

THE NATURE OF SCIENCE

Additional FCAT Practice Questions

Directions: Select the best answer for each of the following questions

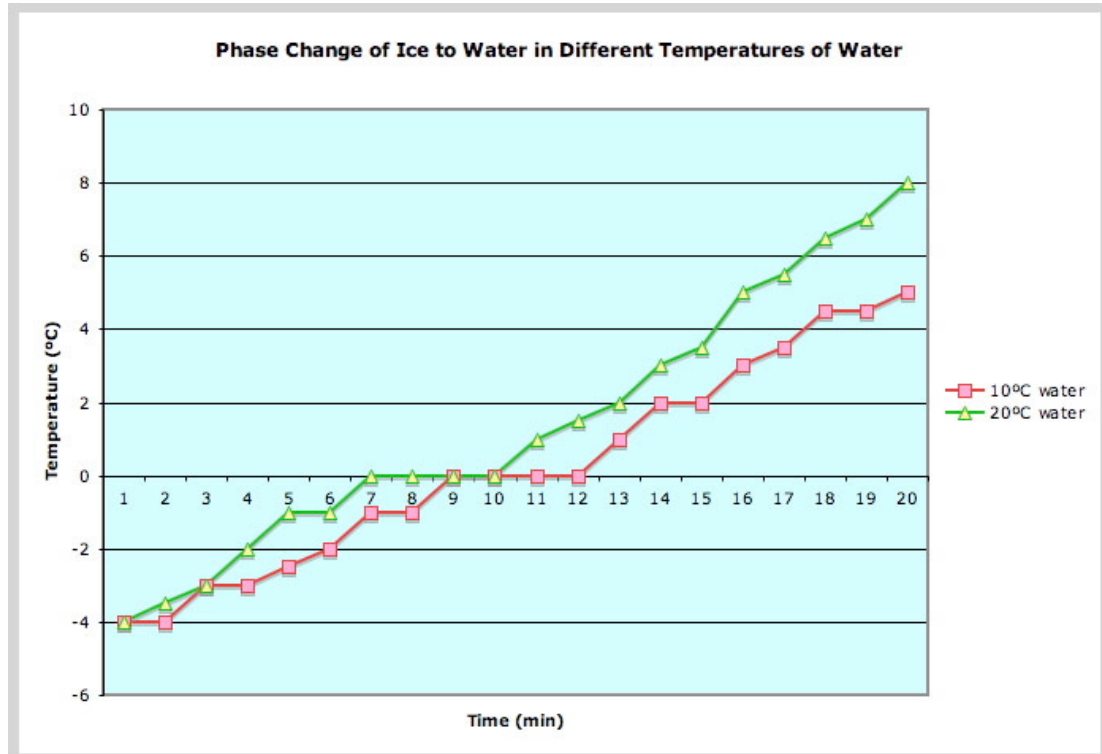
1. Justyn wanted to determine if listening to different types of music would affect the memorization of basic facts. Her hypothesis was that a subject's ability to remember basic facts would be affected by listening to different types of music. She found several volunteers to participate in her investigation. Each volunteer would listen to a certain type of music as they were shown 10 objects, one at a time. One minute later, they would be asked to list, in order, the objects they were shown. The test would be repeated for each participant using a different type of music and a different set of objects for each trial. Justyn discovered that when her volunteers listened to certain types of music, their ability to remember the objects they were shown changed.



What should be the control in Justyn's experiment?

- A. By following the scientific method, magical actions will sometimes occur that make us rich.
- B. By sharing only some of the truth some of the time, it is often possible to confuse people and benefit from their bewilderment.
- C. It is often best to abandon work that is too different or unpopular. It is better to simply accept what has already been stated by the experts.
- D. As new information is gathered and compared to previous work, our knowledge may increase and new theories can be developed.

2. During their study of global warming and its affects, Ms. Burton's class discussed the fate of the ice found floating around Alaska in the Arctic circle. The class decided to do an investigation of how the temperature of the surrounding water affects the rate of phase change for ice. They used a 100 g sample of ice for each trial, and used a thermometer to measure the average energy of each ice sample every 30 seconds as it melted. The entire class combined their results and the averages were graphed.



Which of the following should Ms. Burton's class observe from their results?

- A. Temperature is actually a measure of total energy, not average energy.
- B. The phase change takes the same amount of time to occur in both temperatures of water, but it occurs earlier in warmer water.
- C. Ice melts twice as fast in 20°C water as it does in 10°C water.
- D. The phase change is much faster in the 10°C water than in the 20°C water.

3. In the early 1900s, many fossils were found in the Piltdown quarry near Sussex, England. These fossils appeared to contain the remains of the "missing link", an ancestor to humans that suggested an evolutionary progression from apes to present day Homo sapiens. This discovery answered many questions for science. It was also a media sensation in England, and textbooks were rewritten to include the "Piltdown Man" as an example of the mysterious missing link.



The fossils were quickly locked away in the British Museum, where scientists were rarely allowed to view them. Only plaster casts were made available for study. Nearly 40 years later, the "Piltdown Man" was exposed as a hoax when it was finally studied more closely with microscopes and more modern dating techniques.

There are many reasons why the "Piltdown Man" hoax fooled the world for so many years. Which of the following did not contribute to the success of the hoax?

- A. Expert scientific analysis had proven the Piltdown Man was indeed real.
- B. Many scientists, and the general public, wanted to believe the story and were not as critical as they could have been.
- C. The quality of the forgery was good enough to fool scientists, who had no reason to believe someone would attempt a fake missing link.
- D. The evidence discovered fit into a previously known theory, so few scientists challenged it and investigated further.

4. In 1964, Stephanie Kwolek of Pennsylvania was working on trying to create a better tire. Her company, Dupont, was hoping to invent a material for tires that would allow vehicles to be more fuel efficient in a feared energy crisis.

She was mixing polymers, when one batch turned out completely different than usual - it was thin and cloudy, not clear and thick like most polymer mixtures she worked with. Instead of giving up, she became intrigued and continued to work with the mixture. Eventually, her polymer became Kevlar, a material used for everything from bullet-proof vests to brakes.



What scientific concept does this story illustrate?

- A. Without a clear hypothesis, it is virtually impossible to successfully complete scientific research.
- B. Scientists often work in teams, and it is important to have outsiders examine their work to ensure accuracy.
- C. Technological problems often create a demand for new scientific knowledge, which can often advance science.
- D. Science often evolves slowly, with small steps from several individuals adding up to much larger discoveries.

5. The theory of what our universe looks like has changed significantly over the past few hundred years, ever since the invention of the telescope. Geocentrism (the Earth is the center of the universe) and heliocentrism (the Sun is the center of the universe) have been replaced by theories such as the Big Bang and the infinite universe. As a part of explaining the Big Bang theory, scientists have described "dark matter" and "dark energy" as being necessary forms of matter and energy in our universe that we have not yet discovered.

Why would the theory of the universe change over time, and why would scientists use explanations that include evidence that has yet to be found?

- A. The universe has changed in the past 500 years, and each theory explains a different point in its history.
- B. Fictional books and movies sometimes force science to change their theories.
- C. The new scientific method is much more efficient at explaining the unknown.
- D. Based on changes in technology and recent discoveries, existing theories are updated and changed accordingly.

Answers

1. C
2. B
3. A
4. C
5. D