

Precalculus Honors  
Summer Packet

*Due August 28, 2018*

*\*Please complete neatly and show all work!*



## ***PRE-CALCULUS (Honors)***

In order to successfully complete the objectives of the Pre-Calculus curriculum, the student must demonstrate a high level of independence, capability, dedication, and effort. This summer packet will help you maintain/improve your skills. This packet is a **requirement** for those entering the Pre-Calculus course and is due on the first day of class in September 2018. Complete this packet on your own as you can, then get together with a friend, e-mail your teacher, or "google" the topic. **SHOW YOUR BEST WORK.**

### Requirements

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*The following are guidelines for completing the summer work packet...*

- ✓ You must show all of your work on the packet.
  - ✓ Be sure all problems are neatly organized and all writing is legible.
  - ✓ We expect you to come in with certain understandings that are prerequisite to Pre-Calculus. A list of these topical understandings is below.
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### Topical understandings within summer work...

- ❖ Factoring
- ❖ Zeros/roots/x-intercepts of rational and polynomial functions
- ❖ Simplifying radicals and complex numbers
- ❖ Completing the square
- ❖ Write the equation of a line
- ❖ Quadratic formula
- ❖ Unit Circle
- ❖ Composite function and notation
- ❖ Triangle Trigonometry and the concepts contained in the unit circle
- ❖ Domain/Range
- ❖ Interpreting and comprehending word problems
  - ❖ Graphing, simplifying expressions, and solving equations of the following types:
  - ❖ Trigonometric, rational, absolute value, logarithmic, exponential, polynomial/power, and radical.

Finally, it is suggested to not wait until the last two weeks of summer to begin on this packet. If you spread it out, you will most likely retain the information much better.

**Practice Set of Required Math Skills for  
Pre-Calculus Honors**

**Skill 1:**

All students should be able to complete operations involving fractions and recall exponent facts quickly and accurately *without the use of a calculator*.

- |                                    |                                  |                                      |                                   |
|------------------------------------|----------------------------------|--------------------------------------|-----------------------------------|
| 1. $\frac{1}{2} + \frac{1}{4}$     | 2. $2\frac{2}{3} - \frac{5}{3}$  | 3. $\frac{4}{5} \times \frac{20}{7}$ | 4. $\frac{3}{5} \div \frac{1}{2}$ |
| 5. $\frac{16}{3} \div 2$           | 6. $\frac{5}{7} \div 2$          | 7. $5 \times \frac{1}{15}$           | 8. $\frac{7}{16} + \frac{1}{20}$  |
| 9. $2 + \frac{1}{3} - \frac{1}{2}$ | 10. $\left(\frac{3}{4}\right)^2$ | 11. $\left(\frac{3}{2}\right)^{-1}$  | 12. $\left(\frac{5}{7}\right)^0$  |
| 13. $8^2$                          | 14. $5^3$                        | 15. $6^{-3}$                         | 16. $2^5$                         |
| 17. $-3^4$                         | 18. $(-3)^4$                     | 19. $2 \times 3^3$                   | 20. $(-2)^{-6}$                   |
| 21. $(2-5)^3$                      | 22. $x^4 = 16$                   | 23. $x^3 = -34324$                   | $4^x = \frac{1}{64}$              |

Simplify

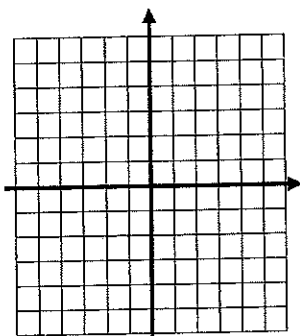
- |                              |   |                           |   |
|------------------------------|---|---------------------------|---|
| 25. $\sqrt{300}$             | 26. $\frac{\sqrt{192}}{2}$              | 27. $\frac{18}{\sqrt{2}}$ | 28. $\frac{\sqrt{3}}{2} \div \frac{1}{2}$ |
| 29. $\frac{4}{5 + \sqrt{3}}$ | 30. $\frac{5 - \sqrt{7}}{3 + \sqrt{2}}$ |                           |   |

**Skill 2:**

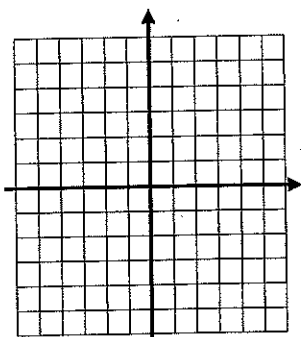
All students should be familiar with all concepts of graphing linear equations in various forms, including graphically, in equations (slope-intercept, point-slope and standard form) and formulas, and numerically in a chart of ordered pairs.

Graph each of the following:

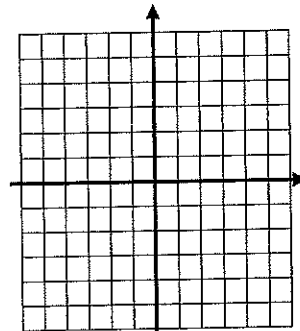
1.  $f(x) = -\frac{4}{5}x - 1$



2.  $y - 1 = 2(x - 4)$



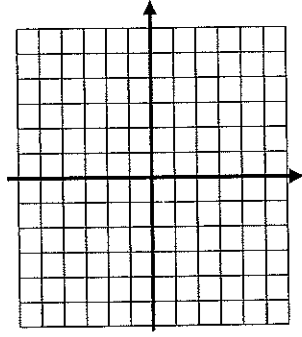
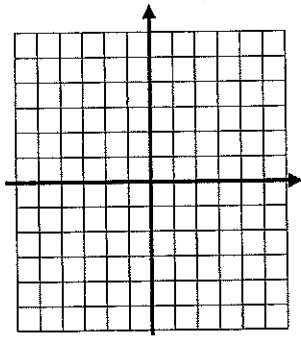
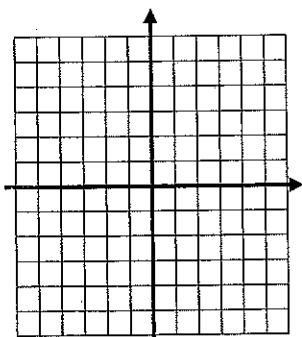
3.  $y + 4 = -(x - 1)$



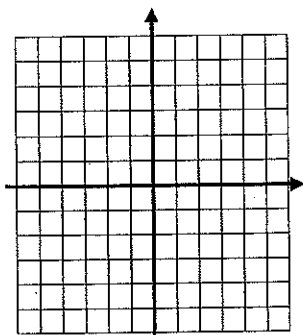
4.  $4x - 3y = -12$

5.  $x - y = 5$

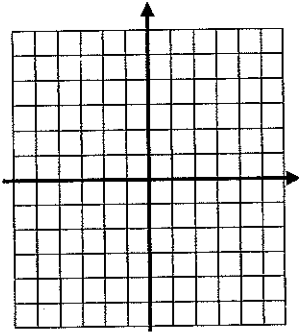
6.  $x = 4$



7.  $f(x) = -3$



8.  $y + 4 = -\frac{1}{2}(x - 3)$



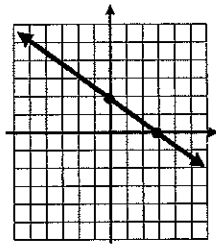
Find the slopes of the lines described.

- |   |   |
|---|---|
| 9. The line passing through (-1, 6) and (4, -9).    | 10. The line $4x - 2y = 5$                      |
| 11. The line with x intercept 3 and y intercept -2. | 12. Any line parallel to $y = \frac{3}{4}x - 2$ |
| 13. Any line perpendicular to $2y = 5x - 1$         | 14. Any horizontal line.                        |
| 15. The line $x = 0$ .                              | 16. The line through (9, 1) and (9, -4).        |

Write the equation of each line indicated. Give answers in slope-intercept form.

- |   |   |
|---|---|
| 17. The line passing through (-1, 6) and (4, -9).   | 18. The line passing through (4, 2) and (-6, 2).              |
| 19. The line with x intercept 3 and y intercept -2. | 20. The line parallel to $y = -2x + 2$ and containing (4, 1). |
| 21. The line graphed below.                         | 22. A linear function for which                               |

$$f(1) = 7 \text{ and } f(-1) = 5.$$

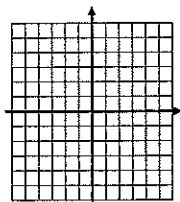


23. A line perpendicular to  $2y = 5x - 1$  and passing through the origin.

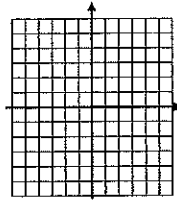
24. The line through  $(9, 1)$  and  $(9, -4)$ .

Shade the half-plane that represents the solution to the linear inequality.

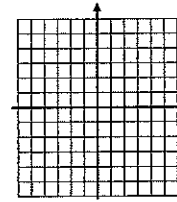
25.  $y \geq 2x - 1$



26.  $2x - 3y < -6$



27.  $x > 2$

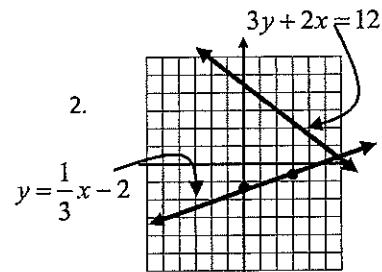


**Skill 3:**

All students should be able to solve a system of equations.

1.  $-3x + 3y = -18$   
 $4x - y = 5$

3.  $2x - 3y = 8$   
 $5x + 2y = 1$



**Skill 4:**

All students should be able to multiply, factor add and subtract polynomials and to use these skills to simplify expressions and solve equations involving quadratic, polynomial, and rational terms.

Factor:

1.  $b^2 + 11b - 26$

2.  $t^2 - 17t + 30$

3.  $x^2 - 81$

4.  $36m^2 - 25n^{12}$

5.  $5x^2 - 7x - 6$

6.  $100x^2 - 75$

7.  $3x^2 - 5x - 2$

8.  $9 + 8x - x^2$

9.  $x^3 - 64$

10.  $xy + xz - 4y - 4z$

11.  $4x^2 + 8x + 4$

12.  $x^6 + 5x^3y^2 - 24y^4$

Multiply, Add, subtract or divide.

$$13. (3x^2y + 2xy^2 - 7xy) - (-4x^2y - 2xy^2 + 8xy)$$

$$15. (3x^5 - 5yz^2)(3x^5 + 5yz^2)$$

$$17. \frac{x}{4+y} - \frac{2x}{4+y}$$

$$19. \frac{2}{t} - \frac{4}{v}$$

$$21. \frac{\frac{x}{y} + \frac{1}{x}}{x^2 + y}$$

$$14. (2x+1)^2$$

$$16. (3x+1)^3$$

$$18. \frac{2}{x^2 + 2x} + \frac{x}{4x + 8}$$

$$20. \frac{5}{x^2 - 4} + \frac{3}{x - 2}$$

$$22. \frac{3x^2 - 5x - 2}{(x^2 - 4)(6x + 2)}$$

Solve:

$$23. 3x(x-1) - x(x-8) = 3$$

$$25. 4x^2 = 20$$

$$27. x^2 - 144 = 0$$

$$29. x^2 + 4x + 10 = 0$$

$$31. 4x^2 - 7x + 6 = 0$$

$$33. 6 + 2\sqrt{2x-5} = 12$$

$$24. 2x^2 - 7x = 15$$

$$26. x^2 - 14x + 45 = 0$$

$$28. x^3 - 5x = 0$$

$$30. 3x^2 - 8x - 5 = 0$$

$$32. x^4 - 17x^2 + 16 = 0$$

$$34. \sqrt{-2x+5} = x+5$$

### Skill 5:

All students should be able to apply the rules of exponents and logarithms to simplify and expand expressions, evaluate expressions and to solve equations. (Give answers with no negative exponents)

$$1. x^8 \cdot x^{n-3}$$

$$2. \left(\frac{49}{4}\right)^{\frac{1}{2}}$$

$$3. (-2x^4)^3$$

$$4. \frac{y^{12}}{y^3}$$

$$5. \frac{y^{4+2x}}{y^2}$$

$$6. \frac{x^5 y^{-3}}{w^0 z^{-1}}$$

$$7. \frac{t^{-5} v^{-2}}{t^6 v^{-7}}$$

$$8. \frac{x}{x^{-2} + y}$$

$$9. \frac{t^{-1} - v}{v}$$

$$10. (x+4)^2$$

$$11. (x-5)^{-2}$$

$$12. \frac{(-2x^{-3})^2}{x^9}$$

$$13. \left(\frac{6}{5}\right)^{-3}$$

$$14. -\frac{1}{2x^{-2}}$$

$$15. (3x^{-3})^{-2}$$

Evaluate or Solve

$$16. 4 \cdot 3^2$$

$$17. 2 + 3(1+2)^2$$

$$18. x^3 = 512$$

$$19. x^{\frac{3}{4}} = -8$$

$$20. 2(1-x)^3 = 2,000$$

$$21. \log_x \sqrt{2} = \frac{1}{2}$$

|  |                                       |                                      |
|--|---------------------------------------|--------------------------------------|
| 22. $2^{x+4} = 4 \cdot 16^x$   | 23. $\frac{1}{27} = \frac{3^x}{9}$    | 24. $\log_2 \frac{1}{32}$            |
| 25. $\left(\frac{2}{3}\right)^{x-2} = \left(\frac{9}{4}\right)^{2x-1}$ | 26. $3 \cdot 9^{2x+1} = 27$           | 27. $\log_8 x = \frac{2}{3}$         |
| 28. $\log 10$  | 29. $\ln e^5$                         | 30. $\log_2 16 + \log_2 \frac{1}{4}$ |
| 31. $\log 1$   | 32. $\log_m x + \log_m 5 = \log_m 10$ | 33. $\log_6 x + \log_6 (2x+1) = 2$   |

Express as a single logarithm

|                           |                       |                  |                                |
|---------------------------|-----------------------|------------------|--------------------------------|
| 34. $\log_a 4 + \log_a n$ | 35. $\log x - \log 5$ | 36. $5 \log_2 w$ | 37. $\ln v - 2(\ln 4 + \ln u)$ |
|---------------------------|-----------------------|------------------|--------------------------------|

Express in terms of  $\log m$  and  $\log n$ .

|                       |                     |
|-----------------------|---------------------|
| 38. $\log m \sqrt{n}$ | 39. $\log n(10m)^3$ |
|-----------------------|---------------------|

**Skill 6:**

Students should be able to sketch graphs of non-linear functions, by using a table of values and through transformations.

Graphing: Sketch a graph, showing the coordinates of two or more important points or asymptotes.

|  |                                     |  |
|--|-------------------------------------|--|
| 1. $y =  x $                                   | 2. $y = \frac{1}{x}$                | 3. $y = 2^x$                               |
| 4. $y = e^x$                                   | 5. $y = \left(\frac{1}{3}\right)^x$ | 6. $y = x^2 + 4$                           |
| 7. $y = (x+3)^2$                               | 8. $y = -2x^2$                      | 9. $y = 2(x-4)^2 - 1$                      |
| 10. $y = x^2 - 4x + 3$                         | 11. $y = 3(x+2)^2 - 5$              | 12. $y = (x-1)^2 + 3$                      |
| 13. $y = 2x^2 - 12x + 16$                      | 14. $y = 2 -  x+4 $                 | 15. $y = \log_2 x$                         |
| 16. $y = \sin x$                               | 17. $y = \cos x$                    | 18. $y = \tan x$                           |
| 19. $y = \cot x$                               | 20. $y = \sec x$                    | 21. $y = \csc x$                           |
| 22. $y = 2 \cos\left(x - \frac{\pi}{4}\right)$ | 23. $y = 3 + \sin 2x$               | 24. $y = -4 - 6 \sin 30(\theta + 4^\circ)$ |

**Skill 7:**

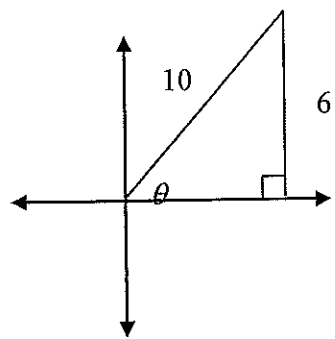
Students should be familiar with trigonometric functions, special right triangles and the unit circle.

Find the exact value of the 6 trigonometric functions for each angle.

|                         |                                 |                          |
|-------------------------|---------------------------------|--------------------------|
| 1. $\theta = -45^\circ$ | 2. $\tan \theta = -\frac{2}{5}$ | 3. $\frac{\pi}{2}$       |
|                         | $90^\circ < \theta < 180^\circ$ |                          |
| 4. $\theta = 210^\circ$ | 5. $\theta = -\frac{\pi}{4}$    | 6. $\theta = -420^\circ$ |



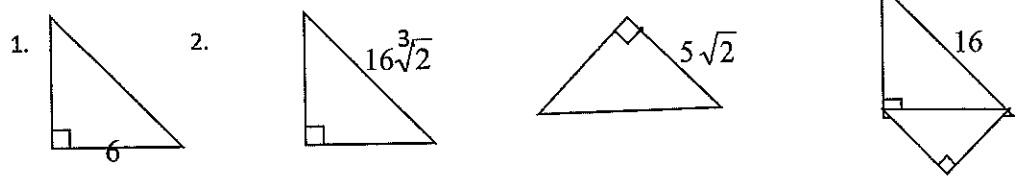
7. Find the exact values of the 6 trig. functions of  $\theta$  below.



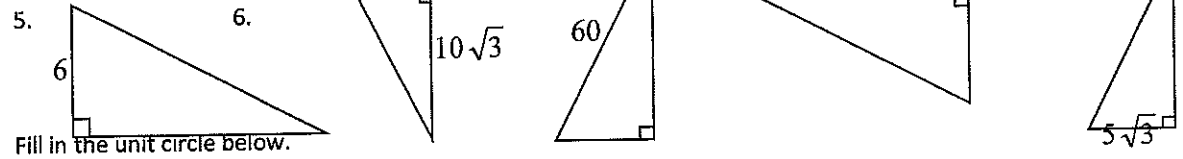
8. Find the exact values of the 6 trig. functions of  $\theta$  of an angle whose Terminal side passes through  $(3, -8)$ .

Find the missing sides of the 45-45-90 or 30-60-90 triangles.

45-45-90



30-60-90



Fill in the unit circle below.

# Unit Circle

Name: \_\_\_\_\_  
Date: \_\_\_\_\_

Label with degrees, radians and ordered pairs

