SCHOLASTIC APTITUDE TEST PAPER & SOLUTIONS

1. A particle completes two revolutions in 50 seconds in a circular path of radius 7m. Distance covered and displacement in two revolutions will be, respectively.

(1) 44m, 14 m (2) 88 m, 44m (3) 44m, zero (4) 88 m, zero

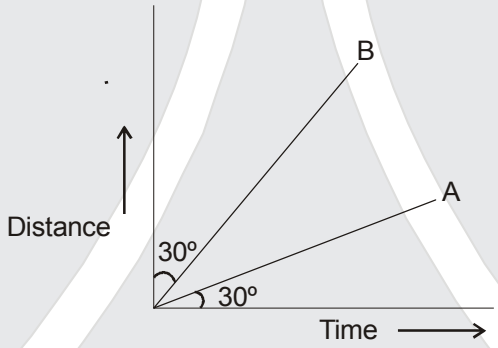
Sol. Distance = $(2\pi r) \times 2$

Displacement = Zero

Distance = $2 \times \frac{22}{7} \times 7 \times 2$

= 88 m

2. Distance – time graph of two cars A and B is shown. The ratio of speeds of A and B.



(1) 1 : 1 (2) 1 : 2 (3) 1 : 3 (4) 3 : 1

Ans. **3**

Sol. Speed = slope of distance – time graph

= tan θ [θ is angle with +ve x axis]

For A

$S_A = \tan 30 = \frac{1}{\sqrt{3}}$

For B

$S_B = \tan 60 = \sqrt{3}$

$\therefore \frac{S_A}{S_B} = \frac{1/\sqrt{3}}{\sqrt{3}} = \frac{1}{3}$

3. Which of the following solid objects will have more inertia, if they have same volumes ?

(1) Ice (2) Wood (3) Iron (4) Aluminium

Ans. **3**

Sol. Inertia depends upon mass

4. A car is moving with a uniform speed of 72 km/h. After applying brakes it stops after travelling 100 m distance. If its mass along with the passengers is 1000 kg, then the value of force due to application of brakes will be …….. in newton.

(1) –1000 (2) –2000 (3) –3600 (4) –7200

Ans. **2**

Sol. u = 72 Km/hr = $72 \times \frac{5}{18} = 20 \text{ m/s}$

v = 0 m/s

s = 100 m/s

From 3rd equation of motion

$v^2 - u^2 = 2as$

$a = \frac{v^2 - u^2}{2s} = \frac{-400}{2 \times 100} = 2 \text{ m/s}^2$

F = m x a

= – 2 x 1000

= – 2000 N

5. The SI unit of universal gravitational constant (G) is.

(1) Nm^2kg^{-2} (2) $Nm^{-2}kg^{-2}$ (3) $Nm^{-2}kg^2$ (4) $Nm^{-1}m^2kg^2$

Ans. **1**

6. If the kinetic energy and momentum of an object of mass m are k and p respectively, then the relation between kinetic energy and momentum will be.

(1) p = 2 km (2) $p = 2k^2 m$ (3) $p = \sqrt{2km}$ (4) $p = \sqrt{\frac{2k}{m}}$

Ans. **3**

7. If mass of an object on the earth is 12 kg, then its weight on the surface of moon will be …… in newton.

(1) 12 (2) 19.6 (3) 117.6 (4) 127.4

Ans. **2**

Sol. M = 12 kg

acceleration due to gravity at moon surface (g') = $\frac{9.8}{6} m/s^2$

w = m x g'

= $12 \times \frac{9.8}{6}$

= 19.6 N

8. The physical quantity which has unit pascal is.

(1) pressure (2) momentum (3) density (4) relative density

Ans. **1**

9. The gravitational force between two objects each of mass m, separated by a distance r, is F, Gravitational force between two objects each of mass 2m separated by a distance 2r, will be.

(1) $\frac{F}{2}$ (2) F (3) 2F (4) 4F,

Ans. **2**

Sol. $F = \frac{Gm^2}{r^2}$

$F' = \frac{G(2m)(2m)}{(2r)^2}$

F' = F

10. When a sheet of paper and stone is dropped in vacuum freely, then which of the following statements is correct?

(1) Stone reaches earlier than the sheet of paper on the earth.

(2) Sheet of paper reaches earlier than the stone on the earth.

(3) Both reach at the same time on the earth

(4) Sheet of paper stops but stone reaches on the earth

Ans. **3**

11. The value of one kWh in joule is.

(1) 1000 (2) 3.6×10^4 (3) 3.6×10^5 (4) 3.6×10^6

Ans. **4**

12. A car of mass 1000 kg is moving with velocity 15 ms^{-1} on a horizontal plane work done by the force of gravity will be $\left(g = 10ms^{-2}\right)$

(1) zero (2) 1500 J (3) 15000 J (4) 150000 J.

Ans. **1**

Sol. No Displacement in direction of force

13. By whom of the following infrasonic sound is produced?

(1) Porpoises (2) dolphins (3) elephants (4) bats

Ans. **3**

14. A sound wave has frequency of 4 kHz and wavelength 25 cm. Then distance travelled by sound in 2 sec. (in km) will be.

(1) 1 (2) 2 (3) 3 (4) 4

Ans. **2**

Sol. $n = 4000$ Hz

$\lambda = \frac{25}{100}m$

$v = n\lambda$

$v = 4000 \times \frac{25}{100}$

v = 1000 m/s

t = 2 sec

distance = v x t = 1000 x 2

= 2 km

15. When an image formed by a concave mirror is virtual, erect and enlarged, than position of the objects will be.

(1) beyond centre of curvature C

(2) in between centre of curvature C and focus F

(3) at focus F

(4) in between pole P and focus F.

Ans. **4**

16. If half of a convex lens is blackened, then which of the following statements is correct?

(1) Image will not be formed

(2) Image formed will be half of size of the object and intensity will be unchanged

(3) Image will be formed fully but intensity becomes half

(4) Image will be formed fully and intensity will be unchanged

Ans. **3**

17. The far point of a myopic person is at 100 cm in front of the eye. The nature and power of the lens required to correct this problem will be.

(1) Concave lens, + 1D (2) concave lens, - 1D (3) convex lens, + 1D (4) convex lens, - 1D

Ans. **2**

Sol. $\frac{1}{f}=\frac{1}{v}-\frac{1}{u}$

$\frac{1}{f}=\frac{1}{\infty}-\frac{1}{100}$

$f=-100\ cm=-1m$

$P=\frac{1}{f}=-1D$

18. Which of the following materials is an alloy?

(1) Ebonite (2) Manganese (3) Manganin (4) Nickel

Ans. **3**

19. The electrical resistivity of the material of conductor is ρ. If its length is doubled and area of cross – section is tripled, then its electrical resistivity will be.

(1) ρ (2) 2 ρ (3) 3 ρ (4) 4 ρ

Ans. **1**

Sol. Resistivity remains same

20. Three resistors of equal resistance are connected first in series and then in parallel. If the equivalent resistances in both cases are R_S and R_P respectively, then the value of $\frac{R_S}{R_P}$ will be.

(1) 1 : 1 (2) 3 : 1 (3) 9 : 1 (4) 1 : 9

Ans. **3**

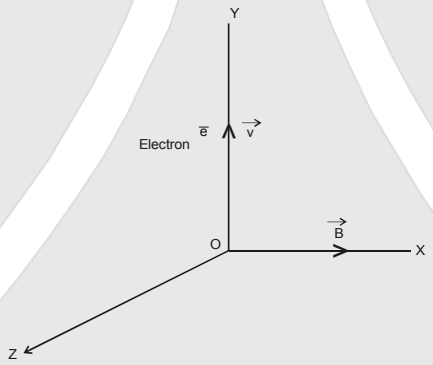
Sol. Let each resistance be R

$R_S = 3R$

$R_P = R/3$

$\frac{R_S}{R_P} = 9:1$

21. In the following figure, the motion of an electron is shown in a figure in uniform magnetic field. The direction of force acting an electron will be.



(1) along positive X – axis

(2) along negative X – axis

(3) Perpendicular to plane of paper, outwards

(4) perpendicular to plane of paper, inwards.

Ans. **3**

Sol. According to Fleming's left hand rule

22. Bio- gas contains methane gas.

(1) up to 25% (2) up to 50% (3) up to 12% (4) up to 75%

Ans. **4**

23. The semi- conductor material used for making solar cell is.

(1) tungsten (2) silicon (3) copper (4) aluminium

Ans. **2**

24. Which of the following low energy particles is bombarded on the nucleus of heavy atom in nuclear fission?

(1) Proton (2) Deuteron (3) Alpha particle (4) Neutron

Ans. **4**

25. Which of the following statements is correct?

(1) Inside the bar magnet, the direction of magnetic field lines is from its north pole to south pole.

(2) Outside the bar magnet, the direction of magnetic field lines is from south pole to north pole.

(3) Magnetic field lines are closed curves

(4) Magnetic field lines are open curves.

Ans. **3**

26. Which one of the following is the correct order of increasing attraction between the particles of matter?

(1) Water < Hydrogen < Salt (2) Hydrogen < Salt < Water

(3) Salt < Water < Hydrogen (4) Hydrogen < Water < Salt

Ans. **4**

Sol. Forces of attraction increases from gas to solid state

$\therefore$ $\underset{(gas)}{\text{Hydrogen}} < \underset{(Liquid)}{\text{Water}} < \underset{(Solid)}{\text{Salt}}$

27. At which temperature will physical state of water be liquid?

(1) 265 K (2) 298 K (3) 378 K (4) 398 K

Ans. **2**

Sol. The M.P. of H_2O is 0°C or 273 K

B.P of H_2O is 100°C or 373 K

$\therefore$ Between 273 K and 373 K, it will be in liquid state.

28. Which one of the following is an example of emulsion?

(1) Butter (2) Fog (3) Milk of magnesia (4) Milk

Ans. **4**

Sol. The dispersed phase and dispersion medium is liquid in emulsion

29. Which is the suitable method of separation of two miscible liquids having less than 25ºC difference in their boiling points?

(1) Sublimation (2) Fractional distillation (3) Chromatography (4) Evaporation

Ans. **2**

Sol. Two miscible liquids having less than 25°C difference in their boiling points are separated by fractional distillation.

30. Which one of the following is not a chemical change?

(1) Rusting of iron (2) Digestion of food (3) Burning of paper (4) Melting of candle

Ans. **4**

Sol. No new substance is formed in melting of candle. So, melting of candle is a physical change

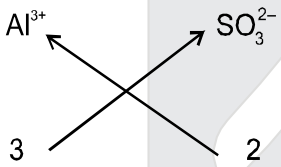
31. The correct formula of the compound aluminium sulphite is.

(1) $Al_2(SO_4)_3$ (2) $Al_3(SO_3)_2$ (3) $Al_2(SO_3)_3$ (4) $Al_3(SO_4)_2$

Ans. **3**

Sol. Aluminum ion $\rightarrow$ Al^{3+}

Sulphite $\rightarrow$ SO_3^{2-}



Formula $Al_2(SO_3)_3$

32. What is the number of molecules in 4.25 g of ammonia ?

(1) 2.40×10^{22} (2) 2.40×10^{23} (3) 1.51×10^{23} (4) 1.51×10^{22}

Ans. **3**

Sol. $\text{Mole} = \frac{\text{Mass}}{\text{GMM}} = \frac{4.25}{17}$

No. of molecules = $\frac{4.25}{17}\times6.023\times10^{23}$

= 1.51 x 10^{23} molecules

33. Which one of the following molecules does not have atomicity two?

(1) Chlorine (2) Nitrogen (3) Oxygen (4) Phosphorus

Ans. **4**

Sol. Atomicity of Chlorine is 2

Atomicity of Nitrogen is 2

Atomicity of Oxygen is 2

Atomicity of Phosphorus is 4

34. The number of electrons in the M- Shell of sulphur atom is.

(1) 4 (2) 5 (3) 6 (4) 7

Ans. **3**

Sol. Electronic configuration of sulphur atom is

K	L	M
2	8	6

So, number of electrons in M-shell is 6.

35. If the ratio of two isotopes $^{14}_{7}X$ and $^{15}_{7}X$ of an element X is 4 : 1, its average atomic mass will be.

(1) 16.00 u (2) 17.75 u (3) 12.84 u (4) 14.20 u.

Ans. **4**

Sol. $^{14}_{7}X$ mass = 14

$^{15}_{7}X$ mass = 15

Average atomic mass = $\frac{14\times4+15\times1}{(4+1)}$

$$=\frac{56+15}{5}=\frac{71}{5}=14.20$$

36. Which of the following does not possess neutron?

(1) Protium $\left[{}_{1}^{1}\mathrm{H}\right]$ (2) Deuterium $\left({}_{1}^{2}\mathrm{H}\right)$ (3) Tritium $\left({}_{1}^{3}\mathrm{H}\right)$ (4) Helium $\left({}_{2}^{4}\mathrm{He}\right)$

Ans. **1**

Sol. Mass number = no. of protons + no. of neutrons

$A = p + n$

In ${}_{1}^{1}\mathrm{H}$

$A = p + n$

$1 = 1 + n$

No of neutrons = 1 – 1 = 0

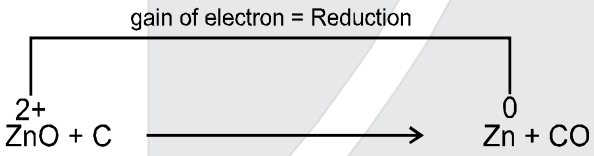
37. Which substance is getting reduced in the following reaction?

$\mathrm{ZnO} + \mathrm{C} \rightarrow \mathrm{Zn} + \mathrm{CO}$

(1) ZnO (2) C (3) Zn (4) CO

Ans. **1**

Sol.



So, substance reduced is ZnO

38. $\mathrm{AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)}$

The reaction given above is which type of the following?

(1) Redox (2) Double displacement (3) Dissociation (4) Combination.

Ans. **2**

Sol. $\mathrm{AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl(s) + NaNO_3(aq)}$

Exchange of ions is taking place. So, it is a double displacement reaction.

39. Which acid is found in ant sting?

(1) Acetic acid (2) Oxalic acid (3) Citric acid (4) Methanoic acid

Ans. **4**

Sol. Ant sting contains formic acid (HCOOH). The IUPAC name of formic acid is methanoic acid.

40. The pH values of four solutions A, B, C and D are 12,4,7 and 2 respectively. Which of the following statements is false for these solutions?

(1) Solution A is basic

(2) Solution B and D are acidic

(3) Solution D has minimum concentration of H^+ ions

(4) The concentrations of H^+ and OH^- ions are equal in solution C.

Ans. **3**

Sol. Acidic solution has pH less than 7.

Basic solution has pH more than 7.

& Neutral solution pH = 7.

For A, pH = 12, so it is basic solution

For B & D, pH < 7, so it is acidic solution

For C, pH = 7, so it is Neutral solution

As pH decreases, the concentration of H^+ ions increases.

41. Which gas reacts with lime water and turns it milky?

(1) Oxygen (2) Chlorine (3) Hydrogen (4) Carbon dioxide.

Ans. **4**

Sol. Lime water is $Ca(OH)_2$

$$Ca(OH)_2(aq) + CO_2(g) \longrightarrow CaCO_3(s) + H_2O(l)$$

Lime water turns milky due to the formation of insoluble suspension of calcium carbonate.

42. Which of the following metals can be cut easily with a knife?

(1) Iron (2) Tin (3) Zinc (4) Sodium

Ans. **4**

Sol. Sodium is a soft metal which can be cut with a knife

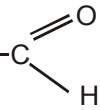
43. Which is the most reactive metal among the following?

(1) Calcium (2) Zinc (3) Copper (4) Silver

Ans. **1**

Sol. The increasing order of reactivity of metal is

Silver < Copper < Zinc < Calcium

44. Which one of the following compounds has  functional group ?

(1) Propanol (2) Propanone (3) Propanal (4) Propene

Ans. **3**

Sol. The formula of propanal is $H_3C - CH_2 - CHO$

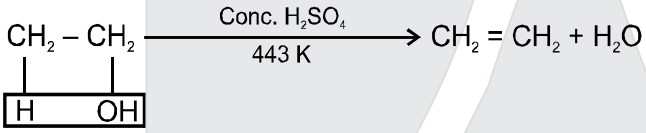
So, it contains aldehydic group

45. What is obtained when ethanol is heated with excess of conc. H_2SO_4 at 443 K temperature?

(1) Ethane (2) Ethene (3) Ethyne (4) Mathane

Ans. **2**

Sol. Dehydration of alcohol



46. Which one of following hydrocarbons will not display addition reaction?

(1) C_2H_4 (2) C_2H_2 (3) C_3H_6 (4) C_3H_8

Ans. **4**

Sol. The formula of propane is C_3H_8 i.e. alkane

Alkanes are saturated hydrocarbons. So, they donot show addition reaction.

47. Which one of the following properties does not belong to ionic compounds?

(1) Hard and brittle (2) High melting and boiling points

(3) Usually water soluble (4) Good conductor of electricity in solid state.

Ans. **4**

Sol. Ionic compounds are bad conductor of electricity in solid state because in the solid state, due to strong electrostatic force of attraction free ions are absent. So, they are insulator in the solid state.

48. If X, Y, and Z are Dobereiner triads and atomic masses of X and Z are 15 and 75, respectively, what will be the atomic mass of Y?

(1) 45 (2) 60 (3) 90 (4) 30

Ans. **1**

Sol.

Element	X	Y	Z
Atomic mass	15	-	75

According to Dobereiner.

Atomic mass of middle element = $\frac{15+75}{2}=\frac{90}{2}=45$

49. Which one of the following atoms is biggest in size?

(1) B (2) Be (3) O (4) N

Ans. **2**

Sol. In a periodic table, atomic size decreases on moving left to right in a period.

So, Beryllium has big size.

50. The element which stands in third period and second group of modern periodic table is.

(1) Sodium (2) Beryllium (3) Magnesium (4) Aluminium.

Ans. **3**

Sol. Magnesium is the element which stands in third period and second group of modern periodic table.

51. The scientist who further expanded cell theory was.

(1) Leeuwenhoek (2) Schleiden (3) Virchow (4) Purkinje

Ans. **3**

Sol. Two biologists, “Schleiden and Schwann” gave the “Cell theory” which was later on expanded by “Rudolf Virchow”.

52. The pair of organelles which are able to make their own protein is.

(1) Mitochondria, Lysosome (2) Ribosome, Lysosome

(3) Plastid, Golgi body (4) Plastid, Mitochondria

Ans. **4**

Sol. Plastid and mitochondria contain their own DNA and ribosomes.

53. The chemical present on cell wall of bark in plants is.

(1) Cutin (2) Suberin (3) Lignin (4) Pectin

Ans. **2**

Sol. Cell wall of plant contain suberin

54. Correct pair of essential micronutrients for plant growth is.

(1) iron, magnesium (2) phosphorus, sulphur (3) potassium, chlorine (4) zinc, copper

Ans. **4**

Sol. Essential plant micro nutrients are boron (B), zinc (Zn), Maganese (Mn), iron (Fe), copper (Cu).

55. The organism which is more sensitive to the level of sulphur dioxide in the air is.

(1) Algae (2) Fungi (3) Lichen (4) Bacteria

Ans. **3**

Sol. Because lichen are the indicators of sulphur dioxide polution

56. The hormone responsible for wilting of leaves is.

(1) Auxin (2) Cytokinin (3) Gibberellin (4) Abscisic acid.

Ans. **4**

Sol. Abscisic acid is Responsible for the wiliting of leaves in plants.

57. During anaerobic respiration, the chemical built up in our muscles is.

(1) Pyruvic acid (2) Lactic acid (3) Oxaloacetic acid (4) Citric acid

Ans. **2**

Sol. Because lactic acid production occur in our muscle cells when we are exercising vigorously.

58. The growth of pollen tube towards ovule shows.

(1) Hydrotropism (2) Phototropism (3) Geotropism (4) Chemotropism

Ans. **4**

Sol. Chemotropism- is movements of plants due to chemical stimulus

Eg : growth of pollen tube.

59. If produce of a terrestrial food chain synthesises 1000 k.cal food energy, then the quantity of food energy that reaches to tertiary consumers will be.

(1) 1000 k. cal (2) 100 k. cal (3) 10 k. cal (4) 1k .cal.

Ans. **4**

Sol. 10% law of energy flow: According to the 10% law of Lederman the 90% part of obtained energy of each organism is utilized in their various metabolic activates and only 10% energy is transferred to the next trophic level.

Producer $\longrightarrow$ Primary consumer $\longrightarrow$ Secondary consumer $\longrightarrow$ Tertiary consumer

1000 k cal $\longrightarrow$ 100 k Cal $\longrightarrow$ 10 k cal $\longrightarrow$ 1 k cal

60. The name of local system of canal irrigation in Himachal Pradesh is?

(1) Tal (2) Kulh (3) Nadi (4) Pyne

Ans. **2**

Sol. Kulh is the local system of canal irrigation in Himachal Pradesh.

61. In animals, hormone secretion control mechanism is called as.

(1) secretion mechansim (2) feedback mechanism

(3) hyposecretion mechanism (4) hypersecretion mechanism

Ans. **2**

Sol. In animals, hormone secretion control mechanism is known as feed back mechanism

62. An example of phylum echinodermata is.

(1) Leech (2) Housefly (3) Liver fluke (4) Starfish

Ans. **4**

Sol. Starfish is an example of phylum echinodermata

63. Which of the following diseases diseases is caused due to the deficiency of RBC?

(1) Anaemia (2) Haemophilia

(3) Leukaemia (4) Thrombocytopenia

Ans. **1**

Sol. Anaemia is caused due to the deficiency of RBC

64. Which of the following is not a sexually transmitted disease?

(1) Syphilis (2) Gonorrhoea (3) AIDS (4) Tuberculosis.

Ans. **4**

Sol. Syphilis, Gonorrhea AIDS are sexually transmitted disease.

65. Cell organelle, which has own DNA and ribosome is.

(1) Mitochondria (2) Lysosome (3) Golgi apparatus (4) Vacuoles

Ans. **1**

Sol. Mitochondria contain its own DNA and Ribosome

66. An example of cold – blooded animal is.

(1) Echidna (2) Kangaroo (3) Pigeon (4) Snake

Ans. **4**

Sol. Snake – Because reptiles are the cold Blooded animals

67. Which organ controls involuntary reactions?

(1) Cerebellum (2) Cerebrum (3) Medulla (4) Forebrain

Ans. **3**

Sol. Involuntary reaction controls by medulla oblongata

68. Spinal chord is protected by the structure.

(1) Vertebral column (2) Skull (3) Sternum (4) Ribs

Ans. **1**

Sol. Spinal chord is protected by the vertebral column

69. Protein digesting enzyme secreted by gastric gland is.

(1) Trypsin (2) Pepsin (3) Erepsin (4) Lipase

Ans. **2**

Sol. Pepsin is the protein digestive enzyme secreted by gastric gland.

70. The biological process involved in the removal of harmful metabolic waste from the body is called.

(1) Respiration (2) Defecation (3) Excretion (4) Egestion

Ans. **3**

Sol. Removal of harmful metabolic waste from the body is called excretion.

71. The product of $\sqrt[3]{2} \times \sqrt[4]{2} \times \sqrt[12]{32}$ is equal to.

(1) $\sqrt{2}$ (2) 2 (3) $\sqrt[12]{2}$ (4) $\sqrt[12]{32}$

Ans. **2**

Sol. $(2)^{\frac{1}{3}} \times (2)^{\frac{1}{4}} \times (32)^{\frac{1}{12}}$

$\Rightarrow \quad 2^{\frac{1}{3}+\frac{1}{4}+\frac{5}{12}} \quad \Rightarrow \quad 2^{\frac{4+3+5}{12}} \quad \Rightarrow \quad 2$

72. If $x^{11} + 11$ is divided by x + 1, then the remainder is.

(1) 9 (2) 10 (3) 11 (4) 12

Ans. **2**

Sol. In $x^{11} + 11$

Put $x + 1 = 0$ (Using Remainder Theorem)

$x = -1$

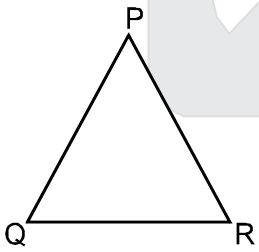
$(-1)^{11} + 11 \quad \Rightarrow \quad -1 + 11 \quad \Rightarrow \quad 10$

73. In ΔPQR if $\angle R > \angle Q$ then

(1) QR > PR (2) PQ > PR (3) PQ < PR (4) QR < PR

Ans. **2**

Sol.



$\angle R > \angle Q$

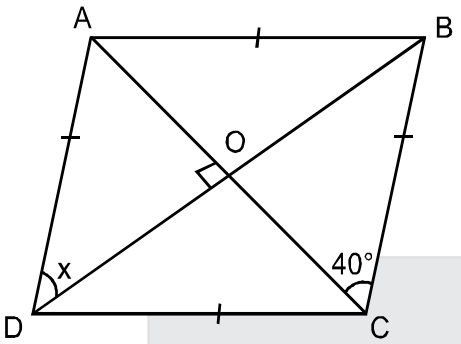
So PQ > PR (Side opposite to larger Angle is larger).

74. In a rhombus ABCD, $\angle ACB = 40^\circ$, then $\angle ADB$ is.

(1) 40° (2) 45° (3) 50° (4) 60°

Ans. **3**

Sol.

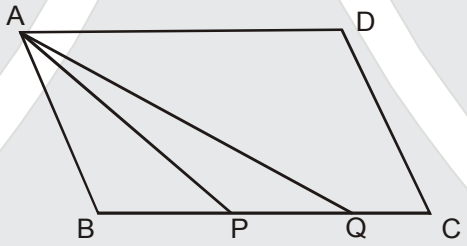


$\angle ACD = \angle CAD = 40^\circ$ (Alternate interior Angles)

So $\angle ADB + \angle CAD + \angle AOD = 180^\circ$

$\angle ADB = 50^\circ$

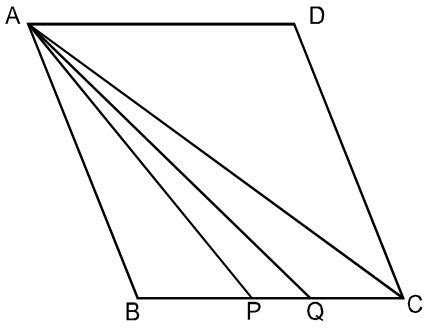
75. In the given parallelogram ABCD, points P and Q divide the side BC in three equal parts. Then the ar. (APQ) is equal to.



(1) $\frac{1}{6}\text{ar.}(ABCD)$ (2) $\frac{1}{4}\text{ar.}(ABCD)$ (3) $\frac{1}{3}\text{ar.}(ABCD)$ (4) $\frac{1}{2}\text{ar.}(ABCD)$

Ans. **1**

Sol.



Join AC

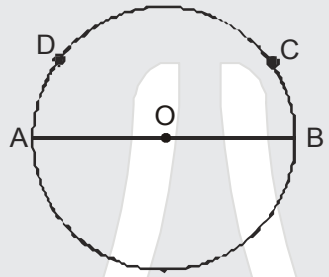
$$\text{ar}(\Delta ABC) = \frac{1}{2}\text{ar}(ABCD)$$

$$\text{ar}(\Delta APQ) = \frac{1}{3}\text{ar}(\Delta ABC)$$

So $$\text{ar}(\Delta APQ) = \frac{1}{3}\cdot\frac{1}{2}\text{ar}(ABCD)$$

$$= \frac{1}{6}\text{ar}(ABCD)$$

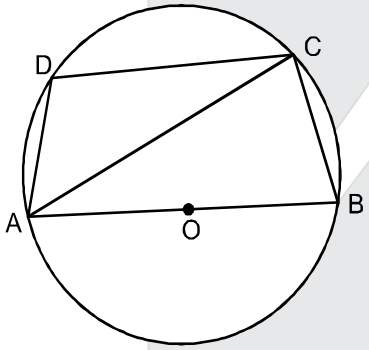
76. In AOB is a diameter of the given circle and $\angle ADC = 120°$ then $\angle CAB$ is equal to.



(1) 30º (2) 60º (3) 45º (4) 90º

Ans. **1**

Sol.



$\angle ADC = 120°$

$\therefore$ $\angle ABC = 180 - \angle ADC = 180 - 120° = 60°$ [$\because$ ABCD is cyclic quadrilateral]

$\angle ACB = 90°$ [$\because$ Angle in a Semicircle]

$\therefore$ $\angle BAC = 180 - 90 = 60°$

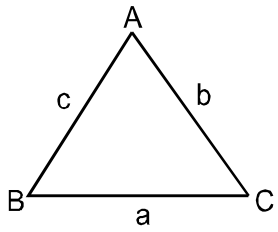
= 30°

77. In each side of a triangle is doubled, then the ratio of areas of new and initial triangles is equal to

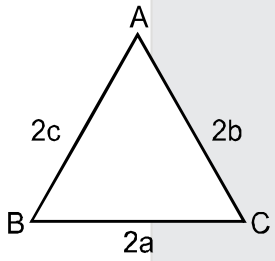
(1) 1 : 4 (2) 2 : 1 (3) 1 : 2 (4) 4 : 1

Ans. 4

Sol.



$A = \sqrt{s(s-a)(s-b)(s-c)}$



$S_1 = \frac{2a+2b+2c}{2} = a+b+c = 2s$

$\therefore \quad A_1 = \sqrt{2s(2s-2a)(2s-2b)(2s-2c)}$

$= \sqrt{2\times2\times2\times2\ s\ (s-a)(s-b)\ (s-c)}$

$A_1 = 2\times2\ A$

$A_1 = 4A$

$\frac{1}{4} = \frac{A}{A_1}$

$\frac{A_1}{A} = \frac{4}{1} \quad \Rightarrow \quad A_1 : A = 4 : 1$

78. If α,β are the zeros of the polynomial $f(x) = ax^2 + bx + c$ then $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ is equal to.

(1) $\frac{b^2 - ac}{a^2}$ (2) $\frac{b^2 - 2ac}{c^2}$ (3) $\frac{b^2 + ac}{a^2}$ (4) $\frac{b^2 + 2ac}{c^2}$

Ans. **2**

Sol. $f(x) = ax^2 + bx + c$

$\alpha + \beta = -\frac{b}{a}$; $\alpha\beta = \frac{c}{a}$

$\therefore \quad \frac{1}{\alpha^2} + \frac{1}{\beta^2} = \frac{\alpha^2 + \beta^2}{(\alpha\beta)^2} = \frac{(\alpha+\beta)^2 - 2\alpha\beta}{(\alpha\beta)^2} = \frac{(-b/a)^2 - 2(c/a)}{\left(\frac{c}{a}\right)^2} = \frac{b^2 - 2ac}{c^2}$

79. If the first, second and last terms of an A.P. are a, b and 2a respectively, then its sum is

(1) $\frac{ab}{2(b-a)}$ (2) $\frac{ab}{(b-a)}$ (3) $\frac{3ab}{2(b-a)}$ (4) $\frac{2ab}{(b-a)}$

Ans. **3**

Sol. $\left.\begin{matrix}\text{First Term} = a \\ \text{Second Term} = b\end{matrix}\right]$ Difference$(d) = (b-a)$

Last Term = 2a

$\therefore \quad 2a = a + (n-1)(b-a)$

$\Rightarrow \quad n - 1 = \frac{a}{b-a} \quad \Rightarrow \quad n = \frac{a}{b-a} + 1 = \frac{b}{(b-a)}$

$\therefore \quad S_n = \frac{n}{2}[a + \ell] = \frac{b}{2(b-a)}[a + 2a] = \frac{3ab}{2(b-a)}$

80. The value of $\cos 1^\circ . \cos 2^\circ \cos 3^\circ ... \cos 100^\circ$ is.

(1) –1 (2) 0 (3) 1 (4) None of these

Ans. **2**

Sol. cos1° cos2° cos3° cos4°----------cos100°

= 0 [$\because$ cos 90° = 0]

81. If $A+B=90^\circ$ then $\frac{\tan A.\tan B+\tan A.\cot B}{\sin A.\sec B}-\frac{\sin^2 B}{\cos^2 A}$ is equal to.

(1) $\cot^2 A$ (2) $\cot^2 B$ (3) $-\tan^2 A$ (4) $-\cot^2 A$

Ans. **2**

Sol. $A + B = 90^\circ \quad \Rightarrow \quad B = (90 - A)$

So, $\left(\frac{\tan A\cdot\tan B+\tan A\cdot\cot B}{\sin A\cdot\sec B}-\frac{\sin^2 B}{\cos^2 A}\right)$

$$=\left(\frac{\tan A\ \cot A+\tan A\cdot\tan A}{\sin A\cdot\operatorname{cosec} A}-\frac{\cos^2 A}{\cos^2 A}\right)=\left(\frac{1+\tan^2 A}{1}-1\right)=\tan^2 A=\cot^2 B$$

82. If $\cos\theta+\cos^2\theta=1$, then $\sin^2\theta+\sin^4\theta$ is equal to.

(1) –1 (2) 0 (3) 1 (4) None of these

Ans. **3**

Sol. $\cos\theta = 1 - \cos^2\theta$

$\cos\theta = \sin^2\theta$

$\therefore \quad \sin^2\theta \quad (1 + \sin^2\theta)$

$= \cos\theta\ (1 + \cos\theta)$

$= \cos\theta + \cos^2\theta \quad$ (1 given)

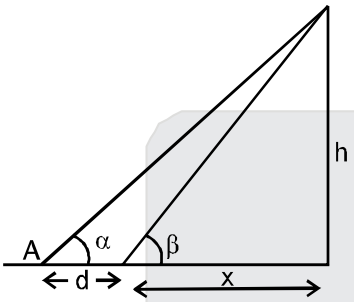
$= 1$

83. The angle of elevation of the top of a tower standing on horizontal plane from a point A is α. After walking a distance d towards the foot of the tower the angle of elevation is found to be β. The height of the tower is.

(1) $\frac{d}{\cot\alpha+\cot\beta}$ (2) $\frac{d}{\cot\alpha-\cot\beta}$ (3) $\frac{d}{\tan\beta-\tan\alpha}$ (4) $\frac{d}{\tan\beta+\tan\alpha}$

Ans. 2

Sol.



$\frac{h}{x}=\tan\beta$

$h\cot\beta = x$

$\frac{h}{x+d}=\tan\alpha \quad \Rightarrow h=(x+d)\tan\alpha$

$h = (h\cot\beta + d)\tan\alpha$

$h=\frac{h\tan\alpha}{\tan\beta}+d\tan\alpha \Rightarrow \left(h-\frac{h\tan\alpha}{\tan\beta}\right)=d\tan\alpha$

$h\left(\frac{\tan\beta-\tan\alpha}{\tan\beta}\right)=d\tan\alpha$

$h=\frac{d(\tan\alpha\tan\beta)}{\tan\beta-\tan\alpha}$ (Now Dividing Nr. & Dr. by $\tan\alpha\ \tan\beta$)

$h=\frac{d}{\cot\alpha-\cot\beta}$

84. The distance between the given points $(\cos\theta, \sin\theta)$ and $(\sin\theta, -\cos\theta)$ is equal to.

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

Ans. **2**

Sol. $d^2 = [\cos\theta - \sin\theta]^2 + [\sin\theta - (\cos\theta)]^2$ (Using Distance formula)

$= (\cos\theta - \sin\theta]^2 + (\sin\theta + \cos\theta)^2$

$= \cos^2\theta + \sin^2\theta + \sin^2\theta + \cos^2\theta$

$= 1 + 1$

$d^2 = 2$

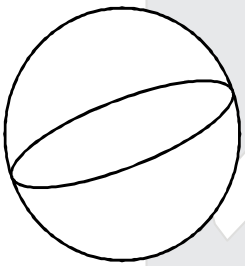
$\therefore \quad d = \sqrt{2}$

85. If the radius of a sphere is increased by 10%, then how much per cent does the volume of the sphere increase?

(1) 33.00% (2) 33.10% (3) 33.11% (4) 33.12%

Ans. **2**

Sol.



$$r_1 \longrightarrow \left(r + \frac{10}{100}r\right) = \left(r + \frac{r}{10}\right)$$

$$= \frac{11r}{10}$$

$$V_1 = \frac{4}{3}\pi r^3$$

$$V_2 = \frac{4}{3}\pi\left(\frac{11r}{10}\right)^3$$

$$\% \text{ charge} = \left(\frac{V_2 - V_1}{V_1}\right) \times 100$$

$$= \frac{\frac{4}{3}\pi\left[\left(\frac{11r}{10}\right)^3 - r^3\right]}{\frac{4}{3}\pi r^3} \times 100$$

$$= \left(\frac{1331r^3 - 1000r^3}{1000r^3}\right) \times 100$$

$$= \frac{331\,r^3}{1000\,r^3} \times 100 = \frac{331}{10}$$

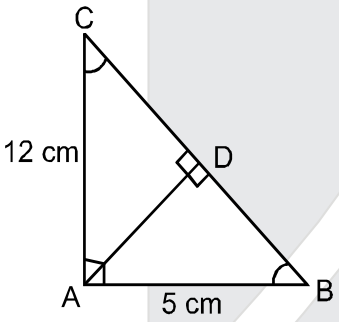
= 33.10%

86. In a ΔABC, $\angle A = 90°, AB = 5$ cm and AC = 12 cm. If $AD \perp BC$, then AD is equal to.

(1) $\frac{13}{2}$ cm (2) $\frac{60}{13}$ cm (3) $\frac{13}{60}$ cm (4) $\frac{2}{13}$ cm

Ans. 2

Sol.



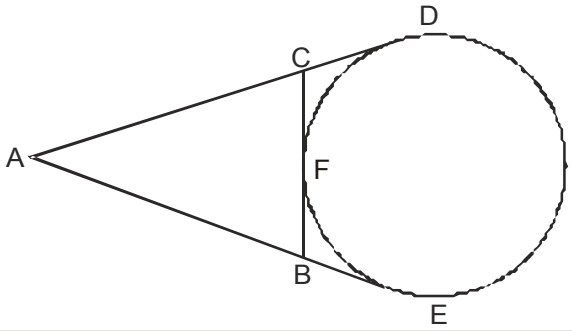
By Pythagoras theorem, BC = 13 cm

So, $\frac{1}{2} \times AB \times AC = \frac{1}{2} \times BC \times AD$

$\Rightarrow$ 12 x 5 = 13 x AD

$\Rightarrow$ $AD = \frac{60}{13}$cm

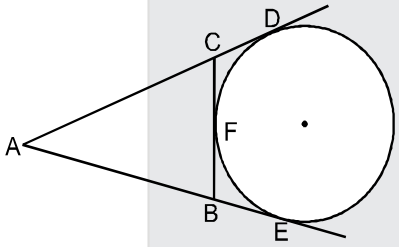
87. In the given figure if AD, AE and BC are tangents to the circle at D, E and F respectively then which statement is true?



(1) AD = AB + BC + CA (2) 2AD = AB + BC + CA (3) 3AD = AB + BC + CA (4)4AD=AB+BC+ CA

Ans. **2**

Sol.



From exterior point A,

AD = AE

$\Rightarrow$ 2AD = AE + AD [adding AD on both side]

$\Rightarrow$ 2AD = AB + BE + AC + CD

= AB + AC + CF + BF [$\therefore$ CD = CF and BE = BF]

= AB + AC + BC

88. If a wire is bent in the shape of a square, then the area of this square is 81 cm^2. If the wire is bent into a semicircular shape, then the area of the semicircle is equal to.

(1) 22 cm^2 (2) 44 cm^2 (3) 77 cm^2 (4) 154 cm^2

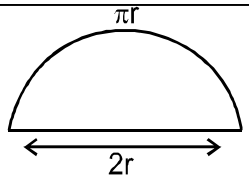
Ans. **3**

Sol. a = side of square

$a^2 = 81$ $\quad a = 9$

$\therefore$ perimeter = 4a = 36

Now



$\therefore$ $P = \pi r + 2r = 36$ (as length of wire is same in both cases)

$$r = \frac{36}{2+\pi} = \frac{36}{2+\frac{22}{7}} = \frac{36}{\frac{36}{7}} = \frac{36}{36} \times 7$$

$r = 7$ cm

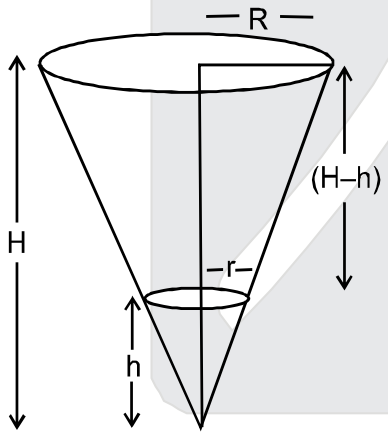
$\therefore$ Area of semicircle = $\frac{1}{2}\pi r^2 = \frac{1}{2} \times \frac{22}{7} \times 7 \times 7 = 77 \text{ cm}^2$

89. A bucket, in the form of a frustum of a cone holds 28.49 litres of water. The radii of the top and bottom are 28 cm and 21 cm respectively. Then the height of the bucket is.

(1) 15 cm (2) 18 cm (3) 20 cm (4) 10 cm

Ans. **1**

Sol.



$R = 28$ and $r = 21$

$\therefore$ Height of frustum = $(H - h)$

Using similarity

$$\frac{r}{R} = \frac{h}{H} \Rightarrow \frac{21}{28} = \frac{h}{H}$$

$$\Rightarrow \quad H = \frac{4}{3}h$$

$V_F = 28.49$ litre

$= 28.49 \times 1000\ cm^3$

$= 28490\ cm^3$

$V_F = V - v$

$= \frac{1}{3}\pi R^2 H - \frac{1}{3}\pi r^2 h$

$= \frac{\pi}{3}\left[R^2 \times \left(\frac{4h}{3}\right) - r^2 \times h\right]$

$= \frac{\pi}{3} \times h\left[\frac{4R^2}{3} - r^2\right] = 28490$

$= \frac{1}{3} \times \frac{22}{7} \times h\left[\frac{4}{3} \times 28 \times 28 \times -21 \times 21\right]$

$= \frac{1}{3} \times \frac{22}{7} \times h \times 7 \times 7\left[\frac{64 - 27}{3}\right] = 28490$

$h = \frac{28490 \times 3 \times 3}{22 \times 7 \times 37}$

h = 45 cm

$\therefore \quad H = \frac{4}{3}h = \frac{4}{3} \times 45 = 60$ cm

$\therefore \quad H - h = 60 - 45 = 15$ cm

$\therefore$ Height of bucket = 15 cm

90. Pythagoras was the student of.

(1) Thales (2) Euclid (3) Thales and Euclid both (4) None of these

Ans. **1**

Sol. Pythagoras was student of Thale.

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