

ACCELERATED MATH IV SUMMER PACKET

DUE THE FIRST DAY OF SCHOOL

The problems in this packet are designed to help you review topics from previous mathematics courses that are essential to your success in Integrated Pre-Calculus Honors. **You are expected to bring this completed packet to class on the first day of school.** In addition, this packet will count as part of your first quarter grade. **Upon returning, you will be ASSESSED on the content of this packet.** All contents outlined in the packet are Integrated Math I objectives. Neatly **SHOW YOUR WORK** on a separate sheet of paper.

Find the maximum value or minimum value for the function.

1. $f(x) = -x^2 + 6x + 4$
2. You are enclosing a rectangular portion of your lawn with a limited amount of fencing. You want to maximize the amount of area enclosed by this amount of fencing. Find the ratio of length to width of the rectangle with maximum area. Describe the rectangle.

Find the zeros of the function.

3. $y = x^2 - 11x + 18$

Factor the expression.

4. $16x^2 - 25$

Solve.

5. $4x^2 - 12x - 16 = 0$
6. $42x^2 - 14x - 56 = 0$
7. Solve the equation. Round the solutions to two decimal places. $5x^2 - 2 = 7$
8. Simplify $\frac{\sqrt{6}}{4 + \sqrt{2}}$.
9. Solve the equation $(x + \sqrt{2})(x - \sqrt{2}) = 7$.
10. Solve the equation by completing the square.
 $x^2 - 4x - 2 = 0$

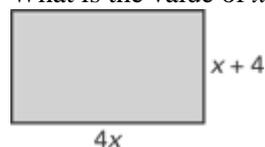
11. Solve the equation. $4 - 2x^2 = 12$

12. Solve the equation. $2x^2 - x + 2 = 0$

Write the quadratic equation in vertex form. Then identify the vertex.

13. $y = \frac{1}{2}x^2 - 2x + 10$

14. The area of the rectangle shown is 84 square units. What is the value of x ?



Factor the polynomial completely.

15. $m^5 + 216m^2$

16. $4x^3 - 8x^2 + 3x - 6$

17. $x^3 + 3x^2 - 4x - 12$

18. $4x^3 - 8x^2 - x + 2$

19. $x^8 - 81$

20. $x^4 - 13x^2 + 36$

Find the real-number solutions of the equation.

21. $x^3 - 5x^2 + 8x - 4 = 0$

22. $e^4 - 4e^2 + 3 = 0$

Given polynomial $f(x)$ and a factor of $f(x)$, factor $f(x)$ completely.

23. $f(x) = 2x^3 - 3x^2 - 8x - 3; x - 3$

Given polynomial function f and a zero of f , find the other zeros.

24. $f(x) = x^3 + 12x^2 + 48x + 64; -4$

List the possible rational zeros of the function using the rational zeros theorem.

25. $h(x) = -2x^4 - 5x^3 - 3x^2 + 7x + 2$

Find all real zeros of the function.

26. $h(x) = x^4 - 4x^3 - 9x^2 + 16x + 20$

Find all zeros of the polynomial function.

27. $f(x) = 10x^4 + x^3 - 12x^2 - x + 2$

28. $f(x) = x^3 - 24x - 32$

Identify the number of solutions of the equation or the number of zeros of the function.

29. $x^7 + x^6 + x^5 + x^4 + x^3 + x^2 + x + 1 = 0$

Write a polynomial function f of least degree that has rational coefficients, a leading coefficient of 1, and the given zeros.

30. $1 - \sqrt{5}$

Write the expression in simplest form.

31. $\sqrt{72}$

Simplify the expression. Write your answer using only positive exponents.

32. $\sqrt[3]{x^6 y^{30}}$

33. The radius r of a sphere with volume V is given by

$$r = \left(\frac{3V}{4\pi} \right)^{1/3}. \text{ What is the radius of a medicine ball with a volume of } \frac{500\pi}{3} \text{ in.}^3?$$

Simplify the expression.

34. $\sqrt[6]{9} - 4\sqrt[6]{9}$

35. $\sqrt[4]{512} + 3\sqrt[4]{2}$

36. $2^5\sqrt{4} - 10^5\sqrt[5]{972}$

Simplify the expression. Assume all variables are positive.

37. $\frac{x^{3/4}y^2}{xy^{1/2}}$

38. $(x^4y^8)^{-0.25}$

39. $4x^{0.9} + (10x^{0.3})^3$

40. Find the inverse of the relation $(1, 1), (2, 2), (1, 3), (4, 4)$.

41. Find an equation for the inverse of the relation $y = 5x - 3$.

42. Write an equation for the inverse of the relation $y = -11x + 9$.

43. Graph the function $y = x^2 - 3$ and its reflection over the line $y = x$. Is the reflection the graph of a function?

44. Are the functions f and g below inverses of each other?

$$g(x) = \frac{1}{2}x - \frac{1}{3}, f(x) = \frac{6x + 2}{3}$$

45. Sketch the graph of the function $f(x) = 2 - 4x$ and its inverse on the same coordinate plane.

46. Sketch the graph of the function $f(x) = \frac{2}{3}x - 2$ and its inverse on the same coordinate plane.

47. Sketch the graph of the function $f(x) = 2 - x^2$. Is the inverse of $f(x)$ a function?

Graph the function f . Then use the graph to determine whether the inverse of f is a function.

48. $f(x) = 5x^6, x \geq 0$

Find the inverse of the function.

49. $f(x) = -16x^2, x \geq 0$

Solve the equation. Check for extraneous solutions.

50. $\sqrt[3]{x-5} = -3$

51. $\sqrt{2y-7} = 11$

52. Solve the system by substitution:
 $y = 3x + 3$
 $y = 2x$

53. A group of 52 people attend a ball game. There were three times as many children as adults in the group. Write a system of equations that you could use to solve this problem, where a is the number of adults and c is the number of children in the group.
Solve the system of equations for c , the number of children in the group.

Use the given values to write an equation relating x , y , and z given that z varies jointly with x and y .

54. $x = 3, y = 2, z = 2.4$

Determine whether the equation shows direct variation with the square.

55. $\frac{b}{37} = a^2$

Find the vertical asymptote(s) of the graph of the function and describe the end behavior of using infinity notation.

56. $k(x) = \frac{x^3}{x^2 - 4x - 5}$

Multiply the expressions. Simplify the result.

57. $\frac{2y^2}{3} \cdot \frac{12x}{5y}$

58. $\frac{(x+2)^2}{x-5} \cdot \frac{x^2-2x}{x^2-4}$

Divide the expressions. Simplify the result.

59. $\frac{x^2-25}{x+8} \div (x-5)$

60. $\frac{3x^2+18x}{6} \div (x+6)$

61. $\frac{x^2+11x+30}{x^2-25} \div \frac{x+6}{x-6}$

62. $\frac{(xy^2)^2}{(2xy)^3} \div \frac{x^2y^4}{(4x)^2y^3}$

Perform the indicated operation(s) and simplify.

63. $\frac{-3x-7}{-20x} + \frac{x+7}{-20x}$

64. $\frac{2x-7}{20x} + \frac{2x+7}{20x}$

$$65. \frac{5}{3(x+2)} + \frac{7}{3(x+2)}$$

Simplify the complex fraction.

$$66. \frac{\frac{x^2 + 14x + 49}{32x}}{\frac{x+7}{8x}}$$

67. If there are initially 3500 bacteria in a culture, and the number of bacteria double each hour, the number of bacteria after t hours can be found using the formula $N = 3500(2^t)$. How many bacteria will be present after 5 hours?

68. Write a rule for the function.

x	22	21	0	1	2
y	27	9	3	1	$\frac{1}{3}$

Write a rule for the function.

$$69. \begin{array}{cccccc} x & -2 & -1 & 0 & 1 & 2 \\ y & \frac{5}{2} & 5 & 10 & 20 & 40 \end{array}$$

Compare the graph of the function to the graph of $y = 6^x$.

$$70. y = -6^x$$

Solve the equation. Check for extraneous solutions.

$$71. \frac{9}{x-3} = \frac{7}{x-5}$$

$$72. \frac{x}{30} - \frac{1}{5x} = \frac{1}{6}$$

$$73. \frac{2x}{x-2} = \frac{1}{x^2-4} + 1$$

74. Choose the equation that represents *exponential decay*.

a. $y = (1.06)^t$ b. $y = (0.94)^t$

Graph the function and label as *exponential growth* or *exponential decay*.

$$75. y = 4\left(\frac{7}{2}\right)^x$$

76. The enrollment at Alpha-Beta School District has been declining 3% each year from 1994 to 2000. If the enrollment in 1994 was 2583, find the 2000 enrollment.

77. The enrollment at Beta-Gamma School District has been declining 3.5% each year from 1986 to 1992. If the enrollment in 1986 was 1815, find the 1992 enrollment.

78. Compare the properties of the two functions and the key characteristics of their graphs. Include information such as the domain and range, asymptotes, end behavior, and general appearance of the graphs.

Function 1: a base-10 logarithmic function whose graph passes through the points (1, 0), (5, 1.398), (10, 2), (50, 3.3979), and (100, 4).

(y -values are rounded to the nearest thousandth where necessary.)

Function 2: $y = \log(x + 2)$

79. Sketch the graph of the equation $y = -7x^2$.

80. Identify the focus and the directrix of the parabola given by $y^2 + 5x = 0$.

81. Sketch the graph of the parabola.
 $y^2 - 8x = 0$

82. Write the standard form of the equation of the parabola with its vertex at (0, 0) and focus at (-3, 0).

83. Write the standard form of the equation of the parabola with its vertex at $(0, 0)$ and directrix

$$y = -\frac{3}{2}.$$

84. The pool at a park is circular. You want to find the equation of the circle that is the boundary of the pool. Find the equation if the area of the pool is 400 square feet and $(0, 0)$ represents the center of the pool.

85. Write the standard form of the equation of the circle that passes through the point $(1, -6)$ with its center at the origin.

For an account that earns simple annual interest, find the interest and the balance of the account.

86. \$120 at 4.1% for 1 year

Use the simple interest formula to find the unknown quantity.

87. $I = \$2496$

$$P = ?$$

$$r = 6\%$$

$$t = 8 \text{ years}$$

88. Four months ago you deposited \$150 in a new savings account, and now your balance is \$152.25. Ten months ago your friend deposited \$150 in a new savings account and her balance is now \$155.75. Which account has the greater simple annual interest rate?

Graph:

89. $f(x) = \sqrt{x+2}$

Refer to the function $g(x) = 2 + \sqrt{x+1}$.

90. What is the range of $g(x)$?

Refer to the function $g(x) = 1 + \sqrt{x+3}$.

91. What is the domain of $g(x)$?

92. What is the range of $g(x)$?

93. Sketch the graph of $g(x)$.

Refer to function $h(x) = 2 - \sqrt{x+1}$.

94. Sketch the graph of $h(x)$.

95. The velocity y (in meters per second) of a moving object is given by the function $y = 0.1414\sqrt{x}$, where x is the object's kinetic energy (in joules).
- Use a graphing calculator to graph the function.
 - Use the graph to find the approximate kinetic energy of the object when its velocity is 2 meters per second. Explain your method.

Graph the function and identify its domain and range. Compare the graph with the graph of

$$y = \sqrt{x}.$$

96. $y = -6\sqrt{x}$

Simplify:

97. $\sqrt{150}$

98. $\sqrt{20}$

Simplify:

99. $\sqrt{\frac{9}{100}}$

100. $\sqrt{\frac{4}{25}}$

101. Find the quotient and completely simplify the radical: $\frac{\sqrt{320}}{\sqrt{8}}$

Simplify the expression.

102. $\sqrt{64x^4}$

103. $\sqrt{144x^2}$

104. Solve the equation, if possible.
 $\sqrt{2x+7} = 5$

105. Sketch the graph of $y = \frac{1}{3x} + 5$. Identify any asymptotes.

Graph the function.

106. $y = \frac{6}{x-3} - 4$

107. $y = \frac{-3}{x+1} - 7$

Find the product.

108. $(x-4) \cdot \frac{x+3}{x^2-16}$

109. A square bird sanctuary has sides that are $\frac{10}{s+2}$ meters long. Write expressions for its perimeter and area.

Solve the equation:

110. $\frac{k}{k-4} + \frac{k}{k-1} = 1$

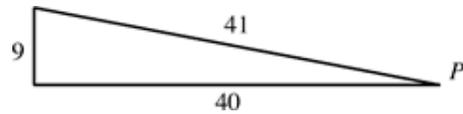
Each letter in DECAFFEINATED is written on a separate piece of paper and put into a bag. You randomly choose a piece of paper from the bag. Find the probability of the event. Write the probability as a fraction.

111. You choose an N.

112. A bag contains five green marbles and one blue marble. The marbles are randomly selected one at a time. What are the odds of picking the blue marble on the first selection?

Use the right triangle to write the quantity as a fraction in lowest terms.

113. $\tan P$



Evaluate without using a calculator.

114. $\cos 60^\circ$

115. $\csc 30^\circ$

Use a calculator. Round to three decimal places.

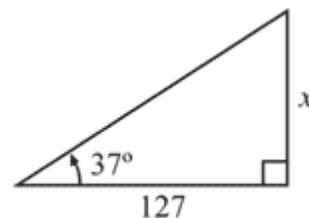
116. $\cot 20^\circ$

117. $\csc 8^\circ$

118. $\tan 42^\circ$

119. A slide 2.8 m long makes an angle of 29° with the ground. How high is the top of the slide above the ground?

120. Solve for x in the triangle shown.



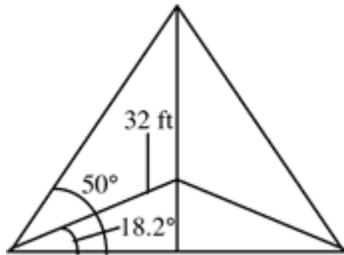
121. The point $(-3, 3)$ is on the terminal side of an angle θ . Find $\cos \theta$.

122. The point $(-1, -2)$ is the terminal side of an angle θ . Find $\sec \theta$.

123. Find the reference angle for $-\frac{5\pi}{3}$.

124. Solve triangle ABC given that $a = 19$, $b = 10$, and $c = 14$.

The roof of a house is being reconstructed to accommodate heavy snows. The current 32-foot roofline makes an 18.2° angle with the horizontal. The owner has decided to construct the new roof so that it makes a 50° angle with the horizontal.



125. How much higher will the new roof be?

Events A and B are independent events. Find the unknown probability.

126. $P(A) = 0.2$
 $P(B) = 0.6$
 $P(A \text{ and } B) = \underline{\quad?}$

127. A bag contains 5 green marbles and 6 red marbles. One marble is drawn at random and not replaced. Then a second marble is drawn. What is the probability that the first marble is red and the second one is green?

128. Given that $\sin \theta = \frac{2}{3}$ and $\frac{\pi}{2} < \theta < \pi$, find the values of the other five trigonometric functions of θ .

Simplify the expression.

129. $\csc x \cos(-x)$

130. $\frac{\sin^2(-x)}{\tan^2 x}$

Find the sale price or retail price. Round to the nearest cent.

131. Original price: \$12.19
 Percent discount: 45%

132. You have \$40.00. You wish to buy a T-shirt costing \$14.50 and a pair of jeans costing \$23.95. There is a 5% sales tax on clothing. Do you have enough money to pay for both?
133. A department store purchases a suit for \$70. The store's percent of increase after the markup is 30%. What is the retail price of the suit?

Tell whether the situation describes independent events or dependent events. Then answer the question.

134. The names of 7 girls and 5 boys on a committee are put in a hat. Two names of students to lead the committee are drawn. What is the probability that both names drawn will be boys' names?

Events A and B are dependent events. Find the missing probability.

135.
 $P(A) = 0.3$
 $P(B \text{ given } A) = \underline{\hspace{2cm}}$
 $P(A \text{ and } B) = 0.09$

