

# Precalculus

## Summer Math Packet 2021

Dear Students,

The teachers in the math department are very excited about the upcoming school year. We look forward to working with you and helping you to become successful in your math classes.

The problems in this packet are a review of concepts that you have learned in your previous math classes. A strong knowledge of this material will help you in your future math classes.

Here are some **suggestions** for the summer math packet:

- Print the packet or get a printed copy from the school
- Work on one page at a time
- Do NOT wait until the end of the summer to complete the whole packet
- Use your notes from previous math courses or watch videos online for extra help if needed (<https://www.khanacademy.org/>, <http://patrickjmt.com/>)

Please show all of your work and circle your final answers for each question. You will turn the completed packet into your teacher on the first day of school. The packet will be your first grade of the year. Students who follow all instructions and turn their packets in with all work shown on the first day of school will receive a homework pass.

Email us if you have any questions. We will answer emails when we can over the summer.

- Mae Margaret Davis – Algebra I, Geometry, Honors Geometry, and Business Calculus ([mdavis@lee-scott.org](mailto:mdavis@lee-scott.org))
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- Barrett Odom - ACT Prep Math ([bodom@lee-scott.org](mailto:bodom@lee-scott.org))

Thank you and have a great summer!

*LSA Math Department*

Show all work and circle your final answers.

Name \_\_\_\_\_

1) Evaluate:  $f(x) = -x^2 - 2x + 4$  for  $x = -3$ .

2) Solve:  $2 - 3(x - 7) = x + 1$ .

3) Solve:  $\frac{-x+2}{2} + 1 = -\frac{4x}{7}$ .

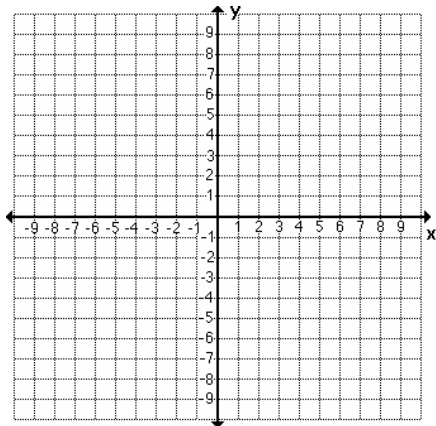
4) Solve:  $y = \sqrt[3]{\frac{30}{v}}$  for  $v$ .

5) Solve:  $-40x - 42 \leq -6(5x - 3)$ .

6) Solve:  $x + 6 > 4$  or  $2 - x > 6$ .

For Questions 7 & 8 Graph each function. State the domain and range in interval notation.

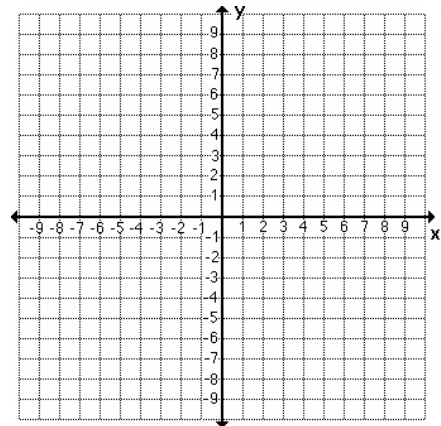
7)  $y = \frac{-1}{3}x - 4$



Domain:

Range:

8)  $y = 4x^2 - 4x - 3$



Domain:

Range:

9) Find the slope between  $(-2, -5)$  and  $(3, 8)$ .

10) Find the slope of a line that is **perpendicular** to the line  $5x + 3y = 8$ .

11) Find the equation of the line through the point  $(-2, 0)$  and with slope  $-\frac{1}{8}$ .

12) Determine whether the relation is defined as a function and state the domain and range.

$$\{(-2, 4), (1, -9), (5, -7), (9, -3), (12, -3)\}.$$

Function: YES or NO

Domain:

Range:

**For questions 13 & 14 solve the system.**

$$13) \begin{cases} 2x - 5y = -5 \\ -2x + 3y = 11 \end{cases}.$$

$$14) \begin{cases} 3x - 4y = -10 \\ 5x + 9y = -24 \end{cases}.$$

$$15) \text{ Simplify: } (9x^7 - 1 - 9x^6) - (-4 + 6x^6 + 3x^7 - 9x^5)$$

$$16) \text{ Simplify: } (8a - 3y)^2.$$

**For questions 17 & 18 use synthetic division to simplify.**

17)  $(2x^4 - 3x^3 - 12x - 11) \div (x - 4)$ .

18)  $(3x^3 - 8x^2 - 100) \div (x + 2)$

**For question 19 - 24 factor COMPLETELY**

19)  $10a^3 - 25a^2b - 12ab^2 + 30b^3$ .

20)  $-16x^3y^3 + 4xy^3$

21)  $g^2 - 18g + 81$

22)  $3x^2 - 3x - 18$

23)  $7 + 33y - 10y^2$

24)  $108x^3 + 4y^3$

24) For the functions  $f(x) = 3x^2 + 3$  and  $g(x) = 5x^3 + x^2 - 2x - 3$ ; find

a)  $(f - g)(x)$

b)  $(g/f)(x)$

c)  $(fg)(x)$

25) A certain rectangle's length is 7 feet longer than its width. If the area of the rectangle is 330 square feet, find the dimensions.

26) The domain of the rational expression  $\frac{x-3}{3x^2+14x+8}$  is all real numbers except.

27) Simplify;  $\frac{21x^{-9}y^3z}{9xy^{-7}z^4}$ .

28) Solve;  $4k^2 - 23k - 6 = 0$ .

29) Simplify;  $\frac{x^2 - 4x - 21}{x^2 - 49}$ .

30) Simplify;  $\frac{z^2 + 10z + 24}{z^2 + 11z + 28} \div \frac{z^2 + 6z}{z^2 - z - 56}$ .

31) Simplify;  $\frac{3}{y^2 - 3y + 2} + \frac{5}{y^2 - 1}$ .

32) Solve;  $4 + \frac{2}{x} = 5$ .

33) Solve;  $\frac{8}{x+3} - \frac{3}{x-3} = \frac{15}{x^2-9}$ .

34) Simplify:  $8\sqrt{3} - 4\sqrt{45} + 5\sqrt{243}$

35) Complete the square. Then factor the polynomial;  $2x^2 - 20x$  \_\_\_\_\_.

35b) Solve by **Completing the Square**:  $x^2 - 5x - 3 = 0$

36) Simplify;  $\sqrt[3]{-54a^{22}b^7}$ .

37) Simplify;  $\frac{2 + \sqrt{5}}{2 - \sqrt{5}}$ .

38) Find the domain; answer in interval notation;  $f(x) = \sqrt{5x - 2}$ .



39) Solve;  $\sqrt{2x+6} - \sqrt{x-1} = 2$ .

40) Simplify;  $\frac{2+i}{5-i}$ .

41) Simplify;  $(2-8i)^2$ .

42) Solve;  $(3x+4)^2 = -36$ .

43) Based on the discriminant of the following quadratic equation, determine the number and nature of the solutions:  $4x^2 - 12x = -9$ .

44) Solve;  $x^2 + x + 6 = 0$ .

45) Solve;  $x^4 - 5x^2 - 36 = 0$ .

46) Convert  $y = 3x^2 + 12x - 7$  to vertex form and label the vertex  $(h, k)$ .

47) Find the x-intercepts of:  $f(x) = x^2 - x - 12$ .

48) Determine whether the function has a maximum or a minimum. Then find the maximum or minimum value.  $h(x) = 4x^2 + 16x - 3$ .

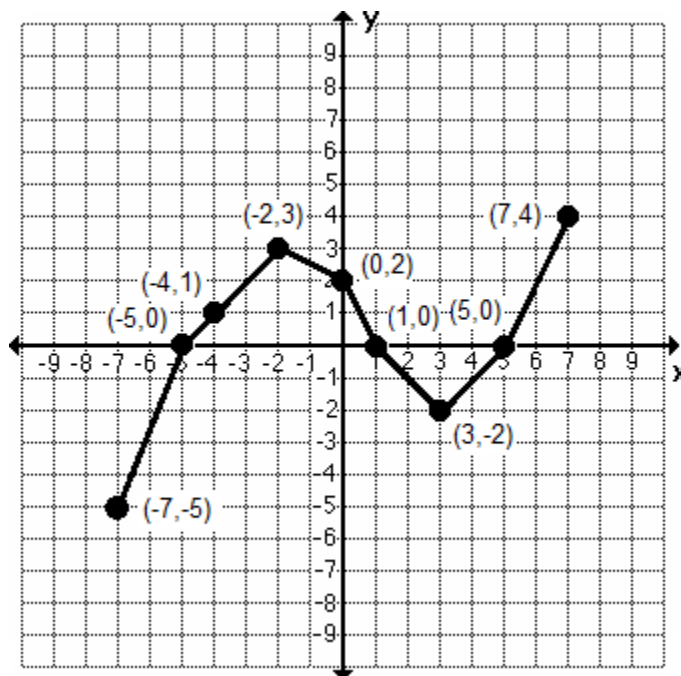
Use the graph of the function  $f(x)$

shown to answer questions 49 – 56.

49. Find  $f(3)$ .

50. Is  $f(-4)$  positive or negative?

51. For what number(s)  $x$  is  $f(x) = 0$ ?



52. In interval notation, what is the domain of  $f$ ?

53. In interval notation, what is the range of  $f$ ?

54. What are the x-intercept(s)?

55. What are the y-intercept(s)?

56. For what number  $x$  is  $f(x) = -5$ ?