Name _____ Date _____ Period _____

Free Response HW #3: Rate of Change Problems

Answer the problems below with the following procedure
1. Write the complete formula for rate of change
2. Substitute into the equation including units.
3. Solve the equation rounding to the nearest tenth.

Be sure to include units in your answer

Question One -   The temperature of Molten lava is 2000°C.
It takes 20 hours for the lava to cool to igneous rock at 200°C.
What is the rate of temperature change for the lava?

Question Two - The wind velocity drops 15 knots in 60 minutes. What is the rate of change in the Wind?

Question Three - At 10:00 am the water level is 4 meters. By 2:00 p.m. the water level rises to 20 meters.
What is the rate of change in the water level over this time period?

Question Four - On the equinox, sunrise occurs at an azimuth of 90°(due East) at 6a.m.
By noon (12:00 p.m), the azimuth of the sun change to 180°(Due South)
What is the rate of change in azimuth of the sun?

5) A cup of water was heated for 20 minutes. The temperature was measured and recorded at 20-minute intervals. Plot the data on the graph below. Be sure to completely label each axis.

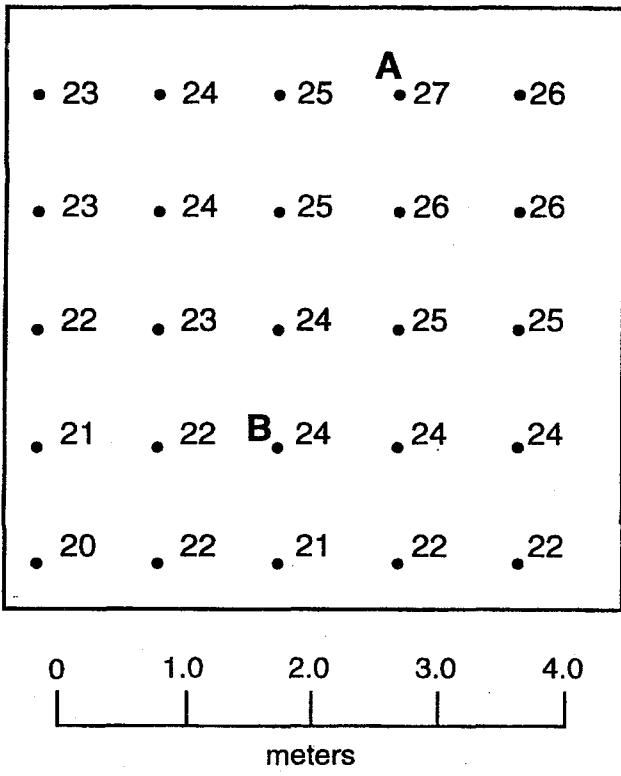| Time (min)	0	2	4	6	8	10	12	14	16	18	20
Temp °C	20	21.5	23	24.5	26	27.5	29	30.5	32	33.5	35

TEMP. °C

TIME (MIN.)
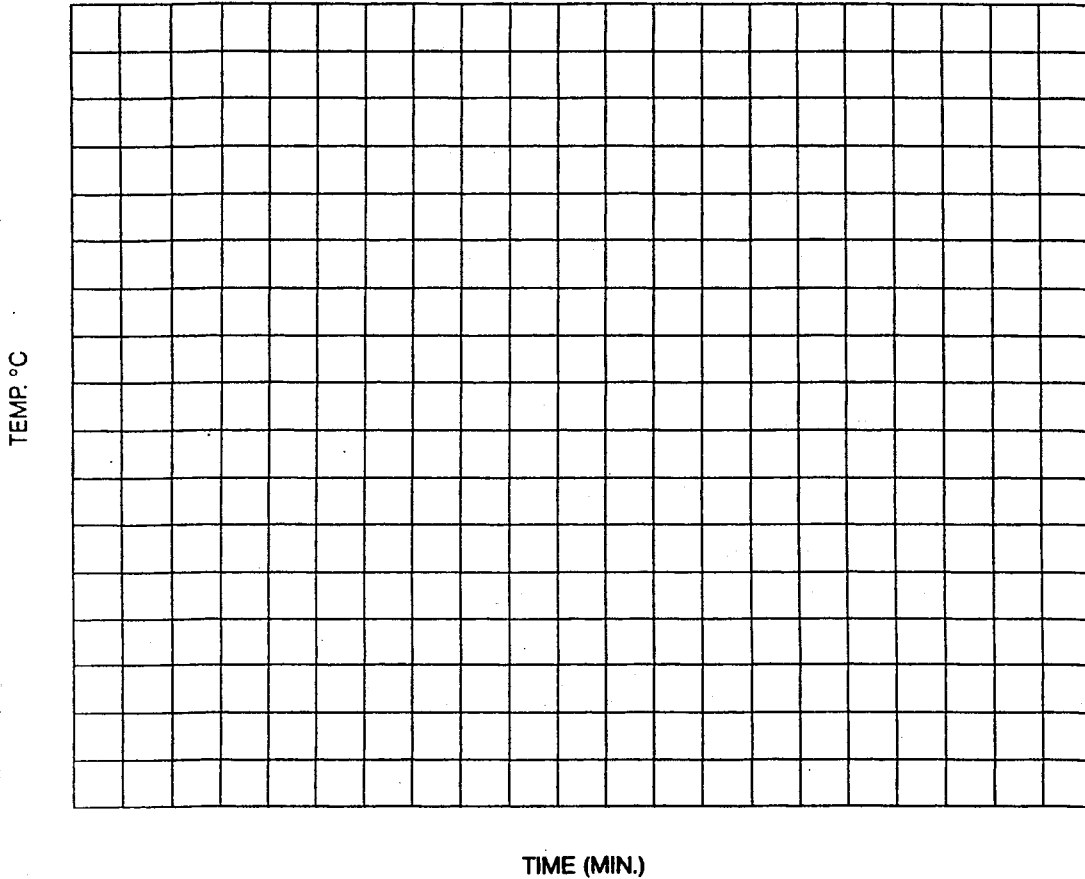
6) Calculate the rate of change for the water from time 0 to time 20. Be sure to include the units.
a. Write the equation for rate of change.
b. Insert the data into the equation with units.
c. Solve the equation. w/units rounding to the tenths.

Base your answers to questions **3** and **4** on the temperature field map below. the map shows 25 measurements (in °C) that were made in a temperature field and recorded as shown. The dots represent the exact location of the measurements. **A** and **B** are locations within the field.

Temperature Field Map (°C)

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                              A
  • 23    • 24    • 25      • 27      •26

  • 23    • 24    • 25      • 26      •26

  • 22    • 23    • 24      • 25      •25

  • 21    • 22   B• 24      • 24      •24

  • 20    • 22    • 21      • 22      •22

  0       1.0     2.0       3.0       4.0
  L_____|_____|_____|_____|
                  meters
```

3. On the temperature field map above, draw threee isotherms: the 23 °C isotherm, the 24 °C isotherm, and the 25 °C isotherm.

4. Calculate the temperature gradient between locations A and B on the temperature field map, following the directions below.

   a Write the equation for the gradient.
   b Substitute data from the map into the equation. w/units
   c Calculate the gradient and label it with the proper units rounding to the tenths.