Science 9

Homeostasis: Exercise and Negative Feedback Mechanisms

During exercise, with regards to the **respiratory system,** what are the Stimulation, Sensor, Control and Effector?

Homeostatic mechanism	**Description**
Stimulation	
Sensor	
Control	
Effector	

During exercise, with regards to the **circulatory system**, what is the Stimulation, Sensor, Control and Effector?

Homeostatic mechanism	**Description**
Stimulation	
Sensor	
Control	
Effector	

Table1: Heart rate and Breathing rate during a 4 km race

Time (min)	Heart Rate (bpm)	Breathing Rate (bpm)
1	70	72
2	70	72
3	70	72
4	80	76
5	85	78
6	105	80
7	115	84
8	120	92
9	125	100
10	127	115
11	130	125
12	133	130
13	135	132
14	138	135
15	140	138
16	115	134
17	90	128
18	72	120
19	70	100
20	70	80

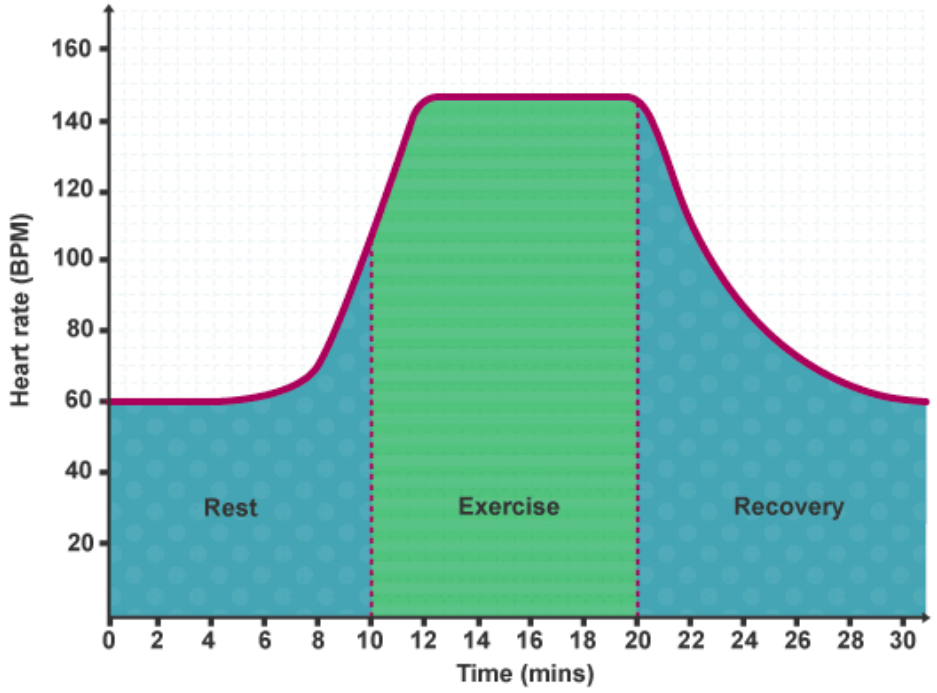
(bpm) = beats per minute

(bpm) = breaths per minute

Angela competes in a 3 km cross-country running race. Every minute, her heart rate and breathing rate are measured throughout the race.
Answer the following questions below:

1. **At what time does the race begin?**
2. **At what time does the race end?**
3. **Using your understanding of homeostasis and exercise, explain why the heart rate increases?**
4. **Using your understanding of homeostasis and exercise, explain why the breathing rate increases.**
5. **Why do you think the breathing rate remains high after the race?**

Table 2: Heart rate before, during and after skiing

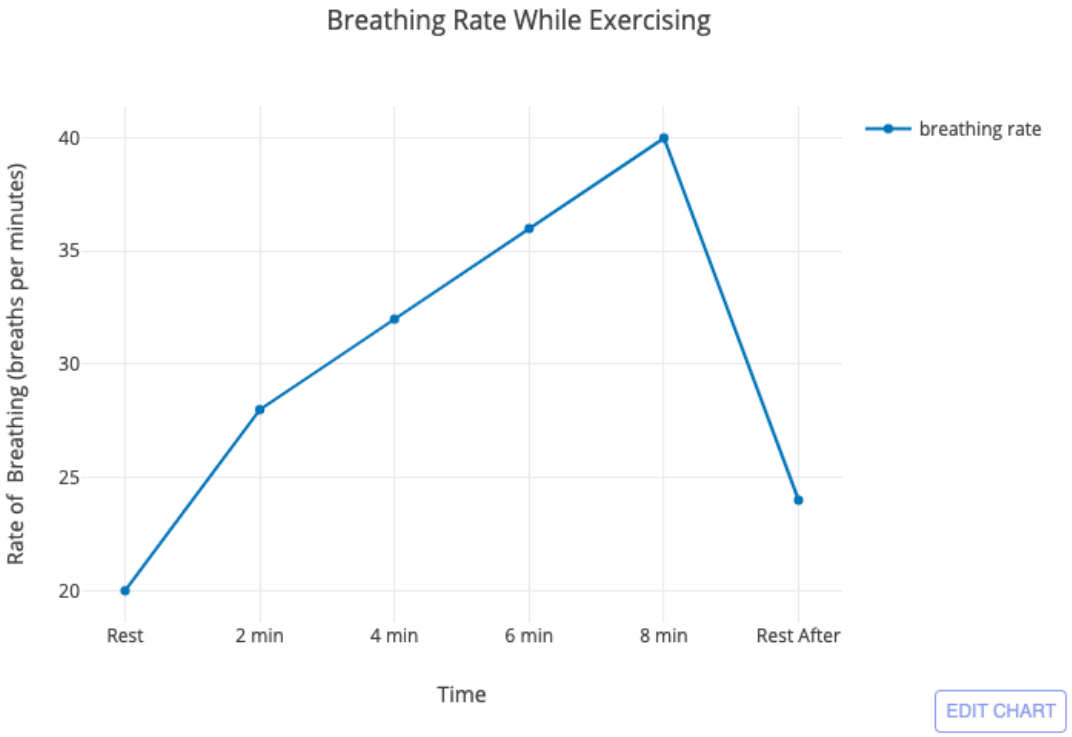


Bob gets out to enjoy a beautiful day of cross-country skiing in the British Columbia mountains.

Bob's heart rate was measured at three different phases:
a. Before cross-country skiing (Rest)
b. During cross-country skiing (Exercise)
c. After cross country skiing (Recovery)

1. **Outline what is happening on this graph?**
2. **What is Bob's initial resting heart rate?**
3. **At 8 min, just before taking part in exercise, Bob's heart rate increases. Why do you think this happens?**
4. **What is Bob's heart rate when he begins skiing?**
5. **What is Bob's heart rate when he stops skiing?**
6. **Explain what is happening in Bob's circulatory system, when he stops skiing?**

Table 3: Breathing rate before, during and after walking



Ariel went for her daily walk and recorded her rate of breathing, before, during and after.

1. **What is Ariel's rate of breathing at rest?**
2. **At what time into her walk does Ariel reach her highest rate of breathing?**
3. **How would you describe the change in her rate of breathing from rest to her highest rate?**
4. **Explain what is happening in Ariel's respiratory system when she stops walking?**