

1. The approximate distance it takes to stop a car, based on the speed the car is traveling, is given in the following chart:

Miles Per Hour	Stopping Distance (ft)
25	62
35	106
45	161
50	195
55	228
65	306

- Find the quadratic function based on the stopping distance for 55 mph and 65 mph and the fact that at 0 mph the stopping distance is 0 feet.
 - Use that equation to predict the stopping distances for 55 mph and 65 mph and compare them with the distances given in the chart.
 - If the equation continues to be valid for higher speeds, how many feet would it take to stop a drag racer that reaches a speed of 230 mph?
2. Translate the following argument into symbolic form and determine whether it's logically correct by constructing a truth table.

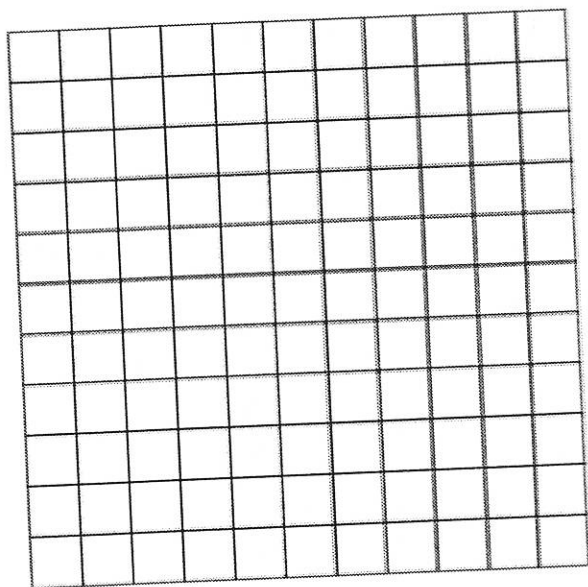
Money causes all the world's troubles, or money helps the poor. If money helps the poor, it's not the cause of all the world's troubles. Money is the cause of all the world's troubles. Therefore, money doesn't help the poor.

3. To chart the movement of a polar bear, scientists attached a radio transmitter to its neck.

Two tracking stations are monitoring the radio signals from the bear. Station B is 10 miles directly east of station A. On Monday, station A measured the direction to the bear at $N43^\circ E$, and station B at $N30^\circ W$. Three days later the directions to the bear from the two tracking stations were $N24^\circ E$ and $N30^\circ W$, respectively. How much farther from station B was the polar bear after those three days?

Part B: Answer each of the following questions. Show all calculations.

1. Find the vertex and graph of $y = x^2 + 5$
(Your solution is worth eight points).



2. Suppose you drop a ball from the top of a five-story building onto the sidewalk 70 feet below. (Each answer is worth three points.)
 - a. What is the initial velocity of the ball?
 - b. Determine a function for the height of the ball t seconds after it's released.
 - c. How long will the ball be in the air before it hits the ground?
3. Suppose you deposit \$400 in an account that earns 0.75 percent each quarter. You make no withdrawals from the account and deposit no more money into the account. How much money will accumulate after 2.5 years? (Your answer is worth three points.)
4. Consider the sequence that begins 1, 1, 1, ... and continues by the rule: Every subsequent element of the sequence is the sum of the three preceding elements. (Each answer is worth two points.)
 - a. Determine the next five (fourth through eighth) elements of the sequence.
 - b. Compute the ratio of the seventh and eighth elements of the sequence. Is it close to the Golden Ratio?

5. Suppose that of 30 cars in the parking lot, 8 are foreign, including 3 red cars. There are a total of 12 red cars in the lot. (Each answer is worth two points.)
- Draw a Venn diagram of this information.
 - How many cars in the lot *aren't* foreign and *aren't* red?
6. Make a simple flowchart in which you purchase "instant scratch-off" lottery tickets one at a time. You stop when you purchase a winning ticket. (Your chart is worth six points.)
7. Determine whether the following argument is correct. If it's not correct, explain what's wrong with the argument and change the minor premise to make a correct argument. (Your answer is worth three points.)

All Rhode Island Red hens lay brown eggs.

My hen, Marguerite, is a Rhode Island Red.

Therefore, Marguerite lays brown eggs.

8. A city block 500 feet by 500 feet has a large building 300 feet by 300 feet in the exact center. The rest of the block is an unobstructed paved lot. What is the shortest distance from the SW corner to the NE corner of the city block, going through the paved lot (to the nearest foot)? (Your solution is worth six points.)
9. An extension ladder adjusts in length from 10 feet to 16 feet. Suppose you've leaned your ladder against your house so that, at its minimum length, it touches the base of your first-floor window, 9 feet above the ground. Without moving the base, how high will the ladder reach when extended (to one decimal place)? (Your solution is worth six points.)
10. Find the dimensions of a rectangular region with maximum area that can be enclosed by 100 feet of fencing. (Your solution is worth six points.)

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