Simple Stethoscopes
Catching the Beat of NGSS
Background Info on Stethoscopes

- Originally doctors would place an ear directly over a patient’s chest in order to hear the heart.
- Rene Laennec used a paper cylinder to listen to a patient’s heart and then later developed a stethoscope from wood.
Background (cont’d)

- Modern designs: flexible, acoustic, binaural (2-ear), with both a bell and a diaphragm (sealed end) at the “head”
Function of the ear:

- Outer ear acts to funnel and amplify sound toward inner ear canal
- Ear canal is a narrow tube leading to the ear drum
- Sound waves “beat” on ear drum (other structures at involved)
Stethoscopes make simple ear models!

- Plastic tubing creates an extension of the ear canal
- Head end acts like the outer ear
- Diaphragm seals the end of the ear canal extension
Stethoscopes can be thought of as bridges between the ear and the heart.
Let’s build it!

- From balloon’s mouth end, cut 1” off neck
Let’s build it! (cont’d)

- Stretch the balloon over the funnel
Let’s build it! (cont’d)

- Place ear bud foam over end of tubing
Let’s build it! (cont’d)

- Insert funnel spout into tubing
To do and notice

- Firmly press foam end up to ear

Finding your heart:
1. Make a fist and put it under your chin
2. Drop your head to see your feet
3. Place stethoscope where fist touches chest
4. Listen carefully!
Some considerations

- Clothing can dampen the amplitude ("volume") of vibrations
- Bare skin works best
What am I hearing?

- The “lub, dub” sound is caused by heart valves opening and closing 🎧 🎧
- Difference in sound frequency caused by many factors
Now what?

- Measure your heart rate in beats per min.
- Do **something vigorous** for 1 min. (run in place, jumping jacks, anything you can do)
- Measure your heart rate again
- Discuss your results with a partner
Formulate a testable question with a partner

- The question should be within the limits of the tool being used to answer it
- What are the limits of a stethoscope with this design?
More science practices

- Use the stethoscope to explain a phenomenon or describe natural processes
- Make observations and measurements
- Use calculations to discover patterns
- Base explanation on evidence
- Provide and receive critiques
- Share info with peers