The Electrocardiogram (ECG) (labs 7.2 and 7.3)

A) Background information on the heart and ECG

Most of the background information for understanding this lab is in labs 7.2 and 7.3.
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B) Setting up the computer and the ECG equipment

This section describes the steps needed to prepare the equipment for recording ECGs. These steps must be followed exactly and in this exact order or the computer will probably not function correctly. It is best if your group's most computer-knowledgeable person takes charge of this section. If you have any problems at all, please ask your instructor for assistance right away.

a) Obtain a computer, a white carton containing the Vennier Lab Pro box, a smaller white carton containing the ECG probe box, and three ECG lead stickers.

b) Open your computer and turn it on.

c) The password is student. Click "Okay"

d) After the log-on window, the "desktop" of the computer should appear.

e) Plug in the Vennier Lab Pro box into a power outlet. It should make a beeping noise and lights should glow when it is getting power.

f) Use the long USB cable to connect the Vennier Lab Pro box to a USB port on the computer.

g) Obtain the ECG probe box. The ECG probe box has 3 colored "alligator" clips at one end and a larger single cable at the other end. Connect the single large cable into any of the four cable ports on the Vennier Lab Pro box.

h) Open the LoggerPro program. It may take several minutes to open.

i) In the LoggerPro program, navigate through these steps:

File>Open>Biology with Vernier>Monitoring EKG (28)

- If done correctly, a screen that says "ECG" at the top should appear.

j) Open the "Data Collect" window by clicking on the stop-watch icon (right next to the green button in the upper left of the screen).

k) In the Data Collect window, make these settings:

- Mode = time-based

- Time = 10 seconds

- Sample at zero = Check mark this box

- Repeat = No check mark in this box

• 100 samples per second

l) Pick a person to be the subject of the ECG tests. Since one of the tests will involve exercise, select someone with no health problems. The test subject should now sit comfortably in a chair and apply the ECG lead stickers to the inside of both their wrists and their left ankle. Next, connect the green alligator clip to the lead on the right wrist, the red clip to the lead on the left wrist, and the black clip to the lead on the ankle. The clearest ECG readings are obtained when the subject is absolutely still, so they should sit as still as possible in the chair, with their arms comfortably on their lap.

C) Recording the resting ECG

a) Start the ECG recording by clicking the green Start button in the upper right of the screen. A 10-second recording of the ECG should appear.

- Show your instructor your ECG

b) If you can see distinct P, QRS, and T waves for the full 10 seconds, save the recording to the desktop by navigating File>SaveAs.

- In the Save As window, select Desktop as the Save In location.

- Name the file with your subject's name and "Resting".

- If the recording is not acceptable, make another one by clicking the green Start button again.

c) Calculate the Heart Rate, the QT interval, and the TQ interval. Record them in the table on the last page of this handout. You will need a ruler and a calculator to calculate the intervals. If you are not sure how to perform these calculations, ask your instructor for assistance.

D) The effects of exercise on ECG

a) The test subject should disconnect their alligator clips but leave their lead stickers attached.

b) The subject should exercise heavily for at least two minutes by running up and down the stairs.

c) As soon as the subject returns to the classroom, reconnect the clips (green to right arm, red to left arm, and black to leg) and make a new ECG by clicking the green Start button again. Remember, the best recordings are made when the subject is as still as possible.

d) If the recording is acceptable, save it to the desktop as you did before but the title should have the subject's name and "Running"

e) Calculate the Heart Rate, the QT interval, and the TQ interval for the running ECG. Record them in the table on the last page of this handout.

E) End activities

Show your instructor your data table and the answers to the questions on the next page before putting away your computer.

After your instructor has verified your results, shut the computer down and return it.

F) Results and Review

	Heart rate (beats/minute)	QT interval (seconds)	TQ interval (seconds)
Resting:	_____	_____	_____
Exercising:	_____	_____	_____

Review questions:

1) For each interval listed below, state what chamber of the heart the interval controls and whether the chamber is in systole or diastole during that interval:

a) The PR interval:

b) The QT interval:

c) The TQ interval:

d) The RP interval:

2) Did the two intervals that you measured (QT and TQ) get longer or get shorter during exercise (compared to their values at rest)? _____

3) Of the two intervals you measured (QT and TQ), which one changed the most during exercise? _____

4) Explain why the **one** interval you named in question (3) changes more than the other interval during exercise. Note that this question is **not** asking why the heart beats faster (the answer to that is "to get more oxygen to the muscles"). Reread the question again and, as a hint, think about what the effects of shortening each of the intervals would be on blood pumping.