

Name: _____ Date: _____



NOBLE
ACADEMY

Senior Calculus
School Year 2017-2018
Summer Assignment

Name: _____

Date: _____

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Calculus Summer Assignment

Dear Noble Academy Student:

Welcome to Calculus! I look forward to getting to know you and working with you this school year. While you are enjoying your summer, please take time to complete the attached assignments. This packet is designed to help make the transition into this challenging course as smooth as possible (and to keep your math skills from deteriorating from lack of use). One thing is for sure - the more you do over the summer, the easier it will be when school starts and the more comfortable you will feel with the pace of the class.

Your summer assignment consists of problems that cover the following concepts:

- Part 1: Prerequisite Skills - Exponent Rules, The Quadratic Formula and Factoring
- Part 2: Domain, Range, Functions and Inverses
- Part 3: Logarithms
- Part 4: Triangles

You should recognize these concepts from Algebra II and Geometry. It is very important that you complete the summer work. **Packets WILL BE COLLECTED on the FIRST day of school.** A completion grade will be assigned to all students. Answers are attached at the end of this packet so you can check your solutions.

We will spend some time in class reviewing the prerequisite skills covered in this packet, but we will NOT complete problems from this packet, as they are your responsibility to complete over the summer. You will be tested on this material within the first two weeks of school. *We will be building on all these concepts for the rest of the year.* These foundational skills are very important!

If you have questions or concerns, you can reach me by email at bdefauw@thenobleacademy.org. I will respond, but please understand that I do not check my email as frequently in the summer as I do during the school year.

Give me your best work while giving yourself the opportunity to get off to a great start. I look forward to seeing you in August!

Sincerely,
Mr. DeFauw
12th Grade Math Teacher

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REQUIRED MATERIALS

Come prepared for class every day. You will need to bring your textbook(s), calculator, and a method to record notes and do problems. Students should have these materials by the first day of class.

- Textbook(s)
 - Will be announced at a later date
- Calculator
 - A graphing calculator will be an essential tool for you as you learn and do calculus. This tool will, of course, help us to calculate results as we solve problems. It will also help us explore new ideas, test conjectures, and create graphs to help us visualize what we are learning.
 - Students are required to purchase a TI-83 or TI-84 calculator to bring to class every day.
- Method to record notes and do problems
 - This could take the form of a college rule notebook, binder, and/or notebook with graphing paper.
- Other miscellaneous items
 - 2 packs of Expo Markers (pack of 6 or 12)
 - One pack will be shared by the class for problems on the big whiteboards
 - One pack will be kept by you to do problems on small whiteboards
 - Mechanical pencils (There will not be a pencil sharpener in the room)
 - 2 color pens (at least one red and one blue, for grading)

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Please work on a separate sheet of paper and ALWAYS show ALL work to support your answer!!

Part 1: Prerequisite Skills – Exponent Rules, The Quadratic Formula and Factoring

Simplify using exponent rules. Assume that no variable equals zero. Write all exponents as POSITIVE.

1. $\frac{x^{-2}y}{x^4y^{-1}}$

2. $\frac{12m^8y^6}{-9my^4}$

3. $(4a^3c^2)^3(-3ac^4)^2$

4. $\left(\frac{5a^7}{2b^5c}\right)^3$

5. $\left(\frac{7m^{-1}n^3}{m^{-1}n^2}\right)^{-1}$

6. $\frac{(3x^{-2}y^3)(5xy^{-8})}{(x^3)^4 \cdot y^{-2}}$

Solve each equation using the quadratic formula.

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

6. $x^2 = 9x - 20$

2. $2x^2 - x - 13 = 2$

7. $9x^2 - 11 = 6x$

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

8. $4x^2 - 8 = x$

4. $8x^2 - 4x = 18$

9. $14x^2 + 1 = 6x^2 + 7x$

5. $10x^2 + 9 = x$

10. $4x^2 + 4x - 8 = 1$

Solve each equation by factoring.

11. $(3n - 2)(4n + 1) = 0$

20. $-4n^2 = 6n + 16 - 5n^2$

12. $m^2 - 3m = 0$

21. $8r^2 + 3r + 2 = 7r^2$

13. $(5n - 1)(n + 1) = 0$

22. $b^2 + b = 2$

14. $(n + 2)(2n + 5) = 0$

23. $10n^2 - 35 = 65n$

15. $3k^2 + 72 = 33k$

24. $3x^2 - 8x = 16$

16. $n^2 = -18 - 9n$

25. $16n^2 - 114x = -14$

17. $7v^2 - 42 = -35v$

26. $28n^2 = -96 - 184n$

18. $k^2 = -4k - 4$

27. $7a^2 + 32 = 7 - 40a$

19. $-2v^2 - v + 12 = -3v^2 + 6v$

28. $42x^2 - 69x + 20 = 7x^2 - 8$

Part 2: Domain, Functions and Inverses**Find the domain of each function.**

1. $h(x) = 4x - 3$

2. $g(x) = 18 - 5x$

3. $f(x) = \frac{2x}{x-3}$

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

5. $g(x) = \frac{x+3}{x(x+2)}$

6. $h(x) = \frac{x-2}{x^2-16x+60}$

7. $g(x) = \frac{4}{x^2-4}$

8. $f(x) = \sqrt{x-2}$

9. $h(x) = \frac{3x}{\sqrt{x-5}}$

10. $f(x) = \frac{5}{|x+3|}$

11. $g(x) = \frac{x+1}{x^2+4x}$

12. $h(x) = \frac{x+2}{\sqrt{9-x^2}}$

13. $j(x) = \frac{x}{|x-10|}$

14. $f(x) = \frac{\sqrt{8-x}}{x}$

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Part 3: Logarithmic Functions

Evaluate each expression. Work on a separate sheet of paper. Make sure to show the exponential equation. Leave your answer in simplest fraction form, if necessary.

1. $\log_5 1$

3. $\log_{\frac{1}{25}} 5$

5. $\log_4 128$

2. $\log_4 \frac{1}{16}$

4. $\log_9 27$

6. $\log_{27} \frac{1}{3}$

Solve each equation. Work on a separate sheet of paper. Show all work. Leave your answer in simplest fraction form, if necessary.

7. $\log_9 x = \frac{3}{2}$

9. $\log_{10} x^2 = -4$

12. $\log_4(2x) = -\frac{1}{2}$

8. $\log_4 x = -\frac{3}{2}$

10. $\log_3(x+2) = 5$

11. $\log_6(2x-1) = 3$

13. $\log_8(x-5) = \frac{2}{3}$

Solve each equation. Work on a separate sheet of paper. Show all work. Leave your answer in simplest fraction form, if necessary. Important: When no base is shown, the base is 10.

14. $\log_6(2x-3) = \log_6 12 - \log_6 3$

23. $\log(x+3) = 1 + \log(x-2)$

15. $\log(x+2) - \log x = 2 \log 4$

24. $\log(57x) = 2 + \log(x-2)$

16. $3 \log_2 x - 2 \log_2(5x) = 2$

25. $\log_5(x+3) - \log_5(2x-1) = 2$

17. $2 \log_4(x+1) = \log_4(11-x)$

26. $\log_2(5y+2) - 1 = \log_2(1-2y)$

18. $\log x + \log(3x-5) = \log 2$

27. $\log(c^2-1) - 2 = \log(c+1)$

19. $\log(-4-x) + \log 3 = \log(2-x)$

28. $\log_7 x + 2 \log_7 x - \log_7 3 = \log_7 72$

20. $\log x - \log(x+6) = \frac{1}{2} \log 9$

29. $\log_{16}(9x+5) - \log_{16}(x^2-1) = \frac{1}{2}$

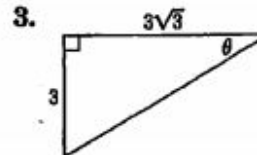
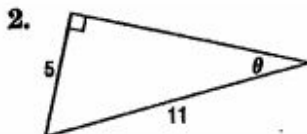
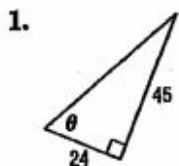
21. $\log_2(x+7) + \log_2 x = 3$

30. $3 \log_5(x^2+9) - 6 = 0$

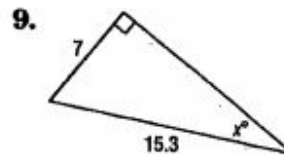
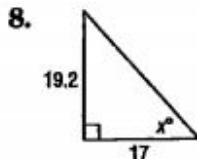
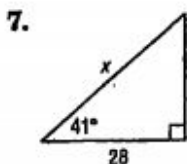
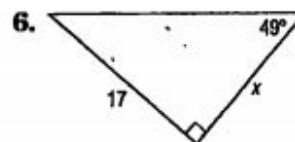
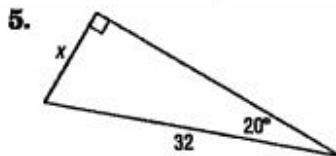
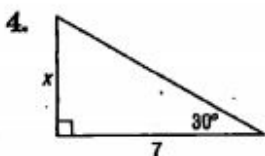
22. $\log_3(x+3) + \log_3(x+5) = 1$

Part 4: Trigonometry

Right Triangle Trigonometry: Find the values of sine, cosine and tangent of for θ . Write your answer in simplest fraction and/or radical form (rationalize your denominator!!)



Write an equation involving sine, cosine or tangent that can be used to find x . Then solve the equation. Round measures of sides to the nearest tenth and measures of angles to the nearest degree.



Solve for all missing parts of triangle ABC using the given measurements. Round measures of the sides to the nearest tenth and measures of the angles to the nearest degree.

10. $A = 35^\circ, a = 12$

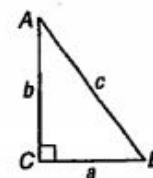
13. $a = 4, b = 7$

11. $B = 71^\circ, b = 25$

14. $A = 17^\circ, c = 3.2$

12. $B = 36^\circ, c = 8$

15. $b = 52, c = 95$



Summer Assignment Solutions

Part 1: Prerequisite Skills

Exponent Rules:

1. $\frac{y^2}{x^6}$

2. $-\frac{4m^7y^2}{3}$

3. $576a^{11}c^{14}$

4. $\frac{125a^{21}}{8b^{15}c^3}$

5. $\frac{1}{7n}$

6. $\frac{15}{x^{13}y^3}$

Quadratic Formula and Factoring:

1. $x = 1.5, x = 1$

2. $x = 3, x = -2.5$

3. $x = 2, x = -1.5$

4. $x = \frac{1 \pm \sqrt{37}}{4}$

5. $x = \frac{1 \pm i\sqrt{359}}{20}$

6. $x = 5, x = 4$

7. $x = \frac{1 \pm 2\sqrt{3}}{3}$

8. $x = \frac{1 \pm \sqrt{129}}{8}$

9. $x = \frac{7 \pm \sqrt{17}}{16}$

10. $x = \frac{-1 \pm \sqrt{10}}{2}$

11. $n = \frac{2}{3}, n = -\frac{1}{4}$

12. $m = 0, m = 3$

13. $n = \frac{1}{5}, n = -1$

14. $n = -2, n = -\frac{5}{2}$

15. $k = 8, k = 3$

16. $n = -6, n = -3$

17. $v = -6, v = 1$

18. $k = -2, (\text{double root})$

19. $v = 3, v = 4$

20. $n = 8, n = -2$

21. $r = -1, r = -2$

22. $b = -2, b = 1$

23. $n = -0.5, n = 7$

24. $x = -\frac{4}{3}, x = 4$

25. $n = 7, n = \frac{1}{8}$

26. $n = -\frac{4}{7}, n = -6$

27. $a = -\frac{5}{7}, a = -5$

28. $x = \frac{4}{7}, x = \frac{7}{5}$

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Part 2: Domain, Functions and Inverses

1. all reals
 2. all reals
 3. all reals, $x \neq 3$
 4. all reals, $x \neq -4$
 5. all reals, $t \neq 0, t \neq -2$
 6. all reals, $x \neq 6, x \neq 10$
 7. all reals, $x \neq \pm 2$
 8. $x \geq 2$
 9. $x > 5$
 10. all reals, $x \neq 3$
 11. all reals, $x \neq 0, x \neq -4$
 12. $-3 < x < 3$
 13. all reals, $x \neq 10$
 14. $x \leq 8, x \neq 0$
-

Part 3: Logarithmic Functions

1. 0
 2. -2
 3. -0.5
 4. 1.5
 5. $\frac{7}{2}$
 6. $-\frac{1}{3}$
 7. $x = 27$
 8. $x = \frac{1}{8}$
 9. $x = \frac{1}{100}$
 10. $x = 241$
 11. $x = 108.5$
 12. $x = 0.25$
 13. $x = 9$
 14. $x = \frac{7}{2}$
 15. $x = \frac{2}{15}$
 16. $x = 100$
 17. $x = 2$
 18. $x = 2$
 19. $x = -7$
 20. no solution
 21. $x = 1$
 22. $x = -2$
 23. $x = \frac{23}{9}$
 24. $x = \frac{200}{43}$
 25. $x = \frac{4}{7}$
 26. $x = 0$
 27. $x = 101$
 28. $x = 6$
 29. $x = 3$
 30. $x = -4, x = 4$
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Part 4: Trigonometry, Law of Sines, and Law of Cosines

$$\sin \theta = \frac{15}{17}$$

1. $\cos \theta = \frac{8}{17}$

$$\tan \theta = \frac{15}{8}$$

*** I will introduce the other 3 trig ratios in class!! For now, just focus on sine, cosine and tangent!!*

$$\sin \theta = \frac{5}{11}$$

2. $\cos \theta = \frac{4\sqrt{6}}{11}$

$$\tan \theta = \frac{5\sqrt{6}}{24}$$

$$\sin \theta = \frac{1}{2}$$

3. $\cos \theta = \frac{\sqrt{3}}{2}$

$$\tan \theta = \frac{\sqrt{3}}{3}$$

4. $x = 4$
 5. $x = 10.9$
 6. $x = 14.8$
 7. $x = 37.1^\circ$
 8. $x = 48^\circ$
 9. $x = 27^\circ$
 10. $B = 55^\circ, b = 17.1, c = 20.9$
 11. $A = 19^\circ, a = 8.5, c = 26.4$
 12. $A = 54^\circ, a = 6.5, b = 4.7$
 13. $B = 60^\circ, c = 8.1, A = 30^\circ$
 14. $B = 73^\circ, b = 3.1, a = 0.9$
 15. $a = 79.5, B = 33^\circ, A = 57^\circ$
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