

MiSP Thermal Conduction Assessment L3

Name _____

Date _____

A sports clothing company is testing new materials to use to make winter gloves for skiing, snowboarding, etc. The company is looking for the material that is the poorest conductor of heat (the best insulator).

Equal masses of the test materials were used to make gloves. A thermometer (temperature probe) was placed inside each glove and the gloves were placed in a -20°C freezer. The temperature of the inside of all three gloves was 37°C (close to human body temperature) when the gloves were placed in the freezer.

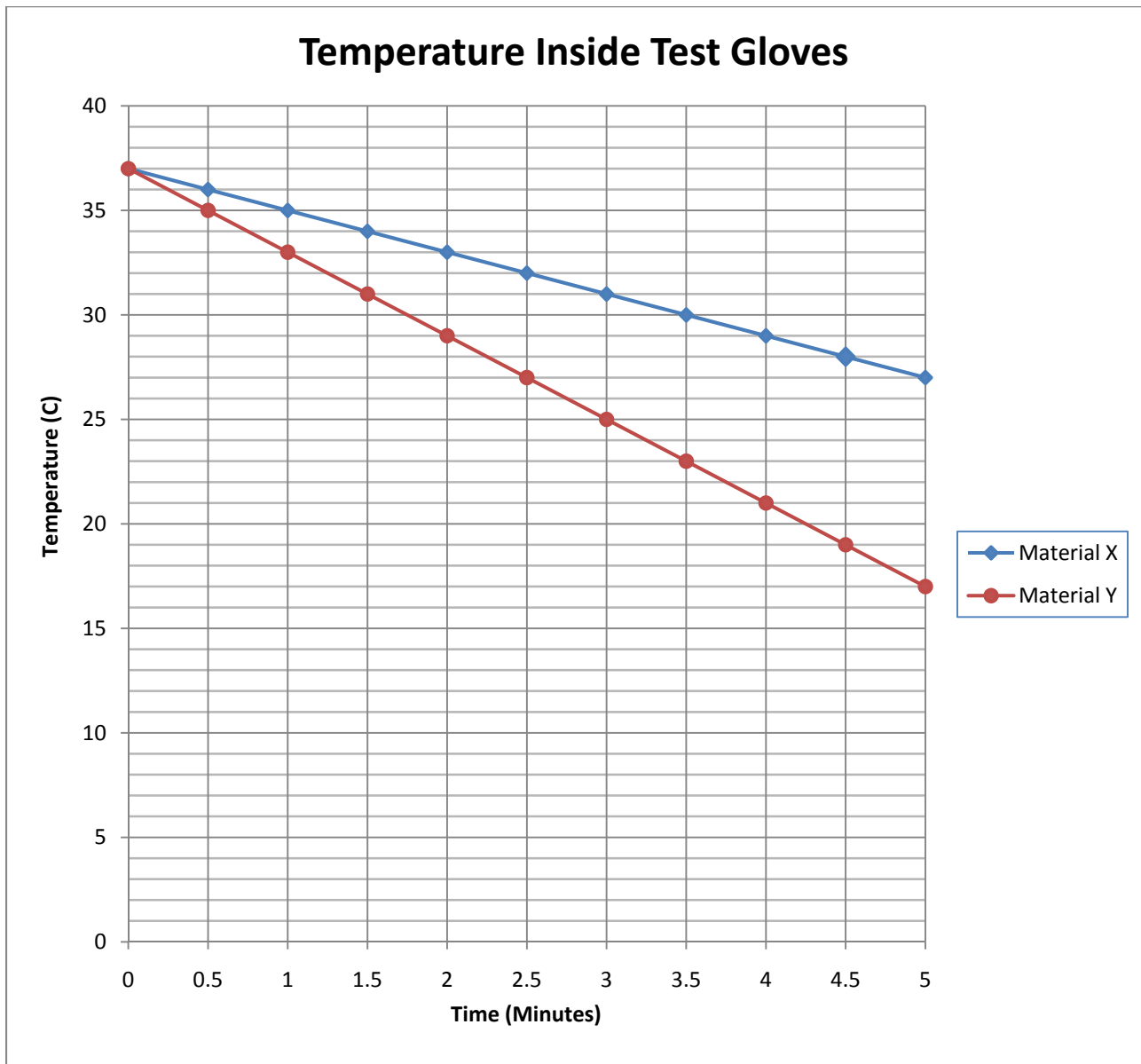
Temperature readings were taken every .5 minute (every 30 seconds) for 5 minutes.

The data is shown in the chart below.

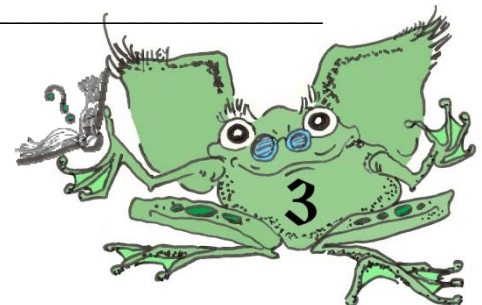
Time (minutes)	Material X Temperature $^{\circ}\text{C}$	Material Y Temperature $^{\circ}\text{C}$	Material Z Temperature $^{\circ}\text{C}$
0	37	37	37
.5	36	35	34
1.0	35	33	31
1.5	34	31	28
2.0	33	29	25
2.5	32	27	22
3.0	31	25	19
3.5	30	23	16
4.0	29	21	13
4.5	28	19	10
5.0	27	17	7



1. The data for materials X and Y were plotted on the graph below
Graph the data for material Z on the chart.



2. How are the graphed lines for the three materials the same? How are they different?



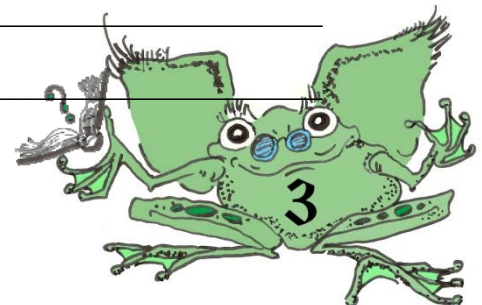
3. Which material is the worst conductor / the best insulator? Why?

4. If the materials all cost about the same, which material would you recommend for use in winter gloves? Why? Use the word *conduction* in your explanation.

5. Calculate the unit rate of change (slope) for material Z.

6. Is the sign of the unit rate of change (slope) positive/+ or negative/-? What does that tell you about the material Z line on the graph?

7. According to the unit rate of change (slope), how will the temperature change in the glove made with material Z in any 2 minutes of time?



8. Look at the graph. Is the absolute value of the unit rate of change (slope) of the material X line greater than or less than the absolute value of the unit rate of change (slope) of the material Z line?

9. Determine the y -intercept for the material Z line. Show your work
 y -intercept for material Z line:

10. Determine the formula for the material Z line using the y -intercept from #9 and the unit rate of change (slope) calculated in #5 above.

11. Using the formula in #10, calculate the temperature in glove Z at 7.5 minutes. Show your work.

