

Honors Algebra II/Trigonometry

Complete the following problems prior to entering Honors Algebra II/Trig. Each question should be done on a separate sheet of paper, and must include all of the work necessary to solve the problem including: all equations, computations, diagrams (if necessary) and analysis. The first few days of school will be spent discussing solutions to these problems, and you will be expected to participate.

- 1) Davis says that adding a two-digit number to the two-digit number formed by reversing the digits of the original number results in a sum of 65.
 - a. Avery says that's impossible. Is it impossible? Explain why or why not.
 - b. Avery offers a counter challenge to Davis. She says by following his addition scheme she got a sum of 154. Find the two numbers Avery used.
 - c. Describe a method (other than addition!) of finding other sums that fit this pattern!

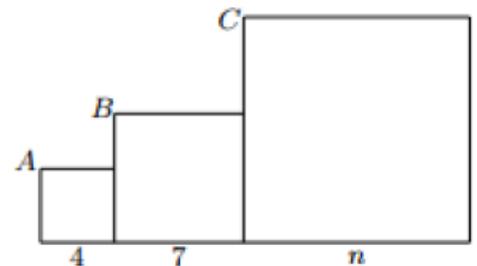
- 2) Tory is buying school supplies. She buys pencils and notebooks.
 - a. If Tory bought a total of 8 items, p of which are pencils, write an expression for the number of notebooks, n , that Tory buys.
 - b. If each pencil costs \$0.29 and each notebook cost \$2.59, write an equation for how much Tory spent on each.
 - c. If her bill is \$9.22, how many pencils did Tory buy?

- 3) If m and n stand for integers, then $2m$ and $2n$ stand for even integers.
 - a. Explain why in a complete sentence
 - b. Use the distributive property to show that the sum of any two even integers is an even integer.
 - c. Write expressions to represent two odd integers in terms of m and n .
 - d. Investigate what you get when you add two odd integers. Write a conclusion with verification.

- 4) Mrs. Bruton recently purchased two boxes of ten-inch candles; one box from a discount store, the other from an expensive boutique. It so happens that the inexpensive candles last only three hours each, while the expensive candles last five hours each. One evening, Mrs. B. hosted a dinner party and lit two of the candles (one from each box) at 7:30 pm. During dessert, a guest noticed that one candle was twice as long as the other. At what time was this observation made?

- 5) There are 396 people in a theater watching a Marvel Movie Marathon (leaving out of course, Age of Ultron, because we really don't want to admit that one existed). If the *ratio* of women to men is 2:3, and the ratio of men to children is 1:2
 - a. How many men are in the theater?
 - b. Women?
 - c. Children?

- 6) Three squares are placed next to each other as shown to the right. The vertices A, B, and C are collinear.
 - a. Find the dimension n .
 - b. Replace the lengths 4 and 7 by m and k respectively. Express k in terms of m and n .



- 7) *Guessing Birthdays*. Mrs. Fox is working a number trick on her advisee, Courtney, whose birthday is the 11th of November. The table below shows the sequence of questions Mrs. Fox asks, as well as the calculations that Courtney makes in response. Another column is provided for the algebra you are going to do to solve the trick. Use the letters m and d for month and day. *Copy the table on your page for this problem

<i>Instruction</i>	<i>Courtney</i>	<i>Algebra</i>
Write the number of your birth month.	11	m
Multiply by 5	55	
Add 7	62	
Multiply by 4	248	
Add 13	261	
Multiply by 5	1305	
Add the day of your birthday	1316	

After hearing the result of the last calculation, Mrs. Fox can do a simple mental calculation and then state Courtney's birthday. Explain how. To test your understanding of this trick try it on someone whose birthday is unknown to you!

- 8) A triangle is formed by the intersections of the lines $3x + 2y = 1$, $y = x - 2$, and $-4x + 9y = 22$. Is the triangle isosceles? How do you know?
- 9) A bug is moving along the line $3x + 4y = 12$ with a constant speed of 5 units per second. The bug crosses the x-axis when $t = 0$ seconds. It crosses the y-axis later. When? Where is the bug at $t = 2$? When $t = -1$? When $t = 1.5$? What does a negative t -value mean in this scenario?
- 10) Suppose a flat rectangular board is built by gluing together a number of square pieces of the same size.
- If twenty squares are glued together to make a 4×5 rectangular board, how many of these squares are completely surrounded by other squares?
 - If the dimensions of the board are $a \times b$, then how many squares (in terms of a and b) are completely surrounded by other squares?
- 11) Club Fitness has a membership fee of \$50, after which individual visits to the gym are \$5.50. Non members pay \$8.00 per visit. Stuart is going to exercise at the gym regularly, and is wondering if it makes sense to become a member. How regularly would Stuart need to visit the gym in order for a membership to be worth it?
- 12) Aaron and Jess are running laps around the outdoor track in the same direction. Jess completes a lap every 78 seconds while Aaron needs 91 seconds for every lap of the track. Jess has just passed Aaron. How much time will it take for Jess to overtake Aaron again?
- 13) Draw a rectangle that is twice as wide as it is tall, and that fits snugly into the triangular region formed by the line $3x + 4y = 12$ and the positive x-axis with one corner at the origin and the opposite corner on the line. Find the dimensions of this rectangle.