



TM

JEE | NEET | Foundation

NSEJS 2022

Student Question Paper

RE-TYPED STUDENT QUESTION PAPER

TIME

120 minutes

QUESTIONS

60

MAX. MARKS

216

PAPER CODE 51

A clean, searchable copy of the original Paper Code 51.

Student name: _____

Class: _____

Date: _____

EXAMINATION INSTRUCTIONS

Read the marking scheme carefully before answering.

- Time: 120 minutes Maximum marks: 216
- Section A-1: Questions 1-48 have only one correct option.
- Section A-2: Questions 49-60 may have one, two, three or four correct options. Marks are awarded only when every correct option is selected and no incorrect option is selected.
- Attempt all sixty questions. Use the rough-work page at the end.

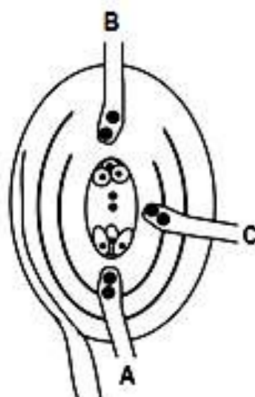
SECTION A-1

Questions 1-48 | Only one of the four options is correct.

- 1** In the nineteenth century, farmers in Japan found that some rice seedlings became very tall. They called it Bakanae disease or mad-seedling disease. The affected plants were infected by the fungus *Fusarium moniliforme*. This led to the discovery of a phytohormone, later named:

- (a) Vernalin (b) Auxin
(c) Florigen (d) Gibberellin

- 2** In most angiosperms, pollen germinates on the stigma, travels through the style and ultimately enters the ovule. In the adjacent diagram, three possibilities of pollen-tube entry are marked A, B and C. What do A, B and C represent?



- (a) A - Mesogamy, B - Chalazogamy and C - Porogamy
(b) A - Porogamy, B - Chalazogamy and C - Mesogamy
(c) A - Chalazogamy, B - Mesogamy and C - Porogamy
(d) A and B - Porogamy, C - Chalazogamy

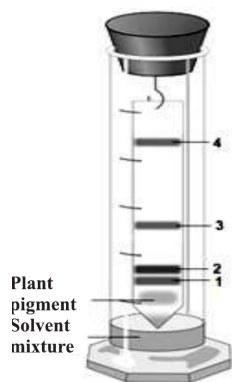
- 3** Members of Cucurbitaceae, such as bottle-gourd, pumpkin, watermelon and muskmelon, bear large fruits although their stems may be only finger-thick. What helps a large quantity of food to be translocated from leaves to fruits for storage?

- (a) Intraxylary phloem (b) Sieve-tubes with companion cells
(c) Bicolateral vascular bundles (d) Trichomes on internodes

4 In some birds, a black bird crossed with a white-feathered bird produces all blue-plumaged chicks. If these blue birds are selfed, the offspring ratio will be:

- (a) 1 black : 1 white : 2 blue (b) 9 blue : 3 black : 3 white
(c) 1 blue : 1 black : 1 white (d) 3 blue : 1 white

5 The diagram shows chromatographic separation of pigments extracted from spinach leaves. The sequence of pigment bands from below upwards is:



- (a) Chlorophyll b, Chlorophyll a, Carotenols and Carotenes (b) Carotenes, Carotenols, Chlorophyll a and Chlorophyll b
(c) Chlorophyll a, Chlorophyll b, Carotenes and Carotenols (d) Carotenols, Phycobilins, Chlorophyll a and Chlorophyll b

6 In some plants and fungi, cell organelles convert lipids into sugars during the early stages of oil-seed germination. These organelles are:

- (a) Glyoxysomes (b) Lysosomes
(c) Ribosomes (d) Liposomes

7 In the analysis of wastewater, Escherichia coli is used as:

- (a) A standard organism for performing a plate count (b) An indicator of faecal contamination of water
(c) An indicator of the number of nitrogen-fixing bacteria in water (d) A measure of the amino-acid content of water

8 Acid rain damages soil and lakes and affects aquatic plants and animals. Which pH range is most suitable for the survival of most aquatic biota?

- (a) 4.5-5.8 (b) 6.5-7.5
(c) 7.5-8.5 (d) Above 9.0

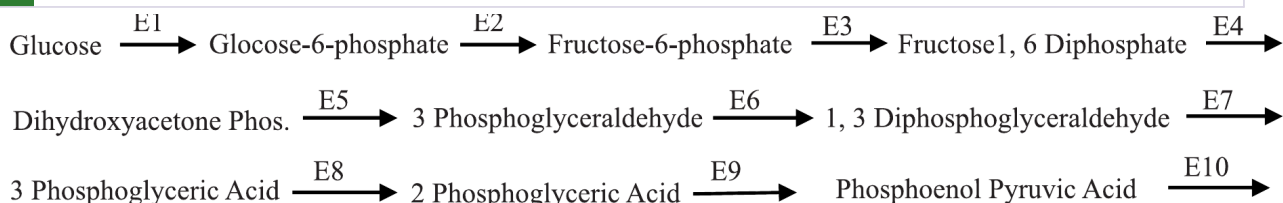
9 Steroid hormones include sex hormones and hormones of the adrenal cortex. Based on intensity of action, which ovarian hormone is produced in large amount and is the principal active estrogen?

- (a) Estrone (b) Estriol
(c) Estradiol (d) Estrane

10 In the human vertebral column there are about 26 bones in the adult. Which group of vertebrae is related to the pelvic region?

- (a) Lumbar (b) Coccygeal
(c) Sacral (d) Cervical

11 In the EMP (glycolytic) pathway shown, reactions are numbered E_1 to E_{10} . At which enzyme levels is ATP generated by substrate-level phosphorylation?



- (a) E_1 and E_3
(b) E_3 and E_6
(c) E_7 and E_{10}
(d) E_6 and E_{10}

12 A thick whitish band of nerve fibres bulges on the inner surface of the dorsal wall of each cerebral hemisphere in the mammalian brain. This structure is:

- (a) Corpus albicans (b) Corpus luteum
(c) Corpus striatum (d) Corpus callosum

13 Body symmetry is a diagnostic feature in classification. Besides truly bilateral animals, some other organisms also show bilateral symmetry. Which of the following is such an example?

- (a) Giardia (b) Cliona
(c) Obelia (d) Trypanosoma

14 Nissl granules are RNA-rich bodies. In which of the following do they occur?

- (a) Osteon (b) Chondrion
(c) Neurons (d) Myocytes

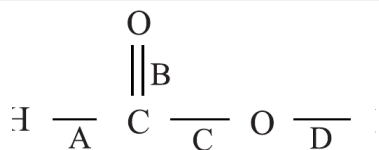
15 Which statement is not applicable to viruses?

- (a) The protein capsid of a virus does not enter the host cell in some viral infections (b) The genetic material is either DNA or RNA, never both
(c) The virion replicates autonomously outside the host (d) The virus replicates in a bacterial or other host cell

16 Carolus Linnaeus devised a system for classifying plants while using binomial nomenclature. His plant classification was:

- (a) Artificial (b) Natural
(c) Phylogenetic (d) Cladistic

- 17** Which labelled bond in the shown molecule of methanoic acid breaks when the compound ionises in water?



- (a) A (b) B
(c) C (d) D

- 18** If the numbers of compounds formed by H, C, Cl and Co are N_1 , N_2 , N_3 and N_4 respectively, then the correct order is:

- (a) $N_1 > N_2 > N_3 > N_4$
(b) $N_1 > N_2 > N_4 > N_3$
(c) $N_2 > N_1 > N_4 > N_3$
(d) $N_2 > N_4 > N_3 > N_1$

- 19** The heaviest nuclide among the following that does not show radioactive nature is:

- (a) Bismuth (b) Lead
(c) Technetium (d) Neptunium

- 20** One kilogram of aqueous urea solution has mole fraction of urea 0.2. It is diluted to a total mass of 5 kg. The mole fraction of urea in the diluted solution is:

- (a) 0.2 (b) 4×10^{-2}
(c) 0.029 (d) 0.971

- 21** Nickel forms a gaseous compound $\text{Ni}(\text{CO})_x$. Under the same conditions, methane effuses 3.24 times faster than this compound. Given atomic mass of Ni = 58.7, the value of x is closest to:

- (a) 3.9 (b) 2.1
(c) 4.7 (d) 3.0

- 22** The Li-H distance in LiH is 1.596 angstrom. The observed dipole moment is 1.964×10^{-29} C m. The percentage ionic character is: (electronic charge = 1.602×10^{-19} C)

- (a) 56.0% (b) 90.8%
(c) 76.8% (d) 100%

- 23** A 2 g mixture of MgCO_3 and CaCO_3 requires 2 g H_2SO_4 for complete neutralisation. The percentage of MgCO_3 in the mixture is closest to:

- (a) 89% (b) 11%
(c) 50% (d) 25%

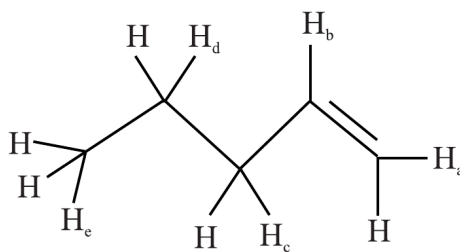
24 The sum of oxidation states of all carbon atoms in a toluene molecule, C_7H_8 , is:

- (a) -1 (b) -7/8
(c) -8/7 (d) -8

25 The oxidation state of each oxygen atom in O_2PtF_6 is:

- (a) -1/2
(b) -2
(c) +1/2
(d) -1

26 When the shown alkene is attacked by a bromine radical, which labelled hydrogen atom is replaced most readily?



- (a) Ha (b) Hb
(c) Hc (d) Hd

27 For molecules with formula $C_{10}H_{16}$, which structural feature is not possible?

- (a) Two triple bonds (b) One ring and one triple bond
(c) Three double bonds (d) None of these

28 Which metal adsorbs hydrogen to a large extent?

- (a) Al (b) Cr
(c) Pd (d) Zn

29 Which compound is both paramagnetic and coloured?

- (a) $K_2Cr_2O_7$ (b) $(NH_4)_2[TiCl_6]$
(c) $VOSO_4$ (d) $K_3[Cu(CN)_4]$

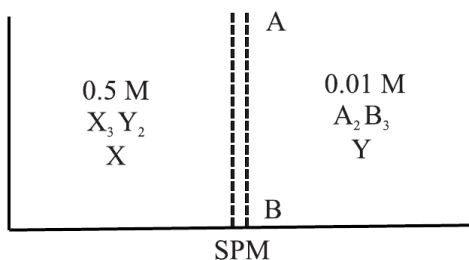
30 A mixture of $HCOOH$ and $H_2C_2O_4$ is heated with concentrated H_2SO_4 . The gases are passed through KOH and their volume decreases by one-sixth. The mole ratio $HCOOH : H_2C_2O_4$ is:

- (a) 1:4 (b) 4:1
(c) 1:1 (d) Data insufficient

31 The correct order of energy levels in the hydrogen atom is:

- (a) $3s = 3p = 3d > 2s$ (b) $3d > 3p > 3s > 2s$
(c) $3d > 3p = 3s > 2s$ (d) $3d > 3p > 3s = 2s$

- 32** A 0.5 M solution of X_3Y_2 and a 0.01 M solution of A_2B_3 are separated by a semipermeable membrane. X_3Y_2 reacts with A_2B_3 to give a brown colour. Assuming complete ionisation, osmosis will cause:



- (a) Brown colour in side X
(b) Brown colour in side Y
(c) Brown colour in both X and Y
(d) No brown colour in either X or Y

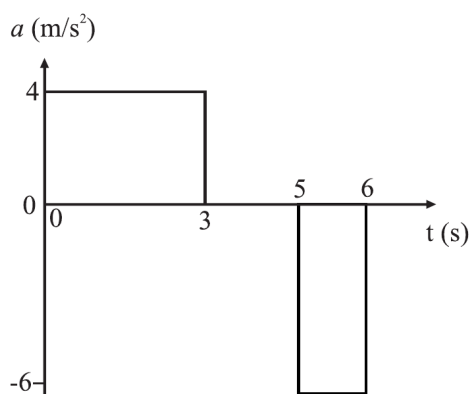
- 33** A particle of mass 0.3 kg starts from rest and moves in one dimension under a force delivering constant power $P = 1.5$ W. Its kinetic energy becomes 15 J after:

- (a) 5 s
(b) 10 s
(c) 12 s
(d) 15 s

- 34** A 200 kg trolley carries a 20 kg sandbag and moves on a frictionless horizontal track at 36 km/h. Sand leaks vertically onto the floor of the trolley at 0.04 kg/s. The speed of the trolley when the bag becomes empty is:

- (a) 8 m/s
(b) 9.2 m/s
(c) 10 m/s
(d) 10.8 m/s

- 35** A particle starts from rest at the origin. Its acceleration-time graph is shown. The displacement and velocity after 6 s are:



- (a) 51 m, 6 m/s
(b) 33 m, 6 m/s
(c) 42 m, 18 m/s
(d) 27 m, 24 m/s

- 36** Two identical stars of mass M are initially at rest and separated by distance d . They move toward each other gravitationally. The speed of each when their separation becomes $d/2$ is:

- (a) $\sqrt{GM/d}$
(b) $\sqrt{2GM/d}$
(c) $\sqrt{GM/2d}$
(d) $\sqrt{GM/4d}$

37 A train approaches a vertical cliff at 72 km/h. When it is 0.7 km from the cliff, it blows a whistle. If the speed of sound is 330 m/s, the driver hears the echo after:

- (a) 3.88 s (b) 4.00 s
(c) 4.12 s (d) 4.24 s

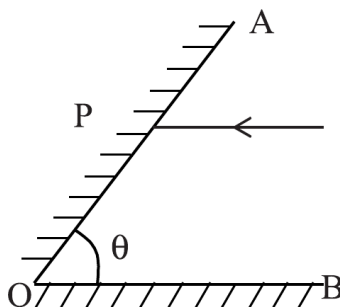
38 A vessel contains liquid 1 of density 0.8 g/cm^3 above immiscible liquid 2 of density 13.6 g/cm^3 . A homogeneous sphere floats with half its volume in each liquid. Its density is:

- (a) 3.3 g/cm^3 (b) 6.4 g/cm^3
(c) 7.2 g/cm^3 (d) 12.8 g/cm^3

39 A wooden toy of density half that of water is dropped from a point 19.6 m above a lake. It enters the water, goes down, returns due to upthrust and rises back to the release height. Neglect resistance. The total time is:

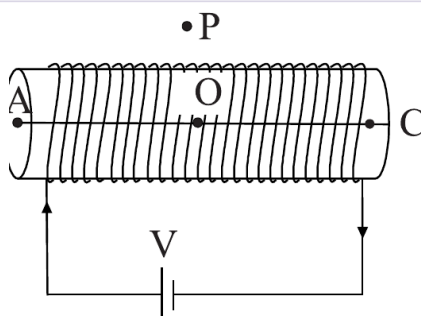
- (a) 2 s (b) 4 s
(c) 8 s (d) 16 s

40 Two plane mirrors OA and OB are inclined at angle θ . A ray parallel to OB strikes OA, reflects to OB and finally emerges parallel to OA. The value of θ is:



- (a) 90 degrees (b) 60 degrees
(c) 45 degrees (d) 30 degrees

41 A long solenoid carries a current. At which labelled point is the magnetic field maximum?



- (a) A at the left end (b) C at the right end
(c) O at the centre of the solenoid (d) P outside the solenoid

- 42** A tank of square base area 2.0 m^2 is divided vertically. A small hinged door of area 10 cm^2 is at the bottom of the partition. Water is on one side and a liquid of relative density 1.8 on the other, both to height 5.0 m. The force needed to keep the door closed is approximately:

(a) 0.04 N (b) 3.9 N
(c) 39 N (d) Zero

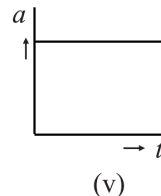
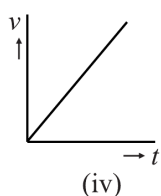
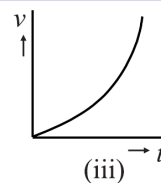
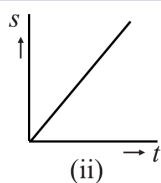
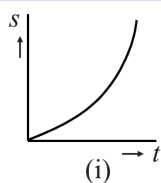
- 43** An electron is projected horizontally east in a uniform magnetic field and is deflected north. The magnetic field is directed:

(a) East (b) West
(c) Upward (d) Downward

- 44** The Raman effect is the discovery of:

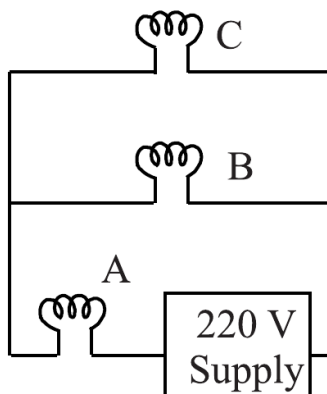
(a) Dispersion of light (b) Total internal reflection of light
(c) Refraction of light (d) Inelastic scattering of light

- 45** Figures (i) to (v) show displacement-time, velocity-time and acceleration-time graphs. Which graphs represent uniform motion?



(a) (i) only
(b) (ii) only
(c) (i), (iv) and (v)
(d) (iv) and (v)

- 46** Three identical 60 W, 220 V bulbs A, B and C are connected to a 220 V supply as shown. The total power dissipated is closest to:



- (a) 180 W (b) 60 W
(c) 30 W (d) 40 W

- 47** A copper wire is stretched so that its radius decreases by 0.15%. The percentage change in resistance is:

- (a) +0.3% (b) -0.3%
(c) +0.6% (d) -0.6%

- 48** Speed of sound is proportional to the square root of absolute temperature. It is 332 m/s at 273 K. At 27 °C, a measured value is 352 m/s. The percentage error is:

- (a) 0.2% (b) 1.15%
(c) 3.15% (d) 6.02%

SECTION A-2

Questions 49-60 | Any number of options may be correct.

49 Which of the following evolutionary lineages of humans can be categorised as prehistoric man?

- (a) Ramapithecus
- (b) Homo habilis
- (c) Homo sapiens fossilis
- (d) Homo heidelbergensis

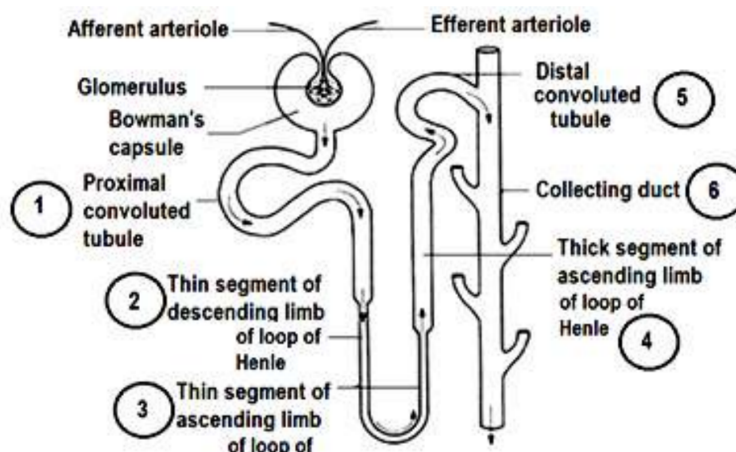
50 Select the sets of diseases caused by deficiency of B-complex vitamins:

- (a) Beri-beri and Pellagra
- (b) Dermatitis and Wernicke-Korsakoff syndrome
- (c) Cheilosis and Pernicious anaemia
- (d) Marasmus and Kwashiorkor

51 After the rainy season, students collect pond water containing aquatic plants. Which groups of organisms are they likely to find?

- (a) Spirogyra, Azolla, Riccia fluitans and Cosmarium
- (b) Ulothrix, Chlorella, Chara and Ricciocarpus natans
- (c) Marchantia, Funaria, Lycopodium and Gnetum
- (d) Salvinia molesta, Azolla, Chlorella and Cladophora

52 Various parts of mammalian uriniferous tubules (nephrons) take part in ultrafiltration, selective reabsorption by active transport, passive osmosis and secretion. In the labelled nephron diagram, the options separately identify: (i) part(s) having columnar epithelial cells with a brush border suitable for reabsorption, and (ii) those parts completely or poorly permeable to water. Select the desired option(s).



- (a) 4, 5
- (b) 1
- (c) 2, 3
- (d) 2, 3, 6

53 A 0.01 M NH_4Cl solution at 25 °C has:

- (a) $[\text{Cl}^-] < 10^{-2} \text{ M}$
- (b) $[\text{NH}_4^+] < 10^{-2} \text{ M}$
- (c) $\text{pOH} > 7$
- (d) $[\text{H}^+] > 10^{-7} \text{ M}$

54 The amphoteric nature of Al_2O_3 is employed in which processes?

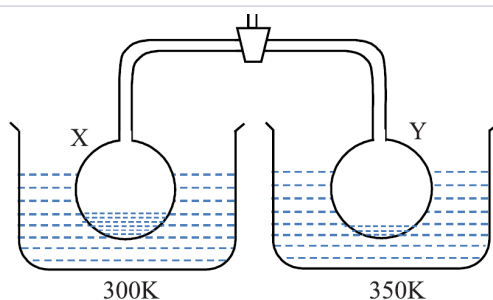
- (a) Bayer's process
- (b) Hall's process
- (c) Serpek's process
- (d) Dow's process

55 As a general trend, first ionisation energy decreases on moving down a group. Select the correct set of the following proposed orders:

- I. $\text{Li} > \text{Na} > \text{K} > \text{Rb} > \text{Cs} > \text{Fr}$
- II. $\text{Li} > \text{Na} > \text{K} > \text{Rb} > \text{Cs} < \text{Fr}$
- III. $\text{Sr} < \text{Ba} < \text{Ra}$
- IV. $\text{Sr} > \text{Ba} < \text{Ra}$
- V. $\text{Cu} > \text{Ag} > \text{Au}$
- VI. $\text{Cu} > \text{Ag} < \text{Au}$
- VII. $\text{Cd} > \text{Hg}$
- VIII. $\text{Cd} < \text{Hg}$

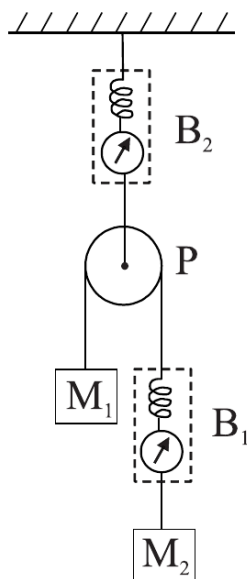
- (a) I, V, VII
- (b) II, IV, VIII
- (c) III, V, VII
- (d) II, VI, VIII

56 Two water containers at 300 K and 350 K are connected by a valve. Their vapour pressures are 22 torr and 40 torr. Select the correct statements after opening the valve.



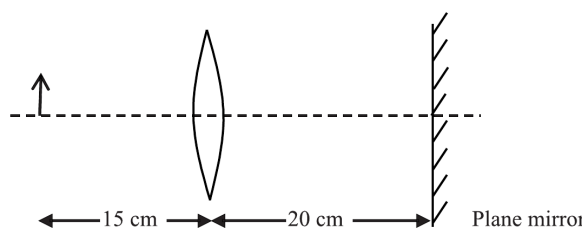
- (a) Final pressure is equal in both and greater than 22 torr
- (b) Final pressure in each is 40 torr
- (c) Mass of water decreases in container X
- (d) Mass of water decreases in container Y

- 57** Two blocks $M_1 = 3 \text{ kg}$ and $M_2 = 6 \text{ kg}$ are connected through strings, a massless pulley and spring balances B_1 and B_2 as shown. Select the correct statements about balance readings and acceleration.



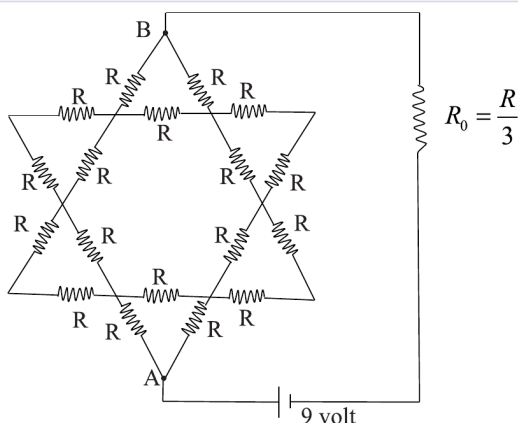
- (a) Reading of B_1 is 4.5 kg wt
- (b) Reading of B_1 is 4.0 kg wt
- (c) Reading of B_2 is 9.8 kg wt
- (d) Acceleration of M_1 is $9.8/3 \text{ m/s}^2$

- 58** A convex lens of focal length 10 cm has an object 15 cm in front of it. A plane mirror is 20 cm behind the lens. Select the correct statements about the final image.



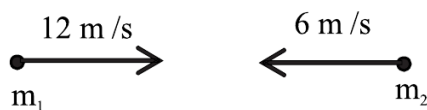
- (a) The final image is 10 cm from the lens toward the mirror
- (b) The final image is 30 cm from the lens, that is 10 cm behind the mirror
- (c) The final magnification is -2
- (d) The final magnification is +2

- 59** A network of eighteen 3-ohm resistors is connected in series with $R_0 = R/3$ to a 9 V source. Select the correct statements.



- (a) Current from the battery is 1.5 A
- (b) Potential difference between A and B is 7.5 V
- (c) Power dissipated in R_0 is 2.25 W
- (d) Power dissipated in the network between A and B is 12.25 W

- 60** Masses $m_1 = 2$ kg and $m_2 = 1$ kg move toward each other at 12 m/s and 6 m/s respectively and collide elastically in one dimension. Select the correct statements.



- (a) The two bodies nearly exchange velocities
- (b) m_1 comes to rest
- (c) m_2 moves at 18 m/s toward the right
- (d) Both reverse direction with their original speeds

