



# CAREER POINT

## State Talent Search Examination, 2015

### Scholastic Aptitude Test

(For Students of Class X)

01-11-2015

Time : 90 minutes

Max. Marks : 90

1. The distance traveled by a body is proportional to time. Its speed -  
 (1) increases (2) decreases  
 (3) becomes zero (4) remains constant

Ans. [4]

Sol.  $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$

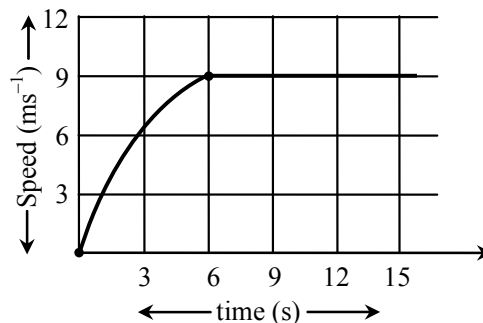
$$\text{Distance} = \text{Speed} \times \text{Time}$$

If speed is constant

$$\text{Distance} \propto \text{Time}$$

So correct option is (4).

2. The speed-time graph for a car is shown in figure. How far does the car travel in the first 6 seconds ?



- (1) 27 m (2) 54 m (3) 6 m (4) 9 m

Ans. [1]

Sol. Area under speed-time graph is distance.

So, Area of triangle is  $\frac{1}{2} \times b \times h$

the base is 6 cm, height is 9 cm,

$$\therefore \text{Distance traveled is } \frac{1}{2} \times 6 \times 9 = 27 \text{ cm}$$

So, correct option is (1).

3. The physical quantity which has unit Newton/kg is -  
 (1) force (2) momentum  
 (3) acceleration (4) energy

**Ans.** [3]

**Sol.**  $\frac{N}{kg} = \frac{kg \cdot m}{sec^2 \times kg} = m/sec^2$

The unit of acceleration is  $m/s^2$ .  
 So correct option is (3).

4. Two objects of masses 100 g and 200 g are moving along the same line and direction with velocities of  $2 \text{ ms}^{-1}$  and  $1 \text{ ms}^{-1}$  respectively. Ratio of their momenta is -  
 (1) 4 : 1 (2) 1 : 1 (3) 2 : 1 (4) 1 : 2

**Ans.** [2]

**Sol.** Given ;  $m_1 = 100 \text{ g} = 0.1 \text{ kg}$   
 $v_1 = 2 \text{ m/s}$   
 $m_2 = 200 \text{ g} = 0.2 \text{ kg}$   
 $v_2 = 1 \text{ m/s}$   
 $P_1 = m_1 v_1 = 0.2 \text{ kg m/s}$   
 $P_2 = m_2 v_2 = 0.2 \text{ kg m/s}$

So,  $\frac{P_1}{P_2} = \frac{0.2}{0.2} = 1$

$P_1 : P_2 = 1 : 1$

then correct option is (2).

5. Acceleration of all freely falling bodies -  
 (1) increases with time (2) decreases with time  
 (3) remains constant (4) remains zero

**Ans.** [3]

**Sol.** Bodies falling freely near the surface of earth are accelerated at the rate of  $9.8 \text{ m/s}^2$ .  
 Then correct option is (3).

6. A stone is thrown vertically upward with a velocity of  $9.8 \text{ ms}^{-1}$ . The maximum height attained by the stone is -  
 (1) 19.6 m (2) 9.8 m (3) 49 m (4) 4.9 m

**Ans.** [4]

**Sol.** Given :  $u = 9.8 \text{ m/s}$   
 $v = 0 \text{ m/s}$  (at maximum height reached)  
 $a = -9.8 \text{ m/s}^2$   
 $h = ?$   
 Using  $v^2 = u^2 + 2gh$   
 $(0)^2 = (9.8)^2 - 2 \times 9.8 \times h$   
 $h = 4.9 \text{ m}$



7. When we place an iron nail on the surface of water the nail sinks. This means that -  
 (1) upthrust on iron nail is less than its weight      (2) upthrust on iron nail is less than its weight  
 (3) upthrust on iron nail is same as its weight      (4) density of iron nail is less than that of water

**Ans.** [2]

**Sol.** The upthrust on iron nail is less than its weight, so it sinks.

8. The S.I. unit of relative density is -  
 (1)  $\text{kg m}^{-3}$       (2)  $\text{gm cm}^{-3}$       (3)  $\text{kg m}^{-2}$       (4) no unit

**Ans.** [4]

**Sol.** Relative density =  $\frac{\text{Density of substance}}{\text{Density of water at } 4^\circ\text{C}}$  ,

It is a ratio of physical quantities having same units, So it has no units.

9. When a ball is thrown upward in the condition of negligible air resistance then its total energy -  
 (1) increases      (2) decreases  
 (3) remains constant      (4) becomes zero at the highest point of its journey

**Ans.** [3]

**Sol.** Total energy always remains constant.

10. Work done is reducing the velocity from  $20 \text{ ms}^{-1}$  to  $10 \text{ ms}^{-1}$  of a mass of 0.5 kg is -  
 (1) 75 J      (2) 7.5 J      (3) 50 J      (4) 25 J

**Ans.** [1]

**Sol.** Given : Initial velocity (u) = 20 m/s  
 Final velocity (v) = 10 m/s  
 Mass of a body (m) = 0.5 kg

Work done = change in K.E.

$$= \frac{1}{2}mv^2 - \frac{1}{2}mu^2$$

$$= \frac{1}{2} \times 0.5 [(10)^2 - (20)^2]$$

$$\Rightarrow \frac{1}{4}(-300) = -75 \text{ J}$$

Thus, work done is 75 J.

11. kWh is a unit of -  
 (1) energy  $\times$  time      (2) power/time      (3) energy/time      (4) work

**Ans.** [4]

**Sol.** kWh is the unit of work, work and energy are inter convertible.



12. In which of the following materials speed of sound is maximum ?

- (1) Aluminium (2) Glass (3) Water (4) Air

Ans. [1]

Sol. Speed of sound is maximum in Aluminium.

13. For hearing distinct echoes the minimum distance of the obstacle from the source of sound must be -

- (1) 34.4 m (2) 17.2 m (3) 3.44 m (4) 1.72 m

Ans. [2]

Sol. For hearing distinct echoes the minimum distance of the obstacle from the source of sound must be 17.2 m.

14. Heart of a young man beats 80 times in 1 minute. What will be the frequency of his heartbeat ?

- (1) 13.3 Hz (2) 80 Hz (3) 1.33 Hz (4) 60 Hz

Ans. [3]

Sol. Given number of beats 80/min.

$$\text{Frequency} = \frac{\text{No. of oscillation}}{\text{Time}} = \frac{80}{60 \text{ sec}} = 1.33 \text{ Hz}$$

15. If convex lens forms an image equal in size to that of the object the object is placed at a distance -

- (1) between F and 2 F (2) greater than 2 F  
(3) less than F (4) 2 F

Ans. [4]

Sol. When object is placed at 2 F an image equal in size to that of the object is formed.

16. What will be the focal length of a convex lens whose power is 1.5 D ?

- (1) + 1.5 m (2) + 66.6 cm (3) - 66.6 cm (4) - 1.5 m

Ans. [2]

Sol. Given P = 1.5 D

$$f = \frac{1}{P} = \frac{1}{1.5} = 0.66 \text{ m}$$

$$f = + 66.6 \text{ cm}$$

17. The amount of light entering the eye is controlled by -

- (1) eye lens (2) pupil (3) cornea (4) retina

Ans. [2]

Sol. Iris controls the size of the pupil and therefore helps in regulating the amount of light entering the eye through a variable aperture (pupil).

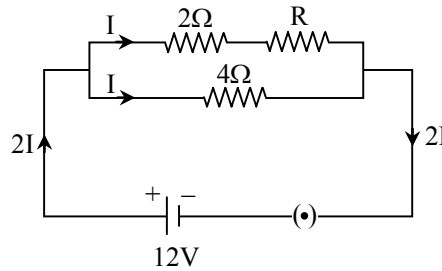
18. The direction of conventional current in a conductor is assumed in the direction of flow of -

- (1) electrons (2) atoms (3) positive charges (4) negative ions

Ans. [3]

Sol. The direction of conventional current is opposite to the direction of flow of electron ( $e^-$ ) i.e. in the direction of positive charge.

19. What will be the value of R in the following electric circuit ?



- (1)  $6 \Omega$                       (2)  $4 \Omega$                       (3)  $8 \Omega$                       (4)  $2 \Omega$

**Ans.** [4]

**Sol.** Given  $v = \text{constant}$

$$I_1 R_1 = I_2 R_2$$

$$I \times (2 + R) = I \times 4$$

$$2I + IR = 4I$$

$$R = 4 - 2 = 2 \Omega$$

Hence the resistance will be same in both the branches as the current is same in both branches.

20. The electric power of an electron appliance is given by -

- (1)  $I^2 V$                       (2)  $IV$                       (3)  $IR^2$                       (4)  $V^2 R$

**Ans.** [2]

**Sol.** Power =  $\frac{\text{work}}{\text{time}}$

Work = volt  $\times$  charge

$$P \Rightarrow \frac{V \times Q}{t}$$

$$\Rightarrow P = VI \quad \left( I = \frac{Q}{t} \right)$$

21. By increasing the number of turns in a current carrying coil the intensity of the magnetic field produced by it

- (1) decreases                      (2) increases  
(3) first decreases then increases                      (4) remains unchanged .

**Ans.** [2]

**Sol.** The magnetic field inside a solenoid increases with the current and is directly proportional to the number of coil per unit length.

22. A compass needle just above a wire in which electrons are moving towards east will point -

- (1) South                      (2) East                      (3) North                      (4) West

**Ans.** [3]

**Sol.** Electrons are moving toward east, the current flow in opposite direction of electron i.e. toward west, by using right hand thumb rule. The direction of magnetic field line of force from south to north pole and a compass needle show deflection toward north.



23. A rectangular coil of copper wire is rotated in a plane perpendicular to the magnetic field. The direction of induced current reverses once in each  
(1) two rotations (2) one rotation (3) one fourth rotations (4) half rotation  
**Ans.** [4]  
**Sol.** After half rotation the rectangular coil of copper wire is rotated in plane perpendicular to the magnetic field. Produces current in any generator that changes twice in one complete cycle.
24. To make practical use of wind energy the minimum wind speed should be  
(1)  $2 \text{ kmh}^{-1}$  (2)  $5 \text{ kmh}^{-1}$  (3)  $10 \text{ kmh}^{-1}$  (4)  $15 \text{ kmh}^{-1}$   
**Ans.** [4]  
**Sol.** Minimum velocity required for wind energy for any partical purpose is 15 km/hr.
25. For operation of ocean thermal energy conversion plants the minimum temperature difference between the water at the surface and water at the depths upto 2 km should be -  
(1)  $20^\circ\text{C}$  (2)  $15^\circ\text{C}$  (3)  $10^\circ\text{C}$  (4)  $5^\circ\text{C}$   
**Ans.** [1]  
**Sol.** The main requirement for OTEC power plant is temperature difference of  $20^\circ\text{C}$  or more so that heat can flow.
26. What is the mass of an atom ?  
(1) Sum of the masses of electron and neutron  
(2) Sum of the masses of electron and proton  
(3) Sum of the masses of proton and neutron  
(4) Sum of the masses of electron, proton and neutron  
**Ans.** [3]  
**Sol.** Mass of an atom = mass of proton + mass of neutron.
27. Corrosion is which type of reaction ?  
(1) Reduction (2) Oxidation (3) Double Displacement (4) Decomposition.  
**Ans.** [2]  
**Sol.** Corrosion is a process in which a metallic substance oxidizes in presence of moist air.
28. Human body works within which pH range ?  
(1) 4.8 – 5.6 (2) 8.1 – 9.2 (3) 5.9 – 7.0 (4) 7.0 – 7.8  
**Ans.** [4]  
**Sol.** Human body is slightly alkaline having pH approximately 7.4
29. Which reaction produces bleaching power ?  
(1)  $\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O} \rightarrow$  (2)  $\text{CaCO}_3 + 3\text{H}_2\text{O} \rightarrow$  (3)  $\text{NaOH} + \text{Cl}_2 \rightarrow$  (4)  $\text{Ca}(\text{OH})_2 + \text{Cl}_2 \rightarrow$   
**Ans.** [4]  
**Sol.** Bleaching powder is formed by action of chlorine gas ( $\text{Cl}_2$ ) with slaked lime  $\text{Ca}(\text{OH})_2$  at  $40^\circ\text{C}$   
 $\text{Ca}(\text{OH})_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$



30. Which one is natural source of oxalic acid ?

- (1) Lemon (2) Orange (3) Tamarind (4) Tomato

Ans. [4]

Sol. Oxalic acid is present in tomato.

31. What is Aqua regia ?

- (1) Mixture of concentrated sulphuric acid and nitric acid  
 (2) 2 : 1 mixture of nitric acid and hydrochloric acid  
 (3) Fresh mixture of concentrated hydrochloric acid and concentrated nitric acid in 3 : 1 ratio  
 (4) Water extract of a plant namely Regia

Ans. [3]

Sol. Aqua regia is the freshly prepared mixture of conc. HCl & conc. HNO<sub>3</sub> in 3 : 1 ratio.

32. Which type of medicine is used for the treatment of indigestion ?

- (1) Antiseptic (2) Antacid (3) Anti-histaminic (4) Anti-psychotic

Ans. [2]

Sol. Antacid is used in the treatment of indigestion.

33. Which is/are allotrope(s) of carbon ?

- (1) Diamond (2) Fullerene (3) Both (4) None of these

Ans. [3]

Sol. Both diamond and fullerene are allotropic form of carbon.

34. Which one is the correct formula for ketone functional group ?

- (1)  $-C=O$  (2)  $\begin{array}{c} -C- \\ || \\ O \end{array}$  (3)  $-CHO$  (4)  $-COOH$

Ans. [2]

Sol. General formula of ketone is  $\begin{array}{c} -C- \\ || \\ O \end{array}$

35. Which is the formula of propanal ?

- (1) C<sub>3</sub>H<sub>6</sub> (2) C<sub>3</sub>H<sub>8</sub> (3) C<sub>3</sub>H<sub>6</sub>O (4) C<sub>3</sub>H<sub>8</sub>O

Ans. [3]

Sol. C<sub>n</sub>H<sub>2n</sub>O is the general formula of aldehyde. So, propanal is CH<sub>3</sub>-CH<sub>2</sub>-CHO or CH<sub>3</sub>-CH<sub>2</sub>- $\begin{array}{c} O \\ || \\ C-H \end{array}$   
 Therefore -C<sub>3</sub>H<sub>6</sub>O is the correct answer.

36. Poisonous liqueur contains which substance ?

- (1) Ethanol (2) Methanol (3) Propanol (4) Butanol.

Ans. [2]

Sol. Poisonous liqueur contain methanol (CH<sub>3</sub> - OH)



37. On the basis of which property, elements are arranged in modern periodic table.  
(1) Atomic radii (2) Ionisation potential (3) Atomic number (4) Atomic weight  
**Ans.** [3]  
**Sol.** Elements in modern periodic table are arranged on the basis of atomic numbers
38. The element with atomic number 79 stands in which period and group of the modern periodic table ?  
(1) 6<sup>th</sup> period, 11<sup>th</sup> group (2) 5<sup>th</sup> period, 10<sup>th</sup> group  
(3) 6<sup>th</sup> period, 12<sup>th</sup> group (4) 7<sup>th</sup> period, 11<sup>th</sup> group.  
**Ans.** [1]  
**Sol.** Group No. 11  
Period no. 6s  
 ${}_{79}\text{Au} = [\text{Xe}]^{54}, 4f^{14}, 5d^{10}, 6s^1$   
As last electrons enters in 6s subshell, so it belongs to 6 period & 11 group.
39. Electronegative elements are found on which side of modern periodic table ?  
(1) Left side (2) Right side (3) Middle (4) Nowhere.  
**Ans.** [2]  
**Sol.** As we move from left to right, non-metallic character increases.
40. How many elements are there in 6<sup>th</sup> period ?  
(1) 31 (2) 18 (3) 32 (4) 28.  
**Ans.** [3]  
**Sol.** Total 32 elements are there in 6<sup>th</sup> period of modern periodic table.
41. Neutralisation reaction is  
(1) between acid and salt (2) between salt and base  
(3) between acid and base (4) between acid and water  
**Ans.** [3]  
**Sol.** When acid reacts with base it forms salt & water  
 $\text{Acid} + \text{Base} \rightarrow \text{Salt} + \text{Water}$   
Eg.  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
42. Three R stands for  
(1) Reduce, Recycle, Reuse (2) Refuse, Right, Routine  
(3) Both (4) None of these  
**Ans.** [1]  
**Sol.** These three 'R' reduce, recycle, reuse are used for conservation of environment.
43. Amrita Devi Vishnoi is famous as a  
(1) film actress (2) conservator of khejri trees  
(3) dacoit (4) dancer.  
**Ans.** [2]  
**Sol.** Amrita devi along with other members sacrificed their lives for the conservation of khejri trees.





44. Which is Greenhouse gas ?

- (1) C<sub>2</sub>H<sub>2</sub> (2) CO<sub>2</sub> (3) SO<sub>3</sub> (4) N<sub>2</sub>O<sub>5</sub>.

Ans. [2]

Sol. CO<sub>2</sub> is called the green house gas as it covers the earth and maintain the optimum temperature.

45. Amalgam is an alloy with

- (1) copper (2) Tin (3) Mercury (4) Zinc.

Ans. [3]

Sol. When mercury (Hg) is mixed with metals like sodium or potassium, it is called amalgam

46. Metals at the bottom of activity series are found as

- (1) free state (2) sulphide ore (3) carbonate (4) oxide.

Ans. [1]

Sol. Least reactive metals occur in free state

47. What will produce when NaOH (sodium hydroxide) is heated with zinc ?

- (1) Sodium metal (2) Zinc oxide (3) Sodium zincate (4) No reaction occurs.

Ans. [3]

Sol.  $2 \text{NaOH} + \text{Zn} \rightarrow \underset{\text{Sodium}}{\text{Na}_2\text{ZnO}_2} + \text{H}_2 \uparrow$   
Zincate

48. Which solution will conduct electric current ?

- (1) Glucose solution (2) Sulphuric acid solution  
(3) (4) None of these

Ans. [2]

Sol. Acidified solution helps in conductance of electricity.

49. Ionic compounds generally show

- (1) hardness (2) high melting and boiling points  
(3) water solubility (4) all of these

Ans. [4]

Sol. Ionic compounds are hard and have high melting & boiling point. Because of polar in nature they are soluble in water.

50. What is the atomic number of Cobalt ?

- (1) 24 (2) 27 (3) 28 (4) 26

Ans. [2]

Sol. Atomic no. of cobalt is 27. It has 27 electrons & 27 protons.



51. The enzyme related with digestion of fat is  
(1) amylase (2) lipase (3) pepsin (4) trypsin  
**Ans.** [2]  
**Sol.** "Lipases" are the enzyme responsible for digestion of fat and lipids.
52. The breakdown of glucose, a 6-carbon molecule into two, 3-carbon molecule pyruvate is called  
(1) Calvin cycle (2) Glycolysis (3) Krebs cycle (4) Glycogenolysis.  
**Ans.** [2]  
**Sol.** 'Glycolysis' is the process by which sugar [glucose] breaks down into 3 carbon unit, in aerobic as well as anaerobic condition.
53. A hormone which is synthesized at the shoot tip and then diffuses towards the shady side of the shoot and caused causes curvature is called  
(1) Auxin (2) Cytokinin (3) Gibberlin (4) Abscisic acid  
**Ans.** [1]  
**Sol.** Auxin shows apical dominance that means it present at the tips of roots and shoots
54. The means of vegetative propagation in Bryophyllum plant is  
(1) Auxillary bud (2) Apical bud (3) Flower bud (4) Leaf bud.  
**Ans.** [4]  
**Sol.** The means of vegetative propagation in plant is Leaf-Bud.
55. Which is not an example of example of sexually transmitted disease ?  
(1) Gonorrhoea (2) syphilis (3) AIDS (4) Herpes.  
**Ans.** [4]  
**Sol.** Herpes is not considered as sexually transmitted
56. The main factor responsible for the damage of ozone layer is  
(1) Carbon dioxide (2) Carbon monoxide (3) Hydrocarbons (4) Chlorofluorocarbon.  
**Ans.** [4]  
**Sol.** Chlorofluorocarbon is responsible for green-house effect as well as damage of ozone layer
57. The water harvesting found in Rajasthan is  
(1) khadins (2) Tal (3) Kulhas (4) Bundhis  
**Ans.** [1]  
**Sol.** The water harvesting system found in Rajasthan is khadins.
58. Cell organelle which functions in the storage, modification and packaging of substances manufactured in the cell is  
(1) Mitochondria (2) Golgi apparatus (3) Endoplasmic (4) Lysosome.  
**Ans.** [2]  
**Sol.** Golgi apparatus helps in modification and packaging of substances inside the cell.



59. Ciliated columnar epithelium is present in the inner lining of  
(1) kidney tubules (2) ducts of salivary glands  
(3) respiratory tract (4) blood vessels.  
**Ans.** [3]  
**Sol.** Internal lining of respiratory tract contain ciliated columnar glandular epithelium.
60. The absence of specialised tissue for conduction of water and minerals is the main characteristic feature of  
(1) Angiosperms (2) Bryophyta  
(3) Pteridophyta (4) Gymnosperms  
**Ans.** [2]  
**Sol.** Bryophytes do not have vascular system for the transportation of water & food.
61. Which of the following is the cause of kala-azar disease ?  
(1) Trypanosoma (2) Leishmania (3) Staphylococci (4) Plasmodium  
**Ans.** [2]  
**Sol.** Leishmania is the cause of kala-azar disease
62. The nitrogen fixing bacteria found in the root nodules of leguminous plants is  
(1) Clostridium (2) Azotobacter  
(3) Cyanobacteria (4) Rhizobium  
**Ans.** [4]  
**Sol.** Rhizobium are the bacteria found in root-nodules which converts atmospheric  $N_2$  to  $NH_4^+$
63. White revolution is related with  
(1) Fish (2) Silk (3) Milk (4) Cereals  
**Ans.** [3]  
**Sol.** White revolution is related to increased production of milk in our nation.
64. The essential element for the formation of chlorophyll in plants is  
(1) Manganese (2) Nitrogen (3) Magnesium (4) Phosphorus  
**Ans.** [3]  
**Sol.** Magnesium element is present in the centre of chlorophyll.
65. An example of cereal plant is  
(1) Xanthium (2) Triticum (3) Parthenium (4) Cyprinus  
**Ans.** [2]  
**Sol.** Triticum is the example of cereal
66. Which of the following hormones regulates the menstruation ?  
(1) Relaxin (2) Progesterone (3) Prolactin (4) Oxytocin  
**Ans.** [2]  
**Sol.** Progesterone is responsible for regulation of menstruation.

67. What will happen if the uterus is replaced by a plastic pouch in a woman ?

- (1) Embryo development will not take place
- (2) Female gamete will not be formed
- (3) Menstruation will not take place
- (4) Ovary will not release place

**Ans.** [1]

**Sol.** Uterus is the site for embryo development and if uterus is replaced by plastic pouch the development of embryo will not occur.

68. The correct pair of Analogous organs is

- (1) our arm and dog's fore-leg
- (2) wings of bird and wings of butterfly
- (3) our teeth and elephant's tusk
- (4) wings of parrot and wings of eagle.

**Ans.** [2]

**Sol.** Wings of birds and wings of butterfly have same function but different origin. So its an example of analogous organ.

69. The phylum which has true Coelom (body cavity) is

- (1) Platyhelminthes
- (2) Nematoda
- (3) Coelenterata
- (4) Annelida

**Ans.** [4]

**Sol.** Annelida have true coelom

70. Green plant → Grasshopper → Rat → Snake → Eagle –

In this food chain which animal will receive maximum energy ?

- (1) Rat
- (2) Grasshopper
- (3) Snake
- (4) Eagle

**Ans.** [2]

**Sol.** Producers (plants) are huge source of energy, so the animal who consume plant source will get maximum energy.

71. The  $\frac{p}{q}$  form of number  $1.\overline{27}$  is

- (1)  $\frac{12}{11}$
- (2)  $\frac{13}{11}$
- (3)  $\frac{14}{11}$
- (4)  $\frac{15}{11}$

**Ans.** [3]

**Sol.**  $1.\overline{27} = 1 + \frac{27}{99} = 1 + \frac{3}{11} = \frac{14}{11}$



72. The value of  $2^{2/3} \cdot 2^{1/3}$  is  
 (1)  $2^{2/9}$  (2)  $2^2$  (3) 2 (4)  $2^{1/3}$

Ans. [3]

Sol.  $2^{2/3} \cdot 2^{1/3} = 2^{\frac{2+1}{3}} = 2^{3/3} = 2$

73. If one of the factors of  $x^3 - 2x^2 - x + 2$  is  $(x + 1)$ , then another factor will be  
 (1)  $x^2 - 3x + 2$  (2)  $x^2 + 3x - 2$  (3)  $x^2 - 3x - 2$  (4)  $x^2 + 3x + 2$

Ans. [1]

Sol.

$$\begin{array}{r}
 x^2 - 3x + 2 \\
 x + 1 \overline{) x^3 - 2x^2 - x + 2} \\
 \underline{-x^3 + x^2} \phantom{+ 2} \\
 -3x^2 - x + 2 \\
 \underline{+3x^2 + 3x} \phantom{+ 2} \\
 2x + 2 \\
 \underline{-2x + 2} \\
 \phantom{2x} + 4 \\
 \phantom{2x} \times
 \end{array}$$

74. If we add 1 to the numerator and subtract 1 from the denominator, a fraction reduces to 1. It becomes  $\frac{1}{2}$ , if we only add 1 to denominator. What is the fraction ?

- (1)  $\frac{2}{3}$  (2)  $\frac{3}{5}$  (3)  $\frac{4}{5}$  (4)  $\frac{2}{3}$

Ans. [2]

Sol. Let the required fraction be  $\frac{x}{y}$

Now,  $\frac{x+1}{y-1} = 1$   
 $x + 1 = y - 1$   
 $x - y = -2$  ... (i)

Also,  $\frac{x}{y+1} = \frac{1}{2}$   
 $2x = y + 1$   
 $2x - y = 1$  ... (2)

Now,  $2x - y = 1$   
 $x - y = -2$   
 $\begin{array}{r} - \\ + \\ + \\ \hline x = 3 \end{array}$

$\Rightarrow y = 5$

$\therefore$  Fraction =  $\frac{3}{5}$



78.  $\frac{1 + \tan^2 \theta}{1 + \cot^2 \theta}$  is equal to  
 (1)  $\sec^2 \theta$  (2)  $-1$  (3)  $\cot^2 \theta$  (4)  $\tan^2 \theta$

Ans. [4]

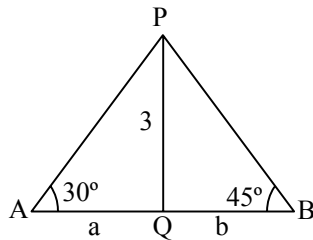
Sol. 
$$\frac{1 + \tan^2 \theta}{1 + \cot^2 \theta} = \frac{1 + \tan^2 \theta}{1 + \frac{1}{\tan^2 \theta}} = \frac{\tan^2 \theta (1 + \tan^2 \theta)}{(1 + \tan^2 \theta)}$$

$$= \tan^2 \theta$$

79. From a point on a bridge across a river, the angles of depression of the bank on opposite sides of the river are  $30^\circ$  &  $45^\circ$  respectively. If the bridge is at a height of 3 m from the bank, the width of the river is  
 (1) 6 m (2)  $3(\sqrt{3} + 1)$  m (3)  $2(\sqrt{3} + 1)$  m (4)  $(\sqrt{3} + 1)$  m

Ans. [2]

Sol.



In  $\triangle APQ$ ,  $\tan 30^\circ = \frac{3}{a}$

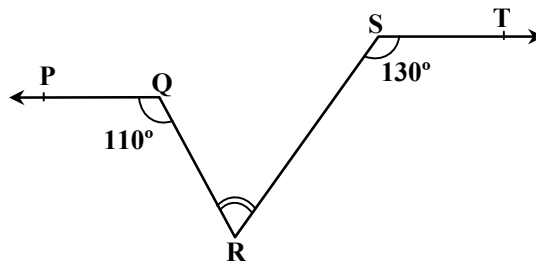
$$\frac{1}{\sqrt{3}} = \frac{3}{a} \Rightarrow a = 3\sqrt{3}$$

In  $\triangle PQB$ ,  $\tan 45^\circ = \frac{3}{b}$

$$3 = b$$

$\therefore$  Width of river =  $3\sqrt{3} + 3 = 3(\sqrt{3} + 1)$  m

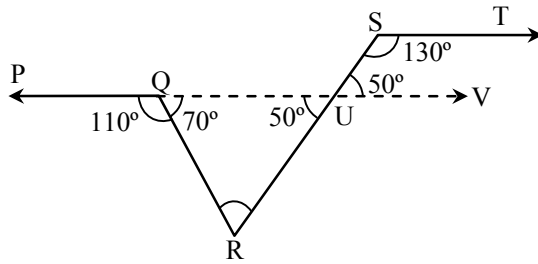
80. In the given figure, if  $PQ \parallel ST$ ,  $\angle PQR = 110^\circ$  and  $\angle RST = 130^\circ$ . Then the value of  $\angle QRS$  is-



- (1)  $60^\circ$  (2)  $70^\circ$  (3)  $80^\circ$  (4)  $90^\circ$

Ans. [1]

Sol.



$$\angle PQR + \angle RQU = 180^\circ \quad [\text{Linear Pair}]$$

$$\angle RQU = 70^\circ$$

$$\angle TSU + \angle SUV = 180^\circ \quad [\text{Co-Interior Angles}]$$

$$\angle SUV = 50^\circ$$

$$\text{Also, } \angle SUV = \angle RUQ \quad [\text{Vertically Opposite Angles}]$$

$$\angle RUQ = 50^\circ$$

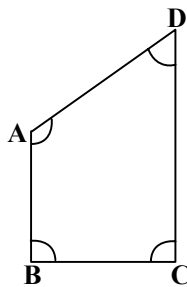
Now, In  $\triangle RQU$ ,

$$\angle RQU + \angle QUR + \angle QRS = 180^\circ$$

$$70^\circ + 50^\circ + \angle QRS = 180^\circ$$

$$\angle QRS = 60^\circ$$

81. In the given figure, if AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD, then which statement is true ?



(1)  $\angle A > \angle C > \angle D > \angle B$

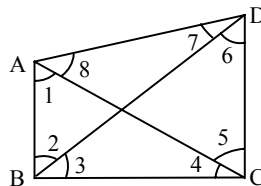
(2)  $\angle C > \angle B > \angle D > \angle A$

(3)  $\angle B > \angle C > \angle D > \angle A$

(4)  $\angle A > \angle C > \angle B > \angle D$

Ans.[4]

Sol.



In  $\triangle ABC$ ,

$$BC > AB$$

$$\Rightarrow \angle 1 > \angle 4$$

..... (1)



Also, In  $\triangle ACD$ ,  
 $CD > AD$   
 $\Rightarrow \angle 8 > \angle 5$  ..... (2)

From (1) & (2)  
 $\angle 1 + \angle 8 > \angle 4 + \angle 5$   
 $\Rightarrow \angle A > \angle C$  ..... (I)

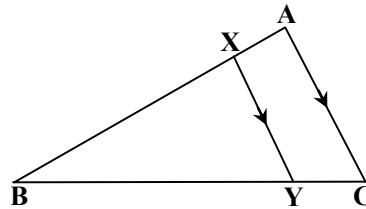
Similarly in  $\triangle ABD$ ,  
 $AD > AB \Rightarrow \angle 2 > \angle 7$  ..... (3)

Also, In  $\triangle BCD$ ,  
 $CD > BC \Rightarrow \angle 3 > \angle 6$  ..... (4)

From (3) & (4)  
 $\angle 2 + \angle 3 > \angle 7 + \angle 6$   
 $\angle B > \angle D$  ..... (II)

From (I) & (II), only (4) option exists  $\angle A > \angle C > \angle B > \angle D$

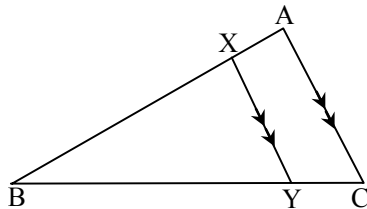
82. In the given figure, the line segment  $XY$  is parallel to side  $AC$  of  $\triangle ABC$  and it divides the triangle into two parts of equal area. The ratio of  $XB$  and  $AB$  is-



- (1)  $\sqrt{2} : 1$       (2)  $1 : \sqrt{2}$       (3)  $1 : (\sqrt{2} - 1)$       (4)  $(\sqrt{2} - 1) : 1$

Ans. [2]

Sol.



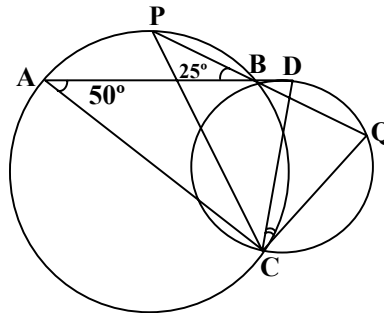
$XY \parallel AC \Rightarrow \triangle BXY \sim \triangle BAC$  [By AA Similarity Criteria]

$$\therefore \frac{\text{ar} \cdot \triangle BXY}{\text{ar} \cdot \triangle BAC} = \left( \frac{BX}{AB} \right)^2$$

$$\Rightarrow \left( \frac{BX}{AB} \right)^2 = \frac{1}{2}$$

$$\Rightarrow \frac{BX}{AB} = \frac{1}{\sqrt{2}}$$

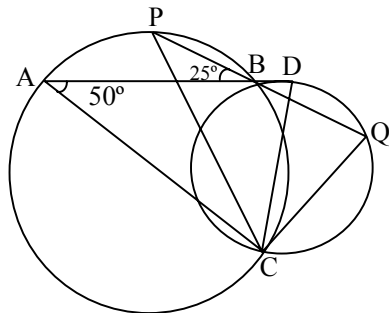
83. In the given figure, two circles intersect in two points B and C. Through B, two line segments ABD and PBQ are drawn intersecting the circles in A, D and P, Q respectively. If  $\angle ABP = 25^\circ$  and  $\angle CAB = 50^\circ$  then the value of  $\angle DCQ$  is



- (1)  $25^\circ$                       (2)  $50^\circ$                       (3)  $30^\circ$                       (4)  $90^\circ$

Ans. [1]

Sol.



$\angle PBA = \angle DBQ$  [Vertically opposite angles]

$\therefore \angle DBQ = 25^\circ$

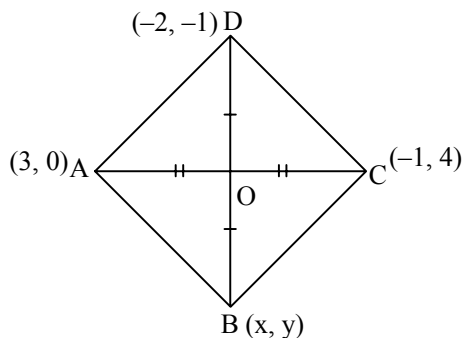
Also,  $\angle DBQ = \angle DCQ$  [Angle subtended by same arc DQ]

$\Rightarrow \angle DCQ = 25^\circ$

84. If  $(3, 0)$ ,  $(x, y)$ ,  $(-1, 4)$  and  $(-2, -1)$  are vertices of a rhombus taken in order, then vertex  $(x, y)$  is  
 (1)  $(-2, -3)$                       (2)  $(0, 3)$                       (3)  $(4, 5)$                       (4)  $(-4, 5)$

Ans. [3]

Sol.



$\therefore ABCD$  is a rhombus

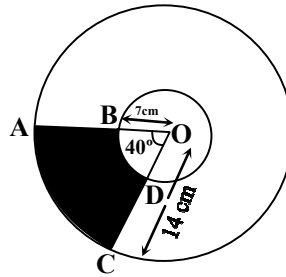
$\therefore$  Diagonals bisect each other & the mid-point of AC & BD is same

$$\Rightarrow \left( \frac{3-1}{2}, \frac{0+4}{2} \right) = \left( \frac{-2+x}{2}, \frac{-1+y}{2} \right)$$

$$\Rightarrow x-2=2, \quad y-1=4$$

$$x=4, \quad y=5$$

85. According to figure, the radii of two concentric circles with centre O are 7 cm & 14 cm respectively. If  $\angle AOC = 40^\circ$ , then the area of shaded region is



(1)  $\frac{49\pi}{3}$

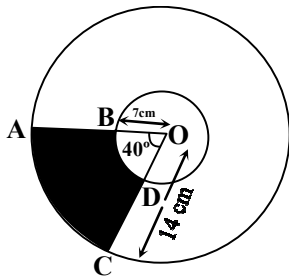
(2)  $\frac{21\pi}{3}$

(3)  $\frac{28\pi}{3}$

(4)  $\frac{35\pi}{3}$

Ans. [1]

Sol.



$$\begin{aligned} \text{Area of shaded region} &= \frac{\theta}{360^\circ} \times \pi (r_1^2 - r_2^2) \\ &= \frac{40}{360} \times \pi (14^2 - 7^2) \\ &= \frac{1}{9} \times \pi (196 - 49) \\ &= \frac{147\pi}{9} \\ &= \frac{49\pi}{3} \end{aligned}$$



86. The diameter of a sphere is decreased by 25%. Its surface area will be decreased by-  
 (1) 56.25% (2) 55% (3) 40% (4) 43.75%

Ans. [4]

Sol. Total surface area of sphere =  $4\pi r^2$

Let New radius = R

$$\therefore R = r - \frac{25r}{100} = \frac{3r}{4}$$

$$\text{New T.S.A} = 4\pi \left(\frac{3r}{4}\right)^2 = \frac{9r^2}{16} (4\pi)$$

$$\% \text{ decrease} = \frac{\frac{9}{16}(4\pi r^2) - 4\pi r^2}{4\pi r^2} \times 100\%$$

$$= \left(\frac{9}{16} - 1\right) \times 100\%$$

$$= \frac{-7}{16} \times 100\%$$

$$= -43.75\% = 43.75\% \text{ (decreased)}$$

87. The radii of the ends of frustum of a cone of height 45 cm are 28 cm and 7 cm. The volume of frustum of cone is-

- (1) 8079.5 cm<sup>3</sup> (2) 6620 cm<sup>3</sup> (3) 48510 cm<sup>3</sup> (4) 5461.5 cm<sup>3</sup>

Ans. [3]

Sol. Volume of frustum =  $\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$

$$= \frac{1}{3} \times \frac{22}{7} \times 45 (28^2 + 7^2 + 28 \times 7)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 45 (784 + 49 + 196)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 45 \times 1029$$

$$= 48510 \text{ cm}^3$$

88. If the mean of the following distribution is 6, the value of f is

Class-interval :	0 – 2	2 – 4	4 – 6	6 – 8	8 – 10
Frequency :	1	2	5	f	3

(1) 6

(2) 7

(3) 5

(4) 3

Ans.[2]

Sol.

C.I.	$f_i$	$x_i$	$x_i f_i$
0 – 2	1	1	1
2 – 4	2	3	6
4 – 6	5	5	25
6 – 8	f	7	7f
8 – 10	3	9	27
	11 + f		59 + 7f

Mean = 6 (Given)

$$\text{Also, mean} = \frac{59 + 7f}{11 + f}$$

$$\Rightarrow \frac{59 + 7f}{11 + f} = 6$$

$$59 + 7f = 66 + 6f$$

$$f = 7$$

89. The wickets taken by a bowler in 10 cricket matches are as follows:

2, 6, 4, 5, 0, 2, 1, 3, 2, 3

(1) 6

(2) 5

(3) 3

(4) 2

Ans.[4]

Sol.

$x_i$	$f_i$
0	1
1	1
2	3
3	2
4	1
5	1
6	1

Highest frequency is 3, which is of observation '2'

$\therefore$  mode = 2

90. A die is thrown 1000 times with the frequencies for the outcomes 1, 2, 3, 4, 5 and 6 are given in the following table:

Class-interval :	1	2	3	4	5	6
Frequency :	179	150	157	149	175	190

(1) 0.150

(2) 0.175

(3) 0.149

(4) 0.157

Ans.[2]

Sol. Probability of outcome 5 =  $\frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$

$$= \frac{175}{1000}$$

$$= 0.175$$