



**INTERNATIONAL  
FSP CONTESTS**

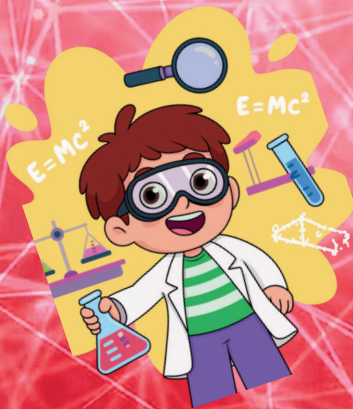


**FSP  
SCIENCE  
CONTEST  
QUESTION  
BOOKLET**

**Volume-23**

**GRADE 9 & 10  
VIBRANT YOUNGSTERS**

**EXHIBIT YOUR SKILLS TO THE WORLD**



**Time Allowed 90 minutes  
Maximum Marks : 90**

## INSTRUCTIONS FOR THE EXAMINATION INVIGILATORS

- 1). Invigilation must be carried out promptly.
- 2). Don't start attempting the paper until instructed by the invigilator.
- 3). Carefully recheck your name, father name, school name, address etc. at the bubble sheet/answer sheet.
- 4). Record all answers on the bubble sheet only, select best answer from the four given options and mark only one option in each question.
- 5). Use blue/black ink to fill up the circles for your answers on the bubble sheet use of lead pencil is not allowed.
- 6). Use of any helping material including cell phones and electronic devices is strictly prohibited.
- 7). Every correct answer earns three points. there would be negative marking, one point would be deducted for every incorrect answer.
- 8). Candidates may not leave the examination room unescorted for any reason, and this includes using the washroom.
- 9). No materials or electronic devices shall be brought in to the room.
- 10). There are five categories of the contest as under:
  - A Vibrant youngsters Grade 1 & 2
  - B Vibrant youngsters Grade 3 & 4
  - C Vibrant youngsters Grade 5 & 6
  - D Vibrant youngsters Grade 7 & 8
  - E Vibrant youngsters Grade 9 & 10/0-levels
- 11). Only registered students can participate in the contest.
- 12). No candidate shall take out of the hall any answer book(s) or part of an answer book, whether used or unused, or other supplied material.
- 13). If a participant does not understand a word or phrase on the exam paper, neither examiner nor invigilator is permitted to answer.
- 14). For information about upcoming contests or providing valuable feedback, please visit [www.fspcompetitions.org](http://www.fspcompetitions.org)
- 15). Any academic misconduct or malpractice must be reported to FSP vibrant youngsters at [info@fspcompetitions.org](mailto:info@fspcompetitions.org)

**Q1: A perfectly insulated laboratory chamber contains a refrigerator with its door left open. The refrigerator is connected to a power source inside the same chamber. The system runs continuously for several hours. Students debate whether the average temperature of the chamber will rise, fall, or remain constant.**

**Consider the principles of thermodynamics and energy conservation.**

**What will most likely happen?**

- A. The chamber cools because the refrigerator removes heat.
- B. The chamber's temperature remains unchanged.
- C. The chamber warms because electrical energy converts to heat.
- D. The chamber cools initially, then stabilizes below original temperature.

**Q2: An astronaut drops a metal sphere and a wooden sphere of equal size on the Moon, where there is no atmosphere. Simultaneously, the same experiment is performed on Earth in a vacuum chamber.**

**Students analyze gravitational acceleration and mass effects. Which conclusion is correct?**

- A. The heavier sphere falls faster on Earth only.
- B. Both spheres fall at the same rate in both cases.
- C. The wooden sphere falls slower on the Moon.
- D. Mass determines acceleration in vacuum.

**Q3: A sealed glass chamber contains a green plant and a small animal. The chamber is exposed to sunlight but no external air exchange occurs. After several weeks, oxygen levels fluctuate but eventually stabilize.**

**Students analyze photosynthesis, respiration, and carbon cycling. Which process maintains balance in this system?**

- A. Only respiration
- B. Only photosynthesis
- C. The coupling of photosynthesis and respiration
- D. Nitrogen fixation

**Q4: A satellite orbits Earth in a stable circular orbit. Suddenly, its velocity increases slightly without changing direction.**

**Consider gravitational forces and orbital mechanics. What will happen next?**

- A. It will crash into Earth.
- B. It will move into a higher elliptical orbit.
- C. It will remain in the same orbit.
- D. Gravity will disappear.

**Q5: A resistor R is connected in series with another identical resistor. The same resistors are then connected in parallel. Students compare total resistance and power consumption for both arrangements using the same battery.**

**Which arrangement draws more current?**

- A. Series connection
- B. Parallel connection
- C. Both equal
- D. Neither conducts

**Q6: A mutation alters the shape of an enzyme's active site. The substrate still binds weakly but reaction rate drops drastically. Students examine enzyme kinetics.**

**What is the most direct explanation?**

- A. DNA replication stopped
- B. Activation energy effectively increased
- C. Ribosomes stopped functioning
- D. ATP production increased

**Q7: A student drops a ball into a hypothetical frictionless tunnel drilled straight through Earth's center. Ignore air resistance and assume uniform density. Analyze gravitational force variation with depth.**

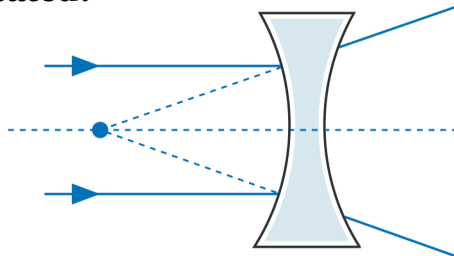
**How will the ball move?**

- A. Constant acceleration downward
- B. Stop permanently at center
- C. Oscillate in simple harmonic motion
- D. Escape Earth

**Q8: A convex lens produces a real image three times larger than the object. The image forms on a screen. Based on ray diagrams and lens formula reasoning,**

**Where is the object located?**

- A. Beyond  $2F$
- B. At  $2F$
- C. Between  $F$  and  $2F$
- D. Inside  $F$



**9: A predator species is removed from a stable ecosystem. Initially, herbivore population increases dramatically, followed by vegetation collapse and eventual herbivore decline.**

**This phenomenon is best described as:**

- A. Genetic drift
- B. Trophic cascade
- C. Mutualism
- D. Primary succession



**Q10: A radioactive isotope has a half-life of 5 years. After 20 years,**

**What fraction remains?**

- A.  $1/2$
- B.  $1/4$
- C.  $1/8$
- D.  $1/16$

**Q11: If Earth's rotational speed suddenly doubled (same radius),**

**What would happen to objects at the equator?**

- A. Weight increases
- B. Weight decreases due to higher centrifugal effect
- C. Gravity disappears
- D. No change

**Q12: A gas is compressed rapidly in an insulated cylinder. Temperature increases significantly. Students apply thermodynamic principles.**

**Why does temperature rise?**

- A. Heat entered from surroundings
- B. Work done on gas increases internal energy
- C. Molecules disappear
- D. Pressure decreased

**Q13: In an ecosystem, nitrogen - fixing bacteria have disappeared due to pollution, causing a sharp decline in plant growth. Why?**

- A. Photosynthesis stops completely
- B. Nitrogen becomes unavailable for protein synthesis
- C. Oxygen decreases
- D. Carbon cycle halts

**Q14: Light passes from air into glass at an angle. It slows down and bends toward the normal. Students compare frequency, wavelength, and speed.**

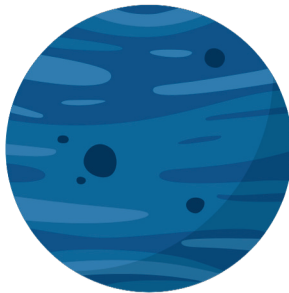
**Which quantity remains unchanged?**

- A. Speed
- B. Wavelength
- C. Frequency
- D. Direction

**Q15: Two planets have equal density, but one has twice the radius of the other.**

**Compare surface gravity.**

- A. Equal
- B. Double
- C. Half
- D. Four times



**Q16: A block slides down two identical inclined planes—one frictionless, one rough.**

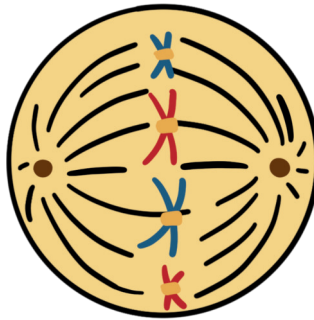
**Starting from same height, compare speeds at bottom.**

- A. Same speed
- B. Rough plane slower
- C. Rough plane faster
- D. Both stop midway

**Q17: During mitosis, spindle fibers fail to separate sister chromatids.**

**What condition may result?**

- A. Normal daughter cells
- B. Mutation in RNA only
- C. Aneuploidy (abnormal chromosome number)
- D. Increased ATP



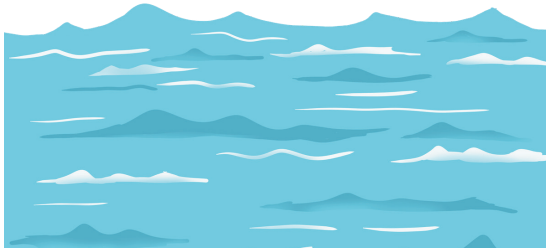
**Q18: A sound wave travels from warm air into cold air. Since sound speed depends on temperature, What happens to wavelength if frequency remains constant?**

- A. Increases
- B. Decreases
- C. Same
- D. Becomes zero

**Q19: Ocean water becomes more acidic due to increased atmospheric CO<sub>2</sub>.**

**Which marine organisms are most directly affected?**

- A. Fish with scales
- B. Coral reefs and shell-forming organisms
- C. Sharks
- D. Seaweed only



**Q20: A charged rod attracts neutral paper bits.**

**This occurs because:**

- A. Paper becomes magnetized
- B. Charges in paper rearrange (induction)
- C. Gravity increases
- D. Paper gains mass

**Q21: A closed container has ice and water at equilibrium at  $0^{\circ}\text{C}$ . Heat is added slowly. Temperature remains constant initially.**

**Why?**

- A. Heat increases kinetic energy
- B. Heat increases potential energy during phase change
- C. Ice becomes colder
- D. Pressure decreases



**Q22: If Sun's mass doubled but Earth's velocity remained unchanged, Earth would:**

- A. Escape orbit
- B. Spiral inward
- C. Stay in same orbit
- D. Stop moving



**Q23: A plant exposed to high wind, low humidity, and high temperature shows rapid water loss.**

**Which physiological process increases most?**

- A. Photosynthesis
- B. Transpiration
- C. Respiration
- D. Germination



**Q24: In a circuit, voltage doubles while resistance remains constant. According to Ohm's Law, power dissipated becomes:**

- A. Same
- B. Double
- C. Four times
- D. Half

**Q25: A wheel and axle increases mechanical advantage by:**

- A. Reducing work done
- B. Increasing distance over which force is applied
- C. Eliminating gravity
- D. Increasing energy

**Q26: A spaceship travels at  $0.9c$  relative to Earth. Time onboard compared to Earth observers will:**

- A. Run faster
- B. Run slower (time dilation)
- C. Stop
- D. Reverse

**27: Removing decomposers from an ecosystem would eventually cause:**

- A. More nutrients available
- B. Nutrient cycle breakdown
- C. Faster plant growth
- D. More oxygen production



**Q28:A tall truck accelerates forward. Due to its high center of mass, what increases?**

- A. Stability
- B. Forward tilt
- C. Backward tipping risk
- D. Tire friction elimination

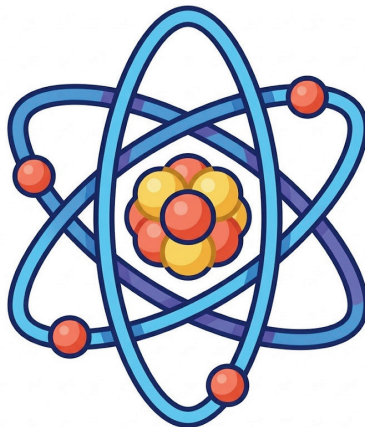


**Q29: In a population, allele frequencies change due to random events rather than selection. This is called:**

- A. Natural selection
- B. Genetic drift
- C. Mutation
- D. Migration

**Q30: A photon has energy  $E = hf$ .  
If frequency doubles, energy:**

- A. Halves
- B. Doubles
- C. Quadruples
- D. Remains same







# ANSWER SHEET

## Grade 9 & 10

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# International FSP Contests



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