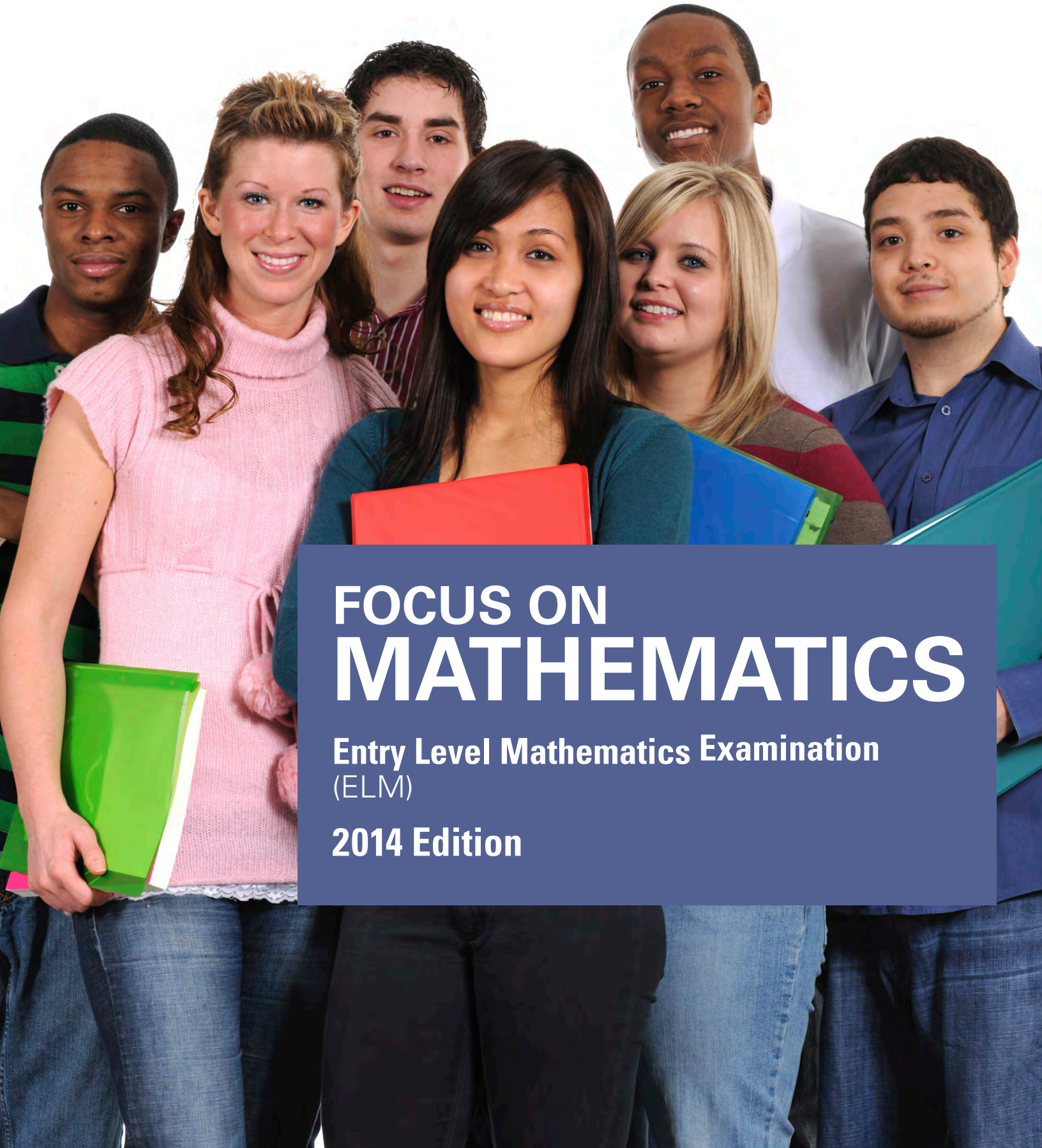
CSU The California State University
OFFICE OF THE CHANCELLOR



FOCUS ON MATHEMATICS

Entry Level Mathematics Examination (ELM)

2014 Edition

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For Further Information Please See:

General Website for the Early Assessment Program (EAP): http://www.calstate.edu/eap/
Overview of the EAP program, tests scores, and test blueprints.

CSU Math Success Website: http://www.csumathsuccess.org/mshome
Information for students, parents, counselors, and teachers on the EAP, the ELM, student personalized road maps, and other advising features for all 23 CSU campuses.

This publication may be downloaded from: http://www.calstate.edu/sas/documents/FocusonMath.pdf

Additional questions concerning CSU admission requirements should be directed to Mr. Eric Forbes, Student Academic Support, 401 Golden Shore, Long Beach, CA 90802-4210. Telephone: (562) 951-4744.

College Readiness for All at the California State University

Increasing student graduation rates in the California State University (CSU) system is one of the primary goals of the *Graduation Initiative*, a strategic initiative adopted by the CSU Board of Trustees in 2010. College readiness for first-time freshmen is critical if the CSU is to meet the goals set forth in the *Graduation Initiative* and meet the workforce and economic needs of the state. To ensure student success, the CSU has implemented a number of strategies, such as the Early Assessment Program (EAP), the Early Start Program (ESP), the Entry Level Mathematics Test (ELM), and the English Placement Test (EPT), to ensure that students are college and workforce ready.

The Early Assessment Program (EAP) is a nationally recognized collaboration involving the State Board of Education (SBE), the California Department of Education (CDE), and the California State University (CSU). The California County Superintendents of Education Services Association (CCSESA) collaborates in the area of professional development. The EAP provides an opportunity for students to learn about their readiness for college-level English and mathematics in their junior year of high school, and facilitates opportunities for students to improve their skills during their senior year.

Those students who are admitted to the CSU and have not yet demonstrated proficiency in English or math by their senior year of high school will have to take the English Placement Test (EPT) and/or the Entry Level Math Test (ELM) as a way of ensuring they are placed in the appropriate classes upon enrollment in the university. Students may also be required to participate in the Early Start Program depending on their college readiness status. All campuses are committed to implementing effective practices to guide freshman in attaining college level proficiency in mathematics and English.

The CSU hosts an English Success and a Math Success website to provide students, parents, teachers, counselors and testing coordinators further information regarding these requirements. The websites can be found at: http://www.csuenglishsuccess.org/eshome for English and http://www.csumathsuccess.org/mshome for math.

This brochure provides information about how students demonstrate proficiency in Mathematics and more specifically about the Entry Level Mathematics Placement Test (ELM). Another brochure, *Focus on English,* provides information about the English assessment test, the English Placement Test (EPT), it is available online at http://www.calstate.edu/sas/documents/focusonenglish.pdf

The Entry Level Mathematics Placement Examination

The California State University (CSU) publishes *Focus on Mathematics* to ensure that high school teachers and students are aware of entry level requirements in mathematics for success in the CSU.

Students planning to enroll at one of CSU's 23 campuses will be joining more than 450,000 students and 47,000 faculty and staff in an academic enterprise requiring college-level skills in reading, writing, and quantitative reasoning. The CSU is committed to ensuring that those who earn degrees from the university possess the knowledge and skills necessary to function in an increasingly complex and technological society. This booklet describes the CSU proficiency requirements in mathematics and the CSU Entry Level Mathematics (ELM) placement examination developed to ensure that students possess entry-level skills before undertaking baccalaureate coursework in quantitative reasoning.

CSU Proficiency Requirement in Mathematics

All students in the CSU are required to take college-level courses in mathematics or quantitative reasoning in order to graduate with a Bachelor's degree. It is important that students arrive at the university with the necessary entry-level mathematics skills to be successful. If, upon entry, a student is found to need additional work in entry level mathematics skills and is placed in developmental coursework, *such developmental work will not count toward credit for graduation.*

Before entering the university, students are required to complete three years of college preparatory coursework (Algebra I, Geometry, and Algebra II or an equivalent integrated mathematics sequence). Although not required for admission to the CSU, students are advised to complete a fourth year of a mathematics course with Algebra II as a prerequisite to increase college readiness. A fourth year precalculus class is recommended for all students interested in pursuing a major in science, technology, engineering, or math (STEM).

All students are encouraged to take mathematics in their senior year of high school since students whose last math course was completed in the junior year or earlier often have difficulties with the required college-level mathematics courses and with the Entry Level Mathematics (ELM) requirement.

The Entry Level Mathematics Requirement

The Entry Level Mathematics (ELM) Examination is designed to assess the level of mathematics skills acquired through three years of rigorous college preparatory mathematics coursework (Algebra I and II, and Geometry) for students entering the California State University (CSU). The CSU ELM must be completed by all entering undergraduates who have not demonstrated proficiency prior to enrollment in any course at the University. Students who score 50 or above on the ELM will be placed in college-level mathematics classes.

Students may demonstrate proficiency for college level mathematics in one of the following ways:

- A score of 550 or above on the mathematics section of the College Board SAT Reasoning Test
- A score of 550 or above on a College Board SAT Subject Test in Mathematics (level 1 or level 2)
- A score of 23 or above on the ACT Mathematics Test

- A score of 3 or above on the College Board Advanced Placement (AP) Calculus AB or Calculus BC exam
- A score of 3 or above on the College Board Advanced Placement (AP) Statistics examination
- Completion and transfer to CSU of a college course that satisfies the requirement in Quantitative Reasoning, provided such a course was completed with a grade of C or better
- A report of "Ready for college-level Mathematics courses" on the CSU Early Assessment Program (EAP), taken in grade 11 in conjunction with the CST in Summative High School Mathematics or Algebra II
- A report of "Conditionally ready for college-level Mathematics courses" or "Conditional" on the CSU Early Assessment Program (EAP) taken in grade 11 along with the California Standards Test in Summative High School Mathematics or Algebra II, and successful completion of a CSU-approved 12th grade math experience.

Description of the ELM Placement Test

The ELM placement test described in *Focus on Mathematics* reflects the desire of the CSU mathematics and mathematics education community to employ a placement test that assesses mathematical skills needed in campus General Education (GE) programs in quantitative reasoning and to serve the needs of entering students planning both quantitative and non-quantitative courses of study. The placement test was developed by a committee of CSU mathematics professors, mathematics education professors, and chairs of mathematics departments. The ELM placement test described here has been used by the CSU since March 2002.

Content of the Test

The ELM emphasizes working with numbers and data, the connections between algebra and geometry, critical thinking, and problem solving. The test provides the major geometric formulae for reference because its purpose is to assess understanding of mathematical concepts and problem-solving skills rather than recall of facts and equations. The placement test is predicated on the idea that students are responsible for mastering the content of three years of college preparatory high school mathematics. Table 1 contains a list of the topics covered by the placement test and shows the proportion of the test devoted to each of the three major content areas: Numbers and Data, Algebra, and Geometry.

Timing

The ELM contains 50 multiple-choice questions. Students will be allotted 90 minutes to complete the test.

Calculators Not Allowed

Test –takers are not allowed to use calculators for the ELM placement test. The questions on the ELM do not require involved computation. Rather, the placement test includes problems that emphasize quantitative reasoning and problem solving.

Table 1: CSU ELM Topics

NUMBERS AND DATA (approximately 35%)
- ✓ Carry out basic arithmetic calculations
- ✓ Understand and use percent in context
- ✓ Compare and order rational numbers expressed as fractions and/or decimals
- ✓ Solve problems involving fractions and/or decimals in context
- ✓ Interpret and use ratio and proportion in context
- ✓ Use estimation appropriately
- ✓ Evaluate and estimate square roots
- ✓ Represent and understand data presented in tables, pie charts, bar and line graphs, histograms, and other formats for presenting data visually used in print and electronic media
- ✓ Interpret and calculate the arithmetic mean
- ✓ Interpret and calculate the median
- ✓ Make estimates and predictions based on data
- ✓

ALGEBRA (approximately 35%)
- ✓ Evaluate and interpret algebraic expressions
- ✓ Simplify algebraic expressions
- ✓ Express relationships among quantities using variables
- ✓ Use properties of exponents
- ✓ Perform polynomial arithmetic (add, subtract, multiply, divide, and factor)
- ✓ Perform arithmetic operations involving rational expressions
- ✓ Solve linear equations (with both numerical and literal coefficients)
- ✓ Solve systems of linear equations in two unknowns
- ✓ Solve linear inequalities
- ✓ Solve problems in context that are modeled by linear equations
- ✓ Solve quadratic and rational equations (with both numerical and literal coefficients; real solutions only)
- ✓ Solve problems in context that are modeled by quadratic equations
- ✓ Solve equations involving absolute value (in one variable)
- ✓ Solve inequalities involving absolute value (in one variable)
- ✓ Find and use slopes and intercepts of lines
- ✓ Use constant and average rates to solve problems in context (using appropriate units)

GEOMETRY (approximately 30%)
- ✓ Find the perimeter, area, or volume of geometric figures (including triangles, quadrilaterals, rectangular parallelepipeds, circles, cylinders, and combinations of these figures)
- ✓ Calculate the ratio of corresponding geometric measurements of similar figures (e.g., if the perimeters are in a 3:2 ratio, the areas are in a 9:4 ratio)
- ✓ Use the Pythagorean Theorem
- ✓ Use properties of congruent or similar geometric objects
- ✓ Solve geometric problems using the properties of basic geometric figures (including triangles, quadrilaterals, polygons, and circles)
- ✓ Determine angles in the plane (using properties of intersecting lines, parallel lines, and perpendicular lines)
- ✓ Identify and plot points on the number line
- ✓ Identify and plot points in the coordinate plane
- ✓ Plot points on the graph of a function determined by an algebraic expression
- ✓ Graph linear functions in one variable
- ✓ Graph quadratic functions in one variable
- ✓ Relate basic information about a function to features of its graph (e.g., linearity, positivity or negativity, increasing or decreasing)
- ✓ Find the length or midpoint of a line segment in the coordinate plane

Scores on the ELM Placement Test

The ELM placement test consists of 50 multiple-choice questions. The reported score will be based on 45 of these questions. The remaining five questions are being field tested for possible use on future tests. The ELM is scored on a scale of 0-80. All scores are reported as even numbers on this scale. The passing scaled score is 50. The ELM is reviewed regularly, and new editions are developed several times each year. Therefore, the questions on one edition of the test are not identical to those on another. However, steps are taken to ensure that each edition represents the same level of difficulty. The inevitable slight differences in difficulty between one edition of the test and another are accommodated through the statistical practice of equating the scores to the ELM scale. A scaled score earned by taking any given ELM test administered on or after March 23, 2002, indicates the same level of proficiency as the same scaled score earned by taking any other given ELM test administered on or after that date. A scaled score earned on the ELM placement test before the March 23, 2002, administration cannot be compared to a scaled score earned by taking the ELM placement test on or after that date and cannot be used for placement. The score that determines proficiency on the new scale was recommended by a panel of expert judges chosen from faculty in mathematics and related departments throughout the CSU.

How the ELM Placement Test is Used

The ELM placement test must be taken by all nonexempt students before they can enroll in the CSU. Students receiving a total scaled score of 50 or above may enroll directly in a baccalaureate quantitative reasoning course. Students receiving a total scaled score below 50 are typically required to take developmental coursework. Campuses have the option of permitting students who score below 50 to take the ELM placement test again after participating in a self-study course or a guided tutorial.

The Early Start Initiative

The CSU has enacted the Early Start Program (ESP) requiring incoming students who do not demonstrate readiness for college level math and/or English to begin remediation during the summer before coming to the CSU. The goals of the ESP are to better prepare students in math and English before their first semester, thereby decreasing the time toward graduation. More information is available at: http://www.csumathsuccess.org/teachers/early_start

The Graduation Initiative

The CSU adopted the Graduation Initiative in 2010 with the goal of increasing the system's graduation rates by eight percent by 2016. Involving all 23 CSU campuses, the *Graduation Initiative* encourages campuses to establish graduation targets and to close the Under Represented Minority achievement gap through a series of carefully planned activities. More information is available at: http://graduate.csuprojects.org/

Questions about the ELM Placement Test

Q. Is this an admission test?
A. No. The ELM is a placement test designed to determine a student's proficiency in mathematics and is taken after a student has been admitted. The results of the placement test will not affect a student's admission to any CSU campus.

Q. When is the ELM placement test given?
A. The ELM placement test is given periodically throughout the year. There are three systemwide administration dates, when the placement test is given on all campuses. Students should take the exam no later than the March date of the year they are entering the University. Systemwide and campus dates are published each year and are included in materials sent to applicants. Information about test dates and test registration can be obtained from testing offices on CSU campuses. A full listing of campus test dates is available online at http://www.ets.org/csu/test_administration/dates/.

Q. Suppose a student has scored 550 on the math part of the SAT. Does the student still need to take the ELM placement examination?
A. No. Anyone who scores "College Ready" on the EAP test; 550 or above on the mathematics section of the College Board SAT Reasoning Test; 550 or above on the Mathematics Level of the College Board SAT Subject Tests™; 23 or above on the ACT Math test; or 3 or above on an AP mathematics test (Calculus AB, Calculus BC, or Statistics) demonstrates proficiency in mathematics and is exempt from the ELM placement test. Students may also be exempt through transferred coursework. See pages 2 and 3 of this publication for more details.

Q. What about the CSU/UC Mathematics Diagnostic Testing Project (MDTP) tests? Does a student who does well on these tests have to take the ELM placement test?
A. Yes. The MDTP tests are diagnostic tests while the ELM examination is a placement examination. However, the MDTP tests are rigorous, and a student who scores well on the MDTP Intermediate Algebra examination should do well on the ELM placement test.

Q. What should students do who are uncertain whether they are required to take the ELM placement test?
A. Admissions Office or Test Office staff at the campus the student plans to attend will be able to answer questions about testing requirements and procedures.

Q. May students use calculators during the ELM placement test?
A. No. Calculators are not allowed for the ELM placement test. The questions on the ELM do not require involved computation. Rather, the placement test includes problems that emphasize quantitative reasoning and problem solving.

Q. Why is math being tested?
A. With science and technology playing an increasingly important role in our society, all college-bound students must have an adequate grasp of mathematics. More and more undergraduate majors require some proficiency in math, and many require either statistics or calculus or both. These majors include agricultural science and management, business administration, economics, engineering, environmental sciences, medical physics, nursing, physical sciences, psychology, and pre-medical/pre-dental programs. Those students in less quantitative majors will also find

themselves called upon in their professions and their personal lives to use effective quantitative reasoning and should, as college graduates, demonstrate a capacity to do so.

Q. How does this placement test relate to the graduation requirements of a campus?
A. Basic mathematics provides the necessary background for the CSU general education quantitative reasoning requirement which consists of a course at the level of college algebra or higher. Such a course is required for graduation from the California State University. Successful completion of the ELM requirement is prerequisite to that course. The placement test is designed to help CSU campuses offer students the help they may need. A low score on the ELM means that a student probably needs extra help in order to do well in general education courses that require entry-level mathematics skills. Students will be placed in appropriate developmental programs during the first term of enrollment and must demonstrate competence at the end of the first year of enrollment.

Q. How should a student prepare for the placement test?
A. The CSU makes available a variety of ELM preparation materials free to students at the CSU Math Success website found at http://www.csumathsuccess.org/exam_prep. Studies have shown that students who do not continue to use the math they have learned may have difficulty recalling simple principles. An algebra review text or learning assistance center may be helpful in preparing for the placement test.

Q. Should a student who has completed at least three years of math in high school be ready for college-level math?
A. Yes. But students who have not had recent practice using their math skills will still benefit from a review. All students are encouraged to take mathematics in their senior year of high school.

Q. What happens if a student does not demonstrate proficiency on the ELM?
A. Students who do not demonstrate proficiency on the ELM placement test will be required to participate in the Early Start Program (ESP) the summer before the freshman term. Students who do not achieve a score of 50 or higher on the ELM should contact the campus regarding options for ESP. More information regarding the ESP can be found at:
http://www.csumathsuccess.org/teachers/early_start

Q. Do students who receive a low score have to pay for extra help?
A. Yes, students who need to participate in ESP may need to pay fees in order to complete the program. Please contact your college admissions office to discuss your options for completing the ESP.

Q. What services are available for students who receive a low score on the ELM?
A. Each campus offers different services for students who need help in basic mathematics. For example, some campuses offer pre-baccalaureate courses in the mathematics department while others have established developmental education courses in the continuing education program. Some campuses offer tutorial programs using graduate students and peer tutors. Some campuses have modularized programs, structured to parallel topics covered by the ELM placement test; others use programmed instruction, especially using interactive computers. Some campuses use modules that review specific topics that may be taken as directed study to prepare for courses in quantitative reasoning. A few campuses offer review courses for ELM preparation in continuing education programs. Finally, many campuses have well-developed learning assistance centers that are able to assist students.

Q. What happens if a student is out of the country on the first test date available?
A. Student should take the placement test at their first available opportunity. It is to a student's advantage to take the placement test as soon as possible. All students **must** take the placement test before enrollment will be permitted.

Q. Does a student have to take the test at the campus the student plans to attend?
A. No. A student may take the test at any CSU campus. The resulting score will be sent to the appropriate campus.

Q. How do students receive their placement test scores?
A. Test scores are mailed to the address provided by the student on the day of the test. Students are also asked on the day of the test to establish a PIN which will allow them to retrieve their scores on line.

Q. How long are ELM testing materials and scores retained by ETS?
A. ETS retains answer sheets and test books for 18 months. Although answer sheets (not test books) are available for review at the ETS office in Concord, they may not be returned to students. ELM scores are retained by ETS for the life of the program and are available from 1983 to the present.

The CSU/UC Mathematics Diagnostic Testing Project

Since 1978 the California State University and the University of California have jointly funded the development of a series of mathematics diagnostic tests. The group writing the tests includes high school, university, and community college faculty. Tests are available free of charge to test skills in pre-algebra, elementary and intermediate algebra, and pre-calculus. Scoring and interpretation services are provided by regional MDTP service sites. Scores are reported only to teachers in order to ensure that the tests are used solely for diagnosis and improvement of classroom instruction.

More information about this program can be obtained by contacting:

Donna M. Ames
University of California,
San Diego 9500 Gilman Dr.-0112
La Jolla, CA 92093-0112
Phone: (858) 534-4519
Fax: (858) 534-9058 (Attn: Donna Ames)
Email: mdtp@ucsd.edu

The web site is http://mdtp.ucsd.edu

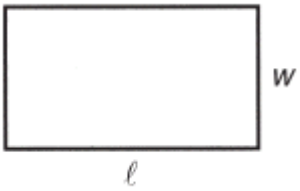
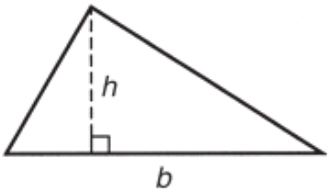
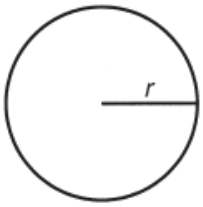
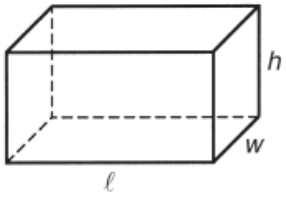
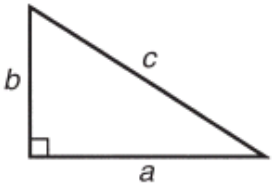
Appendix A

CSU Mathematics Placement Test

Sample Problems

CALIFORNIA STATE UNIVERSITY
ENTRY LEVEL MATHEMATICS TEST

Geometry Reference Formulas

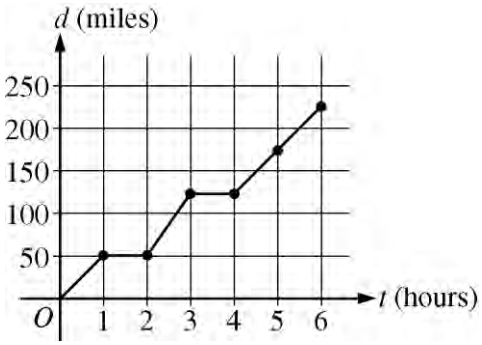
Rectangle  	Area = ℓw Perimeter = $2\ell + 2w$
Triangle  	Area = $\frac{1}{2}bh$
Circle  	Area=πr^2 Circumference=$2\pi r$
Rectangular Solid  	Volume = ℓwh
Right Circular Cylinder  	Volume=$\pi r^2 h$
Pythagorean Theorem  	$c^2 = a^2 + b^2$

Sample ELM Problems

Following are samples of the types of problems appearing on the ELM examination. This collection does not include every kind of question that might be asked, but the problems are typical in the way they examine the relevant skills and competencies that are listed in Table 1 on page 3. The answers appear on page 26.

Directions: Solve each of the following problems. You may use the blank space for scratchwork.

Notes: (1) Unless otherwise specified, the denominators of algebraic expressions appearing in these problems are assumed to be nonzero.
(2) Figures that accompany problems are drawn as accurately as possible EXCEPT when it is stated that a figure is not drawn to scale.
(3) The Geometry Reference Formulas appearing on the previous page will be printed inside the front cover of the ELM test book.



1. In the graph above, d represents the distance, in miles, that a motorist has traveled after t hours on the road. How many hours did it take the motorist to travel 200 miles?

   (A) 4.0 (B) 4.5 (C) 5.0 (D) 5.5 (E) 6.0

   Topic — Represent and understand data

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2. $\left(3x^3y\right)\left(-2x^2y^3\right) =$

   (A) $-6x^5y^4$ (B) $-6x^6y^3$ (C) xy^{-2} (D) x^6y^3 (E) $6x^5y^3$

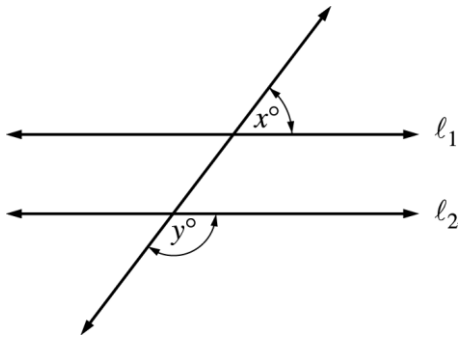
   Topic — Simplify algebraic expressions

---

3. A theater has 25 rows, each with 12 seats. At a certain performance there were, on average, 3 empty seats per row. What was the attendance at that performance?

(A) 225 (B) 264 (C) 297 (D) 300 (E) 375

Topic — Carry out basic arithmetic calculations



4. In the figure above, ℓ_1 is parallel to ℓ_2 and $y = 127$. What is the value of x ?

(A) 37 (B) 45 (C) 53 (D) 60 (E) 63

Topic — Determine angles in the plane

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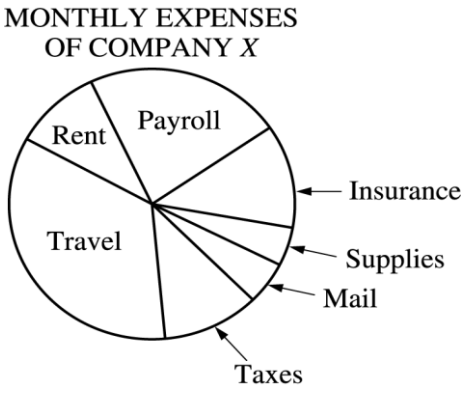
5. If $b = 6$ and $h = 10$, then $\frac{1}{2}bh =$

(A) 8 (B) 15 (C) 16 (D) 30 (E) 60

Topic — Evaluate algebraic expressions



6. Which of the categories shown in the graph above accounts for approximately one-third of Company *X*'s expenses?

   A) Insurance (B) Payroll (C) Rent (D) Travel (E) Taxes

   Topic — Represent and understand data

---

7. If $4x - 5 = 18 - 7x$, then $x =$

   (A) $-\frac{13}{3}$ (B) $\frac{13}{11}$ (C) 2 (D) $\frac{23}{11}$ (E) $\frac{23}{3}$

   Topic — Solve linear equations

---

8. $(2x + 1)(x + 3) =$

   (A) $3x + 4$ (B) $2x^2 + 3$ (C) $2x^2 + 7x + 3$ (D) $6x^2 + 5x + 1$ (E) $9x^3$

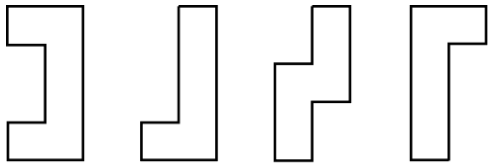
   Topic — Perform polynomial arithmetic

---

9. A certain medicine is prescribed in an amount proportional to a patient's body weight. If a patient weighing 70 kilograms requires 210 milligrams of this medicine, then the amount of medicine required for a patient weighing 80 kilograms is

(A) 220 mg (B) 230 mg (C) 240 mg (D) 250 mg (E) 290 mg

Topic — Interpret and use ratio and proportion



10. Which of the figures above are congruent?

(A) I and II
(B) I and III
(C) I and IV
(D) II and III
(E) II and IV

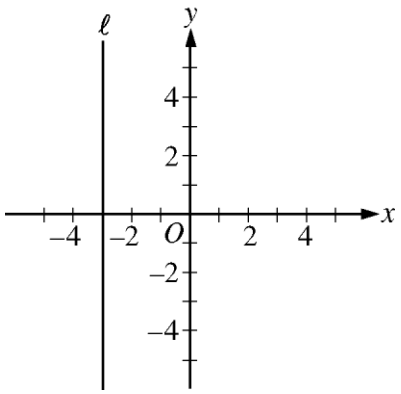
Topic —Use properties of congruent geometric objects

---

11. $\frac{5t^2 - 30t}{5t} =$

(A) $-29t$ (B) $t - 6$ (C) $t + 6$ (D) $5t^2 - 6$ (E) $5t^2 + 6$

Topic — Simplify algebraic expressions



12. Which of the following is an equation of line ℓ in the figure above?

(A) $x + y = -3$ (B) $x = -3$ (C) $x = -3y$ (D) $y = -3$ (E) $y = -3x$

Topic — Graph linear functions

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13. $x^{-2} =$

(A) $\frac{1}{x^2}$ (B) $\sqrt{x}$ (C) $-x^2$ (D) $x^{\frac{1}{2}}$ (E) $x^{-\frac{1}{2}}$

Topic —Simplify algebraic expressions

---

14. If $3x - d = c$, then $x =$

(A) $c + d - 3$ (B) $d + \frac{c}{3}$ (C) $\frac{d - c}{3}$ (D) $\frac{c - d}{3}$ (E) $\frac{c + d}{3}$

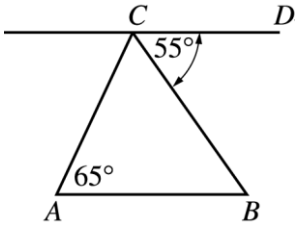
Topic — Solve linear equations

---

15. One factor of $x^2 + 2x - 8$ is

(A) $x - 1$ (B) $x - 2$ (C) $x - 4$ (D) $x - 6$ (E) $x - 8$

Topic — Perform polynomial arithmetic



16. In the figure above, CD is parallel to AB. What is the measure of $\angle ACB$?

(A) 25° (B) 35° (C) 60° (D) 120° (E) 125°

Topic — Determine angles in the plane

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17. If the point $(2, 4)$ is on the line $y = 6x + b$, then $b =$

(A) –22 (B) −8 (C) 12 (D) 16 (E) 26

Topic — Plot points on the graph of a function

---

18. An apple falling from a tree is h feet above the ground t seconds after it begins to fall, where $h = 64 - 16t^2$. After how many seconds will the apple hit the ground ($h = 0$) ?

(A) 1 (B) 2 (C) 4 (D) 8 (E) 48

Topic — Solve problems modeled by quadratic equations

---

19. If $\sqrt{x - 1} = 4$, then $x =$

(A) 3 (B) 9 (C) 15 (D) 17 (E) 25

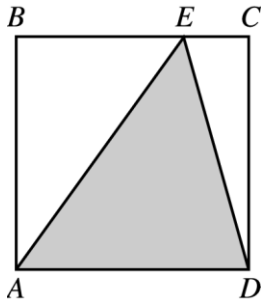
Topic — Solve rational equations

---

20. If $\begin{cases} 2x + 3y = 6 \\ x = -2y + 5, \end{cases}$ then $y =$

(A) −4 (B) −2 (C) −1 (D) 2 (E) 4

Topic — Solve systems of linear equations



21. The area of square $ABCD$ in the figure above is 64. What is the area of the shaded triangle AED ?

(A) 16 (B) 24 (C) 28 (D) 30 (E) 32

Topic — Find area

---

22. The operating budget of the Western Robotics Company was $300 million last year. If the operating budget this year is 12 percent less than last year, what is this year's operating budget, in millions of dollars?

(A) $36 (B) $264 (C) $274 (D) $288 (E) $336

Topic — Use percent

---

23. In the coordinate plane, which of the following is the midpoint of the line segment with endpoints $(2, 5)$ and $(6, 1)$?

(A) $(8, 6)$ (B) $(4, 3)$ (C) $(4, 4)$ (D) $\left(\frac{7}{2}, \frac{7}{2}\right)$ (E) $\left(\frac{3}{2}, \frac{5}{2}\right)$

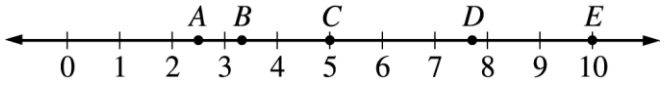
Topic — Find midpoint of a line segment

Player	Weight (in pounds)
R	270
S	230
T	240
U	?

24. If the average weight of the four players listed in the table above is 250 pounds, what is the weight, in pounds, of Player *U* ?

(A) 220 (B) 230 (C) 240 (D) 250 (E) 260

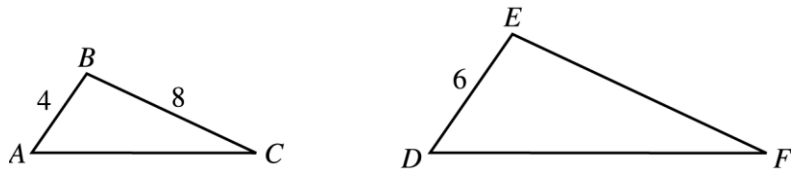
Topic — Calculate the arithmetic mean



25. Which point on the number line above could represent $\sqrt{10}$?

(A) *A* (B) *B* (C) *C* (D) *D* (E) *E*

Topic —Estimate square roots



26. Triangles *ABC* and *DEF* in the figure above are similar. What is the length of *EF* ?

(A) 4 (B) 6 (C) 8 (D) 12 (E) 16

Topic — Use properties of similar geometric objects

---

27. The ratio of the number of boys to the number of girls in an algebra class is 4 to 5. If there are 45 students in the class, how many are girls?

(A) 11 (B) 20 (C) 25 (D) 36 (E) 41

Topic — Interpret and use ratio and proportion

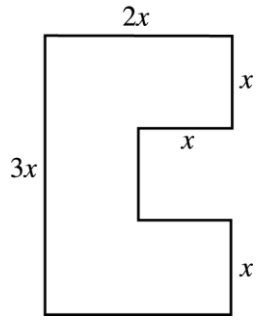
ENROLLMENT AT CENTRAL COLLEGE

Freshmen	1,816
Sophomores	1,473
Juniors	1,431
Seniors	1,298

28. According to the table above, which of the following best approximates the total enrollment at Central College?

(A) 1,800 + 1,400 + 1,400 + 1,200
(B) 1,800 + 1,400 + 1,400 + 1,300
(C) 1,800 + 1,500 + 1,400 + 1,300
(D) 1,900 + 1,500 + 1,400 + 1,300
(E) 1,900 + 1,500 + 1,500 + 1,300

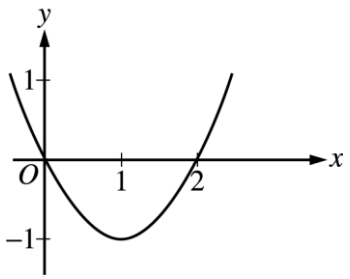
Topic —Use estimation appropriately



29. What is the perimeter of the figure above if all intersecting line segments meet at right angles?

(A) $6x$ (B) $8x$ (C) $10x$ (D) $11x$ (E) $12x$

Topic — Find perimeter



30. The figure above shows the graph of $y = f(x)$. What are all values of x for which $f(x) > 0$?

(A) $x < 0$ (B) $x > 1$ (C) $x > 2$ (D) $0 < x < 2$ (E) $x < 0$ or $x > 2$

Topic — Relate basic information about a function to features of its graph

---

31. The inequality $-3x < 5$ is equivalent to

(A) $x < -15$ (B) $x < -\frac{5}{3}$ (C) $x > -15$ (D) $x > -\frac{5}{3}$ (E) $x > -\frac{3}{5}$

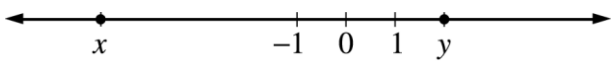
Topic — Solve linear inequalities

---

32. Marshall is making corn bread. His recipe calls for $3\frac{1}{2}$ cups of cornmeal, but he wants to make only half the amount given in the recipe. How many cups of cornmeal should he use?

(A) $1\frac{1}{4}$ (B) $1\frac{1}{2}$ (C) $1\frac{3}{4}$ (D) 5 (E) 7

Topic — Solve problems involving fractions



33. Which of the following must be true about the numbers x and y graphed on the number line above?

I. $x + y > 0$
II. $y - x > 0$
III. $xy > 0$

(A) I only (B) II only (C) III only (D) II and III only (E) I, II, and III

Topic — Evaluate the reasonableness of a solution

---

34. Which of the following numbers is between 3.74 and $3\frac{4}{5}$?

(A) $3\frac{9}{10}$ (B) 3.72 (C) 3.82 (D) $3\frac{1}{2}$ (E) $3\frac{3}{4}$

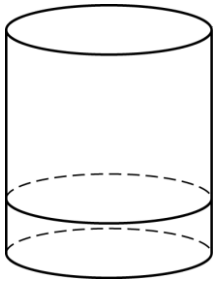
Topic — Compare and order rational numbers

---

35. The sale price of Kathy's new coat was reduced 30% from the original price of \$80. What was the sale price of the briefcase?

(A) \$30 (B) \$40 (C) \$50 (D) \$56 (E) \$104

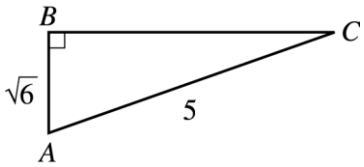
Topic —Use percent



36. The figure above shows a right circular cylindrical vessel that is exactly one-quarter full. If 7 liters of liquid are added, the vessel will be exactly three-fifths full. What is the total capacity of the vessel, in liters?

(A) 14 (B) 20 (C) 21 (D) $\frac{9\pi}{20}$ (E) 21π

Topic — Solve problems involving fractions



37. In right triangle ABC above, $BC =$

(A) $5 - \sqrt{6}$ (B) $\sqrt{19}$ (C) $\sqrt{31}$ (D) $5 + \sqrt{6}$ (E) 4

Topic — Use the Pythagorean Theorem

---

38. $\frac{a}{b} + \frac{b}{a} =$

(A) 1 (B) $\frac{ab}{a+b}$ (C) $\frac{a+b}{ab}$ (D) $a^2 + b^2$ (E) $\frac{a^2+b^2}{ab}$

Topic — Perform arithmetic operations involving rational expressions

---

39. What is the slope of the line through the points $(2, 1)$ and $(4, 2)$?

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

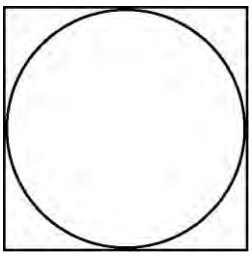
Topic — Find and use slopes and intercepts of lines

---

40. This year José earned 3 times as much money as he earned last year. If José earned T dollars this year and he earned L dollars last year, which of the following equations represents the relationship between T and L ?

(A) $3L = T$ (B) $\frac{L}{3} = T$ (C) $T \times L = 3$ (D) $\frac{L}{3} = \frac{T}{3}$ (E) $\frac{L}{3} = \frac{3}{T}$

Topic — Express relationships among quantities



41. If the area of the square shown above is 36, what is the area of the inscribed circle?

(A) 6 (B) 36 (C) 6π (D) 9π (E) 36π

Topic — Find area

HISTORY TEST SCORES

Test 1	82
Test 2	71
Test 3	93
Test 4	88
Test 5	86

42. Dan's scores on 5 history tests are given in the table above. What is the median of Dan's scores?

(A) 82 (B) 84 (C) 86 (D) 88 (E) 93

Topic — Calculate the median

---

43. $\sqrt{24}$ is a number between

(A) 0 and 1 (B) 1 and 2 (C) 2 and 3 (D) 3 and 4 (E) 4 and 5

Topic — Estimate square roots

---

44. A line ℓ with slope 2 passes through the origin. Which of the following is a point on line ℓ ?

(A) $(2, 4)$ (B) $(2, 2)$ (C) $(2, 1)$ (D) $(2, -1)$ (E) $(2, -4)$

Topic — Find and use slopes and intercepts of lines

45. In the picture above, the perimeter of the starfish is 30 centimeters. This original picture is to be enlarged in both dimensions to an image that is similar to the original picture. If the area of the enlarged image is 9 times the area of the original picture, what is the perimeter in centimeters of the starfish in the enlarged image?

    (A) 30 (B) 90 (C) 180 (D) 270 (E) 2,430

    Topic — Calculate the ratio of corresponding geometric measurements of similar figures

---

46. A stack of three cubes of the same size has a volume of 24 cubic inches. What is the length, in inches, of an edge of one of the cubes?

    (A) 2 (B) $\frac{8}{3}$ (C) 3 (D) 8 (E) $2\sqrt{2}$

    Topic — Find volume

---

47. An investment company advertised that last year its clients, on average, made a profit of 9%. Which of the following claims can legitimately be made, based on that information?

    (A) All of their clients made a profit of at least 9% last year.
    (B) At least one of their clients made a profit of at least 9% last year.
    (C) Some of their clients will make a profit of at least 9% this year.
    (D) All of their clients will make a profit of at least 9% this year.
    (E) If a person becomes one of their clients, that person will make a profit of at least 9% each year.

    Topic — Distinguish between reasonable and unreasonable claims

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WEATHER BALLOON TEMPERATURES

Height	Temperature
1,000 ft.	23°
2,000 ft.	20°
3,000 ft.	17°

48. A weather balloon is released and as it rises in the air it records the temperature, in degrees Celsius, as shown in the table above. If the temperature continues to decrease at a constant rate, the temperature at 5,500 feet will be

(A) 12.5° (B) 11° (C) 9.5° (D) 8° (E) 6.5°

Topic — Use constant rates

---

49. How many dollars will x pens cost if 5 such pens cost y dollars?

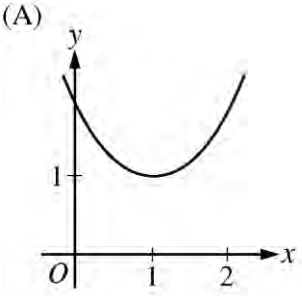
(A) $\frac{xy}{5}$ (B) $\frac{5}{xy}$ (C) $5xy$ (D) $\frac{y}{5x}$ (E) $\frac{x}{5y}$

Topic — Interpret and use ratio and proportion

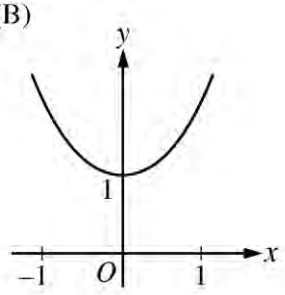
---

50. Which of the following is the graph of $y = x^2 + 1$?

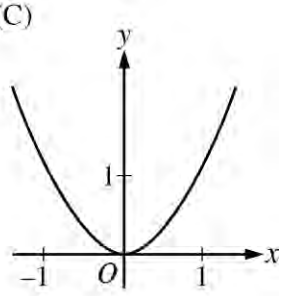
(A)



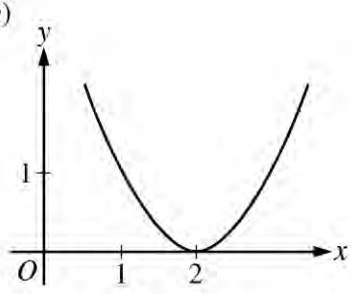
(B)



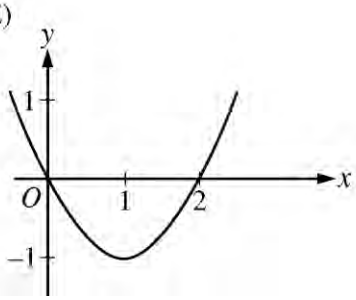
(C)



(D)



(E)



Topic — Graph quadratic functions

Answer Key to Sample Problems

1. D	6. D	11. B	16. C	21. E	26. D	31. D	36. B	41. D	46. A
2. A	7. D	12. B	17. B	22. B	27. C	32. C	37. B	42. C	47. B
3. A	8. C	13. A	18. B	23. B	28. C	33. B	38. E	43. E	48. C
4. C	9. C	14. E	19. D	24. E	29. E	34. E	39. D	44. A	49. A
5. D	10. E	15. B	20. E	25. B	30. E	35. D	40. A	45. E	50. B

Appendix B: Sample Score Report and Interpretation of Results

SAMPLE

English Placement Test

What do my English Placement Test (EPT) scores mean?

The EPT Total Score is reported on a scale of 120-180. The CSU has determined that a Total Score of 147 or higher indicates that you are ready to undertake coursework that requires college-level writing. However, there may be some slight variation in the way campuses use scores to establish preparedness for college-level course work. You can find out what the campus of your choice does by consulting the campus catalog or course schedule.

Your EPT subscores may help your campus's writing faculty focus instruction where it is most needed. Essay subscores range from 1, the lowest score, to 6, the highest. A score of 0 means the essay did not address the assigned topic. Subscores in Reading Skills and Composing Skills are reported on the same scale (120-180) as the EPT Total Score.

If you took the EPT before January 13, 2008, essay subscores ranges were from 2, the lowest score, to 12, the highest.

Entry Level Mathematics Test

What do my Entry Level Mathematics (ELM) scores mean?

The ELM Total Score is reported on a scale of 0-80. The CSU has determined that a Total Score of 50 or higher indicates that you are ready to undertake college-level coursework in mathematics. However, there may be some slight variation in the way campuses use scores to establish preparedness for college-level coursework. You can find out what the campus of your choice does by consulting the campus catalog or course schedule.

For more information about EPT and ELM scores and what they mean, you can consult the EPT/ELM *Information Bulletin* at www.ets.org/csu.

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STUDENT ACADEMIC SERVICES

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