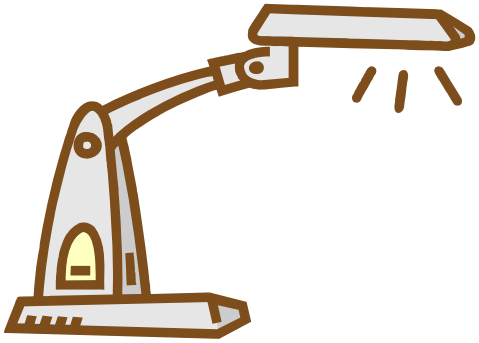
MiSP Insolation Assessment L3

Name _____ Date _____

1. Draw a line underneath the lamp picture below to show how you would place a thermometer so that its temperature would increase more than in any other position.



2. Use the results of the soil and water insolation experiment to explain how the sand and water temperatures would compare at 1:00 p.m. on a sunny summer day.

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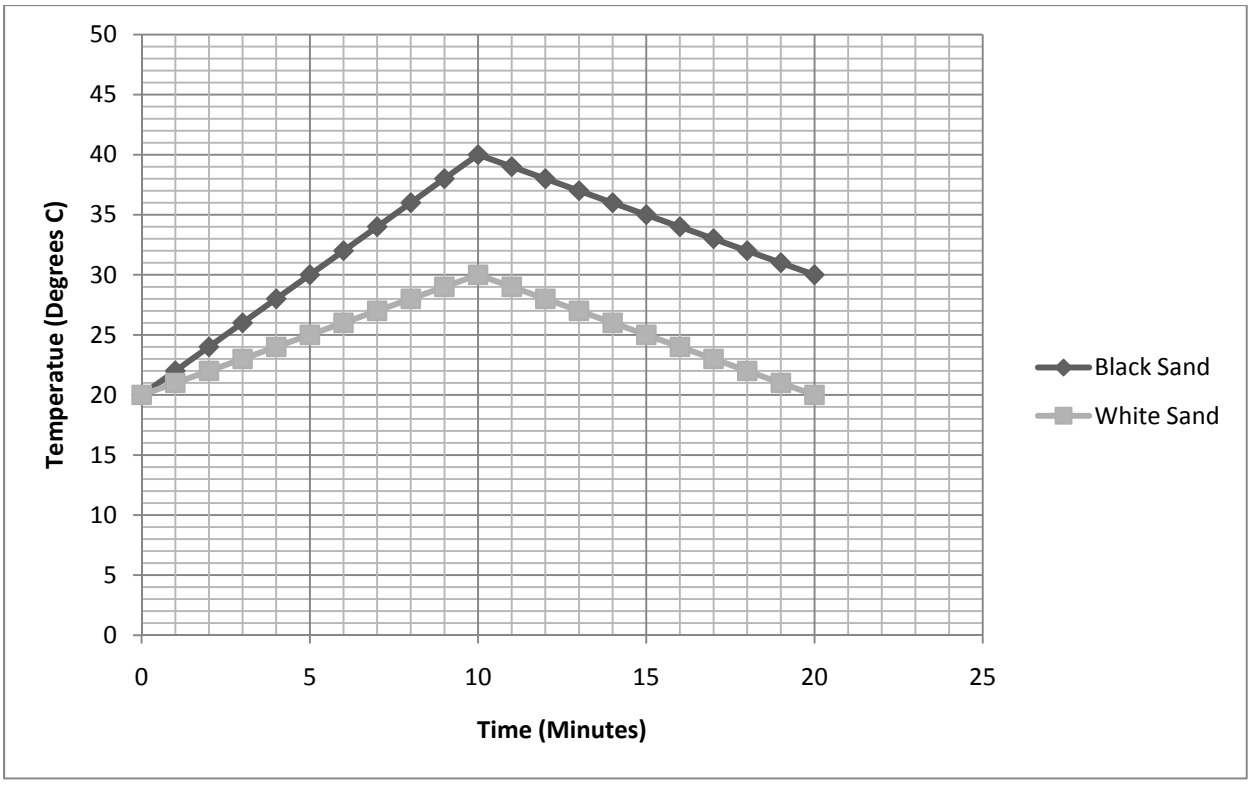
Continued

Students performed an experiment similar to the soil and water experiment that you did. They took two Styrofoam cups and placed black sand in one and an equal amount of white sand in the other. Calibrated thermometers were placed at the same depth, just underneath the sand in each cup. The initial temperatures were read and then a heat lamp was turned on for 10 minutes. After 10 minutes, the heat lamp was turned off and removed. Temperature readings were taken every minute.

Refer to the chart and the graph below to answer questions 3-10.

Insolation of Black and White Sands

Time	Black Sand	White Sand
(minutes)	Temp °C	Temp °C
0	20	20
1	22	21
2	24	22
3	26	23
4	28	24
5	30	25
6	32	26
7	34	27
8	36	28
9	38	29
10	40	30
11	39	29
12	38	28
13	37	27
14	36	26
15	35	25
16	34	24
17	33	23
18	32	22
19	31	21
20	30	20



3. Which sand's (black or white) temperature increased the most after 10 minutes?

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4. What happened to the two sand samples' temperatures when the light was turned off?

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5. If the light was NOT turned off after 10 minutes, what would the temperature of each sand sample be at 13 minutes?

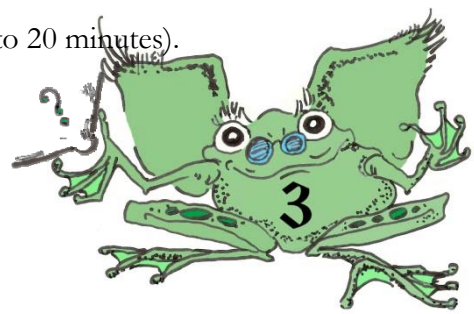
   Black sand _____

   White sand _____

6. Which sand's (black or white) heating line (0 to 10 minutes) has a unit rate of change (slope) of +1°C/minute?

   _____

7a. Calculate the unit rate of change (slope) of both sands' cooling line (10 to 20 minutes).



Unit rate of change:

Black sand (10-20 minutes)	White sand (10-20 minutes)

7b. Compare the two unit rates of change for the cooling of the two sands (10-20 minutes). What do the two unit rates of change (slopes) numbers tell you about the cooling of the black sand and the white sand?

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_____

_____

8. What is the *y*-intercept for the cooling line (10-20 minutes) for the WHITE SAND?

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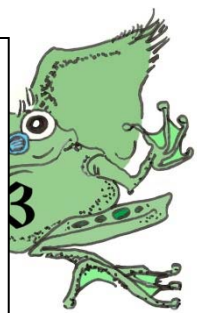
9. Using the *y*-intercept from #8 and the unit rate of change (slope) you calculated in #7, what is the formula for the WHITE SAND cooling line (10-20 minutes)?

MiSP



10. Using the formula in #9, calculate the temperature of the white sand at 15.5 minutes. Show your work.