

key

Rate of Change

When a measured variable changes over time.

Formula for Rate of Change

change $\frac{\Delta \text{in } f_v}{\Delta \text{in time}}$

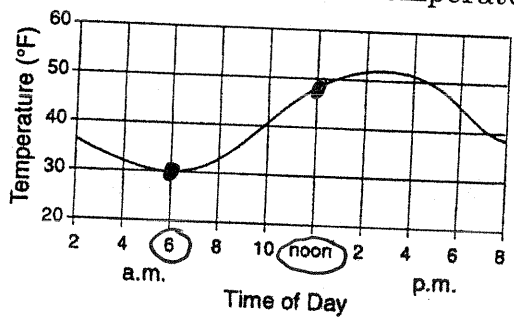
Graphs

Give a visual picture of the data making it easier to organize and understand the data.

1. The temperature of water in a container was 60°C. Ten minutes later, the water temperature was 35°C. What was the rate of cooling of the water?
- (1) 25 C°/min (2) 2.5 C°/min (3) 35 C°/min (4) 3.5 C°/min

$$\frac{60^\circ - 35^\circ}{10 \text{m}} = \frac{25^\circ}{10 \text{m}}$$

2. The graph below shows the temperature readings for a day in April.

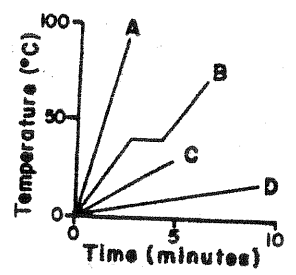


The average rate of temperature change, in Fahrenheit degrees per hour, between 6 a.m. and noon was

- (1) 6°/hr (2) 8°/hr (3) 3°/hr (4) 18°/hr

$$\frac{48^\circ - 30^\circ}{6 \text{ hr.}} = \frac{18^\circ}{6 \text{ hr.}}$$

Use the graph to the right to answer questions 3 and 4. The graph represents the relationships between temperature and time as heat is added at a constant rate to equal masses of four substances labeled A, B, C, and D.



3. The temperature of which substance increased the most rapidly? A
4. Which substance has a change that is not at a constant rate? B
5. Calculate the average daily rate of movement of the hurricane during the period from 3 p.m. August 24 to 3 p.m. August 28. The hurricane traveled 2,600 kilometers during this 4-day period.

$$\frac{2,600 \text{ Km}}{4 \text{ d.}}$$

$$650 \text{ Km / day}$$

6. A student measures and records the temperature of water in a beaker for 8 minutes as shown below.

	Start								Finish
Time	0 min	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min
Temperature	90°C	83°C	78°C	73°C	68°C	64°C	60°C	57°C	54°C

What is the average rate of cooling for the water in the beaker during the 8-minute time interval?

- (1) 3.2 °C/min (2) 3.6 °C/min (3) 4.5 °C/min (4) 4.0 °C/min

$$\frac{90^{\circ} - 54^{\circ}}{8 \text{ min}}$$

$$\frac{36^{\circ}}{8 \text{ min}}$$

7. The temperature of water in a container was 60°C. Ten minutes later the water temperature was 35°C. What was the rate of cooling of the water?

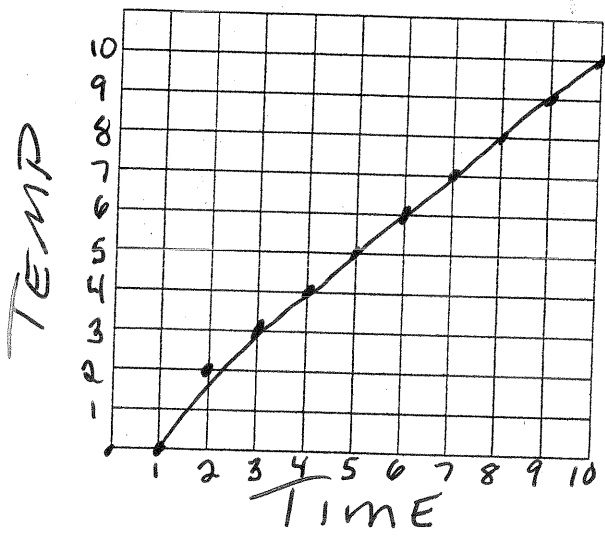
- (1) 25 °C/min (2) 2.5 °C/min (3) 35 °C/min (4) 3.5 °C/min

$$\frac{60^{\circ} - 35^{\circ}}{10} = \frac{25^{\circ}}{10}$$

8. Create a line graph using the following steps.

- (a) Determine the correct scale that will best fit the data in the table below.
 (b) Remember to label the axis with units.
 (c) Plot the data and connect the points.

Time (min)	0	1	2	3	4	5	6	7	8	9	10
Temperature (°C)	0	0	2	3	4	4	5	6	6	8	10



(a) Determine the average rate of temperature change that occurred during this experiment.

By looking at the line graph, did the rate of temperature change stay the same throughout the experiment? YES

Explain how you can tell. Looking at the graph and calculating the