SUMMER WORK 2020 **Name: _____**

SUMMER WORK is due at the beginning of class on the FIRST DAY OF SCHOOL.

Welcome to **Accelerated Pre-Calculus** at Sandy Creek High School.

I am excited about the upcoming year! In order for us to hit the ground running, I need to ask you to spend some time this summer reviewing math content. Accelerated Pre-Calculus is a course in which the concepts from the beginning lessons build upon one another and are essential to the mastery of the material that will be encountered later in the semester. Your success in class will be the result of the consistency of your study and homework habits. Reviewing class notes each night and diligent homework efforts will greatly enhance your learning process. You are a student whose job and responsibility is to be the best student that you can be!

When completing this packet, please be sure to show your work. Be sure to make note of the problems that you have difficulty solving. *I will collect these problems on the first day of school and y*ou will be assessed over this material within the first two weeks of school.

Start your year off on the right track by completing these problems before school begins. All answers should be written on the answer sheet provided. As you complete this packet, you may want to use a calculator. We will be using graphing calculators in Accelerated Pre-Calculus. If you are looking to purchase a graphing calculator, I recommend a TI-84 or TI-84 Plus.

I am looking forward to working with each of you next year. Please feel free to contact Mrs. Maddox (maddox.amy@mail.fcboe.org) if you have any questions or concerns. You can also reach me by text at 770-695-7434 (make sure you state your name in the text).

See you in August!

Mrs. Maddox

Accelerated Pre-Calculus Teacher

1. Consider $5x^3 + 5x^2 - 40x - 60 = 0$.

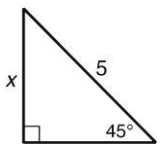
a. Identify the roots of the equation.

b. State the multiplicity of each root. Explain what the multiplicity means in terms of the graph of the related function.

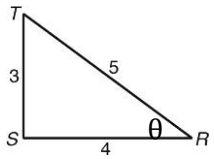
2. Find the inverse of each function.

a. $f(x) = \sqrt{10+x} + 2$ b. $f(x) = 5x - 1$ c. $f(x) = x^2 + 2x - 1, x > 0$

3. What is the value of x in simplest radical form?



4. Find cos θ.



5. A telephone pole has cable attached to the pole at one end and anchored to the ground at the other end. If the distance from the base of the pole to the ground anchor is 15 feet, and the cable makes a 60º angle with the ground, find:

a. The exact length of the cable.

b. The exact height the cable is attached to the pole.

6. Simplify each.

a. $(-3 + 4i) - (4 - 5i)$

b. $(1 + 8i)(6 + 2i)$

c. $(-3 + 3i)(-2 + 2i)$

d. $\frac{3+i}{5-2i}$

e. $\frac{-3+i}{4-3i}$

7. Factor each expression completely.

a. $x^6 - 16x^4$

b. $x^4 - 1$

c. $4x^3 - 8x^2 - 25x + 50$

d. $8x^3 + 27$

e. $2x^2 - 9x - 18$

f. $x^2 - 9x + 18$

g. $3x^2 + x - 4$

h. $8x^2 - 72x + 162$

i. $9x^4 - x^2$

8. Complete the square for the equation of the circle $x^2 + y^2 + 6x - 4y + 3 = 0$ then find the center and the radius.

9. State the domain of each function.

a. $f(x) = \sqrt[3]{x^2 + 10x - 11}$

b. $\frac{\sqrt{x+5}}{x-6}$

c. $\frac{\sqrt{x+3}}{\sqrt{6-x}}$

10. Rewrite in exponential form.

a. $\log_4 2 = \frac{1}{2}$

b. $\log_{\frac{1}{4}} 64 = -3$

11. Solve each equation. State answers in exact and approximate form.

a. $5 \cdot \ln\left(\frac{x}{4}\right) - 3 = 12$

b. $4(e^{3x} - 5) = 24$

12. A damsel is in distress and is being held captive in a tower. Her knight in shining armor is on the ground below with a ladder. When the knight stands 15 feet from the base of the tower and looks up at his precious damsel, the angle of elevation to her window is 60 degrees. How long does the ladder have to be?

13. Suppose you are flying a kite and it gets caught at the top of the tree. You have let out all 100 feet of string for the kite, and the angle that the string makes with the ground is 75 degrees. How high off of the ground is the kite?

14. Identify all real roots of each equation.

a. $x^3 + 6x^2 - 5x - 30 = 0$

b. $2x^3 - 42x + 40 = 0$

15. Identify the leading coefficient, degree, and end behavior of each function.

a. $P(x) = -4x^4 - 3x^3 + x^2 + 4$

b. $R(x) = -2x^7 + 6x^5 + 2x^3$

16. Simplify each expression.

a. $\frac{18x^2 - 3x}{3xy} \cdot \frac{12y^2}{6x - 1}$

b. $\frac{x^2 - 3x}{14y} \div \frac{2xy}{3y^2}$

c. $\frac{y^3 + 2y^2 + 4y}{y^3 + 2y^2} \cdot \frac{y^2 - 4}{y^3 - 8}$

17. Rationalize the denominator.

a. $\frac{1}{\sqrt{5}}$

b. $\frac{3}{\sqrt{3} + \sqrt{2}}$

18. Divide using synthetic division.

a. $2x^4 - 5x^3 + 7x^2 - 3x + 1 \div x - 3$

b. $9x^3 + 7x^2 - 3x \div x - 10$

c. $x^8 - 1 \div x + 2$

19. Decide whether each is a circle, ellipse, hyperbola, or parabola.

a. $x^2 - 2x + 8y^2 - 8 = -y$

b. $4x^2 + 16x - 36y = -16$

c. $25x^2 + 25y^2 - 50y = 75$

d. $3x^2 - 3y^2 + 9x - 12y = 18$

20. Complete the square for the equation of each ellipse then find the center and state the direction each opens.

a. $2x^2 + 3y^2 - 8x + 6y + 5 = 0$

b. $9x^2 + 4y^2 - 18x + 16y - 11 = 0$

21. An ellipse has a center at (1, 3), the major axis is parallel to the y-axis, one vertex is at (1, 8), and the length of the minor axis is 6 units. Write the equation of the ellipse.

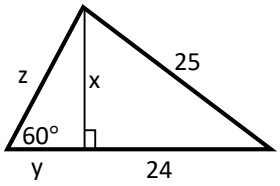
22. Complete the square for the equation of each hyperbola then find the center and state the direction each opens

a. $x^2 - 4y^2 + 8x - 16y - 36 = 0$

b. $4y^2 - 16x^2 - 32x - 24y - 44 = 0$

23. A building is 60 ft high. From a distance at point A on the ground, the angle of elevation to the top of the building is 40°. At point B, the angle of elevation is 70°. Find the distance from point A to point B.

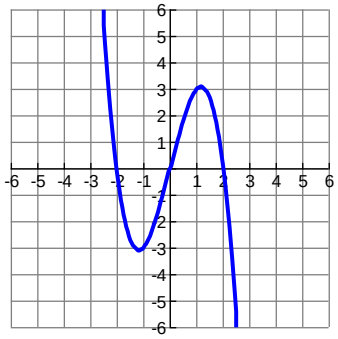
24. Solve for each variable.



25. A pilot flying at an altitude of 31,000 feet, uses his software to see two airports ahead in the distance. He measures the angle of depression to one airport to be 53° and the angle of depression to the other airport to be 12°. Find the distance (in miles) between the two airports.

26. For each function below, state the domain, range, zero(s), y-intercept, whether it is odd/even/neither, symmetry, relative maximum, relative minimum, interval of increase, interval of decrease, and end behavior.

a.



b. $f(x) = x^4 - 20x^2 + 64$