

*Princeton High School*

*Mathematics Department*

*Alg.2/Pre-Calc Summer Assignment (for Calc)*

## **Packet is Optional**

**Summer assignment vision and purpose:** The Mathematics Department of Princeton Public Schools aims to build confidence and competence in students as they strengthen their mathematical understanding. As such, students can complete the summer assignment in preparation for the coming school year. Success in mathematics is dependent on comprehending critical concepts. Such concepts will be extended and applied in more challenging contexts in successive years. For this reason, the department is supporting and providing summer assignments for students. These assignments will serve as a reinforcement of previously learned skills.

**Directions:** Please complete all of the following questions. *Be sure to show all of your work and attach all completed work on additional pages. All graphs should be completed on graph paper.* Questions are divided into subgroups based on skill and concept. Some procedures and examples have been provided to help reinforce or remind you of previously covered material. Also, please be sure to complete the following information:

The following problems cover topics that should be familiar to you from studying Algebra, Geometry, and Pre-Calculus. The format of some of the problems may look different, but the concepts have been covered in previous math classes.

### Section 1: Simplifying Expressions

1. If  $x = 3$ ,  $y = 5$  and  $\frac{1}{z} = \frac{1}{x} + \frac{1}{y}$ , then  $z =$

1. \_\_\_\_\_

2. Simplify using only positive exponents:  $\frac{x^{-2}y^{-6}}{3x^{-4}y^3}$ .

2. \_\_\_\_\_

3. Factor completely:  $5x^3 - 15x^2 + 25x$ .

3. \_\_\_\_\_

4. Express in simplest form:  $\sqrt{4x^2 + 36x + 81}$ .

4. \_\_\_\_\_

5. Express in simplest form:  $\frac{3x^2 + 11x - 4}{2x^2 + 11x + 12}$ .

5. \_\_\_\_\_

6. Express in simplest form:  $\frac{\frac{1}{x} - \frac{1}{x^2}}{x}$ .

6. \_\_\_\_\_

7. Express as a sum:  $\log_2 \left[ (\sqrt[3]{x})^y \right] =$

7. \_\_\_\_\_

### Section 2: Solving Equations

8. Solve for g:  $s = \frac{1}{2} gt^2$ .

8. \_\_\_\_\_

9. Solve for x:  $3x^2 - 5x = 2$

9. \_\_\_\_\_

10. If the two solutions of the quadratic equation  $4x^2 + 4x + k = 0$  are equal, then  $k =$  \_\_\_\_\_?

10. \_\_\_\_\_

11. If the roots of a quadratic equation are  $\frac{-3}{2}$ ,  $\frac{4}{5}$ , then the quadratic equation could be written as \_\_\_\_\_.

11. \_\_\_\_\_

12. Solve for x:  $x^6 - 16x^4 = 0$

12. \_\_\_\_\_

13. Solve for x:  $|5x - 2| = 8$  13. \_\_\_\_\_

14. Solve for x:  $\frac{2x - 1}{x + 3} = -2$  14. \_\_\_\_\_

15. Solve for x:  $\frac{1}{3} = 3^{2x+2}$  15. \_\_\_\_\_

16. Solve for x:  $\log_2(6 - 2x) - \log_2 x = 3$  16. \_\_\_\_\_

17. Given the system  $\begin{cases} 3x + y = 1 \\ x - 3y = 17 \end{cases}$ , find x. 17. \_\_\_\_\_

**Section 3: Equations of Lines and Circles**

18. Find the slope of the line through (-3,-6) and (5,-2). 18. \_\_\_\_\_

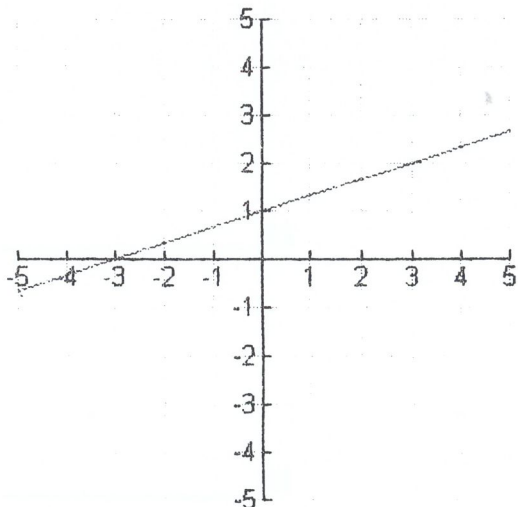
19. Find the equation of the line with slope 2 and intercept (0, 5). 19. \_\_\_\_\_

20. Find the equation of the line with slope  $-\frac{1}{2}$  through point (2, 5).

20. \_\_\_\_\_

21. Find the equation of the line in the figure below.

21. \_\_\_\_\_



#### Section 4: Trigonometry Basics

23. Evaluate the following:

a.  $\sin 0 = \underline{\hspace{2cm}}?$

b.  $\cos 0 = \underline{\hspace{2cm}}?$

c.  $\sin \pi = \underline{\hspace{2cm}}?$

d.  $\cos \pi = \underline{\hspace{2cm}}?$

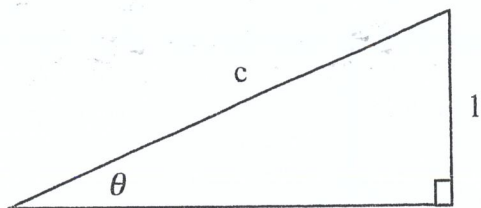
e.  $\sin \frac{\pi}{2} = \underline{\hspace{2cm}}?$

f.  $\cos \frac{\pi}{2} = \underline{\hspace{2cm}}?$

24. What is the radian measure of an angle whose degree is  $72^\circ$ ?

24. \_\_\_\_\_

25. In the figure below,  $\tan \theta =$  \_\_\_\_\_?



25. \_\_\_\_\_

### Section 5: Functions

26. If  $f(x) = x^2 - 1$  and  $g(x) = 2x + 1$ , then the composite function  $f \circ g$  is defined by  $(f \circ g)(x) =$  \_\_\_\_\_?

26. \_\_\_\_\_

27. If  $f(x) = ax + b$  and  $f(2) = f(4)$ , then  $a =$  \_\_\_\_\_?

27. \_\_\_\_\_

28. If  $f(x) = x^2 + 2x + 3$ , then  $f(a - 1) =$  \_\_\_\_\_?

28. \_\_\_\_\_

29. If  $f(x) = 2x^2 + 1$ , then  $f(x + h) =$  \_\_\_\_\_?

29. \_\_\_\_\_

30. Write a function that is decreasing over its entire domain.

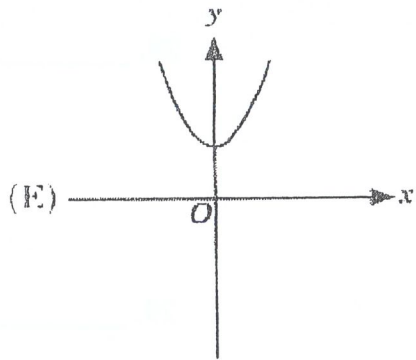
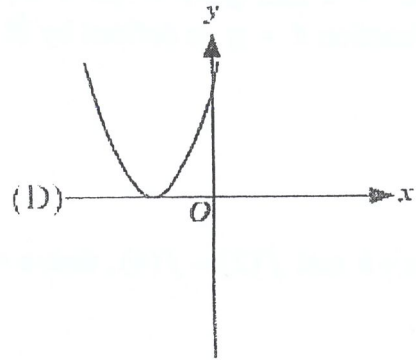
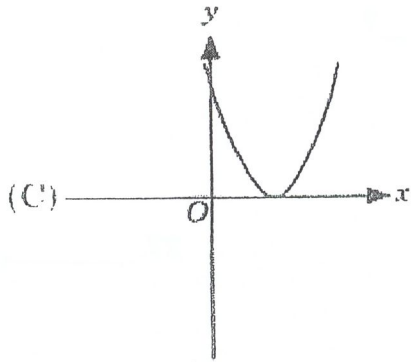
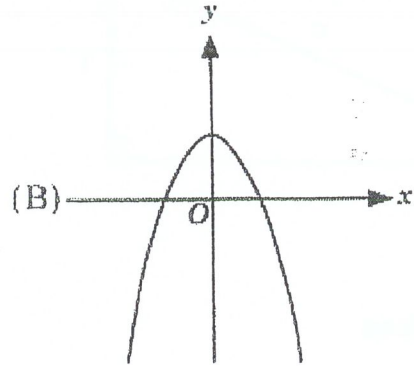
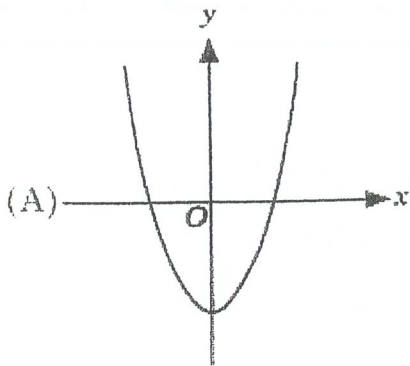
30. \_\_\_\_\_

31. The perimeter of a rectangular field is P feet. The width of the field is 200 feet less than its length. In terms of P, what is the length of the field in feet?

31. \_\_\_\_\_

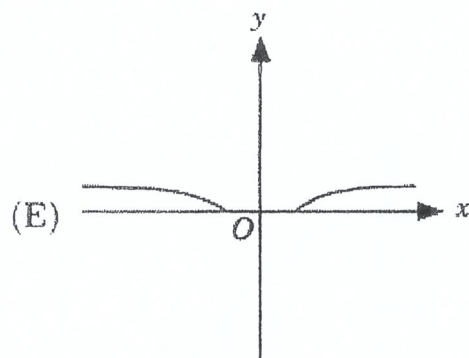
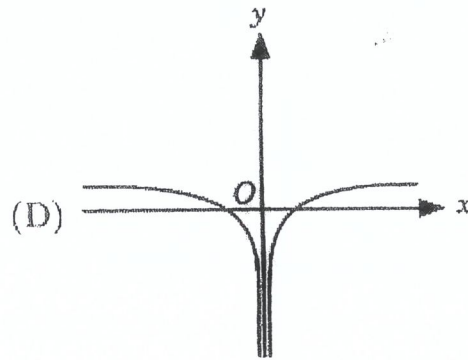
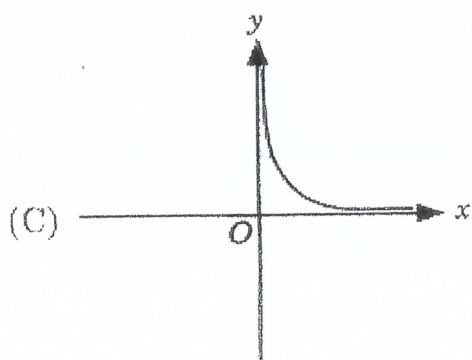
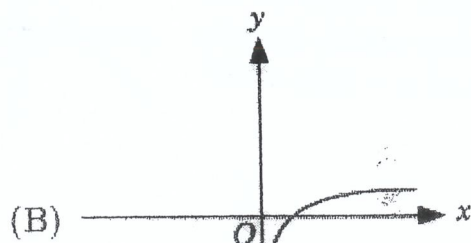
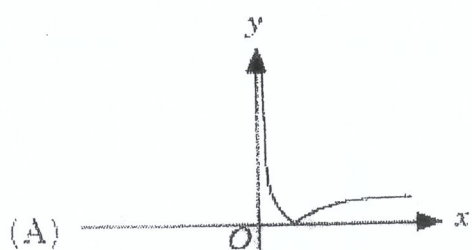
32.)

Which of the following could be a portion of the graph of  $y = (x - 2)^2$ ?

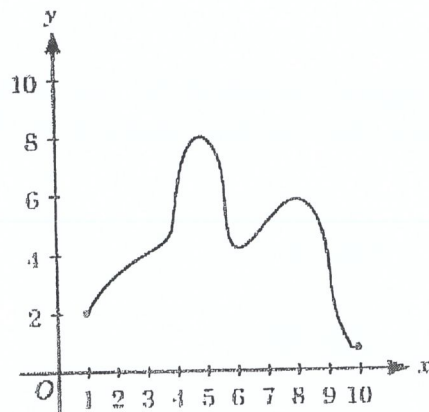


No Answer Selected

33.) Which of the following could be a portion of the graph of  $y = |\log_2 x|$ ?

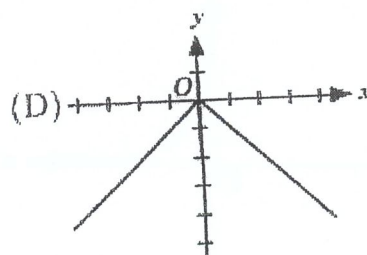
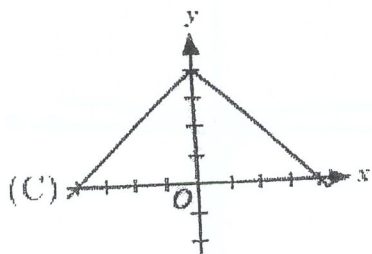
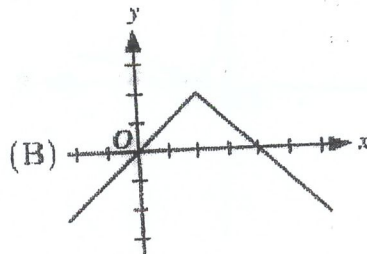
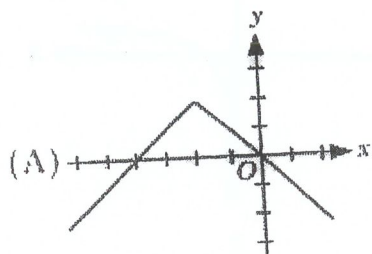
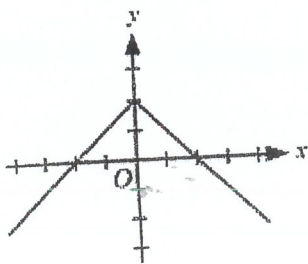


34.) The graph of the function  $y = f(x)$  is shown to the right. For exactly how many values of  $x$  does  $f(x) = 3$ ?

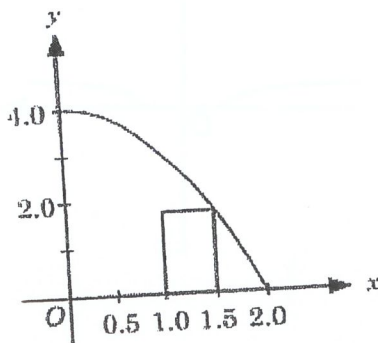




- 35.) The graph of  $y = h(x)$  is shown in the figure to the right. Which of the following could be the graph of  $y = h(x + 2)$ ?



- b) A portion of the graph of  $f(x) = 4 - x^2$  is shown to the right. What is the area of the shaded rectangle?



- 37.) What is the area of the region bounded by the graph of  $y = x + 3$ , the  $x$ -axis, and the vertical lines  $x = 3$  and  $x = 5$ ?

(A) 2

(B) 4

(C) 7

(D) 14

(E) 28

No Answer Selected