Upper School Algebra 1 Summer Assignment Directions

Dear Students and Parents,

The math work to be completed this summer is broken into two parts. Each part has a distinct purpose in shaping the hearts and minds of students in Algebra 1 so that they become excited and eager to take part in learning the Algebra 1 curriculum.

The first part of the work is that students will read the book, “The Curious Incident of the Dog in the Night-Time” by Mark Haddon. This book tells the story of a young boy who investigates the death of a dog and his adventure of self-discovery. The purpose of this reading as part of the math curriculum summer work is to engage students in learning and excited about the math concepts they will be learning in the coming school year. As students read different sections of the book, they are to answer reflection questions based on the book and many that relate to mathematics.

This part of the summer work is broken into fifteen different days to assist students with time management. Students should read a section of the book each day and then answer those questions. Students are welcome to work at their own pace; but a guide is provided if needed. Students should answer all questions and be prepared to discuss the book the first week of school.

The second part of the summer assignment includes additional practice problems. The concepts have been previously studied and students should be familiar with all of these concepts in preparation for learning Algebra 1. Students should complete these to their best ability and be certain to show all work.

Have a wonderful, math filled summer!

Students Name: ______________________________

The work in this assignment was completed independently by my daughter:

Parent Signature: ___________________________________________
As you read through each day’s passage, be sure to answer the questions in the Reflection section. Be sure to reflect on the passage while you’re reading or as soon as you finish reading so that the content is freshest in your mind. Assignments will sometimes deal with passages you have just read, but they might be questions foreshadowing passages you are about to read as well. Please use additional pages if you need extra room to write.

Day 1: Please read Chapter 2 through Chapter 13

Reflection:
1. The narrator, Christopher, often include some very particular details about the story. Some of the details might even be too detailed and unnecessary. As we read this passage, list some of the details that you think are unnecessary below. Why do you choose these details?

2. When completing word problems in math, are there often details that are unnecessary? What might the inclusion of so many details tell us about math in the real world?

3. Why doesn’t Christopher understand jokes? What simile does he use to help the reader understand what jokes sound like to him?

4. So far, we have read the first six chapters. They were numbered Chapters 2, 3, 5, 7, 11, and 13. Is this because Christopher can’t count? Is there a pattern to his choices for chapter numbers? Why do you think he chose these numbers?
Day 2: Please read Chapter 17 through Chapter 31

Reflection:

1. Christopher explains his method for numbering the chapters. He says, “Prime numbers are what is left when you have taken all the patterns away. I think prime numbers are like life. They are very logical, but you could never work out the rules, even if you spent all your time thinking about them.” (p. 12) What does this statement tell us about Christopher and his view of the world?

2. Use what you know about prime numbers to write the prime factorization (Write out all the prime numbers that multiply to the numbers) of the numbers below.

   360  120  10

3. Christopher talks about metaphors. Are there any metaphors you use frequently? List any you can think of: Imagine for a second not being able to understand any metaphors or any facial expressions.

4. How difficult would it be to function at school? At home? With your friends? Why is it important to understand that everyone is different, especially when working with peers in math class?
Day 3: Please read Chapter 37 through Chapter 53

Reflection:

1. What are Christopher's qualifications for a “Good Day”, a “Quite Good Day”, and a “Super Good Day”? Why does he choose these qualifications? What does this say about Christopher?

2. Christopher explains how you can give each letter a value from 1 to 26 (a =1, b = 2, etc.) and add up the numbers in someone’s name to see if it equals a prime number. For example, Sherlock Holmes equals 163, a prime number. Does your name (FIRST and LAST, like Christopher did) equal a prime number? Show your work below:

3. Can you write a formula to be able to find the sum of any name?

4. Christopher doesn’t seem to have an emotional response when he describes how he was first told of his mother’s death. What types of things does he say and do upon hearing the news? Why do you think this is?
**Day 4: Please read Chapter 59 through Chapter 67**

**Reflection:**

1. Christopher mentions that sometimes instructions are confusing (“Be Quiet,” “Keep off the grass”). Can you think of other common instructions that might be difficult for someone like Christopher to understand? What about instructions that are difficult for you to follow? List them below:

   Difficult for Christopher:

   Difficult for you:

2. If your math teacher understands this about you, how might that have a positive impact on your learning experience and understanding?

3. On page 42, Christopher outlines the “Chain of Reasoning” he will use to arrive at his Prime Suspect. How does Christopher use problem solving to arrive at his reasoning? Do you agree or disagree with his reasoning? Would your Prime Suspect be someone different at this point?

4. We’re going to help Christopher with his investigation. In the left-most column, write as many names of characters in the novel as you can think of. Then follow the column through by answering the questions in the boxes provided. Use “Y”, “N”, or “DK” (Don’t Know). Who is your Prime Suspect based on this chart? If you arrived at a different Prime Suspect than Christopher, why do you think this is?

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<tr>
<th>Name</th>
<th>Know Wellington?</th>
<th>Hate Wellington?</th>
<th>Often Angry?</th>
<th>What to make Mrs. Shears Upset?</th>
<th>Suspect?</th>
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Day 5: Please read Chapter 71 through Chapter 83

Reflection:

1. Christopher makes a list of “Behavioral Problems” that he has (p. 46). Look at Footnote 6, his explanation to Problem M. Have you ever been in a situation where telling the truth would get you into trouble? How does that feel? What do you think is the best solution when confronted with a situation like that?

2. Christopher’s father gets angry when Mr. Shears’ name is mentioned. He calls Mr. Shears “evil.” Why do you think Christopher’s father describe Mr. Shears as “evil?”

3. If someone asked you to list out your “Behavioral Problems”, how long would your list be? Do you think it would be easy for you to make such a list? Do you think it was easy for Christopher to make such a list for himself? Why or why not? Are your behaviors different at home and at school? Why or why not?
Day 6: Please read Chapter 89 through Chapter 101

Reflection:

1. Mrs. Alexander mysteriously asks, “So you don’t know?” (p. 59) while talking to Christopher about his mother. Do you think she told the truth after she explained it to Christopher? Why or why not?

2. After hearing the startling news about his mother from Mrs. Alexander, Christopher starts talking about a mathematics problem in Chapter 101. Why do you think Christopher changes topics from chapter to chapter so quickly and seemingly randomly?

3. Play the Monty Hall Problem in study hall or for homework. Use this website: http://math.ucsd.edu/~crypto/Monty/monty.html

   Play ten times “staying” with your original choice and play ten more times “switching” from your original choice. Record the number of wins below in the first blank.

   # of wins (out of ten) staying with your choice: ______ _______

   # of wins (out of ten) switching from your original choice: ______ _______

   What is the percentage win of each? If you had to recommend to a classmate which option to pick, which would you suggest? Why?
Day 7: Please read Chapter 103 through Chapter 127

Reflection:

1. Using Christopher’s method for large multiplication, try to multiply 501 X 428 in your head. Is it easy? Difficult? For what types of numbers will this multiplication method work best? Pick two other numbers and test this way to multiplying out.

2. When discussing Sherlock Holmes, Christopher discusses the idea of a "Red Herring". List some possible "red herrings" for Christopher in the mystery of Wellington’s murder:

3. Application: Christopher describes his memory as a “film,” but it only contains things that actually happened (not imaginary things). What are some advantages and disadvantages of having Christopher’s type of memory? Do you think you would be able to cope if you had this type of memory?
   Are there any types of numbers or mathematics that seem imaginary?
Day 8: Please read Chapter 131 through Chapter 149

Reflection:
1. Christopher explains “Occam’s Razor” to us (p. 90): No more things should be presumed to exist than are absolutely necessary. Do you agree with this statement? Why or why not? Can you think of an example in mathematics where Occam’s Razor applies? What is it?

2. Why do you think Christopher’s father kept the book Christopher was writing even though his father seemed so dead-set against it?

3. What explanation(s) do you have for the letter from Christopher’s mother being dated 18 months after she had died? Are they the same explanations that Christopher came up with? Explain. How does Occam’s Razor come into play in this explanation?
Day 9: Please read Chapter 151 through Chapter 157
Reflection:
1. Christopher explains a formula to predict the number of frogs in a pond. Why do you think this formula explains the number of animals in a population? Why might Lambda have such strange values to explain how the population either grows or shrinks? Do you think that most “random” occurrences have a similar formula (whether we know it or not)?

2. Christopher formulates an explanation for the letters from his mother. Was this the same explanation that you came up with during our previous reading? Why do you think it took him so long to come to this conclusion?

3. Let’s revisit our suspect chart for Wellington’s murder. Use the same rules as on Day 4, but you might add some new characters or change your answers/opinions on some of the older characters.

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Day 10: Please read Chapter 163 through Chapter 167

Reflection:

1. Do you agree with Christopher that people’s brains are like computers? Why or why not? How might this idea be useful when thinking about learning math and your personal use of the calculator?

2. Did Christopher’s father do the right thing in keeping the news of Christopher’s mother from him? Explain.

3. List any “clues” that the author gave to hint:
   a. Christopher’s mother was still alive.
   b. Who the real killer of Wellington was.

Look back through text, if necessary. Look for “clues” to two of the big mysteries from the novel. Clues may be found in what other characters say, in descriptions, in what Christopher says, etc. Provide page numbers for where you found your clues.
Day 11: Please read Chapter 173 through Chapter 181

Reflection:

1. Christopher decides to go live in London. Given all of his possibilities, was this his best choice? Are there other possibilities that he isn't considering that would be better for him?

2. Did Christopher properly understand the joke about the mathematician, the logician, and the economist from p. 181? What was the joke trying to say (why was it funny)? How did Christopher interpret it?

3. Assignment: In Chapter 181, Christopher mentions, “I see everything.” He then explains how he essentially has photographic memory. Describe what it must be like to have a photographic memory (One where you see every detail of every room you have ever entered and remember them all forever). List positives and negatives. Do you have a photographic memory? If not, what are some tricks you can use to help you remember things – especially math concepts!
Day 12: Please read Chapter 191 through Chapter 193

Reflection:

1. In previous chapters, Christopher has mentioned his photographic memory. Discuss why entirely new places, like the train station in Chapter 191, might be frightening and exhausting for someone like Christopher.

2. Do you ever feel this way in school? What are some things that you can do to help make learning less frightening and less exhausting?

3. Look at Christopher’s graph about space/time relationships from Chapter 193 (Page 157). Does this make sense? Do you agree with his explanation of the relationships between space and time? Would you change anything to make it better or more understandable?

4. Christopher mentions the mathematical games “Conway’s Soldiers”. Use this website: https://www.cleverlearning.co.uk/blogs/blogConway.php. Play for 5 to 10 minutes (or longer, if you like the game). Was Christopher correct in his explanation of the game? Can you find a way to get above the fourth line?
Day 13: Please read Chapter 197 through Chapter 223

Reflection:
1. In Chapter 199, Christopher explains why he believes things happen by accident. Do you agree with his explanation of how an eye evolved? Why or why not?

2. Whenever Christopher gets scared, he seems to revert to doing mathematical problems in his head. Why do you think this is? When you get scared or nervous, do you have a fallback activity to think about instead? What is it?

3. Christopher solves some equations using the Quadratic Formula. This formula is used to solve “Quadratics”, which are equations where one side is zero and the other side has a term with a squared variable. You can see a couple of the quadratics he solved in Chapter 197.
Since the equation has a squared term, this means there are two possible solutions to the equation. You obtain these two solutions like this:
If the equation is $0 = x^2 + 4x - 5$, we let $a = 1$, $b = 4$, and $c = -5$.
We then plug into these two equations:
$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{and} \quad x = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$
(Note that the two equations are exactly the same except for one operation).
Solve the two equations for $x$ by plugging in $a$, $b$, and $c$. Use the space below to show work and show that the two values for $x$ make the original equation (the quadratic) true.
Day 14: Please read Chapter 227 through Chapter 229

Reflection:

1. Do you think the rat that Christopher found in Chapter 227 was, in fact, Toby? What clues does the author give to indicate that it might be Toby, or that it might not be Toby? List the clues here:

2. In your opinion, where is Christopher better off: With his mother, who left, or with his father, who killed Wellington and lied about his mother? Are there any better options for Christopher at this point?

3. Discuss Christopher's Dream in Chapter 229. Why do you think this dream makes him so happy? Are there some things about being alone in the world that he is not considering?
Day 15: Please read Chapter 233 through the end

Reflection:
1. Why is sitting his “Maths A Level” so important to Christopher? Why is he so angry when they are postponed for a year?

2. How does Christopher’s father hope that purchasing a dog for Christopher will show that he can be trusted? What is the significance of the fact that Sandy is a dog, not another rat?

3. One of Christopher’s favorite questions from the Maths A-Level Tests is included in Appendix A.

Read his solution, and below list some parts of it that look familiar to you (either from Pre-Algebra, or previous years of mathematics). On the other side of the chart, list parts of it that don’t look familiar to you.

Can you recreate his solution in your own words on the next page? Try your best to explain at least part of what he did.

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<th>Familiar</th>
<th>Not Familiar</th>
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Upper School Algebra 1 Summer Assignment Part 2
Please complete these practice problems to prepare for the work you will complete in Algebra 1. If unsure, you are encouraged to use notes and work from previous classes, Khan Academy, or mathisfun.com. Do your best work and make sure to show all work.

**Section One: Number Sense**

a) Write each fraction or mixed number as a decimal.

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<tr>
<td>1) $\frac{2}{5}$</td>
<td>2) $\frac{5}{33}$</td>
<td>3) $\frac{3}{8}$</td>
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b) Write each decimal as a fraction or mixed number.

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<td>4) -3.9</td>
<td>5) 0.75</td>
<td>6) 0.125</td>
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c) Round the number 375.489 to the correct digit.

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<td>7) Round to the nearest whole number</td>
<td>8) Round to the nearest hundredth</td>
<td>9) Round to the nearest tenth</td>
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d) Add or subtract the following rational numbers.

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<tr>
<td>10) $2.18 - 0.99$</td>
<td>11) $3.97 + 1.4$</td>
<td>12) $\frac{4}{7} + 2\frac{4}{7}$</td>
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e) Add the following integers

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<tr>
<td>13) $-6 + (-3)$</td>
<td>14) $-8 + 10$</td>
<td>15) $-3 + 10 + (-6)$</td>
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f) Subtract the following integers

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<td>16) $-6 - 3$</td>
<td>17) $-8 - (-10)$</td>
<td>18) $13 - 21$</td>
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g) Multiply the following rational numbers (remember a rational number is a number that can be written as a fraction.)

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<td>19) ((-6)(-8))</td>
<td>20) ((3.28)(4.1))</td>
<td>21) (\left(\frac{2}{3}\right)\left(\frac{3}{7}\right))</td>
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h) Evaluate each expression; make sure you follow the correct order of operations (PEMDAS)

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<td>22) (16-12+4)</td>
<td>23) (5-6\times2+3)</td>
<td>24) (2^3-32+8+5)</td>
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i) Evaluate the following expressions if \(a=-6\), \(b=4\), and \(c=-5\)

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<td>25) (a-8)</td>
<td>26) (b-a-c)</td>
<td>27) (3c+b)</td>
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Section 2: Algebraic Expressions

a) Translate each phrase into a variable expression or equation.

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<th>28) Six more than one fourth a number</th>
<th>29) Two less than four times a number</th>
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b) Simplify each of the following expression completely. Remember to distribute to both terms!

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<th>30) 9(x – 4)</th>
<th>31) 5(6 + x)</th>
<th>32) -4(5y – 3)</th>
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<table>
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<tr>
<th>33) -x + 6 + 5x – 3</th>
<th>34) 4 – x – 7 – 5x</th>
<th>35) x + 5 – x + 2</th>
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Section 3: Solving Algebraic Equations
a) Solve for the indicated variable in each equation.

36) $a + 9 = 13$
37) $-54 + m = 82$
38) $w - 83 = -100$

b) The following questions are solving two-step equations. Make sure you show your work.

39) $4x + 7 = 35$
40) $17 + 6p = -73$
41) $\frac{p}{5} - 2 = -6$

Section 4: Word Problems
Write an equation based on the information provided in each problem, and then solve. Show ALL your work!

42) Five more than a number is fifty-seven. What is the number?

43) Jane paid $108 for 6 tickets to a hockey game. How much did each ticket cost?