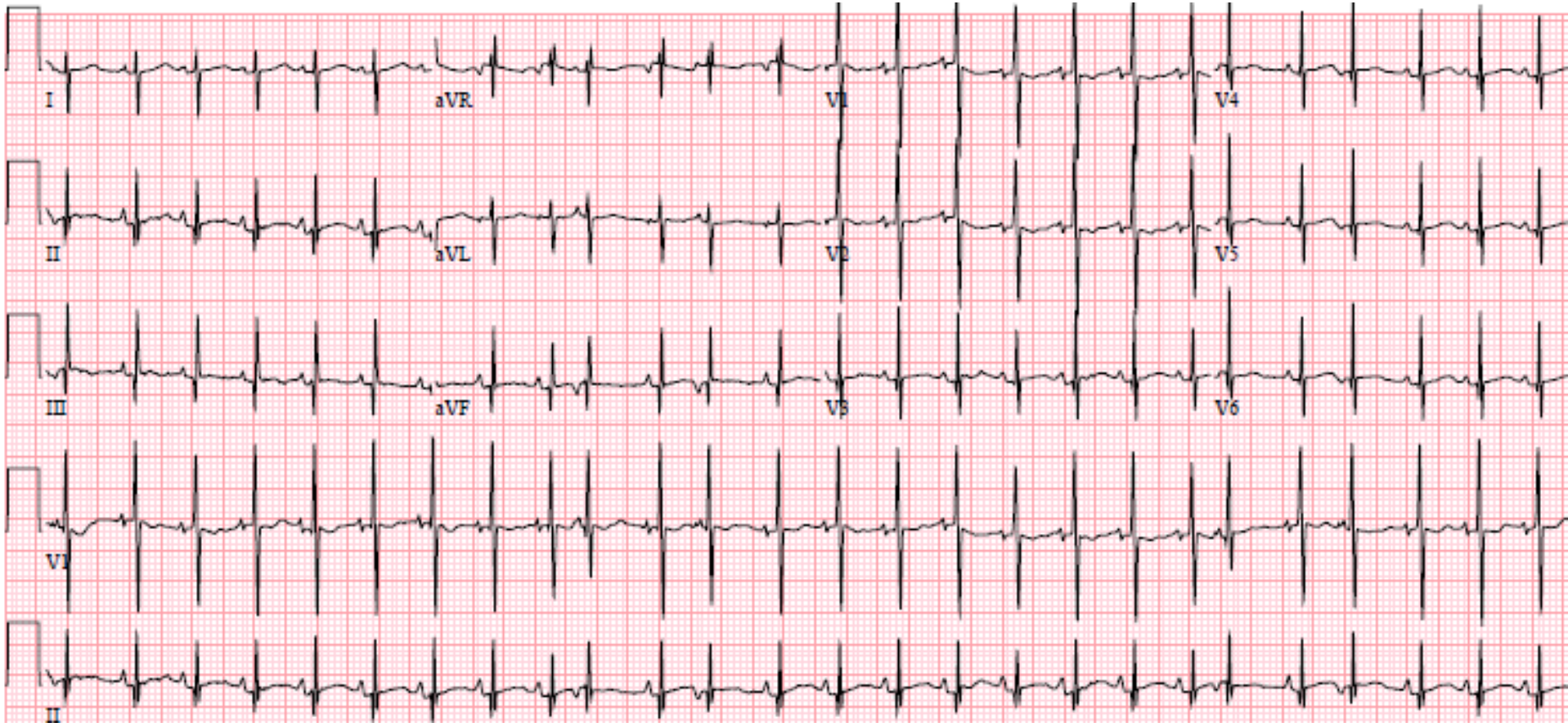
You are called to evaluate a newborn in the nursery on day of life 2 for an “irregular heart beat.” A 12-lead ECG is obtained.

1) There is some irregularity to the rhythm. What is causing this, and how can you be sure? (1 point)
2) Estimate the QRS axis, and report if this is normal or abnormal. (1 point)
3) What, if any, further testing needs to be done based on your answers to #1 and #2? (1 point)



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1) There is some irregularity to the rhythm. What is causing this, and how can you be sure? (1 point)

This ECG shows normal sinus rhythm with premature atrial contractions (PAC's). You can be sure that they are PAC's because first of all, the irregular beats arrive earlier than the normal P wave would. So, by definition they are premature. The early beats have a different P wave morphology than the surrounding sinus P waves (downward in lead aVF). This tells you they can't be coming from the normal location of the sinus node.

2) Estimate the QRS axis, and report if this is normal or abnormal. (1 point)

The QRS axis is approximately 120 degrees. You can tell this by first determining whether the QRS is 1) left or right and 2) up or down . To do this, look at lead I (determines left or right) and lead aVF (determines up or down). If QRS is mostly upright in lead I, then the axis is toward the left. In this case, the QRS is mostly down in lead I, which means the axis is toward the patient's right. If the QRS is upright in lead aVF, then the axis will be going downward, as is the case with our patient. This puts the QRS in the right lower quadrant (relative to patient).

Next, look for a lead where the QRS is *equiphasic*, meaning as much up as it is down. In our case, lead aVR is a good candidate. If a signal is *equiphasic ,* that means it is more or less perpendicular to that lead. Since aVR sits at 210 degrees (some people call it -150 degrees, but it's the same thing), and we already know that the axis sits in the patient's lower right quadrant, we determine that the QRS axis lies right around 120 degrees (210 minus 90).

This is a "right axis deviation" but is considered NORMAL for age. Newborn infant s have right ventricular dominance as a residual effect of fetal circulation. The axis will swing toward the left as the infant reaches 2-3 months of life.

3) What, if any, further testing needs to be done based on your answers to #1 and #2? (1 point)

The axis is normal and the PAC's are a common normal variant. There is no further testing necessary