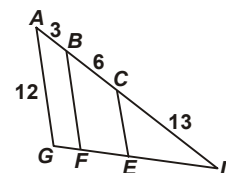


## MENTAL ABILITY

1. In given triangle  $ADG$ , the length of side  $DG$  is 18 units. Line segments  $AG$ ,  $BF$  and  $CE$  are all parallel. What is the approximate length of the line segment  $EG$ ?
- (A) 4.9 units (B) 7.4 units  
(C) 11.0 units (D) 12.5 units



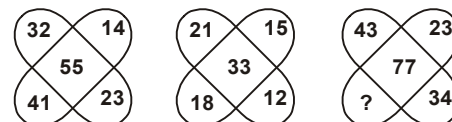
2. In a certain code language 'PROBLEM' is written as 'MPERLOB'. How will 'NUMBERS' be written in that code?
- (A) SNUREMB (B) SNRUBME (C) SNRUEMB (D) SNRUMEB

3. The largest value among  $\frac{4}{5}$ , 80%, 0.801 and  $(0.9)^2$  is \_\_\_\_.
- (A)  $\frac{4}{5}$  (B) 80% (C) 0.801 (D)  $(0.9)^2$

4. The label on a cereal states the following :  
One serving of cereal contains 17 grams of carbohydrates.  
This number of grams is 6% of the maximum amount of carbohydrates that a person should eat in a day.  
Based on this information, which of the following is closest to the maximum amount of carbohydrates that a person should eat in a day?
- (A) 1.02 grams (B) 2.83 grams (C) 102 grams (D) 283 grams

5. In the following question, select the missing number.

- (A) 32 (B) 54  
(C) 57 (D) 44



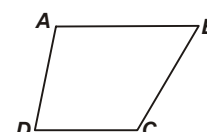
6. Aditya is designing a rectangular mirror. Let  $w$  = the width, in centimetres, of the mirror. The length of the mirror will be 6 centimetres more than the width. The perimeter of the mirror will be less than 96 centimetres and greater than 76 centimetres. Which of the following inequalities shows the possible widths, in centimetres, of the mirror ?
- (A)  $13 < w < 18$  (B)  $16 < w < 21$  (C)  $19 < w < 24$  (D)  $35 < w < 45$

7. Rajat is holding a trivia contest. The 13 students who are participating randomly draw cards that are numbered with consecutive integers from 1 to 13. The student who draws number 1 will be the host. The students who draw the other odd numbers will be on the Red Team. The students who draw the even numbers will be on the Blue Team. One student has already drawn a card and is on the Blue Team. If Partik is the next student to draw a card, what is the probability that he will be on the Red Team?

- (A)  $\frac{1}{13}$  (B)  $\frac{1}{12}$  (C)  $\frac{6}{13}$  (D)  $\frac{6}{12}$

8. In the given figure,  $AB$  is parallel to  $DC$ . Which of the following statements about the figure must be true ?

- (A)  $\angle DAB + \angle ABC = 180^\circ$  (B)  $\angle DAB + \angle CDA = 180^\circ$   
(C)  $AB \cong DC$  (D)  $AD \cong BC$



9. Which of the following is equivalent to the expression given below ?

$$x^2 + 3x - 28$$

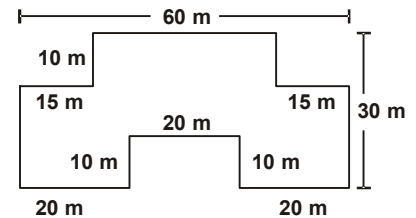
- (A)  $(x - 4)(x + 7)$  (B)  $(x + 4)(x - 7)$  (C)  $(x - 14)(x + 2)$  (D)  $(x + 14)(x - 2)$

10. The given table shows the number of points Dev earned playing a game on each of the first 5 days of the week. What is the number of points Dev must earn on Saturday so that the mean of points over the 6 days is exactly 1250 ?

Game Points Earned	
Day	Number of Points Earned
Monday	800
Tuesday	1200
Wednesday	1500
Thursday	1000
Friday	1600
Saturday	?

- (A) 1020  
(B) 1220  
(C) 1300  
(D) 1400

11. The given diagram shows the dimensions of a garden. In the diagram all intersecting line segments intersect at right angles. What is the area of the garden?



- (A) 1200 sq. m                      (B) 1300 sq. m  
(C) 1500 sq. m                      (D) 1800 sq. m

12. A mechanic has two pieces of sandpaper of different sizes. Each piece is in the shape of a circle. The radius of the larger circle is 4 times the radius of the smaller circle. The area of the larger circle is how many times the area of the smaller circle ?

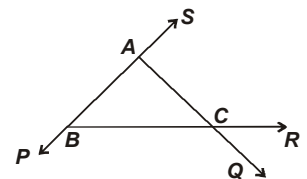
- (A) 2                                      (B) 4                                      (C) 8                                      (D) 16

13. If the second half of the following alphabets is written in the reverse order, which will be the 10<sup>th</sup> letter to the left of 9<sup>th</sup> letter counting from the right end?

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- (A) I                                      (B) C                                      (C) J                                      (D) H

14. In the adjoining figure,  $\angle CBP + \angle BCQ = 250^\circ$ ,  $\angle ACR + \angle CAS = 230^\circ$ . Determine the angles of the triangle ABC.



- (A)  $\angle A = 70^\circ$ ,  $\angle B = 50^\circ$ ,  $\angle C = 60^\circ$   
(B)  $\angle A = 60^\circ$ ,  $\angle B = 70^\circ$ ,  $\angle C = 50^\circ$   
(C)  $\angle A = 50^\circ$ ,  $\angle B = 60^\circ$ ,  $\angle C = 70^\circ$   
(D)  $\angle A = 60^\circ$ ,  $\angle B = 50^\circ$ ,  $\angle C = 70^\circ$

15. If one of the trigonometric ratios of an \_\_\_\_\_ is known, the remaining trigonometric ratios of the angle can be easily determined.

- (A) Acute angle                      (B) Obtuse angle                      (C) Right angle                      (D) Straight angle

## SCIENCE

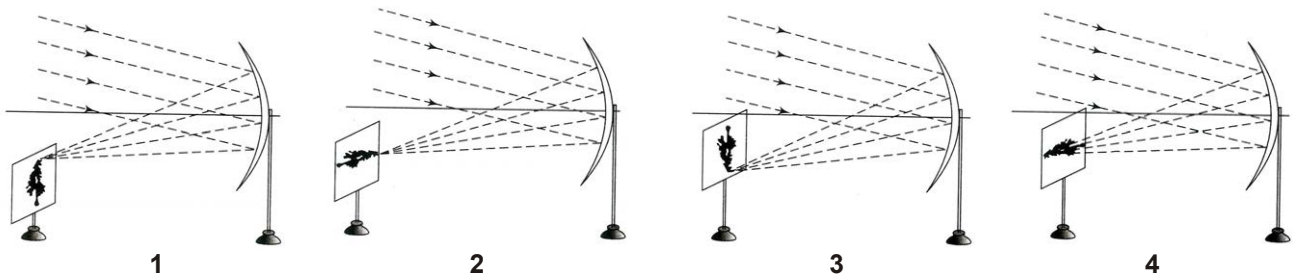
16. When a number of resistors are connected end to end such that the tail end of one resistor is connected to head end of other resistor so as to form a closed circuit then such a circuit is called \_\_\_\_\_.

- (A) Parallel circuit                      (B) Series circuit                      (C) Mixed circuit                      (D) None of these

17. You see a rainbow formation. Then the Sun is \_\_\_\_\_.

- (A) Behind you                                      (B) In front of you  
(C) On your left hand side                      (D) On your right hand side

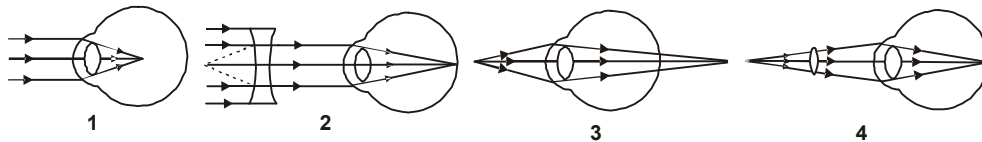
18. Parallel rays, from the top of a distant tree, incident on a concave mirror, form an image on the screen.



The diagram correctly showing the image of the tree on the screen is \_\_\_\_.

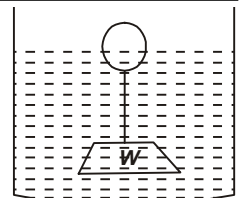
- (A) 1                                      (B) 2                                      (C) 3                                      (D) 4

19. Figures 1, 2, 3 and 4 respectively correspond to \_\_\_\_.



- (A) The short-sighted eye, the correction of long-sight, the long-sighted eye and the correction of short-sight  
 (B) The short-sighted eye, the correction of short-sight, the long-sighted eye and the correction of long-sight  
 (C) The long-sighted eye, the correction of short-sight, the short-sighted eye and the correction of long-sight  
 (D) None of these

20. A balloon filled with air is weighed ( $W$ ) so that it just floats in water as shown in the figure. When it is further pushed by a short distance in to the water and then released it will \_\_\_\_.



- (A) Come back to its original position  
 (B) Stay at the depth where it stands submerged  
 (C) Sink to the bottom  
 (D) Sink down a little further but will not reach the bottom

21. Inertia is the property of a body which preserves its state of rest or uniform motion in a straight line. The following factors tell more about inertia.

- (i) Greater the mass of a body, greater is its inertia  
 (ii) Greater the inertia of a body, the less will be the acceleration produced by a given force.  
 (iii) The law of inertia is the same as Newton's first law of motion.

Which combination is true ?

- (A) (i) & (iii)                                      (B) (i) & (ii)                                      (C) (i), (ii) & (iii)                                      (D) (ii) & (iii)

22. If we go inside a mine and drop a 10 kg iron ball and 1 kg aluminium ball from the top of a high platform \_\_\_\_.

- (A) Both will reach the floor at the same time                                      (B) 1 kg weight will reach the floor first  
 (C) 10 kg weight will reach the floor first  
 (D) It is not possible to indicate which of the two will reach the floor first without further data

23. Read the given statements and mark the correct option.

Statement I : A normal human eye can clearly see all the objects at different distances.

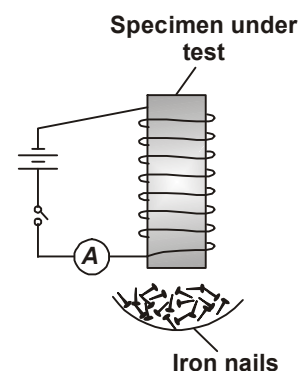
Statement II : The human eye has the capacity to suitably adjust the focal length of its lens to a certain extent.

- (A) Both statement I and statement II are true and statement II is the correct explanation of statement I.  
 (B) Both statement I and statement II are true but statement II is not the correct explanation of statement I.  
 (C) Statement I is true but statement II is false.                                      (D) Statement I is false but statement II is true.

**DIRECTION :** Read the passage carefully and answer Q. nos. 24 and 25.

Three specimens of magnetic materials were tested using the apparatus shown in the diagram. When the switch is closed, the specimen picks up some of the iron nails but when the switch is opened, many or most of the nails fall off. The number of nails picked up and left sticking on were found for three specimens. The table shows the results.

Specimen	Number of nails picked up	Number of nails retained by the specimen
X	35	4
Y	20	10
Z	40	3



24. Which material is the best electromagnet among the three?

- (A) X (B) Y (C) Z (D) All of these

25. What does the number of nails left sticking on the material indicate ?

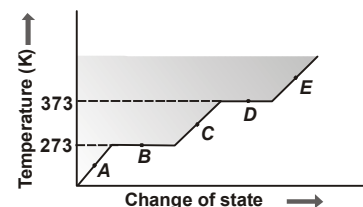
- (A) Ability to retain magnetism when current is removed (B) Ability to induce e.m.f.  
(C) Ability to retain current (D) Ability to change strength of magnetic field

26. Match column I with column II and select the correct option from the codes given below.

Column I		Column II	
(a) Electric current		(i) Volts	
(b) E.m.f		(ii) Ohm	
(c) Resistance		(iii) Ohm-meter	
(d) Resistivity		(iv) Ampere	
(A) a-iv, b-ii, c-i, d-iii	(B) a-iii, b-iv, c-i, d-ii	(C) a-iv, b-i, c-ii, d-iii	(D) a-iii, b-i, c-ii, d-iv

27. What is the physical state of A, C and E ?

- (A) A-solid, C-liquid, E-gas  
(B) A-solid, C-gas, E-liquid  
(C) A-liquid, C-gas, E-solid  
(D) A-liquid, C-solid, E-gas



28. Oxygen gas is enclosed in a container. Various conditions are applied on the gas and the change is studied. Under which of the following conditions, the distance between the molecules of oxygen gas would decrease?

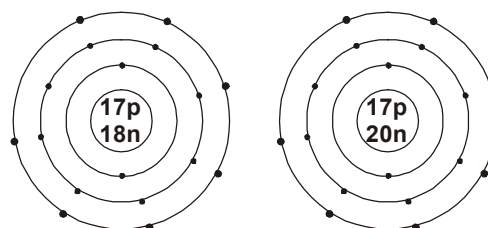
- (i) Increasing pressure on oxygen in the enclosed container  
(ii) Leaking out some oxygen from the container  
(iii) Increasing the volume of the container  
(iv) Adding more oxygen gas to the container without increasing volume of the container  
(A) (i) and (ii) (B) (i) and (iii) (C) (ii) and (iii) (D) (i) and (iv)

29. The weight of a molecule of the compound  $C_{60}H_{122}$  is \_\_\_\_.

- (A)  $1.4 \times 10^{-21}$  g (B)  $1.09 \times 10^{-21}$  g (C)  $5.025 \times 10^{23}$  g (D)  $16.023 \times 10^{23}$  g

30. The given diagram represents two isotopes of an element. What is the element? What is their symbolic representation ?

- (A) Chlorine,  ${}^{35}_{17}\text{Cl}$ ,  ${}^{37}_{17}\text{Cl}$   
(B) Chlorine,  ${}^{35}_{18}\text{Cl}$ ,  ${}^{35}_{20}\text{Cl}$   
(C) Fluorine,  ${}^{35}_{17}\text{F}$ ,  ${}^{37}_{17}\text{F}$  (D) Bromine,  ${}^{35}_{17}\text{Br}$ ,  ${}^{37}_{17}\text{Br}$



31. Columns I and II contain the type of mixtures and the method to separate them. Given below is the key to the matching of the columns. In which option column I is correctly matched to column II ?

Column I		Column II	
A. Common salt from sea water		p. Separating funnel	
B. Suspension of oil and water		q. Chromatography	
C. Cream from milk		r. Evaporation	
D. Dyes in black ink		s. Centrifugation	
(A) A-p; B-q; C-r; D-s	(B) A-q; B-p; C-r; D-s	(C) A-p; B-r; C-s; D-q	(D) A-r; B-p; C-s; D-q

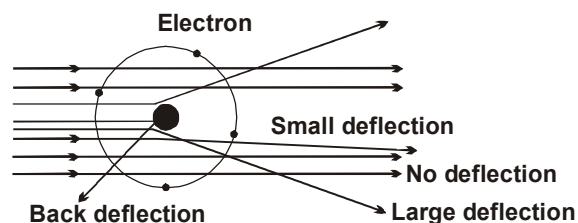
32. A solution with a mass of one kg contains 3 mg of solute. What will be the concentration of the solution in ppm and ppb?

- (A)  $3 \times 10^6$  ppm, 3 ppb  
 (B) 3 ppm,  $3 \times 10^3$  ppb  
 (C) 3 ppm, 3 ppb  
 (D)  $3 \times 10^3$  ppm,  $3 \times 10^6$  ppb

33. In Rutherford's  $\alpha$ -particle scattering experiments, a thin gold metal foil was bombarded by high speed  $\alpha$ -particles.

Rutherford observed that \_\_\_\_\_.

- Most of the  $\alpha$ -particles (nearly 99%) passed through the gold foil undeflected.
- Some of the  $\alpha$ -particles were deflected by small angles.
- Very few  $\alpha$ -particles (1 in 20000) were either deflected by very large angles or were actually reflected back along their path.



These observations led to the discovery of \_\_\_\_\_.

- (A) Nucleus (B) Electrons (C) Neutrons (D) Protons

34. Barium chloride reacts with aluminium sulphate to give aluminium chloride and precipitate of barium sulphate. The equation for this reaction can be written as \_\_\_\_\_.



What is the value of coefficients  $p$ ,  $q$ ,  $r$  and  $s$  to write a balanced equation?

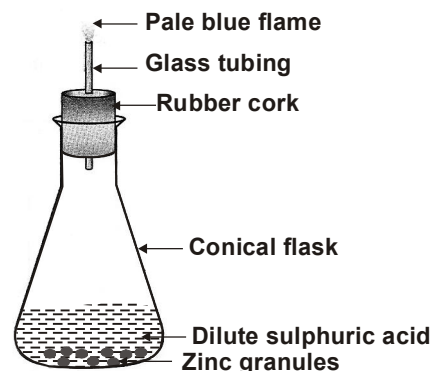
- |     | $p$ | $q$ | $r$ | $s$ |     | $p$ | $q$ | $r$ | $s$ |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| (A) | 2   | 3   | 3   | 1   | (B) | 2   | 1   | 3   | 3   |
| (C) | 1   | 2   | 3   | 4   | (D) | 3   | 1   | 2   | 3   |

35. A double bond between two carbon atoms is formed by \_\_\_\_\_.

- (A) Transfer of two electrons from one carbon atom to the other  
 (B) Transfer of one electron from one carbon atom to the other  
 (C) Sharing two pairs of electrons (D) Sharing two electrons

36. Place a few pieces of granulated zinc in a conical flask. Pour dilute sulphuric acid in the flask and close it properly. What observations are correct regarding the experiment?

- (A) The chemical reaction between zinc and dilute sulphuric acid takes place with change in state.  
 (B) The chemical reaction proceeds with evolution of a gas.  
 (C) The chemical reaction proceeds with evolution of heat energy.  
 (D) All the observations are correct.



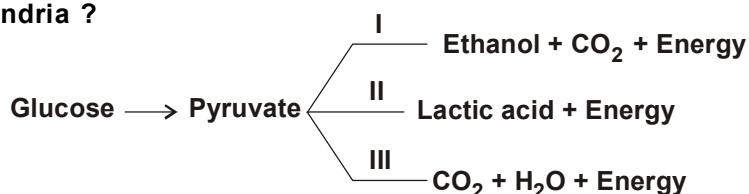
37. A few drops of phenolphthalein indicator were added to an unknown solution *P*. It acquired pink colour. Now another unknown solution *Q* was added to it dropwise and the solution ultimately became colourless. Predict the nature of solutions *P* and *Q*.
- (A) Solution *P* is basic and *Q* is an acid. (B) Solution *Q* is basic and *P* is an acid.  
 (C) Solutions *P* and *Q* both are basic. (D) Solutions *P* and *Q* both are acidic.

38. The positions of three elements *X*, *Y* and *Z* in the periodic table are shown below.

Period	Group 1	Group 2
2	-	<i>Y</i>
3	-	-
4	<i>X</i>	<i>Z</i>
5	-	-

- (A) *Y* is a metal and *X* is less electropositive than *Z*  
 (B) *Y* is a non-metal and *X* is more electropositive than *Z*  
 (C) *Y* is a metal and *X* is more electropositive than *Z*  
 (D) *Y* is a metal and *X* is as electropositive as *Z*

39. The given flow chart shows three steps of glucose breakdown in different conditions. Which of the following steps takes place in the mitochondria ?



- (A) Step I  
 (B) Step II  
 (C) Step III  
 (D) Both (B) & (C)

40. Which of the following types of blood cells are associated with blood clotting?



41. The sensitive plant *Mimosa pudica* shows seismonastic movement as a result of which the whole leaf droops down. The drooping is due to \_\_\_\_\_.

- (A) Loss of turgidity of the basal part of the leaf (B) Swelling of the basal part of the leaf  
 (C) Change in direction of the leaf growth (D) None of these

42. Which of the following pairs are correctly matched?

- (i) Cereal crops - Sorghum (ii) Pulse crops - Lentil  
 (iii) Oil seed crops - Sesame (iv) Fodder crops - Castor  
 (A) (i) & (ii) (B) (ii) & (iv) (C) (i), (ii) & (iii) (D) (iii) & (iv)

43. Mendel used a number of contrasting visible characters of garden pea. Which of the following is incorrect pair of contrasting characters ?

- (A) Tall / Dwarf - Height of stem (B) Round / Wrinkled - Shape of seed  
 (C) White / Red - Colour of flower (D) Yellow / Green - Colour of seed

44. Which of the following modes of asexual reproduction is observed in *Hydra* ?

- (A) Binary fission and budding (B) Multiple fission and regeneration  
 (C) Regeneration and budding (D) Budding and fragmentation

45. Select the incorrect statement regarding the male reproductive system.

- (A) The formation of germ cells or sperms takes place in the testes  
 (B) Testes secrete the hormone oestrogen (C) Testes are located in scrotum  
 (D) The sperms are carried through the vas deferens

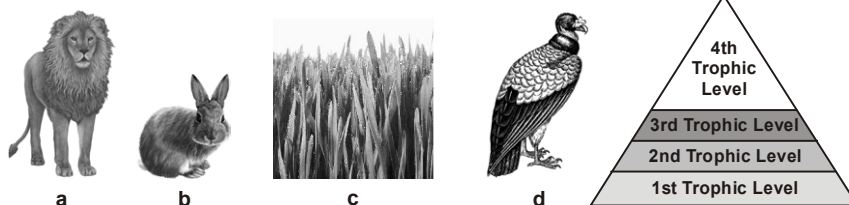
46. Farmers have cultivated wild cabbage as a food plant and generated different vegetables from it by selection. Given below are some of its evolved types along with their characteristics. Select the incorrect match among them.

- (A) Sterile flowers – Cauliflower (B) Swollen parts – Kohlrabi  
 (C) Arrested flower development – Broccoli (D) Smaller leaves – Kale

47. Which of the following muscles are involuntary in action ?  
 (A) Muscles of limbs      (B) Muscles of heart      (C) Muscles of iris      (D) Both (B) & (C)
- 
48. Pulse polio immunisation programme was launched in 1995-1996 with an aim to eradicate polio disease from the world. It involves simultaneous administration of polio drops (polio vaccine) to whole of the high risk population (*i.e.*, children under three years of age) on a single day throughout the nation. What is the basic aim of this programme?  
 (A) To immunise those children who were not earlier immunised or are partially immunised  
 (B) To boost the immunity of children already immunised  
 (C) To replace the disease-causing virus by harmless vaccine virus in the environment  
 (D) All of the above
- 

49. The given figure shows the different trophic levels of a food chain in a grassland ecosystem. Select the correct sequence of organisms that will occupy the pyramid from its base to apex.

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



50. Read the given statements and mark the correct option.  
**Statement I : Fossil fuels are non-renewable sources of energy.**  
**Statement II : Excessive use of fossil fuels causes pollution and leads to global warming.**  
 (A) Both statements I & II are true and statement II is the correct explanation of statement I.  
 (B) Both statements I & II are true but statement II is not the correct explanation of statement I.  
 (C) Statement I is true but statement II is false.      (D) Statement I is false but statement II is true.
- 

**SPACE FOR ROUGH WORK**





