

ACCUPLACER MATH REVIEW

This review is designed to refresh mathematics concepts in preparation for the ACCUPLACER exam. Please contact the Pike's Peak Community College Learning Assistance Center with comments or questions. You can access our website for information regarding all FREE onsite and online services.

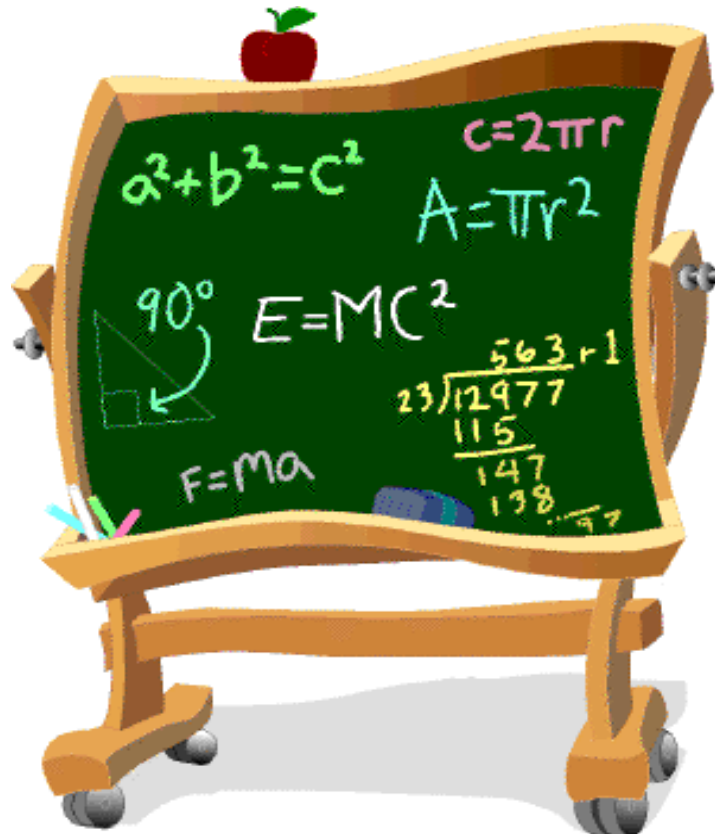
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ARITHMETIC

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

Type 1: Operations with whole numbers and fractions

Whole Numbers:

1. $562 + 24 =$

2. $1085 - 641 =$

3. $86 \times 42 =$

4. $736 \div 23 =$

Remember! When adding, subtracting or multiplying whole numbers line them up vertically with the biggest number on top.

$$\begin{array}{r} \text{quotient} \\ \text{divisor} \overline{\hspace{1cm}} \text{dividend} \end{array}$$

Fractions:

5. What is a fraction?

To Add or Subtract Fractions

Fractions must have a common denominator

Step 1. Find a common denominator

Step 2. Build equivalent fractions using the new common denominator

Step 3. Add or subtract the numerators and keep the denominator the same

Step 4. Reduce to simplest form

6. $\frac{1}{2} + \frac{2}{5} =$

7. $\frac{5}{9} - \frac{2}{3} =$

To multiply fractions

Step 1. Multiply directly across

Step 2. Reduce to simplest form

8. $\frac{1}{8} * \frac{4}{9} =$

To Divide Fractions

Step 1. Multiply first fraction by the reciprocal of the second fraction

Step 2. Reduce to simplest form

9. $\frac{4}{5} \div \frac{10}{12} =$

Trick! With fractions, when trying to divide, flip the second fraction and multiply!

Remember! Copy Dot Flip

Type 2: Operations with decimals and percent

Decimals:

To Add or Subtract Decimals

- Step 1. Write terms vertically, lining up the decimal points
- Step 2. Fill in with place holding zeros when necessary
- Step 3. Add or subtract
- Step 4. Bring the decimal point down into the answer

10. $0.376 + 548.1 + 60$

11. $9.712 - 2.6$

Remember! For any whole number the decimal point is understood to be to the right of the last digit.

To Multiply Decimals

- Step 1. Multiply numbers the same way you would whole numbers
- Step 2. Count total number of decimal places in each factor
- Step 3. Adjust answer to have same number of decimal places as counted in Step 2

12. 97.6×0.021

13. 89.619×0.3

To Divide Decimals

- Step 1. Change divisor to a whole number by moving decimal point of divisor
- Step 2. Move decimal point of dividend the same number of places to the right that the decimal in the divisor moved
- Step 3. Divide as you would whole numbers
- Step 4. Move decimal point up into answer

14. $5.4 \div 0.08$

15. $1.296 \div 0.27$

$$\frac{\text{quotient}}{\text{divisor} \sqrt{\text{dividend}}}$$

A ratio is the quotient of two numbers or quantities and is often written as a fraction.

16. Find the ratio of the length to the width of a regulation size basketball court.



A proportion is a mathematical statement that two ratios are equal. Use cross products to determine proportions.

17. Determine if the following is a proportion:

$$\frac{9}{36} = \frac{2}{8}$$

Remember!

$$\text{If } \frac{a}{b} = \frac{c}{d},$$

$$\text{then } ad = bc$$

Percent:

18. What does percent mean?

To write a percent as a decimal, divide by 100.

19. Write 73% as a decimal.

Trick! To divide by 100
move the decimal two
places to the left.

To write a decimal as a percent, multiply by 100.

20. Write 0.25 as a percent.

Trick! To multiply by 100
move the decimal two
places to the right.

To write a percent as a fraction, divide by 100 and reduce the fraction.

21. Write 56% as a fraction.

To calculate the percent of a number, convert the percent to a decimal and multiply.

22. Find 9% of 50.

Trick! To find the percent of a number, find 1% and multiply by percent looking for.

Type 3: Applications and problem solving

23. There are 338 students in the senior class. Of these students, 26 are entering the military after graduation. What fraction of the senior class is entering the military after graduation?

24. If 21 of the 76 members of the track team are seniors, what percent of the team, rounded to the nearest tenth, is made up of seniors?

25. The current balance of Justin's checking account is \$328. If Justin deposits a check for \$57.19 and deposits \$28.93 in cash, what is his new balance?

26. A model of a house is 12 inches wide. If it was built with a scale of 2 inches = 5 feet, then how wide is the actual house?

27. A rectangle has a perimeter of 18 meters and a length of 7 meters. What is the width?

28. Micah spends 24% of his weekly earnings, or \$45, on gasoline for his car. How much does Micah earn each week?

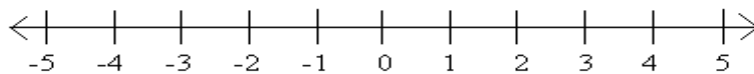
Notes:

ELEMENTARY ALGEBRA

A total of 12 questions of three types are administered in this test.

Type 1: Operations with integers and rational numbers

These include computation with integers and negative rationals, the use of absolute values, and ordering.



Absolute Value:

29. What is an absolute value?

30. $|6|$

31. $|-6|$

Integers:

32. What is an integer?

To add integers with the same sign

Step 1. Add their absolute values

Step 2. Use common sign as sign of sum

33. $17 + 3 =$

34. $-8 + (-4) =$

To add integers with different signs

Step 1. Find the absolute value of each

Step 2. Subtract the smaller absolute value from the larger

Step 3. Use sign of the number with larger absolute value as sign of the difference

35. $24 + (-10) =$

36. $-45 + 85 =$

Trick! When adding and subtracting integers it helps to think of money; addition is a credit and subtraction is a debit.

To subtract integers

Subtraction can be written as addition
so rules stay the same as with addition of integers

37. $16 - 19 =$

38. $-3 - 22 =$

39. $\frac{1}{3} - \frac{4}{9} =$

Multiplying and dividing integers

40. $2(-5) =$

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

42. $-56 \div -4 =$

43. $280 \div -40 =$

Remember! When multiplying or dividing integers, two numbers with the same sign give a positive answer and two numbers with different signs give a negative answer.

$(+)(+) = (+)$ or $(-)(-) = (+)$

$(+)(-) = (-)$ or $(-)(+) = (-)$

Type 2: Operations with algebraic expressions

The second type involves operations with algebraic expressions using evaluation of simple formulas and expressions, and adding and subtracting monomials and polynomials. Questions involve multiplying and dividing monomials and polynomials, the evaluation of positive rational roots and exponents, simplifying algebraic fractions, and factoring.

Exponents:

44. What is an exponent?

45. $3^4 =$

46. $12^2 =$

47. Write $4*4*4*3*3$ as an exponent and solve.

Remember!

$$A^b$$

A is the base, b is the exponent.

A is being multiplied by itself b times.

Square Roots:

48. $\sqrt{9} =$

49. $\sqrt{36} =$

50. $\sqrt{\frac{49}{144}} =$

Trick! Calculating a square root is like doing the reverse of an exponent.

Positive Rational Roots:

51. $\sqrt{3} * \sqrt{12} =$

52. $\sqrt[3]{8x^4} =$

Order of Operations:

PARENTHESSES
EXONENTS
MULTIPLY
DIVIDE
ADD
SUBTRACT

53. $5^2 * (10 - 8) + 2^3 =$

54. $[40 + (8 - 2)] - 2^5 =$

55. $\frac{2 + 4^2}{5(20 - 16) - 3^2 - 5} =$

Remember! The division bar implies grouping. The numerator and denominator are separate groups.

Algebraic Expressions:

56. $4x - 7x + 4$

57. $x + \frac{1}{2}y - \frac{3}{8}y$

58. $4a^2 - 3ab + 6ab + b^2$

59. $\frac{1}{4}(2x + 12)$

Trick! To simplify polynomial expressions combine like terms.

$$60. (5x^2 - 9x - 3) + (-3x^2 - 4x + 6)$$

$$61. (5w^3 + 2w - 4) + (2w^2 - 6w - 3)$$

$$62. (9x^2 + 7x - 5) - (3x^2 + 4)$$

$$63. (6m^3n^4)(n^5)$$

$$64. -c^2(-3c^2 + 5b - 6)$$

$$65. (3d - 5)(4d - 1)$$

$$66. (2z + 3)^3$$

$$67. \frac{(x^2 - 16)}{(x + 4)}$$

Factoring:

$$68. x^3 - 4x^2 + 3x$$

$$69. p^2 - 6p + 9$$

$$70. 3b(a - 2) - 4(a - 2)$$

Remember! When subtracting polynomials be sure to distribute the minus sign throughout the second polynomial.

Remember! When multiplying 2 binomials use FOIL.

FOIL: First, Outer, Inner, Last

Remember! Factoring is a way to break down an expression into parts by separating common terms.

Type 3: Translating written phrases into algebraic expressions

The third type of question involves translating written phrases into algebraic expressions and solving equations, inequalities, word problems, linear equations and inequalities, quadratic equations (by factoring), and verbal problems presented in an algebraic context.

Translating Written Phrases:

71. A passenger train traveled at a speed of 80 miles per hour. Write an algebraic expression to represent the number of miles the train traveled in x hours.
72. Elsa purchased 8 shirts and received a 15% discount. She also paid \$6.45 in taxes on her purchase. Write an algebraic expression to represent the total amount Elsa paid.

Solving Linear Equations:

73. $x + 9 = 52$

74. $-7x = 49$

75. $\frac{x}{3} - \frac{3x}{4} = \frac{1}{12}$

76. Solve for y in $4x + 3y = 20$

Remember! If you do it to one side of the equation you must do it to the other side of the equation.

Solving Linear Inequalities:

77. $-2x + 6 \leq -2$

78. $-3(-2x + 12) < -4(x + 2) - 6$

Remember!
Switch the
inequality sign
if multiplying
or dividing by
a negative.

Solving Quadratic Equations by Factoring:

79. Solve the proportion $\frac{4x}{5} = \frac{12}{3x}$

80. $3x^2 = 12x$

81. $x^2 + 10x + 28 = 4$

Application and Word Problems:

82. A rectangular yard has an area of 96 square feet. If the width of the yard is 4 feet less than the length, what is the perimeter, in feet, of the yard?

83. Carmen earned a score of 81 on her semester science test. She needs to have a total of 170 points from her semester and final tests to receive an A for the class. Write and solve an algebraic inequality to determine the score Carmen must earn on her final test to ensure that she gets an A.

84. Michael plays basketball 3 times as many hours as Bryan. Bryan plays basketball x hours a week. Together, they play a total of 12 hours. How many hours a week does Michael play basketball? Write an equation and solve.

85. A rectangular flowerbed has a length of 36 feet and a width of 77 feet. What is the diagonal length of the flowerbed?

Notes:

Glossary

Absolute value	The absolute value of a number, a , written as $ a $, is the distance between 0 and the number on a number line; the positive value of a number.
Addition Property of Equality	If the same number is added to both sides of an equation, the two sides remain equal.
Algebraic Expression	An expression that has one or more variables.
Algebraic Inequality	An inequality that has one or more variables and contains a least one of the following symbols: $<$, $>$, \leq , \geq
Area	The amount of space inside the boundary of a flat (2-dimensional) object such as a triangle or circle.
Base	The factor being multiplied together in an exponential expression; in the expression, a^b , a is the base.
Binomial	An algebraic expression with two unlike terms which is the sum of two monomials.
Circumference	The distance around a circle. $C = 2\pi r$
Coefficient	The number multiplied by a variable in an algebraic expression.
Commutative Property of Multiplication	In a multiplication problem, the product remains the same even if the order of the factors is changed.
Constant	A quantity that does not change.
Denominator	In a fraction, the bottom number, the number that is the whole. The divisor in the equivalent division equation related to a fraction.

Difference	The result of subtraction; in the equation $5 - 4 = 1$, 1 is the difference found when subtracting 4 from 5.
Distributive Property	When multiplying polynomials, multiply each term of the first factor by each term in the second factor: $(a + b)(c + d) = ac + ad + bc + bd$
Dividend	In a division problem, the number that is the whole divided in parts.
Divisor	In a division problem, the number that divides the dividend.
Dividing Out	Cancelling. Simplifying a rational expression by eliminating factors that the numerator and denominator have in common.+
Domain	The set of all possible input values.
Equation	A mathematical sentence that uses an equal sign (=) to show that two quantities are equal.
Equivalent	Equal to.
Exponent	The number of times a factor is being multiplied together in an exponential expression; in the expression, a^b , b is the exponent. Shorthand notation for repeated multiplication when the same number is a factor multiple times.
Expression	A symbol or combination of symbols representing a value or relation.
Factor	A value being multiplied; in the equation: $7 * 8 = 56$, 7 and 8 are the factors whose product is 56.
Factoring	To rewrite an expression as an equivalent expression that is a product.
Fraction	Describes parts of a whole. See also rational number.

Greatest Common**Factor (GCF)**

In algebra, the greatest monomial that is a factor of all the terms in a polynomial or algebraic expression.

Index

The small number n in the left part of the radical sign. $\sqrt[n]{x}$

Inequality

A mathematical sentence that shows the relationship between quantities that are not equivalent.

Integer

The set of positive whole numbers, negative whole numbers, and 0; can be located as a point on a number line.

Inverse Operation

Pairs of opposite operations that undo each other; addition and subtraction are inverse operations; and multiplication and division are inverse operations.

Isolate

Steps taken to get the variable alone on one side of an equation.

Like Terms

Terms that contain the same variables raised to the same power.

Linear Equation

An equation that can be written in the form $ax + b = c$. The solution of a linear equation is a straight line.

Monomial

An expression that contains only one term, such as $4x$ or $6bc$.

Negative Exponent

An exponent with a negative sign in front of it; indicates how many times to divide by a number.

Negative Number

any number to the left of 0 on the number line.

Numerator

In a fraction, the top number, the number that is the part of the whole. The dividend in the equivalent division equation related to a fraction.

Opposite of a Number

One of two numbers that are the same distance from 0 on a number line but on opposite sides of 0.

Order of Operations	The order in which expressions are evaluated from left to right (parentheses, exponents, multiplication and division, and addition and subtraction – PEMDAS).
Percent	Percent means out of 100; one part in every hundred. The symbol % equals $1/100$ or 0.01.
Perfect Square	A number whose square root is a whole number.
Perimeter	The continuous line forming the boundary of a closed geometric figure; the sum of the lengths of the sides of a figure.
Polynomial	An expression consisting of the sum of two or more terms, such as $6x^2 + 5x + 4$
Positive Number	Any number to the right of 0 on the number line.
Power	The exponent of an expression.
Prime Factor	A prime number that evenly divides a number without any remainders.
Prime Number	A number divisible only by itself and 1.
Product	the result of multiplication; in the equation $5 * 4 = 20$, 20 is the product of the two factors 5 and 4.
Proportion	A mathematical statement that two ratios are equal.
Quadratic Equation	An equation of degree 2, with two solutions at most.
Quotient	The result of division; in the equation $20 \div 5 = 4$, 4 is the quotient when 20 is divided by 5.
Radical Sign	A sign that indicates to take the root of a number.
Radicand	The expression under the radical sign.
Ratio	The quotient of two numbers or quantities that is often written as a fraction.

Rational Number	A number that can be written in the form $\frac{a}{b}$, where a and b are integers and b is not equal to 0; can be located as a point on a number line.
Rationalizing	Rewriting a rational expression so that no radicals are in the denominator.
Remainder	In a division problem, the portion of the dividend that does not divide exactly into the divisor and that is left after dividing.
Simplest Form	A rational expression whose common factors between the numerator and denominator have been divided out and cannot be simplified any further.
Solution	The value or values that make an equation true.
Solution Set	The value or values that make a sentence or statement true.
Subtraction Property of Equality	If the same number is subtracted from both sides of an equation, the two sides remain equal.
Sum	The result of addition; in the equation $5 + 4 = 9$, 9 is the sum of 4 and 5.
Square Root	A number that produces a specified quantity when multiplied by itself: 7 is a square root of 49.
Term	A number or variable, or the product or quotient of numbers and variables.
Undefined	A rational expression whose denominator is equal to 0.
Variable	A letter used to represent a value that can change or vary.
Zero Factor Property	If $ab = 0$, then $a = 0$, $b = 0$, or both $a = 0$ and $b = 0$.

Mathematical Tools

Laws of Exponents and Radicals

$$a^m a^n = a^{m+n}$$

$$(a^m)^n = a^{mn}$$

$$(ab)^n = a^n b^n$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$a^{-n} = \frac{1}{a^n}$$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$$

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$$

$$\sqrt[n]{ab} = \sqrt[n]{a} \sqrt[n]{b}$$

$$\sqrt[m]{\sqrt[n]{a}} = \sqrt[n]{\sqrt[m]{a}} = \sqrt[mn]{a}$$

Proportions

$$\text{If } \frac{a}{b} = \frac{c}{d} \text{ then, } ad = bc$$

Quadratic Formula

$$\text{If } ax^2 + bx + c = 0, \text{ then } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Factoring Formulas

$$a^2 - b^2 = (a - b)(a + b)$$

$$a^2 + 2ab + b^2 = (a + b)^2$$

$$a^2 - 2ab + b^2 = (a - b)^2$$

$$a^3 + b^3 = (a^2 - ab + b^2)(a + b)$$

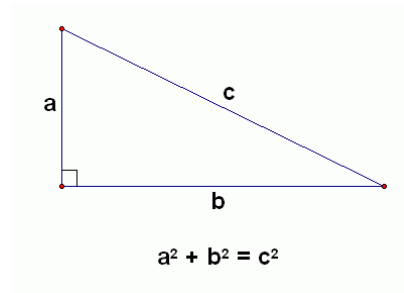
$$a^3 - b^3 = (a^2 + ab + b^2)(a - b)$$

Absolute Value

If $a > 0$, then $|x| = a$ means $x = a$ or $x = -a$

Pythagorean Theorem

In a right triangle, the square of the hypotenuse, c , is equal to the sum of the squares of the other two sides, a and b . $c^2 = a^2 + b^2$

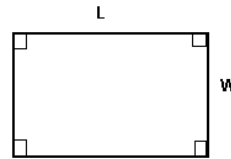


Geometric Formulas

Rectangle: (Length = L) (Width = W)

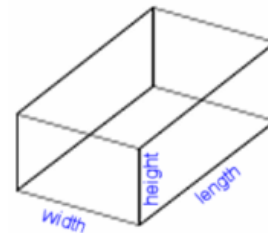
$$\text{Area} = \text{length}(\text{width}) = LW$$

$$\text{Perimeter} = 2(\text{length}) + 2(\text{width}) = 2L + 2W$$



Volume of a Box:

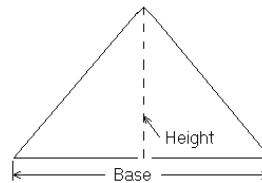
$$\text{Volume} = (\text{length})(\text{width})(\text{height})$$



Triangle:

$$\text{Perimeter} = (\text{side}) + (\text{side}) + (\text{side})$$

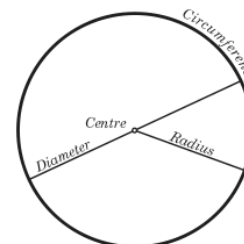
$$\text{Area} = \frac{1}{2}(\text{base})(\text{height})$$



Circle:

$$\text{Circumference} = 2\pi r$$

$$\text{Area} = \pi r^2$$



ACCUPLACER MATH REVIEW

Answer Key

1. 586
2. 444
3. 3612
4. 32
- 5.
6. $\frac{9}{10}$
7. $-\frac{1}{9}$
8. $\frac{1}{18}$
9. $\frac{24}{25}$
10. 608.476
11. 7.112
12. 2.0496
13. 26.8857
14. 67.5
15. 4.8
16. $\frac{94}{50} = \frac{47}{25}$
17. Yes
18. Out of 100
19. 0.73
20. 25%
21. $\frac{14}{25}$
22. 4.5
23. $\frac{1}{13}$
24. 27.6%
25. \$414.12
26. 30 feet wide
27. 2
28. \$187.50
29. The distance between 0 and the number on a number line
30. 6
31. 6
32. The set of positive whole numbers, negative whole numbers, and 0; can be located as a point on a number line
33. 20
34. -12
35. 14
36. 40
37. -3
38. -25
39. $-\frac{1}{9}$
40. -10
41. $\frac{2}{15}$
42. 14
43. -7
44. Shorthand notation for repeated multiplication
45. 81
46. 144
47. $4^3 * 3^2 = 576$
48. ± 3
49. ± 6
50. $\pm \frac{7}{12}$
51. ± 6
52. $2x\sqrt[3]{x}$
53. 58
54. 14

ACCUPLACER MATH REVIEW**Answer Key**

55. 3

56. $-3x+4$

57. $x + \frac{1}{8}y$

58. $4a^2 + 3ab + b^2$

59. $\frac{1}{2}x + 3$

60. $2x^2 - 13x + 3$

61. $7w^2 - 4w - 7$

62. $6x^2 + 7x - 9$

63. $6m^3n^9$

64. $3c^4 - 5bc^2 + 6c^2$

65. $12d^2 - 23d + 5$

66. $8z^3 + 36z^2 + 54z + 27$

67. $x - 4$

68. $x(x - 1)(x - 3)$

69. $(p - 3)(p - 3)$

70. $(a - 2)(3b - 4)$

71. $80x$

72. $6.8x+6.45$

73. $x = 43$

74. $x = -7$

75. $x = -\frac{1}{5}$

76. $y = -\frac{4}{3}x + \frac{20}{3}$

77. $x \geq 4$

78. $x < \frac{11}{5}$

79. $x = \pm\sqrt{5}$

80. $x = 0, x = 4$

81. $x = -6, x = -4$

82. 40 feet

83. $x + 81 \geq 170;$

$x \geq 89$

84. $3x + x = 12;$

Michael plays 9 hours

85. 85 feet