Course: Pre-Calculus
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Placement Exam Instructions

Scholé Academy administers placement exams in order to get to know each student and find the best learning environment for him or her, as we seek to educate our students well and wisely. Students should print and complete this placement exam to confirm proper placement in one of our online math courses. Complete all the problems WITHOUT using a calculator, and WITHOUT consulting any outside resources. Show ALL of your work neatly on a separate piece of paper, and make sure that each answer is clearly labeled and legible. This exam is a tool used to help our instructors get to know their students—perfection is not expected! If you have any questions about the exam content, you are welcome to reach out to the course instructor via email. The completed placement test should be scanned (no photographs, please!) and emailed to the course instructor, who will respond with placement confirmation. Please note that registration is not finalized until the student has submitted a placement exam and received confirmation of proper placement from the course instructor.

To be successful in pre-calculus students must have knowledge of the mathematics that precedes pre-calculus and be comfortable with: basic algebra and geometry. This placement test will assess your skills in each area.

Pre-Calculus Placement Test

ALGEBRA

1. Simplify the expression $\frac{x^2-y^2}{x^2-2xy+y^2}$

2. Find all values of x that satisfy $2x^2 - 4x + 1 = 0$

3. Solve for a and b where $3a - 2b = -5$ and $-2a + 3b = 15$.

4. In the equation $w = 3vu + q$, find the value of w when $q = -1$, $u = 2$, and $v = -3$

5. Solve for x in the equation
   a. $z = bx + cy$
   b. $|-2x + 5| = 7$
   c. $x^2 + 6x - 7 = 0$
   d. $7x - 3(x + 6) = -2$
   e. $3 \log_3 x = 3$
   f. $3^{x+1} = 27^{2x}$

6. Solve the system of equation $\begin{cases} x + y = 19 \\ 5x - y = 23 \end{cases}$

7. Find the value of $10x + 3y$ where $2x + 5y = 13$ and $6x - 7y = 11$

8. Find all values of x such that $\sqrt{x + 3} + \frac{3}{\sqrt{x+3}} = 4$

9. Solve the equation using the quadratic formula $x^2 + x - 3 = 0$

10. Solve the inequalities below

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    a. $-7x + 5 < -4x - 13$

    b. $\frac{3(x+7)}{5} > 2x$

PYTHAGOREAN THEOREM

11. Find the hypotenuse of a right triangle with legs of length 10 and 24.
12. Find the hypotenuse of a right triangle with legs of length 14 and 17.
13. Find the length of the shorter leg of a right triangle with hypotenuse of length 82 and longer leg of length 80.
14. If the hypotenuse of a right triangle has length 60 and one leg has length 45, find the length of the other leg.

BASICS OF COMPLEX NUMBERS

15. Find the value of each of the following
    a. The sum of $3 + 4i$ and $-9 + 2i$
    b. $(4 + 2i)(7 - 6i)$
    c. $\left(\sqrt{3} + i\right)^3$
    d. $|3 + 4i|$

COORDINATES AND GRAPHING

16. Write the equation for each line below.
    a. Write the equation for the line crossing the point $(0, -4)$ and with slope $= 2$
    b. The line crossing the points $(1, 1)$ and $(2, -1)$

17. Find the points of intersection of the graphs of $y = 3x^2 + x - 7$ and $y = 2x^2 + 6x - 13$
18. What is the equation of a circle centered at $(2, 2)$ with radius 5?
19. Graph each two variable equations below
    a. $y + x = 4$
    b. $y = -2x^2$
    c. $x^2 + y^2 = 9$

20. Points A, B, and C lie on a circle in that order so that the measure of arc $AB = 110°$ and the measure of arc $BC = 130°$. What is the measure in degrees of $\angle ABC$?
21. What is the measure of the angle formed by the minute and hour hands of a clock at 1:30?

FUNCTIONS

22. Find $f(-2)$ for the function $f(x) = 2x^2 - 8x$

23. Give the domain and range of function $y = x^2$
24. Given the functions $f(x) = x - 3$ and $g(x) = x^2 + 2$ find:
    a. $g(-2)$
    b. $f\big(g(1)\big)$
    c. $g^{-1}(x)$

SEQUENCE AND SERIES

25. Evaluate each of the following:
    a. $\sum_{k=1}^{10} 6k - 2$
    b. $\frac{1}{3} * \frac{2}{4} * \frac{3}{5} * \dots.. * \frac{38}{40}$

TRIGONOMETRY

26. Given the angle through the point (2, 6), find and simplify the values of the 6 trigonometric functions:
    a. $\sin(\theta)$
    b. $\cos(\theta)$
    c. $\tan(\theta)$
    d. $\cot(\theta)$
    e. $\sec(\theta)$
    f. $\csc(\theta)$