



MATH ACCUPLACER RULES AND GUIDELINES

- ❖ To enter the exam room, students must provide their exam booking form along with their Original Passport/ Emirates ID and they should arrive half an hour (30min) before the starting time of the exam.
- ❖ All unauthorized items must be placed at the front of the classroom; this includes books, phones, flash memory, iPods, etc. Mobile phones should be switched off.
- ❖ Students must remain in the exam room for the entire exam time. No breaks of any type will be allowed. A student who leaves the exam room during the exam will not be permitted to return.
- ❖ During exams, students will be expected to bring sufficient pencils, sharpeners, pens and erasers. Scratch papers will be provided by the proctor when needed.
- ❖ **Calculators are not allowed.** An Electronic Calculator pops up during the exam, if required.
- ❖ Students are not allowed to talk or share any type of information during the exam.
- ❖ All exams are assumed to be closed books. Any use of books or notes during the exam will be regarded as academic dishonesty.
- ❖ Students are absolutely forbidden to walk around in the classroom during the exam.
- ❖ Should the student finish the exam earlier than the specified time, he/she will have to quietly leave the room without disruption.

Students in violation of any of the above rules may be asked to leave the classroom immediately.

***RESULTS OF THE EXAMS WILL BE AVAILABLE ON THE FOLLOWING DAY
AFTER 4:00 P.M. AT THE ADMISSIONS OFFICE***

What is the MATH ACCUPLACER Test?

It is an assessment test that determines your knowledge in MATH as you prepare to enroll in college-level courses. MATH ACCUPLACER is used to identify your strengths and weaknesses in each subject area and to help you improve your skills through interactive online learning tools. The results of the assessment will be used to place you in the appropriate college courses that meet your skill level.

How Does MATH ACCUPLACER Work?

MATH ACCUPLACER test is a 2 hours test where questions are delivered in multiple-choice format.

MATH ACCUPLACER assessments are computer-adaptive. Questions are selected based on your skill level; in other words, your response to one question determines the difficulty level of the following question. You are encouraged to give each question as much thought as you wish before selecting your final answer.

Expect to have the questions look different from what you would see in a typical textbook. Your ability to interpret the question being asked and to apply the correct mathematical idea is also being measured by this test. You must answer each question as it is presented to you before you can continue to the next question. You cannot skip a question or go back to a previous question to change your answer. There is no penalty for wrong answers so please answer all the questions.

One way to diagnose what mathematics to review, and become more comfortable with the questions, is to take practice tests like what is provided in the Sample Questions for Students and the additional review topics attached to this brochure.

The exam is made out of 3 sections as explained below.

- **Section I: Arithmetic**

The Arithmetic test, comprised of 17 questions, measures your ability to perform basic arithmetic operations and to solve problems that involve fundamental arithmetic concepts. There are three types of Arithmetic questions:

- ✓ **Operations with whole numbers and fractions:** topics included in this category are addition, subtraction, multiplication, division, recognizing equivalent fractions and mixed numbers, and estimating.
- ✓ **Operations with decimals and percentage:** topics include addition, subtraction, multiplication, and division with decimals. Percent problems, recognition of decimals, fraction and percent equivalencies, and problems involving estimation are also given.

- ✓ **Applications and problem solving:** topics include rate, percent, and measurement problems, simple geometry problems, and distribution of a quantity into its fractional parts.

- **Section II: Elementary Algebra**

The Elementary Algebra test, comprised of 12 questions, measures your ability to perform basic algebraic operations and to solve problems involving elementary algebraic concepts. There are three types of Elementary Algebra questions:

- ✓ **Operations with integers and rational numbers:** topics include computation with integers and negative rationals, the use of absolute values, and ordering.
- ✓ **Operations with algebraic expressions:** topics include the evaluation of simple formulas and expressions, adding and subtracting monomials and polynomials, multiplying and dividing monomials and polynomials, the evaluation of positive rational roots and exponents, simplifying algebraic fractions, and factoring.
- ✓ **Solution of equations, inequalities, word problems:** topics include solving linear equations and inequalities, solving quadratic equations by factoring, solving verbal problems presented in an algebraic context, including geometric reasoning and graphing, and the translation of written phrases into algebraic expressions.

- **Section III: College-Level Math**

The College-Level Math test, comprised of 20 questions, measures your ability to solve problems that involve college-level mathematics concepts. There are five types of College-Level Math questions:

- ✓ **Algebraic operations:** topics include simplifying rational algebraic expressions, factoring, expanding polynomials, and manipulating roots and exponents.
- ✓ **Solutions of equations and inequalities:** topics include the solution of linear and quadratic equations and inequalities, equation systems and other algebraic equations.
- ✓ **Coordinate geometry:** topics include plane geometry, the coordinate plane, straight lines, conics, sets of points in the plane, and graphs of algebraic functions.
- ✓ **Applications and other algebra topics:** topics include complex numbers, series and sequences, determinants, permutations and combinations, fractions and word problems.
- ✓ **Functions and trigonometry:** topics include polynomials, algebraic, exponential, and logarithmic and trigonometric functions.

MATHEMATICS ACCUPLACER™ EXAMINATION

Review Topics

Arithmetic

- Operations with whole numbers and fractions, including: 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, decimals, fraction and percent equivalencies, and problems involving estimation.
- Applications and problem solving including: rate, percent, and measurement problems, simple geometry problems, and distributing a quantity into its fractional parts.

Elementary Algebra

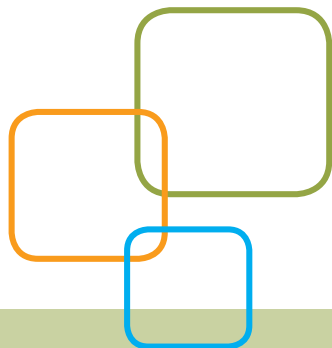
- Add, subtract, multiply and divide using integers, positive and negative fractions
- Compute using absolute value
- Compare numbers (inequalities) and use a number line to express their order (smallest to largest)
- Evaluate expressions and formulas using the correct order of operations
- Evaluate exponent and root operations using both radical symbols and fractional exponents
- Simplify linear expressions using Distributive Property and combining like terms
- Solve linear equations (including using fractions), linear inequalities and absolute value expressions
- Add, subtract, multiply and divide monomials and polynomials
- Factor polynomials (trinomials, difference of squares, perfect squares, greatest common factors)
- Simplify algebraic fractions (add, subtract, reduce to lowest terms)
- Solve quadratic equations by factoring
- Solve word problems and algebraic problems which require geometric reasoning and graphing
- Translate written phrases into algebraic expressions
- Solve formulas for a specified variable

College-Level Mathematics

- Algebraic Operations
 - Simplify expressions involving algebraic fractions (add, subtract, multiply, divide, reduce)
 - Factor and expand polynomials
 - Work with roots (radicals) and exponents
- Solutions of Equations and Inequalities
 - Solve linear equations and inequalities, and graph solutions of inequalities on the number line
 - Solve quadratic equations (including using Quadratic Formula)
 - Solve quadratic inequalities and graph solutions on the real number line

- Solve systems of equations
- Solve systems of linear inequalities graphically
- Solve equations containing radicals
- Coordinate Geometry
 - Apply concepts of plane geometry within a coordinate system
 - Know distance formula, midpoint formula, Pythagorean theorem
 - Calculate slope and write the equation for a line in various forms (standard, slope-intercept, point-slope)
 - Express equation of conic sections (parabolas, circles, ellipses, hyperbolas)
 - Describe sets of points in the plane having particular properties (loci)
- Functions
 - Definition, domains and ranges, function notation
 - Properties of inverse functions
 - Know properties of graphs of algebraic functions – parallel, perpendicular, translations, reflections, even/odd
 - Properties of polynomial, rational, exponential and logarithmic functions
 - Graphs of linear, quadratic, polynomial, rational, exponential and logarithmic functions
- Trigonometry
 - Basic definitions and identities (examples: sum, half-angle formulas and Pythagorean identity.)
 - Know both right angle and circular trigonometry interpretations
 - Graphs of trigonometric functions
 - Radian measure
- Applications and Other Algebra Topics
 - Add, subtract, multiply and divide complex numbers
 - Sequences and series (arithmetic, geometric, working with formulas for generating them)
 - Determinants
 - Permutations and combinations
 - Factorials
 - Word Problems

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Sample Questions for Students

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.

- Operations with whole numbers and fractions: Topics included in this category are addition, subtraction, multiplication, division, recognizing equivalent fractions and mixed numbers, and estimating.
- Operations with decimals and percents: Topics include addition, subtraction, multiplication, and division with decimals. Percent problems, recognition of decimals, fraction and percent equivalencies, and problems involving estimation are also given.
- Applications and problem solving: Topics include rate, percent and measurement problems; simple geometry problems; and distribution of a quantity into its fractional parts.

Arithmetic Sample Questions

For each of the questions below, choose the best answer from the four choices given. You may use the paper you received as scratch paper.

1. $2.75 + .003 + .158 =$
 - A. 4.36
 - B. 2.911
 - C. 0.436
 - D. 2.938
2. $7.86 \times 4.6 =$
 - A. 36.156
 - B. 36.216
 - C. 351.56
 - D. 361.56
3. $\frac{7}{20} =$
 - A. 0.035
 - B. 0.858
 - C. 0.35
 - D. 3.5
4. Which of the following is the least?
 - A. 0.105
 - B. 0.501
 - C. 0.015
 - D. 0.15
5. All of the following are ways to write 25 percent of N EXCEPT
 - A. 0.25 N
 - B. $\frac{25N}{100}$
 - C. $\frac{1}{4} N$
 - D. 25 N
6. Which of the following is closest to 27.8×9.6 ?
 - A. 280
 - B. 300
 - C. 2,800
 - D. 3,000
7. A soccer team played 160 games and won 65 percent of them. How many games did it win?
 - A. 94
 - B. 104
 - C. 114
 - D. 124

8. Three people who work full-time 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 one-half of his time to the project and a second person for one-third of her time, what part of the third worker's time should be budgeted to this project?
- $\frac{1}{3}$
 - $\frac{3}{5}$
 - $\frac{1}{6}$
 - $\frac{1}{8}$
9. 32 is 40 percent of what number?
- 12.8
 - 128
 - 80
 - 800
10. $3\frac{1}{3} - 2\frac{2}{5} =$
- $1\frac{1}{2}$
 - $\frac{1}{15}$
 - $\frac{14}{15}$
 - $1\frac{1}{15}$
11. $2\frac{1}{2} + 4\frac{2}{3} =$
- $6\frac{1}{6}$
 - $6\frac{5}{6}$
 - $7\frac{1}{6}$
 - $7\frac{5}{6}$
12. What is $\frac{1,345}{99}$ rounded to the nearest integer?
- 12
 - 13
 - 14
 - 15
13. Three of four numbers have a sum of 22. If the average of the four numbers is 8, what is the fourth number?
- 4
 - 6
 - 8
 - 10
14. $46.2 \times 10^{-2} =$
- 0.0462
 - 0.462
 - 4.62
 - 462
15. If $\frac{3}{2} \div \frac{1}{4} = n$, then n is between
- 1 and 3
 - 3 and 5
 - 5 and 7
 - 7 and 9
16. What is 12% of 120?
- 10
 - 14.4
 - 18.4
 - 28.8
17. A box in a college bookstore contains books, and each book in the box is a history book, an English book or a science book. If one-third of these books are history books and one-sixth are English books, what fraction of the books are science books?
- $\frac{1}{3}$
 - $\frac{1}{2}$
 - $\frac{2}{3}$
 - $\frac{3}{4}$
18. The measures of two angles of a triangle are 35° and 45° . What is the measure of the third angle of the triangle?
- 95°
 - 100°
 - 105°
 - 110°

Elementary Algebra

Sample Questions


For each of the questions below, choose the best answer from the four choices given. You may use the paper you received as scratch paper.

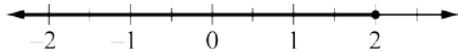
19. Erica bought $3\frac{1}{2}$ yards of fabric. If she uses $\frac{2}{3}$ of the fabric to make a curtain, how much will she have left?
- A. $\frac{1}{6}$ yd.
B. $\frac{1}{3}$ yd.
C. $1\frac{1}{6}$ yd.
D. $2\frac{1}{3}$ yd.
20. Jen wants to tile the floor of her kitchen. The floor is rectangular and measures 12 feet by 8 feet. If it costs \$2.50 per square foot for the materials, what is the total cost of the materials for tiling the kitchen floor?
- A. \$160
B. \$200
C. \$220
D. \$240

Elementary Algebra

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

- The first type involves operations with integers and rational numbers, and includes computation with integers and negative rationals, the use of absolute values, and ordering.
- 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.
- 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.

1. If A represents the number of apples purchased at 15 cents each, and B represents the number of bananas purchased at 10 cents each, which of the following represents the total value of the purchases in cents?
- A. $A + B$
B. $25(A + B)$
C. $10A + 15B$
D. $15A + 10B$
2. $\sqrt{2} \times \sqrt{15} = ?$
- A. 17
B. 30
C. $\sqrt{30}$
D. $\sqrt{17}$
3. What is the value of the expression $2x^2 + 3xy - 4y^2$ when $x = 2$ and $y = -4$?
- A. -80
B. 80
C. -32
D. 32
4. In the figure below, both circles have the same center, and the radius of the larger circle is R . If the radius of the smaller circle is 3 units less than R , which of the following represents the area of the shaded region?
- 
- A. πR^2
B. $\pi(R - 3)^2$
C. $\pi R^2 - \pi \times 3^2$
D. $\pi R^2 - \pi(R - 3)^2$
5. $(3x - 2y)^2 =$
- A. $9x^2 - 4y^2$
B. $9x^2 + 4y^2$
C. $9x^2 + 4y^2 - 6xy$
D. $9x^2 + 4y^2 - 12xy$
6. If $x > 2$, then $\frac{x^2 - x - 6}{x^2 - 4} =$
- A. $\frac{x - 3}{2}$
B. $\frac{x - 3}{x - 2}$
C. $\frac{x - 3}{x + 2}$
D. $\frac{3}{2}$

7. $\frac{4 - (-6)}{-5} =$
- $\frac{2}{5}$
 - $-\frac{2}{5}$
 - 2
 - 2
8. If $2x - 3(x + 4) = -5$, then $x =$
- 7
 - 7
 - 17
 - 17
9. $-3(5 - 6) - 4(2 - 3) =$
- 7
 - 7
 - 1
 - 1
10. Which of the following expressions is equivalent to $20 - \frac{4}{5}x \geq 16$?
- $x \leq 5$
 - $x \geq 5$
 - $x \geq 32\frac{1}{2}$
 - $x \leq 32\frac{1}{2}$
11. Which of the following lists of numbers is ordered from least to greatest?
- $-\frac{1}{3}, -\frac{3}{5}, \frac{2}{3}, \frac{3}{5}$
 - $-\frac{3}{5}, -\frac{1}{3}, \frac{3}{5}, \frac{2}{3}$
 - $-\frac{1}{3}, -\frac{3}{5}, \frac{3}{5}, \frac{2}{3}$
 - $-\frac{3}{5}, -\frac{1}{3}, \frac{2}{3}, \frac{3}{5}$
12. If $5t + 2 = 6$, then $t =$
- 8
 - $\frac{5}{4}$
 - $\frac{4}{5}$
 - 8
13. For which of the following equations are $x = 5$ and $x = -5$ both solutions?
- $x^2 - x^2 - 5x - 25 = 0$
 - $x^2 + 25 = 0$
 - $x^2 + 10x - 25 = 0$
 - $x^2 - 25 = 0$
14. If $x \neq 0$, then $\frac{u}{x} + \frac{5u}{x} - \frac{u}{5x} =$
- $\frac{7x}{5u}$
 - $\frac{5u}{7x}$
 - $\frac{29u}{5x}$
 - $\frac{31u}{5x}$
15. 
- The solution set of which of the following inequalities is graphed on the number line above?
- $2x - 4 \geq -3$
 - $2x + 5 \leq 6$
 - $3x - 1 \leq 5$
 - $4x - 1 \geq 7$
16. $2x + 6y = 5$
 $x + 3y = 2$
- How many solutions (x, y) are there to the system of equations above?
- None
 - One
 - Two
 - More than two
17. Which of the following is a factor of both $x^2 - x - 6$ and $x^2 - 5x + 6$?
- $x - 3$
 - $x + 3$
 - $x - 2$
 - $x + 2$

College-Level Mathematics Test

The College-Level Mathematics test measures your ability to solve problems that involve college-level mathematics concepts. There are six content areas measured on this test: (a) Algebraic Operations, (b) Solutions of Equations and Inequalities, (c) Coordinate Geometry, (d) Applications and other Algebra Topics, (e) Functions and (f) Trigonometry. The Algebraic Operations content area includes the simplification of rational algebraic expressions, factoring and expanding polynomials, and manipulating roots and exponents. The Solutions of Equations and Inequalities content area includes the solution of linear and quadratic equations and inequalities, systems of equations, and other algebraic equations. The Coordinate Geometry content area presents questions involving plane geometry, the coordinate plane, straight lines, conics, sets of points in the plane, and graphs of algebraic functions. The Functions content area includes questions involving polynomial, algebraic, exponential and logarithmic functions. The Trigonometry content area includes trigonometric functions. The Applications and other Algebra Topics content area contains complex numbers, series and sequences, determinants, permutations and combinations, factorials, and word problems. A total of 20 questions are administered on this test.

Sample Questions

For each of the questions below, choose the best answer from the four choices given. You may use the paper you received as scratch paper.

1. $2^{\frac{5}{2}} - 2^{\frac{3}{2}}$

A. $2^{\frac{1}{2}}$

B. 2

C. $2^{\frac{3}{2}}$

D. $2^{\frac{5}{3}}$

E. 2^2

18. $\frac{10x^6 + 8x^4}{2x^2} =$

A. $9x^{12}$

B. $14x^4$

C. $5x^4 + 4x^2$

D. $5x^3 + 2x^2$

19. A rectangular yard has area 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?

A. 40

B. 44

C. 48

D. 52

20. On Monday, it took Helen 3 hours to do a page of science homework exercises. The next day she did the same number of exercises in 2 hours. If her average rate on Monday was p exercises per hour, what was her average rate the next day, in terms of p ?

A. $2(p + 1)$ exercises per hour

B. $3(p - 1)$ exercises per hour

C. $\frac{2}{3}p$ exercises per hour

D. $\frac{3}{2}p$ exercises per hour

2. If $a \neq b$ and $\frac{1}{x} + \frac{1}{a} = \frac{1}{b}$, then $x =$

- A. $\frac{1}{b} - \frac{1}{a}$
- B. $b - a$
- C. $\frac{1}{ab}$
- D. $\frac{a-b}{ab}$
- E. $\frac{ab}{a-b}$

3. If $3x^2 - 2x + 7 = 0$, then $(x - \frac{1}{3})^2 =$

- A. $\frac{20}{9}$
- B. $\frac{7}{9}$
- C. $-\frac{7}{9}$
- D. $-\frac{8}{9}$
- E. $-\frac{20}{9}$

4. The graph of which of the following equations is a straight line parallel to the graph of $y = 2x$?

- A. $4x - y = 4$
- B. $2x - 2y = 2$
- C. $2x - y = 4$
- D. $2x + y = 2$
- E. $x - 2y = 4$

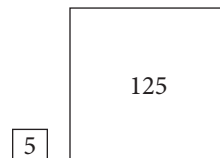
5. An equation of the line that contains the origin and the point (1, 2) is

- A. $y = 2x$
- B. $2y = x$
- C. $y = x - 1$
- D. $y = 2x + 1$
- E. $\frac{y}{2} = x - 1$

6. An apartment building contains 12 units consisting of one- and two-bedroom apartments that rent for \$360 and \$450 per month, respectively. When all units are rented, the total monthly rental is \$4,950. What is the number of two-bedroom apartments?

- A. 3
- B. 4
- C. 5
- D. 6
- E. 7

7. If the two square regions in the figures below have the respective areas indicated in square yards, how many yards of fencing are needed to enclose the two regions?



- A. $4\sqrt{130}$
- B. $20\sqrt{10}$
- C. $24\sqrt{5}$
- D. 100
- E. $104\sqrt{5}$

8. If $\log_{10} x = 3$, then $x =$

- A. 3^{10}
- B. 1,000
- C. 30
- D. $\frac{10}{3}$
- E. $\frac{3}{10}$

9. If $f(x) = 2x + 1$ and $g(x) = \frac{x-1}{2}$, then $f(g(x)) =$

- A. x
- B. $\frac{x-1}{4x+2}$
- C. $\frac{4x+2}{x-1}$
- D. $\frac{5x+1}{2}$
- E. $\frac{(2x+1)(x-1)}{2}$

10. If θ is an acute angle and $\sin \theta = \frac{1}{2}$, then $\cos \theta =$

- A. -1
- B. 0
- C. $\frac{1}{2}$
- D. $\frac{\sqrt{3}}{2}$
- E. 2

11. $5y(2y - 3) + (2y - 3) =$

- A. $(5y + 1)(2y + 3)$
- B. $(5y + 1)(2y - 3)$
- C. $(5y - 1)(2y + 3)$
- D. $(5y - 1)(2y - 3)$
- E. $10y(2y - 3)$

12. For what real numbers x is $x^2 - 6x + 9$ negative?

- A. $-3 < x < 3$
- B. $x < -3$ or $x > 3$
- C. $x = -3$ or $x = 3$
- D. $0 < x < 6$
- E. For no real numbers x

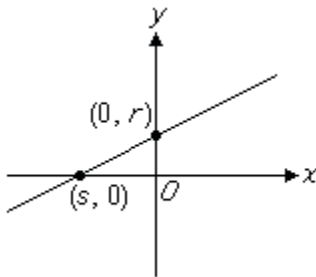
13. A root of $x^2 - 5x - 1 = 0$ is

- A. $\frac{1 - \sqrt{29}}{2}$
- B. $\frac{5 - \sqrt{17}}{2}$
- C. $\frac{1 + \sqrt{29}}{2}$
- D. $\frac{5 + \sqrt{17}}{2}$
- E. $\frac{5 + \sqrt{29}}{2}$

14. In the xy -plane, the graph of $y = x^2$ and the circle with center $(0,1)$ and radius 3 have how many points of intersection?

- A. None
- B. One
- C. Two
- D. Three
- E. More than three

15.



If an equation of the linear function in the figure above is $y = mx + b$, then $m =$

- A. $-\frac{r}{s}$
- B. $\frac{r}{s}$
- C. rs
- D. r
- E. $-s$

16. One ordering of the letters T, U, V and W from left to right is $UTVW$. What is the total number of orderings of these letters from left to right, including $UTVW$?

- A. 8
- B. 12
- C. 16
- D. 20
- E. 24

17. If $f(x) = \frac{3x-1}{2}$ and f^{-1} is the inverse of f , what is the value of $f^{-1}(3)$?

- A. $\frac{1}{3}$
- B. $\frac{2}{3}$
- C. 1
- D. 2
- E. $\frac{7}{3}$

18. The sequence $\{a_n\}$ is defined by $a_0 = 1$ and

$a_{n+1} = 2a_n + 2$ for $n = 0, 1, 2, \dots$. What is the value of a_3 ?

- A. 8
- B. 10
- C. 16
- D. 20
- E. 22

19. From 5 employees at a company, a group of 3 employees will be chosen to work on a project. How many different groups of 3 employees can be chosen?

- A. 3
- B. 5
- C. 6
- D. 10
- E. 15

20. If $f(x) = \left(\frac{1}{3}\right)^x$ and $a < b$, which of the following must be true?

- A. $f(a) + f(b) = 3$
- B. $f(a) + \frac{1}{3} = f(b)$
- C. $f(a) = f(b)$
- D. $f(a) < f(b)$
- E. $f(a) > f(b)$

COLLEGE-LEVEL MATHEMATICS QUESTION

NUMBER

CORRECT ANSWER

1

C

2

E

3

E

4

C

5

A

6

E

7

C

8

B

9

A

10

D

11

B

12

E

13

E

14

C

15

A

16

E

17

E

18

E

19

D

20

E

Answer Key

ARITHMETIC	
QUESTION NUMBER	CORRECT ANSWER
1	B
2	A
3	C
4	C
5	D
6	A
7	B
8	C
9	C
10	C
11	C
12	C
13	D
14	B
15	C
16	B
17	B
18	B
19	C
20	D

ELEMENTARY ALGEBRA	
QUESTION NUMBER	CORRECT ANSWER
1	D
2	C
3	A
4	D
5	D
6	B
7	D
8	B
9	B
10	A
11	B
12	C
13	D
14	C
15	C
16	A
17	A
18	C
19	A
20	D