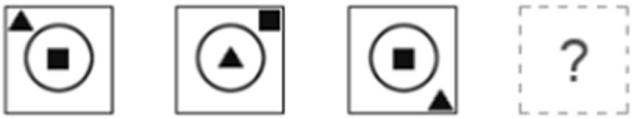
Section : I - Aptitude and Logical Reasoning

1.



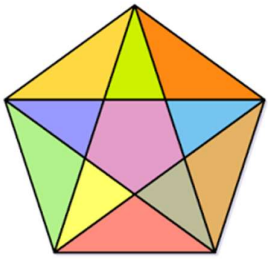
(a) 

(b) 

(c) 

(d) 

2. Determine whether the stated conclusion is valid.
Given: If an animal is a dog, then they like biscuits.
Sammy is a dog.
Conclusion: Sammy likes biscuits.
(a) Invalid (b) Valid
(c) Sammy is a Great Dane (d) Sammy is really a cat

3. 

How many triangles are in this picture?
(a) 27 (b) 35 (c) 14 (d) 10

4. Fill in the blank:
3, 8, 15, 24, 35, ?
(a) 46 (b) 48 (c) 50 (d) 54

ROUGH SPACE

5. A, B, C, D, E, and F are sitting in a row.
   - A is not at the ends.
   - C is to the immediate left of E.
   - D is at one of the ends.
   - F is not next to A.
   - B is sitting between A and C.

   Who is sitting at the other end (not D)?
   (a) A (b) E (c) F (d) B

Section : II - Mathematics

6. What type of a number is $\left(6+\sqrt{2}\right)\left(6-\sqrt{2}\right)$
   (a) Rational number (b) Irrational number (c) Prime number (d) Negative integer

7. Which is an irrational number between $\sqrt{2}$ and $\sqrt{3}$?
   (a) $2^{\frac{1}{2}}$ (b) $3^{\frac{1}{4}}$ (c) $6^{\frac{1}{4}}$ (d) $6^{\frac{1}{8}}$

8. What is the rationalizing factor of $\sqrt[5]{a^2b^3c^4}$?
   (a) $\sqrt[5]{a^3b^2c}$ (b) $\sqrt[4]{a^3b^2c}$ (c) $\sqrt[3]{a^3b^2c}$ (d) $\sqrt{a^3b^2c}$

9. Find the value of $\left(\sqrt[6]{27}-\sqrt{6\frac{3}{4}}\right)^2$
   (a) $\frac{\sqrt{3}}{2}$ (b) $\frac{3}{2}$ (c) $\frac{\sqrt{3}}{4}$ (d) $\frac{3}{4}$

10. If $\sqrt{5}=2.236$ and $\sqrt{3}=1.732$, find the value of $\frac{1}{\sqrt{5}-\sqrt{3}}$
    (a) 3.968 (b) $\frac{1}{3.968}$ (c) 1.984 (d) $\sqrt{0.504}$

ROUGH SPACE

11. What is the simplified form of $\left[\sqrt[3]{x^4y} \times \frac{1}{\sqrt[4]{x^2y^8}}\right]^{-6}$?

(a) $x^5 \cdot y^{10}$ (b) $\frac{y^{10}}{x^5}$ (c) $\frac{y^2}{x}$ (d) $\frac{x^5}{y^5}$

12. Which is greater of 2^{12} and 3^8 ?

(a) 3^8 (b) 2^{12} (c) Both are equal (d) Cannot be compared

13. Find the value of $\frac{1}{1+x^{-m}} + \frac{1}{1+x^m}$

(a) 0 (b) x^m (c) 1 (d) x^{-m}

14. What is the value of $\left(6^{-1} - 8^{-1}\right)^{-1} + \left(2^{-1} - 3^{-1}\right)^{-1}$

(a) 25 (b) 30 (c) 35 (d) 40

15. $\frac{7\sqrt{3}}{\left(\sqrt{10}+\sqrt{3}\right)} - \frac{2\sqrt{5}}{\left(\sqrt{6}+\sqrt{5}\right)} - \frac{3\sqrt{2}}{\left(\sqrt{15}+3\sqrt{2}\right)} =$ _____.

(a) 1 (b) 2 (c) $\frac{1}{2}$ (d) 3

Section : III - Science

16. The length of a rod is measured as 25.4 cm using a metre scale having least count 0.1 cm. Write the measurement correctly including the least count.

(a) 25.4 ± 0.5 cm (b) 25.4 ± 0.1 cm (c) 25.40 ± 0.01 cm (d) 25.40 ± 0.5 cm

17. A student measures the diameter of a sphere with a vernier caliper as 2.40 cm (least count 0.01 cm). Calculate the percentage error in finding its volume.

(a) 0.42% (b) 0.84% (c) 1.26% (d) 2.00%

18. A student records the following readings using a vernier caliper: main scale reading : 2.5 cm, vernier scale division coinciding : 6th division (least count 0.01 cm). What is the correct total reading?

(a) 2.56 cm (b) 2.60 cm (c) 2.06 cm (d) 3.10 cm

ROUGH SPACE

19. A screw gauge has a pitch of 0.5 mm and 50 divisions on its circular scale. Find its least count.
(a) 0.01 mm (b) 0.02 mm (c) 0.05 mm (d) 0.5 mm

20. A car starts from rest and accelerates uniformly at 2 m/s^2. Find the velocity after 10 s.
(a) 10 m/s (b) 15 m/s (c) 20 m/s (d) 25 m/s

21. A body moves with initial velocity 5 m/s and uniform acceleration 2 m/s^2. Find the distance covered in 8 s.
(a) 80 m (b) 96 m (c) 104 m (d) 120 m

22. A particle moves with uniform acceleration. Its velocity at t = 0 is 10 m/s and at t = 5 s is 20 m/s. Find the distance travelled in 5 seconds.
(a) 60 m (b) 70 m (c) 75 m (d) 80 m

23. A train is moving with velocity 72 km/h. Express this speed in m/s.
(a) 18 m/s (b) 19 m/s (c) 20 m/s (d) 22 m/s

24. A motorcyclist covers the first half of a distance at 30 km/h and the second half at 60 km/h. Find his average speed.
(a) 35 km/h (b) 36 km/h (c) 45 km/h (d) 40 km/h

25. A ball is thrown vertically upward with a speed of 50 m/s on a planet where the acceleration due to gravity is g = 5 m/s^2. Calculate the maximum height it reaches.
(a) 125 m (b) 250 m (c) 375 m (d) 500 m

26. Calculate the wavelength (in nanometer) associated with a proton moving at 1.0×10^{3} m/s.
(mass of proton = 1.67×10^{-27} kg)
(n = 6.63×10^{-34} Js)
(a) 2.5 nm (b) 14.0 nm (c) 0.033 nm (d) 0.40 nm

27. The radius of the second Bohr orbit for hydrogen atom is:
H = 6.626×10^{-34} Js
mass of e=9.1×10^{-31} kg
charge of e^{-} = 1.6×10^{-19} C
(a) 1.65 Å (b) 4.76 Å (c) 0.529 Å (d) 2.12 Å

ROUGH SPACE

28. Formula of silica:
(a) SiO_2 (b) Si_2O_2 (c) Si_4O_2 (d) None

29. Correct formula for aluminium oxide is
(a) AlO_3 (b) AlO_2 (c) Al_2O_3 (d) Al_3O_2

30. Oxidation state of Cr in $K_2Cr_2O_7$
(a) +2 (b) –6 (c) +6 (d) 0

31. C^{12}, C^{13}, C^{14} are
(a) isotones (b) isotopes (c) isobar (d) none

32. For a reaction
$CuO + CO \longrightarrow Cu + CO_2$
Which of the following statement is correct?
(a) CuO is oxidized to Cu (b) CO is reduced to CO_2
(c) CO is oxidized to CO_2 (d) Cu is oxidized CO_2

33. Number of unpaired electrons in Cr^{+1}
(Atomic number of Cr = 24)
(a) 5 (b) 4 (c) 6 (d) 3

34. Ground state configuration of Boron
(a) $1s^2 2s^2 2p^0$ (b) $1s^2 2s^1 2p^2$ (c) $1s^2 2s^2 2p$ (d) $1s^0 2s^2 2p^2$

35. Number of a electrons in sodium
(a) 4 (b) 6 (c) 3 (d) 5

36. The cell theory was modified by _____.
(a) Rudolf Virchow (b) Matthias Schleiden (c) Theodor Schwann (d) All of these

37. Which of the following set of organelles contain membranes?
(a) Mitochondria, Ribosome and Chloroplasts (b) Mitochondria, ER and Chloroplasts
(c) Nucleus, Ribosome and Chloroplasts (d) Mitochondria, Centrioles and Nucleus

ROUGH SPACE

38. Prokaryotes contain a primitive nucleus called _____.
(a) Nucleolus (b) Nucleoplasm (c) Protein (d) Nucleoid

39. Which organelle is not covered by a single membrane?
(a) Mitochondria (b) endoplasmic reticulum
(c) Lysosome (d) vacuole

40. Which type of muscle are involuntary?
(a) Skeletal muscle (b) Smooth muscle (c) Cardiac muscle (d) Both b and c

41. Type of connective tissue present around blood vessel and nerves.
(a) Adipose (b) Areolar (c) Dense (d) Epithelium

42. Which type of simple permanent plant tissue gives mechanical support?
(a) Parenchyma (b) Xylem (c) Collenchyma (d) Sclerenchyma

43. _____ is smallest cell.
(a) Virus (b) Bacteria (c) PPLO (d) Yeast

44. What produces myelin sheath in axon?
(a) Node of Ranvier (b) Synaptic vesicle (c) Schwann cell (d) Neuroglial cell

45. Which type of meristem increase the girth of plant?
(a) Apical (b) Intercalary (c) Lateral (d) Primary

ROUGH SPACE