

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

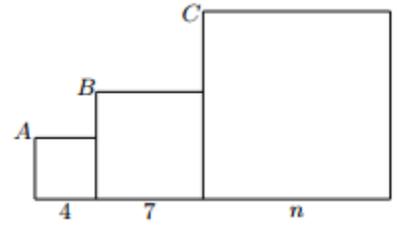
1. Una recently purchased two boxes of ten-inch candles – one box from a discount store, and the other from an expensive boutique. It so happens that the inexpensive candles last only three hours each, while the expensive candles last five hours each. One evening, Una hosted a dinner party and lighted two 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?

2. A bug is moving along the line  $3x + 4y = 12$  with a constant speed 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 when  $t = 2$ ? When  $t = -1$ ? When  $t = 1.5$ ? What does a negative  $t$ -value mean?

3. Write a formula for the distance from A  $(-1, 5)$  to P  $(x, y)$ , and another formula for the distance from P  $(x, y)$  to B  $(5, 2)$ . Then write an equation that says that P is equidistant from A and B. Simplify your equation to *linear* form. This line is called the *perpendicular bisector* of AB. Verify this by calculating two slopes and one midpoint.

4. Three squares are placed next to each other as shown. The vertices A, B, and C are collinear. Find the dimension  $n$ .

5. Replace the lengths 4 and 7 by  $m$  and  $k$ , respectively. Express  $k$  in terms of  $m$  and  $n$ .



6. What is the slope of the line  $ax + by = c$ ? Find the equation for the line through the origin that is perpendicular to the line  $ax + by = c$ .

7. A debt of \$450 is to be shared equally among the members of the Outing Club. When five of the members refuse to pay, the other members' shares each go up by \$3. How many members does the Outing Club have?

8. Brooks and Avery are running laps around the outdoor track, in the same direction. Brooks completes a lap every 78 seconds while Avery needs 91 seconds for every lap of the track. Brooks has just passed Avery. How much time will it take for Brooks to overtake Avery again?

9. 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 coordinate axes, with one corner at the origin and the opposite corner on the line. Find the dimensions of this triangle.

10. A circular Harkness table is placed in a corner of a room so that it touches both walls. A mark is made on the edge of the table, exactly 18 inches from one wall and 25 inches from the other wall. What is the radius of the table?

11. A five-foot *prep* casts a shadow that is 40 feet long while standing 200 feet from a streetlight. How high above the ground is the lamp?

12. Golf balls cost \$0.90 each at Jerzy's Club, which has an annual \$25 membership fee. At Rick and Tom's sporting-goods store, the price is \$1.35 per ball for the same brand. Where you buy your golf balls depends on how many you wish to buy. Explain, and illustrate your reasoning with a graph.

13. 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?