

Section 1 — Science and Technology Practice Test

SECTION 1

22 Questions

Directions: Read questions 1 through 20 and decide which is the best of the choices given. Fill in the corresponding circle on page 2 in your practice test answer booklet. You may use any available space in your practice test book for scratchwork.

1. Which molecule changes as a result of a genetic engineering procedure?

(A) lipid
(B) carbohydrate
(C) nucleic acid
(D) amino acid

2. Which characteristic does an acid have?

(A) It feels slippery or soapy.
(B) It does not react with metals.
(C) It donates the hydroxide ion in solution.
(D) It has a pH that is less than 7.

3. Look at the information and table below.

$$\text{Power} = \text{Work}/\text{Time}$$

The unit of power is the watt, when work is measured in joules and time is measured in seconds.

**Data Relating to
Power Generation by Students**

Student	Work (joules)	Time (seconds)
A	140	5
B	120	7
C	160	8
D	100	4

Which student in the table generated the most power?

(A) Student A
(B) Student B
(C) Student C
(D) Student D

GO ON TO THE NEXT PAGE 

4. In the 1500s, Copernicus proposed that Earth orbited the Sun rather than vice versa. Which statement summarizes the major impact of this idea on human thought?
- (A) Earth was much older than had previously been thought.
- (B) Earth was no longer thought to be the center of the universe.
- (C) Earth was thought to be created by random factors.
- (D) Earth was thought to be moving differently from other objects in space.

5. Several meteorological tools track and record the weather for one day. The observations are recorded in the table below.

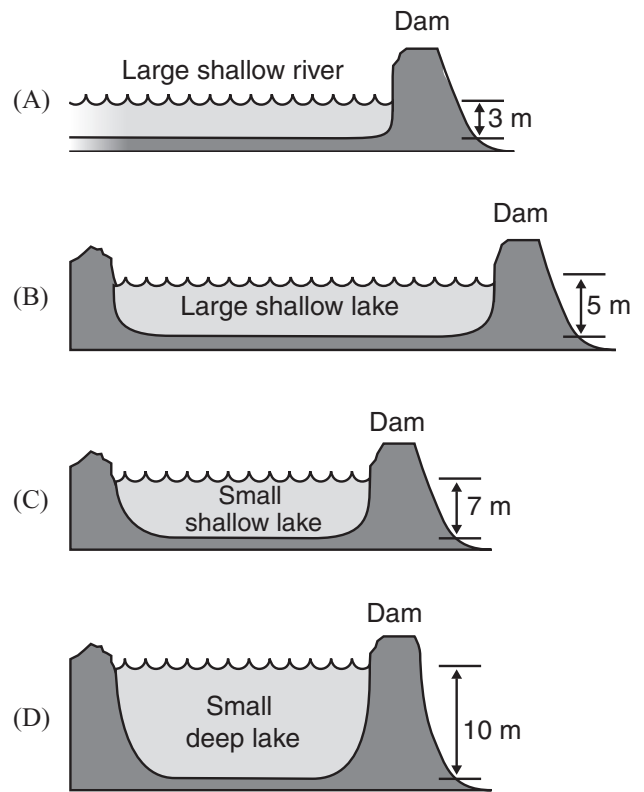
Meteorological Data

Measurement	Time		
	8:00 A.M.	10:00 A.M.	12:00 Noon
Wind speed (km/hr)	5	12	20
Temperature (°C)	7	2	-4
Barometric pressure (inches Hg)	30.3	29.9	29.5
Relative humidity (%)	50	73	85

What kind of weather can most correctly be predicted for midafternoon?

- (A) a rain shower
- (B) a snowstorm
- (C) unseasonably warm and sunny conditions
- (D) cold air temperatures with no precipitation

6. For which dam is the water pressure greatest?



7. According to current research, during which stage of a star's evolution does a black hole appear?
- (A) birth
- (B) main sequence
- (C) expansion stage
- (D) final stage

GO ON TO THE NEXT PAGE

8. Old redwood logs remain intact for centuries. Which statement is the best scientific argument to explain this phenomenon?
- (A) The logs contain chemicals that repel other organisms, including decomposers.
- (B) In a redwood forest, no fungi or other decomposers are present.
- (C) When a tree becomes a log, a gene mutates to protect the log.
- (D) An ecosystem containing redwood trees does not need to recycle materials.

9. Why does the phytoplankton population in the Arctic Ocean increase rapidly during the summer months?
- (A) More shrimp are available for food.
- (B) More sunlight is available for photosynthesis.
- (C) The North Atlantic Drift current brings them north.
- (D) The insect population increases by a significant amount.

10. The age of a painting can be verified by using the technological history of the paint.

Technological History of Paint

Material in Paint	Year(s) Material Introduced	Year Material Stopped Being Used
lead-tin yellow	1300	1750
lapis lazuli	1400s	1824
Indian yellow	1400s	1908
synthesized lapis lazuli	1824	___*
zinc oxide	1830s	___*

* Material is still used.

A chemist analyzes a painting and finds it contains Indian yellow and synthesized lapis lazuli. On the basis of these findings and the information in the table, what is the best estimate of the time period during which the painting was made?

- (A) between 1400 and the present
- (B) between 1400 and 1824
- (C) between 1824 and 1908
- (D) between 1908 and the present

GO ON TO THE NEXT PAGE 

11. A scientist discovers a new organism that has the characteristics listed below.

- It is multicellular.
- It can make its own food.
- Each cell contains a nucleus.
- A cell wall made of cellulose surrounds each cell.

Into which group should this organism be classified?

- (A) animals
 - (B) plants
 - (C) fungi
 - (D) bacteria
-
12. In the late 1930s, the insecticide DDT was developed. Which outcome was most likely a result of using DDT?
- (A) Many insect species became extinct, and so bat populations increased.
 - (B) Certain insects became endangered, and so laws were passed to protect them.
 - (C) Some insects were naturally resistant to DDT, and thus they survived to produce offspring that were resistant.
 - (D) Decreasing amounts of DDT were required to be effective, and eventually it was no longer needed.

13. The manager of a building wants to increase the speed of an elevator from the first to the fourth floor. Which elevator design change would best help the manager accomplish this goal?

- (A) Decrease the diameter of the elevator cable.
- (B) Increase the power of the elevator motor.
- (C) Increase the height of the elevator door.
- (D) Decrease the thickness of the elevator door.

-
14. Which evidence best helped people to accept the idea that Earth is round, not flat?

- (A) A convincing model of a round Earth was distributed to the people.
- (B) People had sailed completely around Earth.
- (C) People had accepted the theory that Earth revolved around the Sun.
- (D) Some people never returned from sailing expeditions.

GO ON TO THE NEXT PAGE 

-
15. Solar radiation caused a skin cell mutation in an individual. Who will be affected by this mutation?
- (A) only the individual
 - (B) only male offspring
 - (C) only female offspring
 - (D) both the individual and all offspring
-
16. Why does an air mass tend to rise as it becomes heated?
- (A) because air's volume decreases as air rises
 - (B) because air pressure increases in an open space
 - (C) because air becomes less dense as its temperature increases
 - (D) because air becomes more dense as its temperature increases
-
17. Which type of change marks the end of eras in the geologic time scale?
- (A) mass organism extinctions
 - (B) large-scale mountain building
 - (C) global warming
 - (D) seafloor spreading
-
18. How do scientists gather information about black holes?
- (A) They examine the visible light black holes emit.
 - (B) They study the effects of black holes on companion stars.
 - (C) They study the effects of black holes in our solar system.
 - (D) They collect the sound waves black holes emit.

GO ON TO THE NEXT PAGE 

19. Joe's well water level was higher in spring than it had been during the winter. He believes the explanations below tell why this happened.

Two Explanations for Joe's Well Water Level Rising

- | |
|---|
| 1. Precipitation was greater during the spring. |
| 2. Snow melted during the spring. |

Which information should Joe examine to best support his explanations?

- (A) population growth of the area
- (B) frequency of water usage
- (C) amount of water used
- (D) weather data

20. Given that a maple tree has sprouted from a cut maple stump, which inference about the new plant is most likely correct?

- (A) It has a better chance of surviving than its parent.
- (B) It has the same DNA as its parent.
- (C) It has half the number of chromosomes of its parent.
- (D) It has larger leaves than its parent.

GO ON TO THE NEXT PAGE 

Directions: Write your answers to constructed-response questions 21 and 22 in the boxes provided on pages 2 and 3 of your practice test answer booklet. Be sure to answer and label all parts (a, b, c, etc.) of the questions.

21. Describe how DNA and RNA produce the physical characteristics found in organisms. Your answer should describe
- the role of DNA,
 - the sequence of processes involved (including the role of RNA), and
 - how the processes produce the observed physical characteristics.

GO ON TO THE NEXT PAGE 

22. Use the information below to answer this question.

Formulas

voltage = current \times resistance

power = voltage \times current

Units of Measure

current: ampere

resistance: ohm

power: watt

voltage: volt

Wires connect a lightbulb to the terminals of a 12-volt battery. The total resistance of the circuit is 4 ohms.

- Calculate the amount of current flowing through the circuit. Show your work.
- Calculate the circuit's power. Show your work.
- If the total resistance of the circuit were greater than 4 ohms, what would happen to the power? Explain your reasoning.

STOP