Virtual Field Trip to Giant's Causeway, County Antrim, North Ireland.

Go to https://www.virtualmicroscope.org/content/basalt-giants-causeway
(Some of the questions below can be answered from searching this website. I would recommend first watching the video in the lower right-hand corner of the website).

1. In terms of the history of geology, what was the controversy between "neptunists" and "plutonists" in the late 18th century?

2. Who proposed the theory of neptunism?

3. What did neptunists believe about the formation of rocks at Giant's Causeway?

4. How did the polygonal columns at Giant's Causeway form?

5. How may sides do the polygons have?

6. What is the geological term for the cracks between the columns?

7. What causes the causeway to *appear* to dip to the left?

8. How old was the eruption that produced the lava field?

9. What geological era, period and epoch correspond to that age?

10. What kind of rock makes up the columns?

11. Why is the rock that makes up the columns fine-grained?

Click on the virtual microscope and then click on number 1. Rotate the stage in both the PPL and XPL images.

12. Approximately what is the size of the grains (in general)?

13. The texture of this rock is said to be “poikilitic”. What does that mean?

14. Draw the poikilitic texture.

Go to https://strabospot.org/giga/detail?s=1467
This is the thin section fo an olivine-rich basaltic lava from Reykjanes Peninsula, Iceland. It has a porphyritic texture.

15. Sketch the thin section in XPL.

16. How does a porphyritic texture differ from a poikilitic one?

17. What % of a rock do rock-forming minerals contribute to the total mass of a rock?

18. What does it mean to be called an accessory mineral?

Click on "View Geological Map". One you see the map (from the British Geological Survey) go to the upper left corner and click on "bedrock only".

19. What is the scale of the map?

20. What do the different colors represent?

21. What color on the map corresponds to the unit that contains Giant's Causeway?

Go to the following website: https://www.alexstrekeisen.it/english/vulc/basalt.php and read the description of basalt. (I expect that you will not understand quite a bit of the description of the chemistry of basalts as we have not yet tackled that topic in our course).

22. If you completed a chemical analysis of the basalt approximately what percent of the rock would be silica?

23. What are the tectonic environments in which basalts form?

24. What tectonic environment are responsible for most of the production of basalts on Earth?

25. What kind of rocks melt in order produce basalt?

26. What is the mechanism (increasing temperature, decreasing pressure, or addition of water) by which basalts are produced?

27. Use the QAPF diagram to answer the following question. What is the maximum amount of quartz you would expect to find in a basalt?

28. Name two other locations where you might find columnar basalts.

Go to https://sketchfab.com/3d-models/peridotite-xenoliths-in-vesicular-basalt-485d264e28ba424cba3f1b3d6541653d. The 3D (rotatable) sample is a vesicular basalt that has a peridotite inclusion.

29. What is the compositional make-up of peridotite?

30. How did the peridotite xenolith end up in the vesicular basalt?

Go to location https://www.mindat.org/glossary/tas_classification to answer the following questions.

31. What does the acronym TAS stand for in a TAS diagram?

32. What does a TAS diagram depict?

33. Why would a petrologist use a TAS diagram to characterize an extrusive rock instead of a QAPF diagram?

34. Using the TAS diagram, explain what is the difference between the volcanic rock basalt and the volcanic rock dacite?

Optional:

If you would like, you can simulate the formation of basalt columns at home! First, mix cornstarch with an equal amount of water. Then spread the mixture I to 2 centimeters thick on a fiat, glass-bottomed surface, such as a Pyrex pie plate. Keep the dish warm under a 40-watt lightbulb.

As the mixture dries, large irregular cracks will form at the surface, said Rojo. Several days later, turn the plate over and you will see that the cracks have moved down through the mixture and formed a polygonal patchwork not unlike the one at the Giant's Causeway.