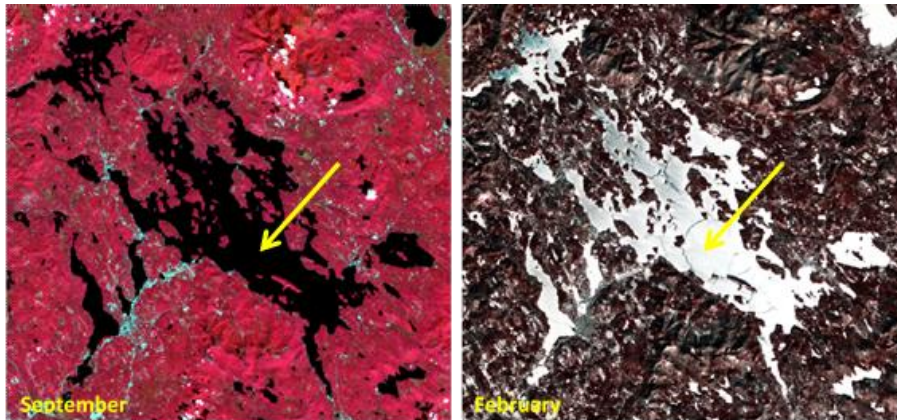


## ***Introduction: Answers***

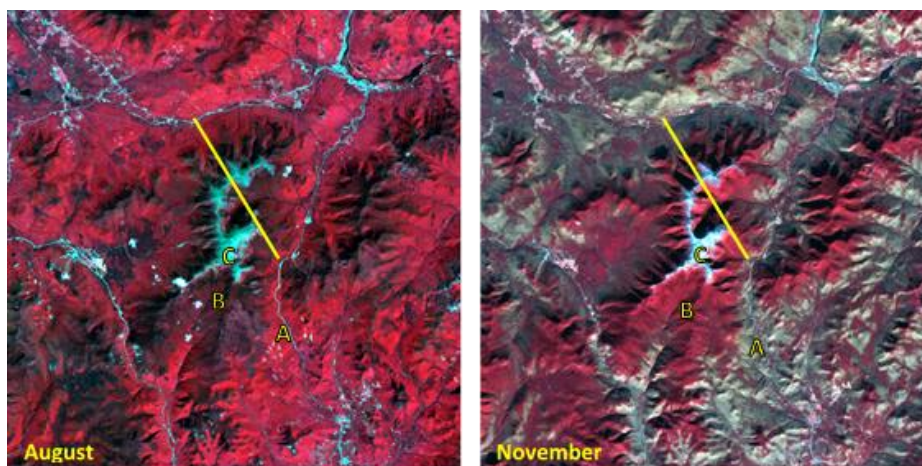
- a) Smell, hearing, sight. These three senses allow us to collect information from a distance. Touch and taste require contact with the object.
- b) We use radio waves daily, for example while we're listening to the music in our car or on our personal radios. Microwaves are the same as what we use to heat up or cook our food when we are home. The weather man also uses microwaves to detect and forecast the weather. A number of devices utilize infrared wavelengths. For example, remote controls emit pulses of infrared light that are detected by a sensor on the TV whenever we press a button. Night vision goggles or cameras also rely on infrared energy. Finally, we use x-rays in the medical field to take pictures of bones.
- c) Frequency and wavelength are inversely related. This means that as wavelength decreases, frequency increases and as wavelength increases, frequency decreases.
- d) If the light entering the room had a wavelength of 450 nm, than we would see it as blue light. If the light entering the room had a wavelength of 300 nm, we wouldn't see it because 300 nm is outside the range of visible light that our eyes can see.
- e) If an object reflected all visible light, it would appear white. White light is the combination of all the wavelengths in the visible range.
- f) If an object reflected no visible light, it would appear black.
- g) A single Landsat pixel covers an area of 900 m<sup>2</sup>. You could fit 36 5m x5m pixels in a single Landsat pixel. Smaller pixels would allow us to see more detail in the image. For example, if a tree was 30 m wide at the top, it would be covered by a single Landsat pixel so, on the image, the tree is represented by a single square pixel. We know tree tops aren't square though. If we took a picture of the same tree using a sensor with 1m pixels, we would have significantly more pixels covering that tree and we could see the shape of the tree clearly.
- h) We can only choose 3 bands to display on the computer. This is because we only have 3 primary colors with which to display the bands.
- i) This is not quite a natural color composite. They assigned the wrong colors to the bands. The vegetation would appear blue on the computer screen. Vegetation absorbs most of the red and blue energy that hits it but reflects the green. This makes the green band the primary influence on how vegetation will look in composite image. Because we assigned the blue to the green band, the vegetation will appear blue. If this person wanted to display the imagery so it looked like how we would see it with our eyes, they need match the primary color to the band; red to the red band, blue to the blue band, and green to the green band.

## Test Yourself: Answers



1. The yellow arrow is pointing to a lake.
2. Both arrows are point to the same thing. They look different because one was taken in September when the lake is water and the other is taken in February when the lake is frozen.
3. The lake in the image to the right is white and the bands used to create this composite are the green, red, and near infrared bands. For the lake to appear white in this image, it has to be reflecting a lot of green, red, and near infrared energy

Bonus: Lake Winnepesaukee

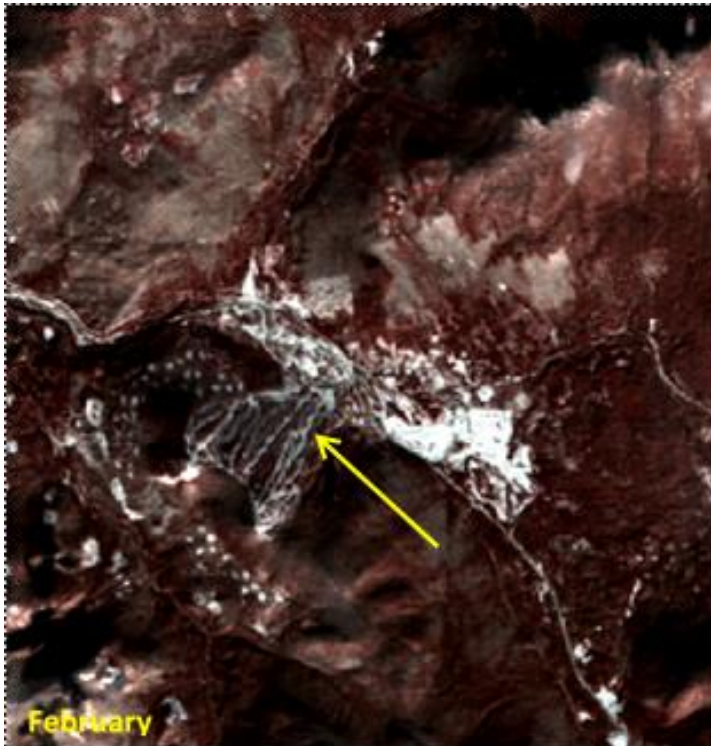


1. Point A is a deciduous forest and point B is a coniferous forest.
2. In the August image, the deciduous trees have their leaves, but in the November image they do not. The leaves reflect the infrared energy, so once they are gone there is no

infrared reflectance in those locations. The conifer trees on the other hand keep their needles year round so they continue to reflect some infrared energy in both images.

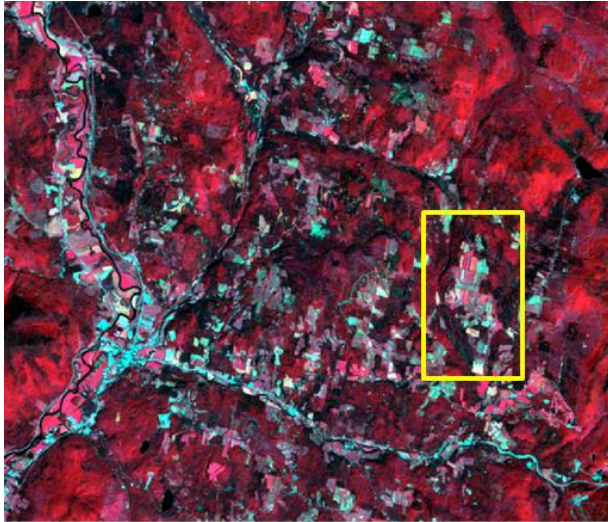
3. There must not be any vegetation at point C since this area is blue, otherwise it would be red like the surrounding areas.
4. It would not be a good idea to build the new road there. The proposed road is going over a tall mountain. We know this is a mountain because it is casting a shadow indicating the area has height.

Bonus: Mount Washington

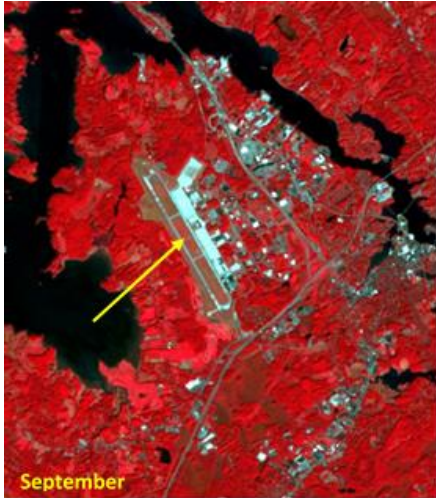


1. The feature the area is pointing to is manmade.
2. This feature is a ski resort. The feature is on a slope as indicated by the shadows being cast. This image was captured in February and the lines the arrow is pointing to are white so they are probably snow covered ski trails.
3. The surrounding landscape does not have snow, so the snow in the ski resort could be manmade.

Bonus: Bretton Woods Resort in Bretton Woods, NH

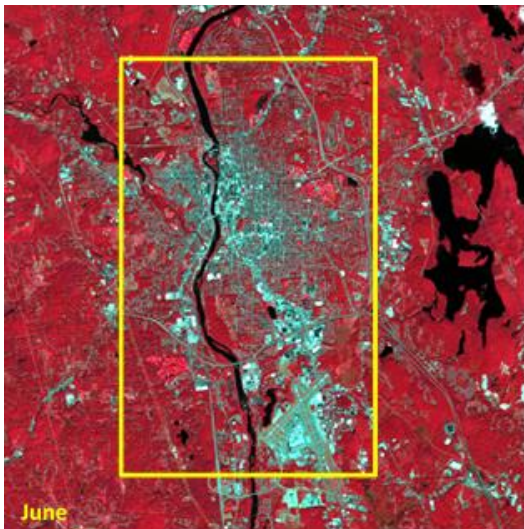


1. Agriculture or Farming
2. Within the box there are patches of bright pink and blue-gray. This suggests these patches are non-woody vegetation and bare ground. Also, the patches are square or rectangular in shape, possibly separate fields.
3. Farming takes place near bodies of water. Probably so the farmers have easy access to water for their crops.
4. Farmers may spray chemical on their crops to keep pests or weeds away. These chemicals may get into the water when it rains or when farmers water their crops. .
5. We should be concerned. There are many farms near the river so there is a higher chance of the chemicals getting into the water.



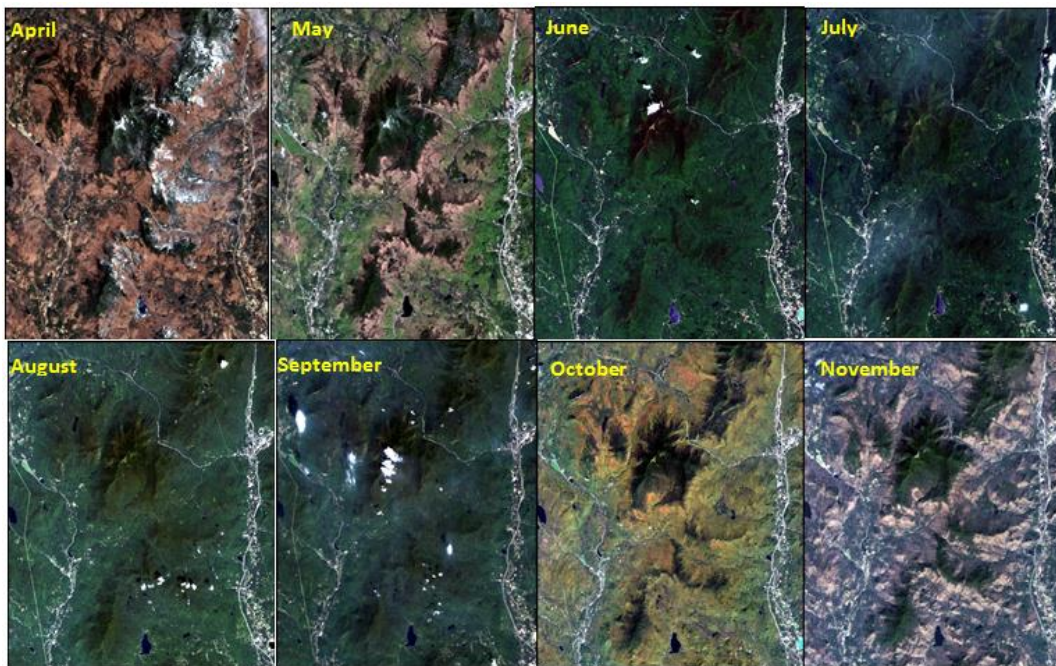
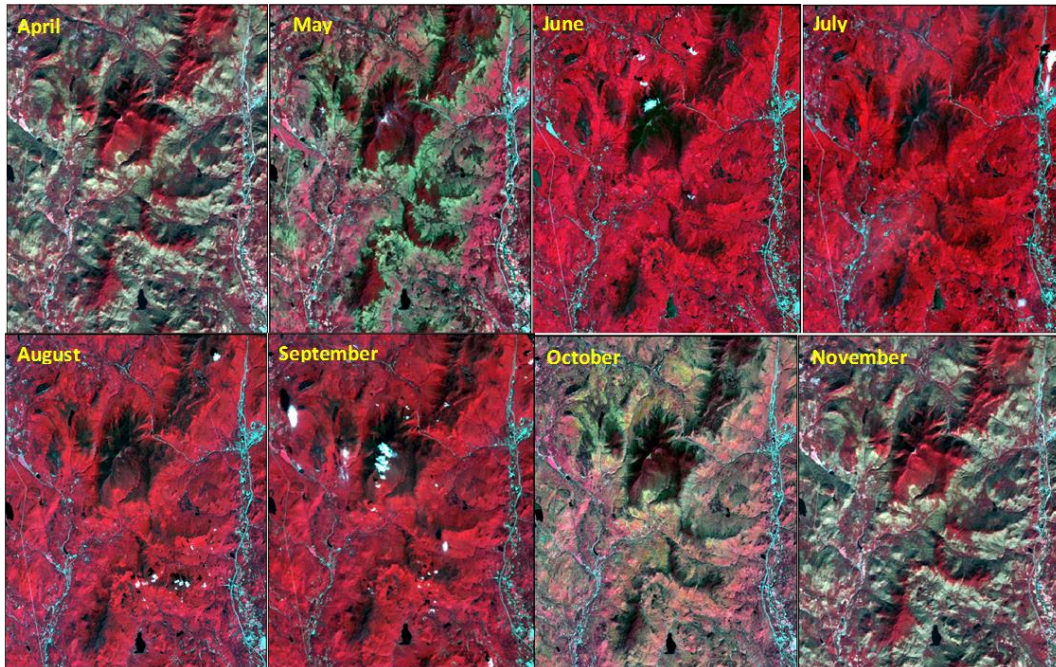
1. An airport
2. The color indicates development and the long narrow shape of the feature looks like a runway.

Bonus: Pease Air National Guard Base in Portsmouth, NH



1. Development, a City
2. There are a lot of areas that look like development based on the color in the image. Straight line features are roads within the city and around it. There is also a long narrow feature at the bottom that looks like an airport.

Bonus: Manchester, NH



1. Senescence, or the growth phase in a plant when it develops leaves and then loses them in the fall.
2. The best time would be June, July, August, and September when the trees have all their leaves.
3. There is. Deciduous trees are common at lower elevations. As elevation increases, the forests tend to have more coniferous trees in them. At very high elevations, there may not be any vegetation at all. This is obvious on Mount Washington.

Bonus: Mount Monadnock in Jaffrey, New Hampshire



1. Answer will vary
2. Answers will vary depending upon what they find. Most of the changes are from vegetation to development. There are some locations (see upper top left circles) where bare ground became vegetated again over time.
3. Changes to development can have numerous environmental impacts. By removing vegetation we're taking away habitat for wildlife. Development can introduce pollutants into the waterways.