Dear Entering Student:

To help us ensure that you will find your work at Pacific Lutheran University rewarding, we ask that you provide us with information to determine which mathematics courses will be appropriate for you as an entering student.

The information you provide consists of two parts. The first part asks about your background and plans while attending PLU. It should only take a few minutes. The second part is a standard set of mathematics problems from the high school curriculum. Together the two parts are referred to as the math placement exam. Altogether, the placement exam takes one hour.

The placement exam covers high school algebra, analytic geometry and trigonometry. You do not need to answer the questions on subjects or topics you have not studied. If desired, you can review the material in previous mathematics courses before taking the exam.

You will need your PLU identification number. You will need plenty of blank scratch paper and pencil(s). You will not need a calculator.

When you are ready to take the exam, visit https://banweb.plu.edu and select Math Placement Evaluation link on the main menu. Next, scroll to the bottom of the online letter, and click the “Click here to begin the placement exam” button found there. You can begin answering questions while the page is loading. Alternatively, you may print this Math Placement Exam document, complete the exam as prescribed, then transcribe your responses to the web page.

To ensure that your placement is as accurate as possible, please allow yourself one hour when you will be as free from interruptions as possible. Please pretend that you are taking a regular closed book exam. Do not look at the mathematics questions before you begin. Do not use a calculator or books. Do not ask anyone to explain questions you do not understand or help you work a problem. Do not guess at questions that you do not know how to work. Please remember: the only purpose of this exam is to determine the classes in which you can be successful.

When you are finished please carefully recheck to make sure you have filled in your PLU identification number at the beginning and that your answers are the ones you want. Answers to the survey and mathematics questions are initially set to “no response”. If you answer a question and wish you had not, you can always reselect “no response”.


It is our hope and desire that you will find your work at Pacific Lutheran University rewarding. The placement exam is part of our effort to insure that this will be the case.

Sincerely,

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S1. Which best describes the most advanced math class you will have completed before coming to PLU (do not include computer science)?

A. calculus
B. pre-calculus, mathematical analysis, or a 4th year of integrated math
C. trigonometry, combined college algebra and trigonometry, or a 3rd year of integrated math
D. second year algebra, college algebra, or a 2nd year of integrated math
E. less than two years of algebra or less than 2 years of integrated math

Response:

S2. Where did you take the class described in survey question 1?

A. high school in the USA
B. two year college in the USA
C. PLU
D. other college or university in the USA
E. outside the USA

Response:

S3. When did you take or will you take the class described in survey question 1?

A. between now and arriving at PLU or within the last 12 months
B. 1 year ago
C. 2 years ago
D. 3 to 5 years ago
E. more than 5 years ago

Response:

S4. What grade did you receive (or do you expect to receive) in the class described in survey question 1?

A. A
B. B
C. C
D. D
E. failure

Response:
S5. How much trigonometry have you studied? (Include any class you are taking now).
   A. none at all 
   B. less than a semester 
   C. a full semester 
   D. more than semester 
   Response:

S6. How much calculus (limits, derivatives and integrals) have you had (include the class you are taking now, if any)?
   A. a full year of AP (Advanced Placement) Calculus (BC exam) or higher level IB (International Baccalaureate) Calculus
   B. a full year of AP (Advanced Placement) Calculus (AB exam) or lower level IB Calculus
   C. a full year course which was not an AP (Advanced Placement) class
   D. one semester or less
   E. none at all
   Response:

S7. Have you taken or do you expect to take an AP Calculus exam?
   A. Yes, the AB exam
   B. Yes, the BC exam
   C. No
   Response:

S8. Have you taken or do you expect to take AP Statistics
   A. No
   B. Yes, the class but not the exam
   C. Yes, the class AND the exam
   Response:

S9. Which of the following best describes the field in which you are likely to major?
   A. English or foreign language, religion, philosophy, music, communication arts, art, nursing, or history.
   B. Physical education
   C. Elementary education, or secondary education with a concentration in something other than math or science
   D. Secondary education with a math or science concentration
   E. Sociology, psychology, anthropology or political science
   F. Business administration
   G. Biological sciences or earth sciences
   H. Mathematics, computer science, physics, engineering, or chemistry
   I. Economics
   J. I am undecided
   Response:
S10. On the basis of your interest, aptitude and preparation in which course do you think you should enroll?

A. Third semester (multivariable) Calculus (Math 253)  
B. Second semester Calculus (Math 152)  
C. Beginning Calculus (Math 151)  
D. Pre-calculus (Math 140)  
E. Math for Business Majors (Math 128)  
F. Math for Elementary Education Majors (Math 123)  
G. Trigonometry (Math 112)  
H. College Algebra (Math 111)  
I. Mathematics of Personal Finance (Math 105) or Mathematical Explorations (Math 107)  

Response:

S11. How many mathematics classes do you plan to take in college?

A. more than 2 semesters.  
B. two semesters  
C. one semester  
D. none  

Response:

S12. Which of the following most closely reflects your reasons for planning to take a math class at PLU?

A. Mathematics is important to my major and is particularly interesting  
B. Mathematics in important to my major  
C. Mathematics is particularly interesting  
D. To fulfill requirements, but I am interested in mathematics  
E. Just to fulfill requirements  

Response:

S13. Which of the following best describes your feelings about taking a math class.

A. very confident  
B. fairly confident  
C. neither nervous nor confident  
D. somewhat nervous and anxious  
E. very nervous and anxious  

Response:
Taking the Mathematics Placement Test

**Online users:**

Arrange for a solid hour of your time during which you may take the test without being interrupted.

1. Print a copy of this booklet (recommended) and enter the letter of your response in the space provided next to each question.
2. Indicate only one response per question.
3. Use of calculators, books, or help from other sources is allowed.
4. Select the "no response" radio button for any questions that cover material you have not studied. Random guessing may result in incorrect placement.
5. Limit yourself to **60 minutes** on the test.
6. When you are ready, turn to page 7, and do as well as you can **without guessing** on the test.

**When you have finished**

1. Connect to the Internet.
2. In the address line of an open browser, enter the following URL: https://banweb.plu.edu/pls/pap/hxskmplc.P_MathIntro
3. Enter your PLU ID (or Social Security number, if you do not know your PLU ID) and click the "Continue" button.
4. After verifying your ID, carefully transcribe your responses from your printed exam to the math placement form provided.
5. Click the "Submit" button **one time** to end all input. Your browser will be directed to a page confirming that your responses have been received.
6. If you downloaded any copies of this document, please remove them from your computer at this time.
7. Within two weeks, you should receive your placement letter, which will include a recommendation based on an evaluation of your responses.
8. Your receipt of your placement letter verifies that we have received and processed the data you submitted. Please destroy all printed copies of the placement exam.
T1. Solve for $x$: $\frac{6}{15} = \frac{2}{x}$

A. 5  B. $\frac{1}{5}$  C. $\frac{4}{5}$  D. 11  E. none of these  Response:

T2. $\frac{3 \div 5}{5 \div 3} =$

A. 1  B. $\frac{34}{15}$  C. $\frac{9}{25}$  D. $\frac{11}{3}$  E. none of these  Response:

T3. For $f(x) = 3x^2 - 4x$ find $f(-2)$

A. -4  B. 4  C. 8  D. 20  E. none of these  Response:

T4. $\frac{a}{b} = \frac{c}{b}$

A. $\frac{ac}{b^2}$  B. $-\frac{ac}{b^2}$  C. $\frac{a}{c}$  D. $-\frac{a}{c}$  E. none of these  Response:

T5. $7x - 3(x - y) - y =$

A. $2(2x - y)$  B. $4(x - y)$  C. $2(2x + y)$  D. $4x$  E. none of these  Response:

T6. Solve for $x$:

$x + a = 2x + 2a - b$

A. $b - 3a$  B. $-b + 3a$  C. $b - a$  D. $\frac{1}{3}(b - 3a)$  E. $\frac{1}{3}(-b + 3a)$  Response:

T7. If $\frac{1}{x} = \frac{1}{3} + \frac{1}{5}$, then $x =$

A. 8  B. 15  C. $\frac{1}{8}$  D. $\frac{8}{15}$  E. $\frac{15}{8}$  Response:
T8. Solve for $x$: \[ \frac{x + 5}{x - 6} = \frac{3}{4} \]

A. 2 \quad B. -38 \quad C. \frac{35}{3} \quad D. \frac{2}{7} \quad E. none of these  

Response:

T9. Solve for $x$: \[ x^2 - 2x - 15 = 0 \]

A. -3 and 5 \quad B. 5 \quad C. 2 \quad D. -3 \quad E. 3 and -5

Response:

T10. The slope of the line $3x + \frac{1}{2}y = 4$ is

A. 3 \quad B. \frac{1}{2} \quad C. -6 \quad D. 8 \quad E. none of these

Response:

T11. \[ \frac{1}{x} + \frac{2}{x+2} = \]

A. $\frac{3x+2}{x(x+2)}$ \quad B. $3x+2$ \quad C. $\frac{2}{x}$ \quad D. $\frac{3}{2x+2}$ \quad E. none of these

Response:

T12. \[ \left( \frac{y^2 + 5y - 24}{y^2 - 25} \right) \left( \frac{y - 5}{y - 3} \right) = \]

A. $\frac{8}{5}$ \quad B. $\frac{y - 8}{y - 3}$ \quad C. $\frac{y + 8}{y + 5}$ \quad D. $\frac{y + 8}{y - 5}$ \quad E. none of these

Response:

T13. \[ \frac{1}{x+1} - \frac{x + 2}{x^2 - 1} = \]

A. $\frac{1}{x^2 - 1}$ \quad B. $\frac{x + 3}{x^2 - 1}$ \quad C. $\frac{2x + 1}{x^2 - 1}$ \quad D. $\frac{-3}{x^2 - 1}$ \quad E. none of these

Response:

T14. If $\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$, then $f =$

A. $p + q$ \quad B. $pq$ \quad C. $\frac{1}{p + q}$ \quad D. $\frac{p + q}{pq}$ \quad E. $\frac{pq}{p + q}$

Response:
T15. Solve for $x$ in the following system:

\[
\begin{align*}
2x + 3y &= 8 \\
2x + 4y &= 10
\end{align*}
\]

A. $x = 7$  
B. $x = \frac{31}{7}$  
C. $x = \frac{1}{7}$  
D. $x = 2$  
E. none of these  

Response:

T16. $\left(2x^2\right)^3 =$  

A. $2x^5$  
B. $2x^6$  
C. $8x^5$  
D. $8x^6$  
E. none of these  

Response:

T17. $\left(\frac{x^4}{x^2}\right)^2 =$  

A. $x^{12}$  
B. $x^8$  
C. $x^4$  
D. $x^{-4}$  
E. none of these  

Response:

T18. $\frac{x^3y}{x^2y^{-1}} =$  

A. $x^{-1}y^2$  
B. $\frac{y^2}{x^5}$  
C. $\frac{x^5}{y^2}$  
D. $x^{-5}y^2$  
E. none of these  

Response:

T19. $(x - y)^{-1} =$  

A. $y - x$  
B. $\frac{1}{x - y}$  
C. $\frac{1}{x} - \frac{1}{y}$  
D. $\frac{x - y}{xy}$  
E. none of these  

Response:

T20. $\sqrt{8x} - \sqrt{2x} =$  

A. $\sqrt{6x}$  
B. $\sqrt{2x}$  
C. $4x$  
D. $2\sqrt{x}$  
E. none of these  

Response:

T21. $\sqrt{50x^6y^8} =$  

A. $5\sqrt{2x^3}y^4$  
B. $25x^6y^8$  
C. $25x^3y^4$  
D. $5\sqrt{2x^4}y^6$  
E. $5x^3y^4$  

Response:

T22. $\frac{x + 1}{-2} > 3$ then:

A. $x < -7$  
B. $x > -7$  
C. $x > 5$  
D. $x < -5$  
E. none of these  

Response:
T23. If $2x + a < x + 2a - b$ then:
A. $x > a - b$  B. $x < 3a - b$  C. $x > 3a + b$  D. $x = 2a + b$  E. none of these
Response:

T24. Solve for $x$. $|x - 12| = 3$
A. 15  B. −15  C. 15 and −15  D. 9 and −9  E. 9 and 15
Response:

T25. If $x^2 < 4$ then:
A. $x < -2$  B. $x < 2$  C. $x > 2$  D. $-2 < x < 2$  E. none of these
Response:

T26. $\log_{10} 10000 =$
A. 1000  B. 100  C. 10  D. 4  E. 1
Response:

T27. If $\log 2 = 0.30$ and $\log 7 = 0.84$ then $\log \frac{7}{2} =$
A. 2.10  B. 0.42  C. 0.54  D. 1.14  E. 0.34
Response:

T28. Solve $I = \frac{E}{R + r}$ for $R$
A. $\frac{E - Ir}{I}$  B. $E - r$  C. $\frac{E}{2I}$  D. $\frac{E - r}{I}$  E. none of these
Response:

T29. The slope of the line in the figure at the right is:
A. $\frac{2}{5}$  B. $-\frac{2}{5}$  C. $\frac{5}{2}$  D. $-\frac{5}{2}$  E. none of these
Response:
T30. The slope for \( y = 4x - 3 \)

A. 3  B. \( \frac{1}{4} \)  C. 4  D. -3  E. none of these  Response:

T31. The \( y \) intercept of the line with the equation \( 2x + 3y + 9 = 0 \) is

A. 3  B. -3  C. 9  D. -9  E. none of these  Response:

T32. Which of the following best represents the graphic solution to this system of equations?

\[
\begin{align*}
x + 3y &= -5 \\
-2x + y &= -4
\end{align*}
\]

A.  
B.  
C.  
D.  
E. none of these  Response:

T33. A car is traveling at a constant speed of 40 miles per hour. How long does it take the car to travel 2 miles?

A. 20 seconds  B. 1 minute and 20 seconds  C. 2 minutes and 30 seconds  D. 3 minutes  E. none of these  Response:

T34. If the circumference of a circle is 10, then the area is:

A. 24  B. 25  C. \( \frac{25}{\pi} \)  D. \( \frac{100}{\pi} \)  E. none of these  Response:
T35. If \( f(x) = x^2 + 2 \), then \( f(x + h) = \)

A. \( x^2 + h^2 + 2 \)  
B. \( x^2 + 2xh + h^2 + 2 \)  
C. \( x^2 + 2h \)  
D. \( x^2 + h^2 + 4 \)  
E. none of these  

Response:

T36. The area of a triangle shaded on the right is:

A. \( \frac{9}{2} \)  
B. 9  
C. \( \frac{27}{2} \)  
D. 27  
E. none of these  

Response:

T37. Look at the graph of \( y = f(x) \) shown to the right. For what values of \( x \) is \( f(x) \geq 4 \)?

A. \( x = 4 \)  
B. \( x = 5 \)  
C. \( x \geq 2 \)  
D. \( x \geq 4 \)  
E. \( 2 \leq x \leq 5 \)  

Response:

T38. The box pictured to the right has a square base and a closed top. Express its surface area in terms of \( x \) and \( h \).

A. \( x^2 + 4xh \)  
B. \( 8x + 4h \)  
C. \( 4x + h \)  
D. \( hx^2 \)  
E. \( 2x^2 + 4xh \)  

Response:
T39. Which of the following graphs represents the graph of \( y = x^2 + 2 \)?

A.  

B.  

C.  

D.  

E. none of these

Response:

T40. Find the length \( z \) using the diagram at the right.

A. 2  

B. \( \sqrt{3} \)  

C. 3  

D. \( 2\sqrt{3} \)  

E. 6  

Response:

T41. Using the diagram of the previous problem, \( \cos A \) is

A. 2  

B. \( \frac{1}{2} \)  

C. \( \frac{3}{4} \)  

D. 0  

E. none of these  

Response:

T42. Let \( A \) be an arbitrary angle, then \( \cos^2 A + \sin^2 A = \)

A. 0  

B. \( \tan^2 A \)  

C. 2  

D. 1  

E. \( \sec^2 A \)  

Response:

T43. If \( \sin B = \frac{3}{5} \) and \( 0^\circ \leq B \leq 90^\circ \), then \( \cos B = \)

A. \( \frac{3}{4} \)  

B. \( -\frac{4}{5} \)  

C. \( \frac{3}{5} \)  

D. \( \frac{2}{5} \)  

E. none of these  

Response:
**T44.** Referring to the diagram at the right, \( \tan A \) is:

![Diagram](image)

A. \( \frac{3}{4} \)  
B. \( -\frac{3}{4} \)  
C. \( \frac{4}{3} \)  
D. \( -\frac{4}{3} \)  
E. none of these

Response:

**T45.** The value of \( \cos\left( -\frac{\pi}{2} \right) \)

A. \( \frac{1}{2} \)  
B. 0  
C. 1  
D. \( -\frac{1}{2} \)  
E. none of these

Response:

**T46.** If \( \sin A = -\frac{5}{13} \) and \( \cos A = \frac{12}{13} \), then \( \tan A \)

A. \( -\frac{5}{12} \)  
B. \( -\frac{12}{5} \)  
C. \( \frac{7}{13} \)  
D. \( \frac{12}{5} \)  
E. none of these

Response:

**T47.** \( \frac{3\pi}{2} \) radians is:

A. \( 90^\circ \)  
B. \( 120^\circ \)  
C. \( 225^\circ \)  
D. \( 270^\circ \)  
E. none of these

Response:

**T48.** The graph of \( y = \sin x \) is:

A.  
B.  
C.  
D.  
E. none of these

Response:

**NOTE TO ALL PLACEMENT EXAM TAKERS:** Please destroy all printed copies of the placement exam and remove any downloaded copies of the exam from your computer.

This test was created by the Department of Mathematics at Pacific Lutheran University in the spring of 1989 and revised in 1997