



# THE MASTER'S SCHOOL

## Honors Calculus *Mrs. Swenson*

Students who will be taking Honors Calculus in the upcoming school year are required to complete the attached summer work before the first day of school.

Students are to bring their completed answer sheet to school with them on the second day of school.

This work serves two purposes: it helps students to remember the concepts that they have learned in the past and allows an assessment of topics that need focused review.

This work is necessary to assess the ability of incoming students and to guide the instruction in the first few weeks of classes.

This work should be done during the two weeks before school begins.

### Supply List

TI-84 Graphing calculator (do not get TI-Nspire or TI-89)

Looseleaf notebook with lined paper and graphing paper

Red pen (for marking homework assignments)

In addition - Geometry students will need protractor and compass

Any questions - contact Mrs. Swenson at [nswenson@masterschool.org](mailto:nswenson@masterschool.org).

## HONORS CALCULUS SUMMER PACKET

For problems 1 - 6, you will be given two quantities. You are to determine which is larger. If  $A$  is larger, your answer is  $A$ . If  $B$  is larger, your answer is  $B$ . If they are always equal, your answer is  $C$ . If there is not enough information to determine which is larger, your answer is  $D$ .

1. Compare:  $A: 7 \frac{1}{4} \text{ ft}^2$                        $B. 0.8 \text{ yd}^2$

2. Given that  $x = t$ , compare:  $A. 7(2t - 2x)$      $B. -6(3t - 3x)$

3. Given that  $4 < x < 9$  and  $2 < y < 14$ , compare:  $A. x$                        $B. y$

4. Given that  $a$  is the average of 3 and 6, compare:  $A. 3a$                        $B. a + 6$

5. Given that  $x^2 = y^2$ , compare:  $A. x$                        $B. y$

6. Assuming  $x > y$  and neither  $x$  nor  $y$  equals 0, compare:  $A. \frac{1}{x}$                        $B. \frac{1}{y}$

7. Solve for  $R_1$ :  $\frac{m}{x} = y \left( \frac{1}{R_1} + \frac{a}{R_2} \right)$

For problems 8 – 23, simplify the expression. (Remember – there can be no radicals in the denominator.)

$$8. a + \frac{1}{a + \frac{1}{a}}$$

$$16. \sqrt{x^3 y^5} y^{1/4} x^{3/2}$$

$$9. \frac{1}{a + \frac{1}{x + \frac{1}{m}}}$$

$$17. \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}}$$

$$10. \frac{x^2 y}{1 + m^2} + \frac{x}{y}$$

$$18. \frac{m}{x + \frac{p}{1 - \frac{y}{m}}}$$

$$11. \frac{4 - 3\sqrt{2}}{8 - \sqrt{2}}$$

$$19. \frac{12!}{8!4!}$$

$$12. \frac{x^a y^{a+b}}{(x^{-a/2})(y^{b-1})}$$

$$20. \frac{n(n!)}{(n+1)!}$$

$$13. \frac{m^{x+2} b^{x-2}}{(m^{2x/3})(b^{-3x/2})}$$

$$21. \frac{41!}{38!3!}$$

$$14. \frac{4 - 2\sqrt{3}}{2 - \sqrt{3}}$$

$$22. \frac{a^2 - b^2}{a + b}$$

$$15. 5\sqrt{\frac{3}{7}} - 2\sqrt{\frac{7}{3}} + \sqrt{84}$$

$$23. \frac{n!(n+1)!}{(n+2)!}$$

Factor the expressions in problems 24 – 33 below:

24.  $2x^3 + 3x^2 - 2x$

29.  $a^6 - 27b^3c^3$

25.  $a^2x - a^2 - 4b^2x + 4b^2$

30.  $x^3y^6 + 8m^{12}$

26.  $16a^{4m+3} - 8a^{2m+3}$

31.  $14x^{4b-2} - 7x^{2b}$

27.  $a^2b^{2x+2} - ab^{2x+1}$

32.  $x^3y^6 - 8x^6y^{12}$

28.  $9x^2 - y^4$

33.  $a^3b^3 - 8x^6y^9$

For problems 34 – 36, solve for all variables.

34. 
$$\begin{cases} 2x + 3y = -4 \\ x - 2z = -3 \\ 2y - z = -6 \end{cases}$$

36. 
$$\begin{cases} x + y + z = 4 \\ 2x - y - z = -1 \\ x - y + z = 0 \end{cases}$$

35. 
$$\begin{cases} 2y^2 - x^2 = 1 \\ y + 1 = x \end{cases}$$

37. 
$$\begin{cases} xy = -4 \\ y = -x - 2 \end{cases}$$

Solve the equations by completing the square.

38.  $x^2 - 3x - 4 = 0$

39.  $2x^2 = x + 3$

40. Complete the square to write  $x^2 = -6x - 13$  in the form  $(x + a)^2 + b = 0$ , where  $a$  and  $b$  are constants.

Solve using the quadratic formula:

41.  $x^2 - 3x - 7 = 0$

42.  $3x^2 - x - 7 = 0$

43.  $2x^2 = x + 3$

44. Divide  $2x^3 - 3x + 5$  by  $x - 3$ .

45. Find the surface area of a right circular cone whose base has an area of  $4\pi$  square centimeters and whose height is 4 centimeters.

46. Find the surface area of a sphere whose volume is  $\frac{4}{3}\pi$  cubic meters.

47. Write the linear equation whose general form is  $2x - 3y + 2 = 0$  in slope-intercept form.

48. Find the equation of the line that passes through the point (1, -1) and is perpendicular to the line  $4y + 3x - 2 = 0$ .

49. Find the volume of a trough 5 meters long whose ends are equilateral triangles, each of whose sides has a length of 2 meters.

50. Using the statement "If the light is on, then the switch is on."

a. write the converse of the statement

b. write the inverse of the statement

c. write the contrapositive of the statement

Use a graphing calculator for the following problems:

51. Approximate the value(s) of  $x$  where the graph of the parabola whose equation is  $y = x^2 + 3x - 1$  crosses the  $x$ -axis.

52. Approximate the value(s) of  $x$  where the graph of the cubic function  $y = x^3 + 3x^2 - 3$  crosses the  $x$ -axis.

53. Approximate the coordinates of the intersection point(s) of the graphs of  $y = x^2 - 3x + 1$  and  $y = x^3 + 3x^2 - 3$ .

54. Approximate the zero(s) of the function  $f(x) = x^3 - 3x^2 - 3x + 1$ .

55. Approximate the coordinates of the intersection point(s) of the graphs of the functions  $f(x) = x^3 - 3x^2 - 3x + 1$  and  $g(x) = x - 1$ .

## HONORS CALCULUS ANSWERS

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

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

23. \_\_\_\_\_

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

13. \_\_\_\_\_

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

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

14. \_\_\_\_\_

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

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

15. \_\_\_\_\_

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

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

16. \_\_\_\_\_

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

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

17. \_\_\_\_\_

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

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

18. \_\_\_\_\_

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

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

19. \_\_\_\_\_

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

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

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

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

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

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

32. \_\_\_\_\_

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

22. \_\_\_\_\_

33. \_\_\_\_\_

34. \_\_\_\_\_

42. \_\_\_\_\_

50. write below

35. \_\_\_\_\_

43. \_\_\_\_\_

51. \_\_\_\_\_

36. \_\_\_\_\_

44. \_\_\_\_\_

52. \_\_\_\_\_

37. \_\_\_\_\_

45. \_\_\_\_\_

53. \_\_\_\_\_

38. \_\_\_\_\_

46. \_\_\_\_\_

54. \_\_\_\_\_

39. \_\_\_\_\_

47. \_\_\_\_\_

55. \_\_\_\_\_

40. \_\_\_\_\_

48. \_\_\_\_\_

41. \_\_\_\_\_

49. \_\_\_\_\_