



Grade 9



CREST Science Olympiad (CSO)

# Sample Paper

## Pattern and Marking Scheme

Grade	Topic/Section	No. of Questions	Marks per Question	Total Marks
Grade 9	Practical Science	40	1	40
	Achiever's Section	10	2	20
<b>Grand Total</b>		<b>50</b>		<b>60</b>

The total duration of the exam is 60 minutes.

## Syllabus

**Section 1:** Motion, Force and Laws of Motion, Gravitation, Work and Energy, Sound, Matter in Our Surroundings, Is Matter Around Us Pure, Atoms and Molecules, Structure of Atom, Cell - The Fundamental Unit of Life, Tissues, Diversity in Living Organisms, Why Do We Fall Ill, Natural Resources, Improvement in Food Resources.

**Achievers Section:** Higher Order Thinking Questions - Syllabus as per Section 1

For more details, visit <https://www.crestolympiads.com/science-olympiad-cso>

## Practical Science (Each Question is 1 Mark)

1. A man is at rest in the middle of a horizontal plane of the perfectly smooth surface of the ice. He can move himself to the shore by making use of which of the following Newton's law?

  - a. Newton's first law of motion
  - b. Newton's second law of motion
  - c. Newton's third law of motion
  - d. Newton's law of gravitation
2. Fill in the blank:  
David is carrying a school bag of 3 kg mass on his back and moves 200 m on a levelled road. The work done against the gravitational force will be ( $g = 10 \text{ ms}^{-2}$ ) \_\_\_\_\_.

  - a.  $6 \times 10^3 \text{ J}$
  - b. 6 J
  - c. 0.6 J
  - d. zero
3. Which of the following statements regarding the matter is/are correct?

  - I. Anything which has mass is matter.
  - II. Anything which occupies space is matter.
  - III. Anything which is felt by our one or more senses is matter.
  - IV. Anything which has no real physical existence is matter.
  - a. I and II
  - b. I, II and III
  - c. Only IV
  - d. I, II, III and IV
4. Hard water cannot be used in boilers. Which of the following is the reason for the same?

  - a. The boiling point of hard water is high.
  - b. The conductivity of hard water is less.
  - c. Hard water causes scales on the walls of the boilers.
  - d. Hard water reacts with metals used in making boilers.
5. Consider the following statements:

  - I. Areolar connective tissue is found between the skin and muscles, around blood vessels and nerves and in the bone marrow.
  - II. Fat storing adipose tissue is found below the skin and between internal organs.

Which of the statement(s) given above is/are correct?

  - a. Only I
  - b. Only II
  - c. I and II
  - d. None of these
6. Fill in the blank:  
Certain parts of a plant can be bent easily without breaking. This flexibility in certain parts, like leaf and stem, can be attributed to the abundance of \_\_\_\_\_.

  - a. parenchyma
  - b. collenchyma
  - c. sclerenchyma
  - d. xylem and phloem

7. Choose the correct option and complete the following sentence:  
The cell organelle which helps in the synthesis of fats in adipose tissue is \_\_\_\_\_.
- a. smooth endoplasmic reticulum                      b. rough endoplasmic reticulum  
c. mitochondria    d. adipocytes
8. In the following question, an assertion and the reason are given. Choose the correct option:  
**Assertion:** Plasma membrane contains bimolecular lipid layer, the surface of which is interrupted by proteins.  
**Reason:** Selective permeability of the plasma membrane is explained with the help of a fluid mosaic model.
- a. Both assertion and reason are true and reason is the correct explanation for the assertion.  
b. Both assertion and reason are true, but reason is not the correct explanation for the assertion.  
c. Assertion is true and reason is false.  
d. Assertion is false and reason is true.
9. Which of the following animals cannot survive both in land and water habitats?
- a. Salamanders    b. Alligators  
c. Ostrich    d. Penguins
10. Which of the following concepts was not considered in Rutherford's atomic model?
- a. The electrical neutrality of atom.  
b. The quantization of energy.  
c. Electrons revolve around the nucleus at very high speeds.  
d. Existence of nuclear forces of attraction on the electrons.
11. What happens when a sound wave passes from a highly polluted region to a pollution-free area?
- a. Amplitude remains unchanged                      b. Velocity remains unchanged  
c. Frequency remains unchanged                      d. Wavelength remains unchanged
12. What will happen if a saturated salt water solution is heated and allowed to cool without adding any more salt?
- a. Some salt will appear to settle at the bottom  
b. Some more salt can be dissolved now  
c. No change takes place  
d. Both a and b
13. Choose the correct option and complete the following sentence:  
Two elements X and Y having the same number of valence electrons in their atom will have similar \_\_\_\_\_.

- a. metallic character
- b. chemical properties
- c. atomic sizes
- d. All of the above

14. Choose the correct option and complete the following sentence:

As the principal quantum number increases, the difference of distance of separation between consecutive energy levels \_\_\_\_\_.

- a. decreases
- b. remains the same
- c. increases
- d. sometimes increases and sometimes decreases

15. An ionic compound is a poor conductor of electricity. Which of the following is the reason for this?

- a. Ions do not conduct electricity.
- b. Charge on the ions is uniformly distributed.
- c. Ions occupy fixed positions in solids.
- d. Ions have a uniform field.

16. A ball of mass 2 kg is thrown up vertically with a kinetic energy of 490 J. The height at which the kinetic energy of the body becomes half of the original value is \_\_\_\_\_. The acceleration due to gravity is  $9.8 \text{ ms}^{-2}$ .

- a. 50 m
- b. 25 m
- c. 12.5 m
- d. 10 m

17. Fill in the blanks:

Suppose gravity of the Earth suddenly becomes zero, then what will happen to the motion of the Moon (neglecting the effect of other celestial body) \_\_\_\_\_.

- a. Moon will stop moving
- b. Moon will start moving with non-uniform acceleration on the same path
- c. the Moon will begin to move in a straight line in the direction in which it was moving at that instant
- d. None of the above

18. Which of the following statement is wrong?

- a. Changes in air temperature have no effect on the speed of sound.
- b. Changes in air pressure have no effect on the speed of sound.
- c. The speed of sound in water is higher than in air.
- d. The speed of light in water is lesser than in air.

19. Which of the following statements is/are correct?

- a. The nature of matrix differs according to the function of the tissue.
- b. Fats are stored below the skin and in between the internal organs.
- c. Epithelial tissues have almost no intercellular spaces between them.
- d. All of the above

20. Identify the disease-causing agents:
- a. Cholesterol, saturated fat and helminths
  - b. Measles, mumps and chickenpox
  - c. Viruses, bacteria and fungi
  - d. Both a and c
21. A compound 'X' is an ionic compound. Which of the following is not the characteristic feature of X?
- a. X is soluble in water.
  - b. X is a good electrical conductor in solid-state.
  - c. X melts at high temperature.
  - d. X is formed by transfer of electron(s).
22. In the following question, an assertion and the reason are given. Choose the correct option:  
Assertion: Coal is a combustible organic fuel.  
Reason: It occurs inside the volcanoes.
- a. Both assertion and reason are true and reason is the correct explanation of assertion.
  - b. Both assertion and reason are true but the reason is not the correct explanation of assertion.
  - c. Assertion is true but reason is false.
  - d. Assertion is false but reason is true.
23. Which of the following is not a consequence of desertification?
- a. Decrease in the water-holding capacity of soil.
  - b. Increased chances of floods.
  - c. Increase in the temperature of the earth.
  - d. Decrease in the concentration of carbon dioxide in atmosphere.
24. Consider the following statements and choose the correct option:  
Statement 1: Mixed cropping is growing two or more crops simultaneously on the same piece of land, for example, wheat + gram, or wheat + mustard, or groundnut + sunflower.  
Statement 2: Intercropping involves growing two or more crops simultaneously on the same field in a definite proportion or pattern. A few rows of one crop alternate with a few rows of a second crop, for example, soybean + maize.
- a. Both the statements are correct.
  - b. Both the statements are incorrect.
  - c. Statement 1 is incorrect but statement 2 is correct.
  - d. Statement 1 is correct but statement 2 is incorrect.
25. All samples of carbon dioxide contain carbon and oxygen in the mass ratio 3 : 8. Which of the following laws is in agreement with the above statement?
- a. Law of conservation of mass
  - b. Law of constant proportions
  - c. Law of constant proportions
  - d. Law of gaseous volumes



32. A ship at rest is sending ultrasonic sound waves to detect a shoal of fish. If the time gap between the signal sent from the ship and received (reflected signal) is 0.5 s, then find the distance of the shoal of fish from the ship. (Velocity of sound in water is 1400 m/s)

- a. 300 m
- b. 350 m
- c. 400 m
- d. 450 m

33. Which of the following is the correct statement?

- a. Gravity and gravitation are same.
- b. Gravity is a particular case of gravitation.
- c. Acceleration due to gravity is a scalar quantity.
- d. Different heavenly bodies have different values for G.

34. Fill in the blank:

To prevent soil erosion, a farmer plants a hedge across a field. This method works because \_\_\_\_\_.

- a. the hedge prevents the soil from direct impact of rainwater
- b. the roots of plants prevent soil erosion
- c. the hedge absorbs minerals from the soil, which makes it most compact
- d. none of the above

35. Match the following:

List I		List II	
1.	Cell Wall	a.	Closed Ring
2.	Flagella	b.	Food Reserve
3.	DNA	c.	Protect Cell
4.	Glycogen	d.	Locomotory Structure

- a. 1 – c, 2 – d, 3 – b, 4 – a
- b. 1 – d, 2 – c, 3 – b, 4 – a
- c. 1 – c, 2 – d, 3 – a, 4 – b
- d. 1 – a, 2 – b, 3 – d, 4 – c

36. Sound travels with a different speed in different media. In what order does the velocity of sound increase in these media?

- a. Water, iron and air
- b. Iron, air and water
- c. Air, water and iron
- d. Iron, water and air

37. Rectify the given statements by replacing the underlined words and select the correct option:

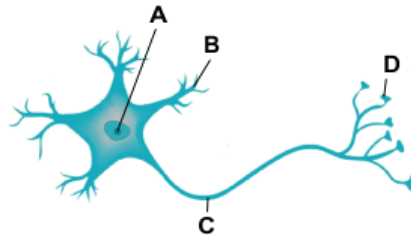
- i. The viscous fluid present in the nucleus is called cytoplasm.
- ii. Vacuoles are rod shaped structures which oxidise food to provide energy.
- iii. Mitochondria contain green pigment chlorophyll and take part in photosynthesis.
- iv. Lysosomes take part in synthesis of proteins.

- a. i-nucleoplasm, ii-Lysosomes, iii-Plastids, iv-Centrosomes
- b. i-protoplasm, ii-Ribosomes, iii-Centrosomes, iv-Golgi bodies
- c. i-nucleoplasm, ii-Mitochondria, iii-Chloroplasts, iv-Ribosomes
- d. i-protoplasm, ii-Plastids, iii-Chloroplasts, iv-Ribosomes

38. Harry made the following comments about cells during a class presentation. After his presentation, his teacher remarked that he made an erroneous comment. Find the same.
- Cellulose cell walls are found in animal cells.
  - Chlorophyll is found in chloroplasts.
  - A cell is usually made up of a cell membrane, cytoplasm and nucleus.
  - Vacuoles are found mostly in plant cells.

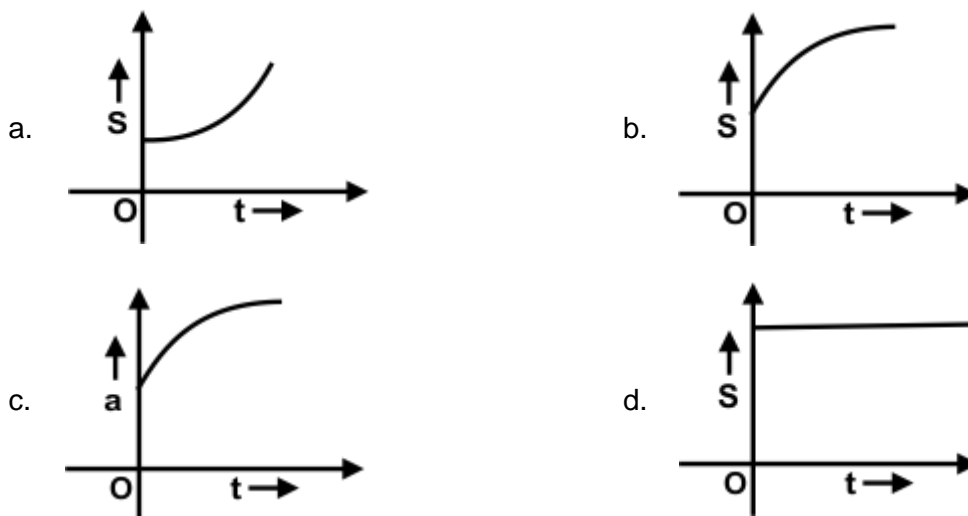
- i and ii only
- ii, iii only
- i only
- All of them

39. Label A, B, C and D in the following diagram and choose the correct option:



- A-Cell body, B-Nucleus, C-Axon, D-Nerve ending
- A-Nucleus, B-Nerve ending, C-Axon, D-Dendrite
- A-Nucleus, B-Dendrite, C-Axon, D-Nerve ending
- A-Nucleus, B-Axon, C-Dendrite, D-Nerve ending

40. Which of the following graphs indicates that a body is undergoing retardation?



## Achiever's Section (Each Question is 2 Marks)

41. Choose the correct option and complete the following sentence:  
The acceleration due to the Earth's gravity decreases, if \_\_\_\_\_.
- we go up from the surface of the Earth
  - we go from the equator towards the pole
  - the rotation speed of the Earth is increased
  - we go down from the surface of the Earth towards its centre



- a. I, II and III
- b. I, III and IV
- c. I, II and IV
- d. I, II and III and IV

42. Consider the following statements and choose the correct option:

- I. Tapeworm is a hermaphrodite.
- II. Roundworm has separate sexes.
- III. Filaria is caused by a nematode.
- IV. Guinea worm is an annelid.

- a. I and II are correct
- b. I, II and III are correct
- c. III and IV are correct
- d. II, III and IV are correct

43. In the following question, an assertion and reason are given. Choose the correct option:

**Assertion:** Meiosis is also known as a reduction division.

**Reason:** Meiosis involves the formation of daughter cells with half the number of chromosomes than that of the parent cell.

- a. Both assertion and reason are true and reason is the correct explanation for the assertion
- b. Both assertion and reason are true and reason is the not the correct explanation for the assertion
- c. Assertion is true and reason is false
- d. Assertion is false and reason is true

44. Consider the following statements and choose the correct option:

**Statement A:** An electron in the inner orbit is more tightly bound to the nucleus.

**Statement B:** The greater the absolute value of the energy of an electron the more tightly the electron is bound to the nucleus.

- a. Both A and B are true and B is not the appropriate reason for A.
- b. Both A and R are individually correct and B is the correct reason for A.
- c. A is correct but B is not correct.
- d. Both A and B are not correct.

45. A ball released from the top of a tower of height  $M$  meters takes  $T$  seconds to reach the ground. What is the position of the ball in  $T/3$  seconds?

- a.  $M/9$  metres from the ground
- b.  $7M/9$  metres from the ground
- c.  $8M/9$  metres from the ground
- d.  $17M/9$  metres from the ground

46. Consider the following sentences and choose the correct option:

- i. The cell wall is the site of energy production in a plant cell.
- ii. Lysosomes are the reservoirs of starch, oil and protein granules.
- iii. A plant cell becomes turgid due to plasmolysis.
- iv. Chemically plasma membrane is composed of fats and lipids.
- v. The functional segments of DNA are called genes.

- a. Only i is correct
- b. Only iv is correct
- c. Only v is correct
- d. iii, iv and v are correct

47. Consider the following statements and choose the correct option:  
 Statement 1: The atmosphere of the earth is heated by radiations which are mainly re-radiated by land and water.  
 Statement 2: Solar radiations heat up land slower than the water bodies.
- Statement 1 is correct and statement 2 is incorrect
  - Statement 1 is incorrect and statement 2 is correct
  - Both the statements are correct
  - Both the statements are incorrect

48. In the following question, an assertion and the reason are given. Choose the correct option:  
**Assertion:** It is the gravitational force exerted by the sun and the moon on the seawater that causes the formation of tides in the sea.  
**Reason:** The gravitational force of attraction is a weak force compared to other fundamental forces of nature

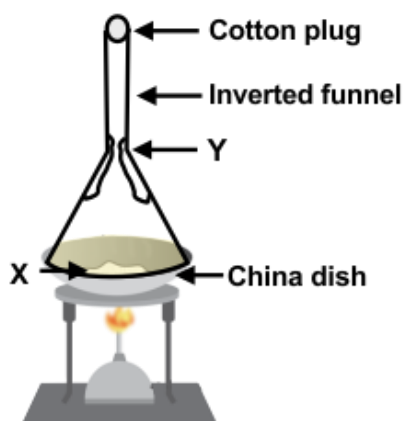
- Both assertion and reason are true and reason is the correct explanation of assertion.
- Both assertion and reason are true and reason is not the correct explanation of assertion.
- Assertion is true but reason is false.
- Assertion is false but reason is true.

49. Match the following:

List I		List II	
A.	Irregularly thickened cell wall	i.	Collenchyma
B.	Thin cell wall	ii.	Xylem parenchyma
C.	Lateral conduction of water	iii.	Parenchyma
D.	Coconut husk	iv.	Sclerenchyma

- A-i, B-iii, C-ii, D-iv
- A-i, B-ii, C-iv, D-iii
- A-iii, B-iv, C-ii, D-i
- A-iii, B-i, C-ii, D-iv

50. Identify X and Y in the given figure:



- X - Mixture of naphthalene and anthracene, Y - Solid naphthalene
- X - Mixture of NaCl and water, Y - Solid NaCl
- X - Mixture of NaCl and anthracene, Y - Solid anthracene

d. X - Mixture of sugar and NaCl, Y - Solid sugar

## Answer Key

1.	c	2.	d	3.	b	4.	c	5.	c	6.	b	7.	a
8.	b	9.	c	10.	b	11.	c	12.	c	13.	b	14.	a
15.	c	16.	c	17.	c	18.	a	19.	d	20.	c	21.	b
22.	c	23.	d	24.	a	25.	b	26.	d	27.	b	28.	a
29.	c	30.	b	31.	c	32.	b	33.	b	34.	b	35.	c
36.	c	37.	c	38.	c	39.	c	40.	b	41.	b	42.	b
43.	a	44.	a	45.	c	46.	c	47.	a	48.	b	49.	a
50.	c												