

CROWN BUTTE VIRTUAL FIELD TRIP

name: _____

www.formontana.net/cb.html

1. **Page 1** Which laccolith did western artist C.M. Russell include on some of his paintings?

2. **Page 2**

a) In which part of the state are laccoliths common?

b) What is the purpose of the diagrams shown on this page?

c) Laccoliths are a type of “plutonic” (a.k.a. intrusive) formation. What does this mean?

d) Laccoliths are formed beneath the surface. Explain why they now stand above the surrounding prairie?

3. **Page 3**

a) Why did the Nature Conservancy purchase Crown Butte?

b) When did Crown Butte and the other laccoliths in this part of the state form?

c) How did the magma get from the volcanic center to the locations where the laccoliths formed?

4. **Page 4**

a) Look at the map. As you travel from Helena to Great Falls along I-15 you are passing through the guts of an ancient volcano. Which two small towns is the ancient volcano located between?

b) How does the size of the Crown Butte Laccolith compare to that of the Shaw Butte Laccolith?

c) Use the scale to estimate how far it is from Crown Butte to the closest edge of the ancient volcano in miles.

5. **Page 5**

a) What is unusual about the dikes of central Montana's laccoliths?

b) What is the specific name of the sandstone that was forced upward by the laccolith, and where else in Montana can it be seen?

6. Page 6

- a) This aerial photo shows the entire butte, including part of the dike that supplied magma to the laccolith is shown in the photo. If you were to travel from the butte to find the source of the magma, which direction would you travel?
- b) The dashed line of the photo shows one way to hike onto the butte. Which side of the butte is dominated by cliffs?

7. Page 7

- a) What is the geologic name for the ridges shown in this photo?
- b) How are ridges like the ones shown in the top photo represented on the map?
- c) What would be shown in this photo if it had been taken 75 million years ago?

8. Page 8 As the magma froze (cooled and became rock) why did it crack to form the columns shown in this photo?

9. Page 9 How were most the mountains in central Montana formed?

10. Page 10

a) Explain why Crown Butte made up of distinct layers as shown in this photo.

b) Magma is a mixture of minerals. Why may they separate as the molten material cools? (2 possibilities)

11. Page 11

a) Explain why the mineral augite started to freeze before the other minerals in the magma?

b) Besides the fact that the magma was cooling slowly (plenty of time), why did the augite (black mineral) form nice big crystals as it froze?

c) What caused the magma to begin to cool so quickly that the other minerals did not form large crystals? (DO NOT use the any form of the "pulse" in your answer!)

d) Look at the bottom photo, which includes the pencil. How did these crystals of augite, which were once embedded in the rock, become separate from it?