

ACCUPLACER MATH REVIEW SHEETS

The Accuplacer exam is a branching exam. This means that when you miss a problem, it will branch to a lower level problem. When you get a problem right, the test then gives you a slightly more difficult problem. In this fashion, this test is very accurate in determining your placement into our DMAT/MATH program.

The first exam that you will be given will be the Elementary Algebra test. Depending on your score, you will then take either the Arithmetic (to place you into DMAT 0066, 0090, 0097, or 0098) or the College- Level (to place you into DMAT 0098, DMAT 0099, or college level math classes).

If you have had two years or more of algebra in high school, it would be wise to study all of the topics on this sheet. However, if you did not have much algebra or feel very weak in algebra, you may want to devote your time to studying only the Arithmetic and Elementary Algebra Topics.

Arithmetic (17 questions)

I. Operations with whole numbers and fractions

A. Addition, Subtraction, Multiplication and division; Recognizing equivalent fractions and mixed numbers

1. $54 + 297 + 209$ 2. $1009 - 345$ 3. 307×452 4. $52 \overline{)5701}$ 5. $\frac{12}{13} \div \frac{13}{14}$ 6. $4 \div \frac{1}{2}$
7. $\frac{1}{7} + \frac{2}{7}$ 8. $\frac{5}{8} - \frac{2}{8}$ 9. $\frac{3}{4} + \frac{2}{5}$ 10. $3\frac{1}{2} - 1\frac{3}{4}$ 11. $2\frac{3}{4} \times 4\frac{1}{8}$
12. Change $\frac{42}{16}$ to a mixed numeral. 13. Change $4\frac{1}{6}$ to an improper fraction.

B. Estimating

For #14 - 16: The World Almanac lists all 4-year colleges in the United States with enrollments of 600 or more. This list is 13 pages long, with an average of 89 colleges on a page.

14. Which figure best estimates the number of 4 year colleges listed? a. 157 b. 8000 c. 54000 d. 50 e. 1000
15. Estimate the minimum number of students enrolled at the colleges listed. a. 54,000 b. 9000 c. 600,000
d. 5,400,000 e. 6,600,000
16. If you could compare the actual number of students attending 4-year colleges to your estimate for question 15, your estimate would turn out to be a. much higher b. a little higher c. much lower d. a little lower e. exactly right.

II. Operations with decimals and percents

A. Addition, subtraction, Multiplication, division

17. $4.8 \overline{)0.1104}$ 18. 3.04×0.27 19. $130 - 24.89$ 20. $2.3 + 46 + 7.809$

B. Percent problems

21. What percent of 25 is 18? 22. What is 42% of 67? 23. 56 is 64% of what number?

C. Recognition of decimal, percent, fraction equivalencies

24. Change 24% to a fraction in lowest terms. 25. Change 23.678 to a fraction in lowest terms.
26. Change $\frac{3}{4}$ to a percent. 27. Change $\frac{5}{9}$ to a decimal. 28. Change 29.8% to a decimal.
29. Change 0.0043 to a percent.

D. Problems involving estimation

30. Which is the least? a. 0.26, b. 0.026, c. 2.6, d. 0.206
31. Junior earns \$5.65 per hour that he works. If he worked 12 hours, approximately how much did he earn?
a. \$72 b. \$60 c. \$80

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III. Applications and Problem Solving.

A. Rate, percent and measurement problems

32. A soccer team played 160 games and lost 35% of them. How many games did they lose?
33. A dieter lost 2 pounds in 3 weeks. If he continues to lose at this rate, how many weeks will it take him to lose 24 pounds?

B. Simple geometry problems

34. Find the area of a square whose sides measure 4 cm. 35. Find the complement of a 67° angle.
36. Find the perimeter of a triangle whose sides are 3m, 5 m, and 4 m.
37. If the legs of a right triangle measure 2 and 7, the hypotenuse measures approximately
a. 7.28 b. 53 c. 14 d. 9.15 e. None of these

C. Distribution of a quantity into its fractional parts

38. Three people who work fulltime are to work together on a project, but their total time on the project is to be equivalent to that of only one person working full time. If one of the people is budgeted for $\frac{1}{2}$ of his time on the project and a second person for $\frac{1}{3}$ of her time, what part of the third worker's time should be budgeted to this project?
a. $\frac{1}{3}$ b. $\frac{1}{4}$ c. $\frac{1}{6}$ d. $\frac{1}{8}$

Elementary Algebra (12 questions)

I. Operations with integers and rational numbers

A. Computation with integers and negative rational numbers

1. $3^2 - (-2)^3 + 4 - 5(6 - 8)$ 2. $\frac{4^2 - 5}{4 - 5}$ 3. $-\left(\frac{3}{4}\right)^2$

B. Use of absolute values and ordering

4. Put the following numbers in order from least to greatest. $|-0.8|$, -0.8 , $\frac{8}{9}$, 0 , $-\frac{8}{9}$

II. Operations with algebraic expressions

A. Evaluation of simple formulas and expressions

5. Evaluate $I = Prt$ when $P = 2000$, $r = 0.05$, $t = 3$. 6. Evaluate $xyz - 4 + 5x$ when $x = -1$, $y = 3$, $z = -2$.

B. Addition, subtraction, multiplication, and division of monomials and polynomials

Simplify the following expressions.

7. $(x^2y + 4z - 6y) - (-x^2y + 8z + 4y - 7)$ 8. $(x - 5)(6 - 4x)$ 9. $\frac{4x + 8y}{2}$

10. Perform the long division: $(2x^2 + 3x - 4) \div (x - 5)$

C. Evaluation of positive rational roots and exponents

11. Evaluate $\sqrt{32}$ 12. Simplify $\sqrt{24a^3b^6c}$ 13. Simplify $\left(\frac{-2x^3y^{-3}}{3a^6}\right)^{-2}$

D. Simplify algebraic fractions

Simplify.

14. $\frac{6x + 12}{3x^2 + 2x - 8}$ 15. $\frac{x}{y} - \frac{4}{y}$ 16. $\frac{2x + 1}{3x - 4} + \frac{5}{7}$ 17. $\frac{\frac{1}{x} + y}{x + y}$ 18. $\frac{x - 1}{x} \div \frac{x^2 - 1}{x + 4}$

E. Factoring

Factor each expression.

19. $xy - 4y + yz$ 20. $x^2 + 3x + 2$ 21. $4x^2 - 5x + 1$ 22. $x^3 - 8$

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III. Solutions of equations, inequalities and word problems.

A. Solving linear equations and inequalities

23. Solve for x: $3x + 4 = -17$ 24. Solve: $4x - 7 < 8x + 4$

B. Solutions of quadratic equations by factoring

25. Solve for x: $x^2 + 4x + 3 = 0$

C. Translating written phrases into algebraic expressions

26. Write the equation for the following : The sum of three consecutive odd integers is 51. Do not solve.

27. Solve: The first angle of a triangle measures 2 times the sum of the second and third angles. The second angle measures 30° . Find the measure of the first angle.

D. Geometric reasoning and graphing

28. What quadrant is (9, -4) in? 29. Find the equation of the line passing through (2,3) and (1,4) and graph.

College Level (20 questions)

I. Algebraic Operations

A. Simplifying rational algebraic expressions

Simplify each of the following expressions

$$1. \frac{2}{x+3} - \frac{4x-7}{2x^2+13x+21} \quad 2. \frac{x^3-1}{x-1} \div \frac{x^2-1}{x+1} \quad 3. \frac{x+7}{8x^2-2x-3} \cdot \frac{2x-1}{2x^2+13x-7}$$

$$4. \frac{4}{x-y} + \frac{2}{x+y} - \frac{3x}{x^2-y^2} \quad 5. (3x+4xy-7xz^2) - (2x^2-4xy+2xz^2)$$

B. Factoring and expanding polynomials

6. Factor completely: $3x^4 - 81xy^3$ 7. Multiply: $(3x-5)(4x-1)$

C. Manipulating roots and exponents

Simplify each of the following.

$$8. x\sqrt{2x^2} + \sqrt{50x^4} - \sqrt{625y^3} \quad 9. \left(\frac{4x^{-3}}{y^{1/2}}\right)^{-4/3} \left(\frac{(2x)^5}{y^6}\right)^2 \quad 10. \sqrt{3x^2} + x\sqrt{24} \quad 11. \frac{\sqrt{5-x}}{\sqrt{5+x}}$$

II. Solutions of equations and inequalities

A. Solution of linear and quadratic equations and inequalities

Solve each of the following.

$$12. 2x - 4 > 3 \quad 13. \left|4x - \frac{1}{2}\right| \leq 1 \quad 14. x^2 - 4x + 4 \geq 0 \quad 15. 2x^2 - 6x + 9 = 0$$

$$16. 3(2x-4) + 7 = \frac{1}{2}(6x-14) \quad 17. |2x-3| = |4x+7|$$

B. Systems of equations

Solve each system on the real numbers. 18. $\begin{cases} y+2x=16 \\ 3x-4y=2 \end{cases}$ 19. $\begin{cases} x^2-y^2=14 \\ 2x^2+3y^2=3 \end{cases}$

C. Other algebraic equations and inequalities

Solve each of the following equations and inequalities.

$$20. \log_4(2x-1) - \log_4 6 = 2 \quad 21. 5^{x+2} = 3^x \quad 22. \frac{2}{x^2-1} - 1 = \frac{1}{x-1}$$

$$23. \sqrt[3]{3x-2} = 2 \quad 24. \sqrt{1-x} + \sqrt{x-1} = 0 \quad 25. \frac{3x-9}{(2x+1)(x-7)} \leq 0$$

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III. Coordinate geometry

A. Plane geometry

26. What quadrant is (3,-2) in? 27. Find the distance between (3,5) and (-2, -6).

B. Straight line

28. Find the equation of the line perpendicular to $3x-y=7$ that passes through the point (-1,2).
29. Graph $2x - 6y = 3$ 30. Find the equation of the line passing through (2,9) and (-1,-1).

C. Conics

31. Determine whether the following equations describe a parabola, a hyperbola, an ellipse, a circle, or none of these.
a) $x^2 - 4x + y^2 - 12y = 60$ b) $2x^2 - 4x + y^2 - 12y = 60$ c) $x^2 - 4x - 2y^2 - 12y = 60$
d) $-4x + y^2 - 12y = 60$ e) $2x^2 - 4x + 2y^2 - 12y = -60$

D. Sets of points in the plane

- Graph the following inequalities and systems of inequalities. 32. $-x + 3y \geq 2$ 33. $\begin{cases} 3x - 2y \geq 2 \\ y < 3x - 6 \end{cases}$

E. Graphs of algebraic functions

Graph the following functions. State the domain and range of each function.

34. $f(x) = 2x - 3$ 35. $f(x) = \log_3(2x - 1)$ 36. $f(x) = x^3 - 2$ 37. $g(x) = e^{3x}$
38. $g(x) = \frac{3x + 4}{x - 5}$ 39. $g(x) = \sqrt{-x}$

IV. Applications and other algebraic topics

A. Complex numbers

- Simplify each of the following: 40. i^{43} 41. $\frac{3 + 2i}{2 - 6i}$

B. Series and sequences

Identify each series as arithmetic, geometric, or neither.

42. 1, 3, 5, 7, 9, ... 43. 1, -2, 4, -8, 16, -32, ... 44. 1, 1, 2, 3, 5, 8, 13, ...
45. Find the sum of the infinite geometric series: $1 + 1/2 + 1/4 + 1/8 + \dots$

C. Determinants, Permutations, Combinations, and Factorials, and Word Problems

- Evaluate: 46. $\begin{vmatrix} 3 & 7 \\ -2 & 4 \end{vmatrix}$ 47. $\binom{12}{5}$ 48. ${}_6P_3$ 49. $7!/4!$

50. In a standard 52 card deck of playing cards, how many different ways can a 5 card hand be chosen?
51. Out of a group of 15 people, where 4 are women and the rest are men, how many ways can 2 women and 5 men be chosen?

V. Functions

A. Graphing polynomials, algebraic, logarithmic, and exponential functions

Graph each of the following and state the domain and range of each.

52. $y = 9x^2 - 6x + 12$ 53. $y = 4|x - 2|$ 54. $y = \ln(x - 3)$ 55. $y = 2^x - 1$

B. Evaluating polynomials, algebraic, logarithmic, and exponential functions; Using properties of logs and exponential to simplify expressions

56. Find $f(2)$ if $f(x) = \log_4 x$ 57. Simplify $\log_3(3^{y+1})$

VI. Trigonometry

A. Graphing

58. Graph one period of $y = 4 - \cos x$.

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B. Word problems

59. A point P moves with angular velocity of 5 radians per second on a circle of radius 2 cm. Find the distance traveled by the point in 5 seconds.
60. From a point on the ground a person notices that a 75 foot antenna on the top of a building has an angle of elevation of 65° . If the angle of elevation to the top of the building is 50° , how tall is the building?

C. Solve trigonometric equations

Solve each equation exactly on the interval $0 \leq x < 2\pi$.

61. $15\sin x + 19 = 14\sin x + 18$ 62. $2\cos^2 x + 3\cos x + 1 = 0$

D. Use inverse trigonometric functions

63. If $\sin^{-1} A = \frac{-\pi}{3}$, find $\cos^{-1} A$. 64. Find $\tan\left(\sin^{-1}\left(\frac{1}{\sqrt{10}}\right)\right)$

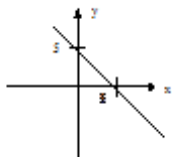
ANSWERS

ARITHMETIC TEST:

1. 560 2. 664 3. 138764 4. 109 R 33 5. 168/169 6. 8 7. 3/7 8. 3/8 9. 23/20 or 1 3/20 10. 1 3/4 11. 11 11/32
 12. 2 5/8 13. 25/6 14. E 15. C 16. C 17. 0.023 18. 0.8208 19. 105.11 20. 56.109 21. 72% 22. 28.14
 23. 87.5 24. 6/25 25. 23 339/500 26. 75% 27. 0.5555... 28. 0.298 29. 0.43% 30. B 31. A 32. 56 33. 36
 34. 16 cm^2 35. 23° 36. 12 m 37. A 38. C

ELEMENTARY ALGEBRA TEST:

1. 31 2. -11 3. -9/16 4. -8/9, -0.8, 0, $|-0.8|$, 8/9 5. 300 6. -3 7. $2x^2y - 4z - 10y + 7$ 8. $-4x^2 + 26x - 30$
 9. $2x+4y$ 10. $2x+13 + \frac{61}{x-5}$ 11. $4\sqrt{2}$ 12. $2ab^3\sqrt{6ac}$ 13. $\frac{9a^{12}y^6}{4x^6}$ 14. $\frac{6}{3x-4}$ 15. $\frac{x-4}{y}$
 16. $\frac{29x-13}{7(3x-4)}$ 17. $\frac{1+xy}{x(x+y)}$ 18. $\frac{x+4}{x(x+1)}$ 19. $y(x-4+z)$ 20. $(x+1)(x+2)$ 21. $(4x-1)(x-1)$
 22. $(x-2)(x^2+2x+4)$ 23. $x=-7$ 24. $x > -11/4$ 25. $x=-1$ or $x=-3$ 26. $x+x+2+x+4=51$ or $3x+6=51$ 27. 120°
 28. IV 29. $y=-x+5$



COLLEGE LEVEL TEST:

1. $\frac{21}{(2x+7)(x+3)}$ 2. $\frac{x^2+x+1}{x-1}$ 3. $\frac{1}{(2x+1)(4x-3)}$ 4. $\frac{3x+2y}{(x-y)(x+y)}$ 5. $-2x^2 + 3x + 8xy - 9xz^2$
 6. $3x(x-3y)(x^2+3xy+9y^2)$ 7. $12x^2 - 23x + 5$ 8. $6x^2\sqrt{2} - 25y\sqrt{y}$ 9. $\frac{2^{17/2}x^{14}}{y^{34/3}}$ 10. $x\sqrt{3} + 2x\sqrt{6}$
 11. $\frac{5+\sqrt{5x}-x\sqrt{5}-x\sqrt{x}}{5-x}$ 12. $x > \frac{7}{2}$ 13. $\frac{-1}{8} \leq x \leq \frac{3}{8}$ 14. $(-\infty, \infty)$ 15. $x = \frac{3 \pm 3i}{2}$ 16. $x = \frac{-2}{3}$
 17. $x = -5$ or $x = \frac{-2}{3}$ 18. (6,4) 19. No Solution in the reals 20. $\frac{97}{2}$ 21. $x = \frac{-2\ln 5}{\ln 5 - \ln 3}$
 22. $x=-2$ 23. $x = 10/3$ 24. $x=1$ 25. $(-\infty, 1/2) \cup [3, 7)$ 26. IV 27. $\sqrt{146}$ 28. $x + 3y = 5$ 29. Next page.
 30. $10x-3y = -7$ 31. a. circle b. ellipse c. hyperbola d. parabola e. no graph 32-39. Next page. 40. -i
 41. $\frac{-3}{10} + \frac{11}{20}i$ 42. Arithmetic 43. Geometric 44. Neither 45. 2 46. 26 47. 792 48. 120 49. 210

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50. 2598960 51. 2772 52 -55. See below. 56. $1/2$ 57. $y+1$ 58. See below 59. 50 cm 60. 94 ft.

61. $x = \frac{3\pi}{2}$ 62. $x = \frac{2\pi}{3}$ or $x = \pi$ or $x = \frac{4\pi}{3}$ 63. $\frac{5\pi}{6}$ 64. $1/3$

Graphs:

