

Worksheet #1

Exercise 1: How many times do you think you can fold a piece of paper in half?

Exercise 2: After answering the question above, take a piece of paper, and see how many times you can fold it in half. Write your answer here:

Exercise 3: What happens to the height of the paper each time you fold it in half?

Exercise 4: Write out the following powers of 2.

$$2^0 =$$

$$2^1 =$$

$$2^2 =$$

$$2^3 =$$

$$2^4 =$$

$$2^5 =$$

$$2^6 =$$

$$2^7 =$$

$$2^8 =$$

$$2^9 =$$

$$2^{10} =$$

$$2^{11} =$$

⋮

$$2^{20} = 1,048,576$$

⋮

$$2^{100} = 1,267,650,600,228,229,401,496,703,205,376$$

Exercise 5: A piece of paper is 0.1 mm thick.

If we folded a piece of paper in half 10 times how thick would it be?

If we folded a piece of paper in half 20 times how thick would it be?

If we folded a piece of paper in half 50 times how thick would it be?

If we folded a piece of paper in half 100 times how thick would it be?

In each answer, if it is over 1,000 millimeters, rewrite it in terms of meters. If it is over 1,000 meters, rewrite it in terms of kilometers. (Remember that we have $1 \text{ m} = 1,000 \text{ mm}$ and $1 \text{ km} = 1,000 \text{ m}$.)

To help you get a sense of the sizes in Exercise 5, here are some references:

Height of a coffee cup: 100 mm

Length of Football Field (including end zones): 100 m

Distance from the Earth to the Sun: 150,000,000 km

Size of Universe: 10^{23} km

Worksheet #2

You are a forensic scientist called to a murder scene.

When you arrive, you measure the temperature of the room to be 60 degrees, and the temperature of the corpse to be 62 degrees.

As a forensic scientist, you know from your math and science courses in college that a live human has a body temperature of 98.6 degrees, and that when a person dies, their body cools so that every hour the difference in temperature between the body and the room decreases by a factor of one half.

Figure out how long ago the murder was committed.

Hint: Use the graph below and follow these steps.

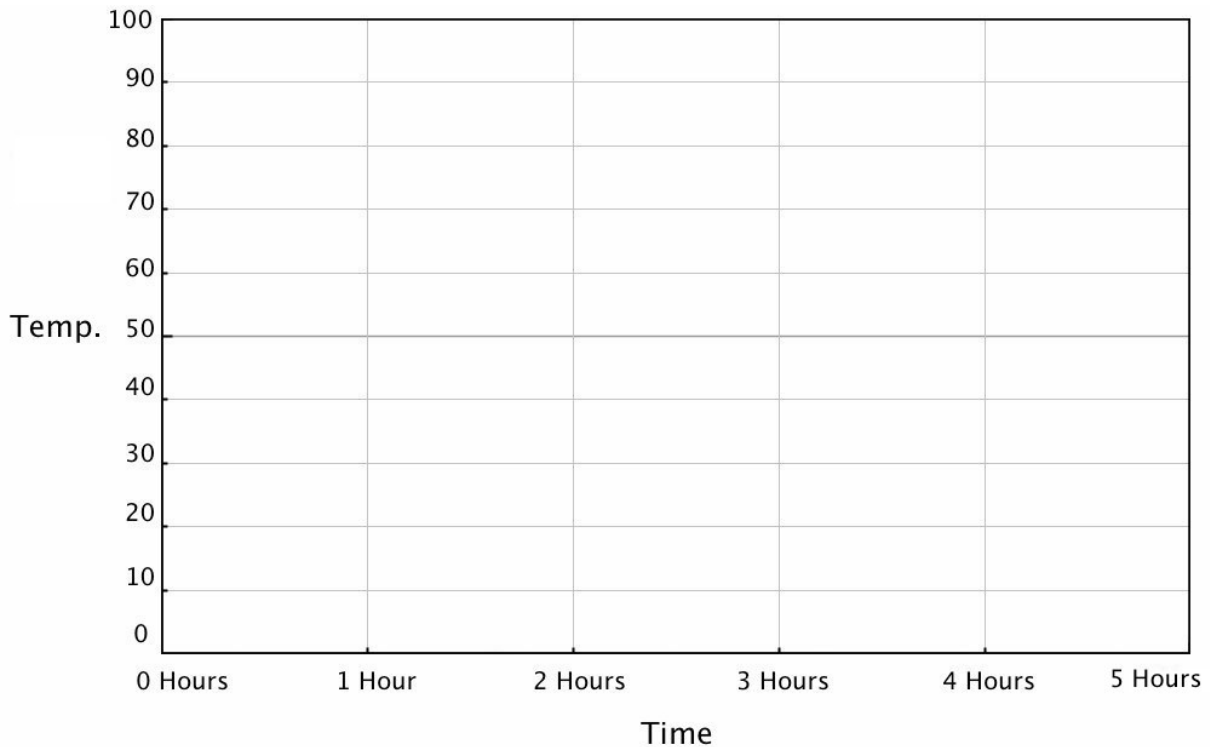
Step 1: Draw a horizontal line at 60 degrees. This represents the temperature of the room.

Step 2: Plot a point at time zero and 98.6 degrees. (If you wish to approximate, you can say 98.6 is pretty close to 100.) This is the temperature of the body at the moment of death.

Step 3: For each hour, plot a point for the body's temperature. Remember that each hour the difference between the body's temperature and the room's temperature decreases by half.

Step 4: Draw a curve connecting the points.

Step 5: At approximately what time will the body have a temperature of 62 degrees? This is how long it has been since the murder.



Worksheet #3

Exercise 1: Suppose you put \$5 in the bank, and every year the bank gives you 10% annual interest.

- How much money will you have in your account after 1 year?
- How much money will you have in your account after 10 years?
- How much money will you have in your account after 20 years?
- How much money will you have in your account after 100 years?

Exercise 2: If someone loans you \$1,000 with no interest, and you you make payments of \$100 every month, how long does it take you to pay off the loan?

Exercise 3: Suppose you have a credit card with a 24% annual interest rate. Also suppose the interest is compounded each month when the bill is sent. If you charge \$1,000 and didn't make any payments, how much would you owe after 1 year?

Exercise 3: Suppose you have the same credit card as in Exercise 3 (with a 24% interest rate that is compounded each month). Suppose you charge \$1,000 and then make a \$100 payment each month. How long does it take to pay off the loan? How much do you end up paying total on the loan?

It may help to use the following chart:

	Amount Owed (Start with \$1,000. In following rows, copy Column 3 from prior row)	Interest Added (Multiply Amount in Column 1 by 1.02.)	Amount Owed After Payment (Take Amount in Column 2 and subtract 100.)
Month 1			
Month 2			
Month 3			
Month 4			
Month 5			
Month 6			
Month 7			
Month 8			
Month 9			
Month 10			
Month 11			
Month 12			