tone include: amused, angry, ashamed, praising, and excited.

PRACTICE QUESTIONS

Answer each of the following 20 questions. To review the questions you answered incorrectly, to the reading strategies area that is in parentheses following the correct answers on the Answer Key.

1. Read the statements below and then choose the best answer from the list of choices.

Sometimes when we don't get enough sleep we become very short-tempered.

It is important to set a time to go to bed that is realistic.

How are these two sentences related?

- A) The first sentence explains the meaning of the second.
- B) The second sentence explains why a lack of sleep affects us.
- C) The second sentence contradicts the first.
- D) The second sentence proposes a solution.

2. Read the statements below and then choose the best answer to the question from the list of lettered choices that follows.

Most people collect *Star Wars* toys for sentimental reasons.
Some people collect them strictly to make money.

What is the relationship between the two sentences?

- A) Cause and effect
- B) Contrast
- C) Repetition
- D) Statement and example

3. Read the passage and then answer the question based on what is stated or implied.

There are two kinds of jewelry that I do. There is commercial jewelry - class rings, necklaces, the kinds of things most people wear. I sell these items to meet my expenses for raw materials, supplies, and to make my living. The other, more creative work I do makes me feel that I am developing as a craftsperson.

The author of this passage implies that:

- A. artists are poor.
- B. there is no market for creative work.
- C. rings and necklaces can not be creative.
- D. commercial and creative work fulfills different needs for the artist.

4. Read the statements below and then choose the best answer to the question from the list of lettered choices that follows.

Jenny does not like cake.

She does not like to bake it, ice it, or eat it.

What does the second sentence do?

- A) It states the cause of the first.
- B) It provides supporting details.
- C) It compares the three things Jenny does not like about cake.
- D) It draws a conclusion about Jenny.

5. Read the sentences below and then choose the best answer to the question from the list of lettered choices that follows.

When we write a check that we know is going to "bounce," we are in fact performing a criminal act.

It is a crime to knowingly write a "bad" check, one we know we don't have sufficient funds to cover.

What does the second statement do?

- A) It provides supporting evidence for the first statement.
- B) It draws a conclusion from the first sentence.
- C) It restates the central idea of the first sentence.
- D) It provides a contradictory point of view.

6. Read the passage below and then choose the best answer to the question from the list of lettered choices that follows.

SCUBA diving is the most exhilarating experience I have ever had. The first time I went, the dark mirror of the water beckoned me to drop from the side of the boat. I jumped feet first and entered a brightly colored world populated with fish, plants, and objects I had never dreamed of.

Which of the following best describes the mood of the author after having this experience?

- A) Bored
- B) Anxious
- C) Excited
- D) Serene

7. Read the passage below and then choose the best answer to the question from the list.

Huge beasts such as the dinosaur have never really become extinct. Mothra, a giant caterpillar who later becomes a moth, destroys Tokyo, and stars in the 1962 Japanese film named for him. Mothra is born, dies, and reborn regularly on classic movie channels. In Japan, Mothra is one of the most popular films ever made. Mothra has survived the creation of more current scary creatures such as giant apes, extraterrestrial beings and swamp creatures. More than 30 years after his creation, Mothra still lives.

The main subject of the passage is:

- A) the reasons that fads do not endure.
- B) the lasting appeal of Mothra.
- C) the difficulty of marketing good horror movies.
- D) old models for creatures are still used because making new monsters is expensive.

8. The two sentences below are followed by a question or statement. Read the sentences and then choose the best answer to the question or the best completion of the statement.

Anxious to ensure that America would depart from European traditions regarding religion and royalty, the early U.S. could be described as a place that focused more on work than on the entertainment offered by spectacle and ceremony in the Old World.

However, national celebrations such as the lighting of the White House Christmas Tree and the ceremonies used to swear in new federal officials give the American people some experiences that are based upon national tradition.

What does the second sentence do?

- A) It cancels the meaning of the first sentence
- B) It provides an example of the first sentence.
- C) It adds more detail to the first sentence.
- D) It offers an exception to the information given in the first sentence.

9. Two sentences below are followed by a question or a statement. Read the sentences, and then choose the best answer to the question or the best completion of the statement.

Public speaking is very different from everyday conversation.

First of all, speeches are much more structured than a typical informal discussion.

How are these sentences related?

- A) Sentence two offers support for the statement made in the first sentence.
- B) Sentence two contradicts the statement made in the first sentence.
- C) Sentence two shows an exception to the first sentence.
- D) Sentence two compares two kinds of speeches.

10. Read the passages below and then choose the best answer to the question. Answer the question on the basis of what is stated or implied in these passages.

Many people who have come close to death from drowning, cardiac arrest, or other causes have described near-death experiences—profound, subjective events that sometimes result in dramatic changes in values, beliefs, behavior, and attitudes toward life and death. These experiences often include a new clarity of thinking, a feeling of well being, a sense of being out of the body, and visions of bright light or mystical encounters. Such experiences have been reported by an estimated 30 to 40 percent of hospital patients who were revived after coming close to death and about 5 percent of adult Americans in a nationwide poll. Near-death experiences have been explained as a response to a perceived threat of death (a psychological theory); as a result of biological states that accompany the process of dying (a physiological theory); and as a foretaste of an actual state of bliss after death (a transcendental theory).

The primary purpose of this passage is to:

- A) entertain
- B) persuade
- C) inform
- D) express disbelief in the afterlife

ANSWERS

Review the questions you missed in the Reading Strategies sections indicated in parentheses following the correct answer.

1. D (Cause/Effect)
2. B (Comparison/Contrast)
3. D (Implied and Stated Ideas)
4. B (Supporting Details)
5. C (Main Idea)
6. C (Tone)
7. B (Main Idea)
8. D (Exception)
9. A (Supporting Details)
10. C (Main Idea)

Sentence Skills Overview

The *Sentence Skills* section of ACCUPLACER contains 20 multiple choice questions that fall into two categories:

1.) Sentence Correction

These questions ask you to choose the most appropriate word or phrase to substitute for the underlined portion of the sentence.

Example: Ms. Rose planning to teach a course in biology next summer.

Select the best version of the underlined part of the sentence above.

- A). planning
- B). are planning
- C). with a plan
- D). plans

The correct answer is **d**. The sentence should be: **Ms. Rose plans to teach a course in biology next summer.**

2.) Revision

These questions require you to rewrite a sentence according to the criteria shown. The revised sentence must maintain the same meaning as the original sentence.

Example: Being a female jockey, she was often interviewed.

Rewrite the sentence, beginning with:

She was often interviewed...

The next words should be:

- A) on account of she was a female jockey.
- B) by her being a female jockey.
- C) because she was a female jockey.
- D) being as she was a female jockey.

The correct answer is **c**. The sentence should be: **She was often interviewed because she was a female jockey.**

Testing Tips

- Familiarize yourself with basic grammar rules.
- Reread the sentence with the answer you chose to make sure it sounds correct.
- Utilize scratch paper to write the sentence out.
- Remember: Answer the question using proper grammar and English language skills, not how YOU would necessarily write or speak informally.

PRACTICE QUESTIONS

Questions on the test may ask you to rewrite sentences, as shown below. You will be told what changes your new sentence should contain. Your new sentence should be grammatically correct and have essentially the same meaning as the original.

1. *Writing a best seller had earned the author a sum of money and had freed her from the necessity of selling her pen for the political purposes of others.*

Rewrite, beginning with

The author was not obliged to sell her pen for the political purposes of others...

The new sentence will include

- A) consequently she earned a sum of money by writing a best seller.
- B) because she had earned a sum of money by writing a best seller.
- C) by earning a sum of money by writing a best seller.
- D) as a means of earning a sum of money by writing a best seller.

Analysis of #1: In order to rewrite the sentence you must first look at the meaning of the original sentence: What was the author "obliged" to do? The sentence says he was *faced with "the necessity of selling his pen," etc.* Therefore, this necessity was his obligation.

To retain this main idea, your new sentence must begin with "The author was not obliged to sell her pen for the political purposes of others..." But you must now complete the sentence to explain **why** she was not so obliged.

To do so, test all four options (A - D) to see which fits your main clause best in both grammar and meaning. Write your options out! Don't just jump at the first version you think sounds good.

A. The author was not obliged to sell her pen for the political purposes of others [consequently she earned] a sum of money by writing a best seller.

Note: This sentence makes little sense because her earning the money is not a consequence of her lack of obligation but rather the cause of it. Besides, the structure creates a run-on sentence, which is grammatically incorrect.

B. The author was not obliged to sell her pen for the political purposes of others [because she had earned] a sum of money by writing a best seller.

This version makes more sense because earning the money is in fact the cause of his not needing to sell his pen, and the sentence is grammatically correct.

C. The author was not obliged to sell her pen for the political purposes of others [by earning] a sum of money by writing a best seller.

At first glance, this sentence may seem to make sense, but "was not obliged...by earning" makes little sense and only clumsily conveys the idea.

D. The author was not obliged to sell her pen for the political purposes of others [as a means of earning] a sum of money by writing a best seller.

This sentence also makes no sense because not selling her pen is not a means of earning money but rather a result of such earning.

Therefore, of the four choices, **B** is clearly the best.

2. Rewrite the underlined portion of this sentence using one of the following answers.

Jose wanted to study he tried to keep his roommates quiet; but he did not succeed.

- A) Jose wanted to study he tried to keep
- B) Jose wanted to study, he tried to keep
- C) Because he wanted to study, Jose tried to keep
- D) Jose wanting to study, and trying to keep

Analysis of #2: This question requires you to examine four versions of the same sentence to determine which one is grammatically correct.

A. Jose wanted to study he tried to keep his roommates quiet; but he did not succeed.

This version contains two complete sentences (independent clauses) without proper punctuation. Therefore, version A is a run-on sentence, which is not correct.

B. Jose wanted to study, he tried to keep his roommates quiet; but he did not succeed.

This version separated two sentences (independent clauses) with only a comma, creating a comma splice, which is grammatically incorrect.

C. Because he wanted to study, Jose tried to keep to keep his roommates quiet; but he did not succeed.

In this version, the opening clause has been changed from an independent (main) clause to a dependent (subordinate) clause. Therefore, we no longer see two complete sentences strung together incorrectly. The "Because" clause (the subordinate clause) is correctly separated from the main clause by a comma, so this version of the sentence is correct.

D. Jose wanting to study, and trying to keep his roommates quiet; but he did not succeed.

In this version, the past tense verbs "wanted" and "tried" have been changed to -ing verbs. But "wanting" and "trying" by themselves do not create a definite time frame for the actions. The word "trying" could be taken to mean "is trying," "was trying," "has been trying," "will be trying," etc. Each of these verb structures indicates a different time frame. So, an -ing verb form by itself is not a COMPLETE verb; it requires a helping verb to fix the time of the action. Therefore, the verb structures in version D are incomplete, and the sentence is thus a fragment and thereby incorrect.

Therefore, version **C** is the only correct choice here.

Additional Practice Questions

3. *In the modern world, groups of people living thousands of miles apart may still be dependent on each other politically, culturally, and economically.*

Change people living to people may live.

Your new sentence will include

- A) apart and still be dependent
- B) apart so as to be dependent still
- C) apart, they are still dependent
- D) apart, but would still be dependent

4. *Predictions twenty years ago that the phonograph record was about to become obsolete have proven to be true.*

- A) Predictions twenty years ago that

- B) Predictions twenty years ago,
- C) Twenty years ago, predictions that
- D) Predictions, twenty years ago

5. When you move out of an apartment before the contract expires, this is an example of breaking a lease.

- A) When you move out of an apartment before the contract expires, this
- B) You move out of an apartment before the contract expires, this
- C) Moving out of an apartment before the contract expires
- D) The fact that you move out of an apartment before the contract expires

6. *Knocked to his knees, the quarterback looked as if he were in pain.*

- A) Knocked to his knees, the quarterback looked
- B) The quarterback was knocked to his knees, looked
- C) The quarterback looked knocked to his knees
- D) The quarterback, looking knocked to his knees,

7. *Yesterday the President announced that he would retire from political life, to amazed reporters.*

- A) Yesterday the President announced that he would retire from political life, to amazed reporters.
- B) Yesterday the President announced that he would retire from political life, amazing reporters.
- C) The President, to the amazement of reporters, announced that he would retire from political life yesterday.
- D) Yesterday the President announced to amazed reporters that he would retire from political life.

ANSWERS

- 1. B
- 2. C
- 3. A
- 4. A
- 5. C
- 6. A
- 7. D

Tips for Writing the ACCUPLACER Essay

Before you begin to write

- **Read the question carefully.** Read the question and determine the topic: Is it asking about a book, an event, an idea? What are you being asked to do with this topic? Discuss it? Contrast it with something? Agree or disagree with the topic?

The following words are commonly found in essay test questions. Understanding them is essential to performing well on the ACCUPLACER essay exam. If you know these words backwards and forwards, you will improve your chances for successfully answering the question in an essay format.

- **ANALYZE:** Break into separate parts and discuss, examine, or interpret each part.
- **COMPARE:** Examine two or more things. Identify similarities and differences. Comparisons generally ask for similarities more than differences. (See Contrast.)
- **CONTRAST:** Show differences. Set in opposition.
- **CRITICIZE:** Make judgments. Evaluate comparative worth. Criticism often involves analysis.
- **DEFINE:** Give the meaning; usually a meaning specific to the course of subject. Determine the precise limits of the term to be defined. Explain the exact meaning. Definitions are usually short.
- **DESCRIBE:** Give a detailed account. Make a picture with words. List characteristics, qualities and parts.
- **DISCUSS:** Consider and debate or argue the pros and cons of an issue. Write about any conflict. Compare and contrast.
- **ENUMERATE:** List several ideas, aspects, events, things, qualities, reasons, etc.
- **EVALUATE:** Give your opinion or cite the opinion of an expert. Include evidence to support the evaluation.

- **ILLUSTRATE:** Give concrete examples. Explain clearly by using comparisons or examples.
 - **INTERPRET:** Comment upon, give examples, describe relationships. Explain the meaning. Describe, then evaluate.
 - **OUTLINE:** Describe main ideas, characteristics, or events. (Does not necessarily mean *write a Roman numeral/letter outline*.)
 - **PROVE:** Support with facts (especially facts presented in class or in the test).
 - **STATE:** Explain precisely.
 - **SUMMARIZE:** Give a brief, condensed account. Include conclusions. Avoid unnecessary details.
 - **TRACE:** Show the order of events or progress of a subject or event.
- **Formulate an answer to this question.** After you determine what the question is asking you, brainstorm, freewrite or bubble map notes to generate ideas for your answer.
 - **Stop and take a breath.** Read over your ideas and ask yourself which ones directly address the question or essay prompt. Throw out whatever is irrelevant to the task at hand no matter how much you love it or think you need to add it. Keep only the relevant information.
 - **Now make a very brief (very rapid) outline.** What is your thesis? What will you argue? Remember that your thesis is your promise to the reader: You are promising that by the end of this essay, you will have convinced the reader of such and such and nothing else. Once again, check to make sure the thesis responds directly and specifically to the question.
 - The Your thesis statement must be concise and well-written.
 - Your thesis goes in the introductory paragraph. Don't hide it; make it clearly asserted at the beginning of your paper.
 - Your thesis must make an argument. The key difference between an opinion statement and thesis statement is that a thesis statement tells the reader that the claim being stated has been thoroughly explored and is defensible by evidence. It answers the “what” question (what is the argument?) and it offers an answer to the “why” question (why is this argument the most persuasive?).

Examples of good thesis statements:

1. The ability to purchase television advertising is essential for any candidate's bid for election to the Senate because television reaches millions of people and thus has the ability to dramatically increase name recognition.
 2. The organizational structure of the United Nations, namely consensus voting in the security council, makes it incapable of preventing war between major powers.
- Create a list of the points you'll need to make to prove your thesis. Throw out any point that only shows off another bit of information you have in your head rather than builds the argument for your thesis. Each point should be in the form of an assertion, a mini-thesis and will serve as the topic-sentences for your body paragraphs.
 - Arrange these topic sentences in some sort of logical order rather in the order they have just occurred to you. What piece of information does the reader need first? Second? etc. Each point should build on the one that comes before and towards making the case for your thesis.

Writing the essay

- **Do not write a long introduction.** You don't want to take time away from the argument itself. Write a sentence or two to introduce the problem being addressed, transition to your thesis, state your thesis, and then stop.
- **Use examples.** As you work your way through your body paragraphs—as specified in your brief outline—remember that each claim or point you make needs an example as evidence. Your position means very little if you haven't supported it with proof. So specific, concrete evidence is crucial. If you are arguing that a character in a novel is greedy, don't simply assert that she is greedy. Give the reader an example from the plot that illustrates her nature and then explain how her behavior can be understood/interpreted as greedy.
- **Do not write a long conclusion.** You have just finished expressing your ideas, but you need to tie everything together in a tidy package for the reader. Write two to three sentences that summarizes your thesis and main points.

Reviewing the essay

- **Edit essay.** Always try to leave yourself a few minutes at the end to look over your essay. It should be clear, logical, grammatically correct, and easy to read. Make sure it is as close to error-free as possible. The steps outlined here aren't much different from the ones you'll use to write the ACCUPLACER essay.

Additional Resources

General Websites

www.studyguidezone.com/ACCUPLACERtest.htm

www.testprepreview.com/ACCUPLACER_practice.htm

www.collegeboard.com/student/testing/ACCUPLACER/

www.google.com - in the search box, type “ACCUPLACER practice”

www.amazon.com - in the search box, type “ACCUPLACER”

www.sparknotes.com

www.cliffsnotes.com

Reading/Grammar Websites

www.chompchomp.com

www.dailygrammar.com

www.grammar-monster.com

Basic Math/Algebra Websites

ncc.mymathtest.com

www.purplemath.com

www.math.com

www.mathmax.com

www.algebrahelp.com

www.mathgoodies.com

Books/Study Guides (available at libraries and major bookstores)

SAT/ACT/GED study guides (publishers such as Kaplan, Princeton Review, CollegeBoard, Barron, McGraw-Hill)

Cliffs Quick Review book

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- College Board ACCUPLACER (2007). ACCUPLACER sample questions for students. [PDF document]. Retrieved from <http://professionals.collegeboard.com/profdownload/accuplacer-sample-questions-for-students.pdf>
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