

Date: 04/09/2018

Max. Marks: 100

SOLUTIONS

Time allowed: 120 minutes

1. Value of acceleration due to gravity on earth is maximum at
- (1) poles (2) equator
(3) depth of 60 km below earth's surface (4) height of 400 km above earth's surface

Sol. Answer is 1st option

g is inversely proportional to radius

$$g = \frac{Gm}{R^2}$$

Radius is minimum at pole. Hence g is maximum at pole.

II-Method

$$g' = g - R\omega^2 \cos^2 \phi$$

$$g_{\text{poles}} = g - R\omega^2 \cos^2 90^\circ$$

$$= g - R\omega^2 (0)$$

$$g_{\text{poles}} = g \dots\dots(1)$$

$$g_{\text{equator}} = g - R\omega^2 \cos^2 \phi$$

$$= g - R\omega^2 (1)$$

$$g_{\text{equator}} = g - R\omega^2 \dots\dots(2)$$

∴ from (1) and (2) g is maximum at poles.

2. Magnetic field due to current through a, is similar to magnetic field produced by a bar magnet.
- (1) circular loop of conducting wire (2) rectangular loop of conducting wire
(3) solenoid (4) thick copper wire

Sol. Answer is 3rd option

3. Choose the wrong statement related to refraction of light .
- (1) Twinkling of stars
(2) Oval shape of sun in morning and evening
(3) Object in water appears bigger in size
(4) Red light undergoes dispersion, while passing through prism

Sol. Answer is 4th option — Red light undergoes dispersion, while passing through prism

4. How much time the satellite will take to complete one revolution around the earth, if velocity of satellite is 3.14 km/s and its height above earth's surface is 3600 km (Radius of earth is 6400 km)
- (1) 2000 S (2) 20000 S (3) 1000 S (4) 10000 S

Sol. Answer is 2nd option

$$V = \frac{2\pi(r+h)}{T}$$

$$3.14 = \frac{2 \times 3.14 \times (6400 + 3600)}{T}$$

$$T = 2 \times 10000$$

$$T = 20000 \text{ S}$$

5. A planet in an orbit sweeps out an angle of 1600 from March to May, When it is at an average distance of 140 million km from Sun. If the planet sweeps out an angle of 100 from October - December, then the average distance from sun is -

- (1) $56 \times 10^5 \text{ km}$ (2) $56 \times 10^6 \text{ km}$ (3) $56 \times 10^7 \text{ km}$ (4) $56 \times 10^8 \text{ km}$

Sol. Answer is 3rd option

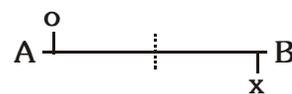
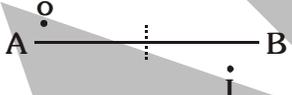
$$r_1^2 \phi_1 = r_2^2 \phi_2$$

$$(140 \times 10^6)^2 \times 160 = r_2^2 \times 100$$

$$r_2 = 140 \times 10^6 \times 4$$

$$\therefore r_2 = 56 \times 10^7 \text{ km}$$

6. Observing the following table, choose the correct alternative

	Column - I	Column - II
A.		(i) image formed by concave lens
B.		(ii) Image formed by convex lens with object at 2F
C.		(iii) Image formed by convex lens with object beyond 2F
D.		(iv) Image formed by convex lens with object within

In column I AB principal axis of lens, O point object, I point image. Match the two Columns.

- (1) A-(i), B-(ii), C-(iii), D-(iv) (2) A-(iii), B-(i), C-(iv), D-(ii)
 (3) A-(iv), B-(iii), C-(ii), D-(i) (4) A-(ii), B-(iv), C-(i), D-(iii)

Sol. Answer is 4th option

7. How much heat energy in joules is necessary to raise the temperature of 5 kg of water from 20 to 100 ?

- (1) 1672 KJ (2) 167200 J (3) 16720 J (4) 1672 J

Sol. Answer is 1st option

$$\begin{aligned} H &= mC\Delta t \\ &= 5000 \times 4.18 \times 80 \\ &= 1672000 \\ &= 1672 \text{ kJ} \end{aligned}$$

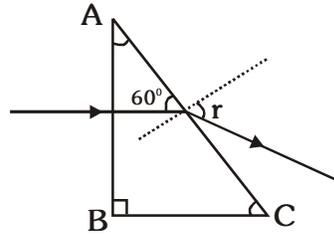
8. A ray falls on a prism ($AB = BC$) and travels as shown in figure. If refractive index of glass with respect to air 1.5, find $\sin r$

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

(2) $\frac{3}{2\sqrt{2}}$

(3) $\frac{\sqrt{2}}{3}$

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



Sol. Answer is 2nd option

$$\frac{\sin i}{\sin r} = \frac{\mu_a}{\mu_g}$$

$$\frac{\sin 45^\circ}{\sin r} = \frac{1}{1.5}$$

$$\frac{1}{\sqrt{2}} = \frac{1}{1.5 \sin r}$$

$$\therefore \sin r = \frac{1.5}{\sqrt{2}} = \frac{1.5 \times 2}{2\sqrt{2}}$$

$$\sin r = \frac{3}{2\sqrt{2}}$$

9. In a Helium gas discharge tube every second 40×10^{18} He⁺ (ions) move towards the right through a cross section of the tube, while n electrons move to the left in the same time. If the current in the tube is 8A towards right then $n = ?$

(1) 3×10^{18}

(2) 3×10^{19}

(3) 3×10^{18}

(4) 3×10^{21}

Sol. Answer is 2nd option

$$I = 8A$$

$$\frac{Q}{t} = 8 \quad \therefore \phi = 8C$$

$$n \times e = 8 \quad \therefore n \frac{8}{s} = \frac{8}{1.61 \times 10^{-19}}$$

$$n = \frac{80}{16} \times 10^{19}$$

$$n = 5 \times 10^{19}$$

$$2 \times 40 \times 10^{18} + n_{e/s} =$$

$$\therefore n_{e/s} = 3 \times 10^{19}$$

10. Device/device changing electrical energy in to mechanical energy is/are

I Electrical generator

II Electric motor

III. Voltmeter

IV Ammeter

(1) I and II

(2) II and III

(3) II, III and IV

(4) Only II

Sol. Answer is 3rd option

11. A convex lens produces an image of an object on a screen with a magnification of 2. When the lens is moved 30 cm away from the object, the magnification of the image is 1/2. The Focal length of the lens is
- (1) 20 cm. (2) 25 cm. (3) 30 cm. (4) 35 cm.

Sol. Answer is 1st option

$$m = -\frac{1}{2} = \frac{f}{f+u}, \quad \begin{aligned} f &= u = -2f \\ 3f &= u \\ u &= -3f \end{aligned}$$

$$-2 = \frac{-f}{f+u+30}$$

$$-2 = \frac{f}{f-3f+30}$$

$$\therefore -2 = \frac{f}{-2f+30}$$

$$4f - 60 = f$$

$$3f = 60$$

$$f = 20 \text{ cm}$$

12. Two plane mirrors at an angle x° produce 5 images of a point. The number of images produced when x° is decreased to $(x-30)^\circ$ is

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

Sol. Answer is 3rd option

$$\left(\frac{360}{\phi}\right) - 1 = 5$$

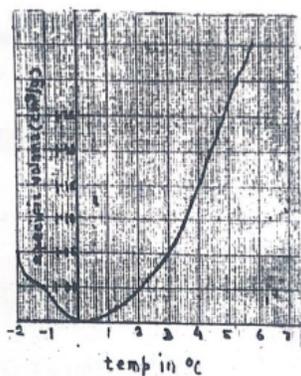
$$\frac{360}{\phi} = 6$$

$$\therefore \phi = \frac{360}{6} = 60^\circ = x$$

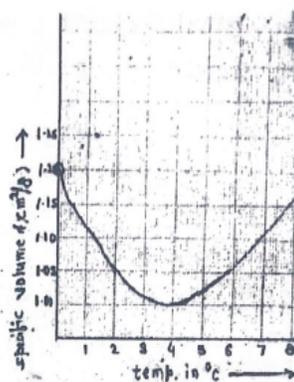
$$x - 30 = 60^\circ - 30^\circ = 30^\circ$$

$$\left(\frac{360}{\phi}\right) - 1 = \frac{360}{30} = 12 - 1 = 11$$

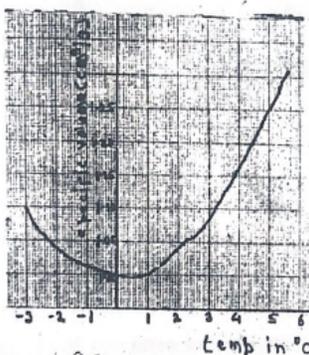
13. Choose the correct diagram (graph) showing anomalous behaviour of water.



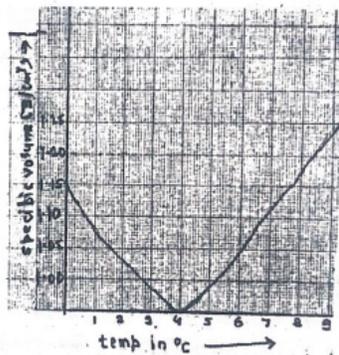
(1)



(2)



(3)



(4)

Sol. Answer is 2nd option

14. In which year National Chemical laboratory Pune was established?

- (1) 1950 (2) 1995 (3) 2005 (4) 1989

Sol. Answer is 1st option

National Chemical laboratory Pune was established in 1950

15. Which is the chemical formula of red oxide?

- (1) Fe_2O_3 (2) FeO_3 (4) FeO (4) FeO_2

Sol. Answer is 1st option

Formula of red oxide is Fe_2O_3

16. In water purification Fullerene is used as

- (1) Fuel (2) Insulator (3) Catalyst (4) Reductant

Sol. Answer is 3rd option

17. Which block elements are called transition elements ?

- (1) S-block (2) P-block (3) D-block (4) F-block

Sol. Answer is 3rd option

D-block elements are known as transition elements.

18. What is chemical formula of rust on Iron ?

- (1) Fe_2O_3 (2) $\text{Fe}_2\text{O}_3\cdot\text{H}_2\text{O}$ (3) FeO (4) FeO_2

Sol. Answer is 2nd option

Chemical formula of rust is $\text{Fe}_2\text{O}_3\cdot\text{H}_2\text{O}$

19. What is the percentage of Al_2O_3 in Bauxite ?

- (1) 30 % to 70% (2) 35% TO 70 % (3) 30% TO 75% (4) 70% TO 75%

Sol. Answer is 1st option

20. Chemical formula of lime stone is
- (1) $\text{Ca}(\text{OH})_2$ (2) CaCO_3 (3) CaCl_2 (4) CCl_4
- Sol. Answer is 2nd option
Chemical formula of lime stone is CaCO_3
21. What is the condensed structural formula of alcohol ?
- (1) --- OH (2) --- CHO (3) --- COOH (4) --- NH_2
- Sol. Answer is 1st option
Condensed formula of Alcohol is --- OH
22. In which of the following elements does not consist isotopes ?
- (1) Carbon (2) Neon (3) Chlorine (4) Iodine
- Sol. Answer is 2nd option
Neon is inert gas does not form isotopes.
23. In which of the following ink silver nitrate is used ?
- (1) Voting ink (2) Writing ink (3) Printing ink (4) Marker pen ink
- Sol. Answer is 1st option
Silver nitrated is used in Voting ink.
24. To prevent the misuse of the important commercial solvent ethanol is mixed with
- (1) Methanol (2) Propanol (3) Ethanoic acid (4) Propane
- Sol. Answer is 1st option
Ethanol is mixed with methanol to avoid misuse known as Denatured alcohol
25. Chemical formula of cryolite is
- (1) NaAlF (2) Na_3AlF_6 (3) Na_2AlF_3 (4) Na_2AlF_2
- Sol. Answer is 2nd option
Chemical formula of Cryolite is Na_3AlF_6
26. Which of the following is not Dobereiner's Triade ?
- (1) Li, Na, K (2) Cl, K, Cr (3) Ca, Sr, Ba (4) Cl, Br, I
- Sol. Answer is 2nd option
Cl, K, Cr do not form Dobereiner Triad
27. By using only one of the two strands of DNA, mRNA is produced this process is called as
- (1) Transcription (2) Translation (3) Translocation (4) Replacement
- Sol. Answer is 1st option
Transcription is the process by which a strand of m-RNA is produced from DNA.
28. Identify phase in mitosis shown by : centromeres split and thereby sister chromatids of each chromosome separates and they are pulled apart in opposite direction.
- (1) Telophase (2) Prophase (3) Metaphase (4) Anaphase
- Sol. Answer is 4th option
In Anaphase stage sister chromatids pull apart in opposite direction.
29. If the embryonic cells are divided into two groups 8 days after the zygote formation then there is high possibility formation of
- (1) Genetically different twin girls (2) Siamese twins
(3) Genetically different twin boys (4) Genetically different one boy one girl
- Sol. Answer is 2nd option
Siamese twins are conjoined twins produced by division of zygote.

30. Which is the sequence of four whorls of flower from outside to inside ?
 (1) calyx → corolla → androecium → gynoecium (2) gynoecium → androecium → corolla → calyx
 (3) calyx → androecium → corolla → gynoecium (4) gynoecium → corolla → androecium → calyx
- Sol. Answer is 1st option
 Outermost whorls is calyx, followed by corolla androecium and gynoecium is centre.
31. Sunder ban sanctuary of West Bengal is reserved for which animals ?
 (1) Rhino (2) Bison (3) Tiger (4) Asiatic lion
- Sol. Answer is 3rd option
 Sunderban National Park is a tiger resource in West Bengal.
32. From the following which animal is warm blooded, presence of mammary glands and body divided into head, neck, trunk and tail.
 (1) Penguin (2) Tortoise (3) pigeon (4) Bat
- Sol. Answer is 4th option
 Bat is a mammal
33. In process of fermentation of production on wine from grapes which microorganism is used?
 (1) *Saccharomyces cerevisiae* (2) *Aspergilla's oryzae*
 (3) *Lactobacillus brevis* (4) *Aspergillus niger*
- Sol. Answer is 1st option
Saccharomyces cerevisiae is used for making wine from grapes.
34. Given below pairs proteins of produced by biotechnology and disease they are used against.
 Find the odd pair.
- | Proteins Produced | Diseases |
|--------------------|--------------|
| (1) Insulin | - Diabetes |
| (2) Erythropoietin | - Anemia |
| (3) Interleukin | - Cancer |
| (4) Interferon | - Hemophilia |
- Sol. Answer is 4th option
 Haemophilia is a genetic disease and cannot be cured with interferons.
35. Which factor from the following decreases efficiency of nervous system, liver as well as lifespan of person.
 (1) Tobacco (2) Gutkha (3) Alcohol (4) Stress
- Sol. Answer is 3rd option
 Alcohol effect nervous system, liver and life span of a person.
36. Who is responsible at the district level disaster management and implementation of rehabilitation schemes ?
 (1) Chief Minister (2) Home Minister (3) Collector (4) Tahsildar
- Sol. Answer is 3rd option

37. Identify the adrenal gland from the following figure



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

Sol. Answer is 4th option
D represent adrenal gland present above kidney.

38. Identify the correct sequence for process of energy production from carbohydrates.

- 1) Carbohydrates → Glycolysis → Pyruvic acid → Acetyl CoA → Krebs cycle → $\text{CO}_2 + \text{H}_2\text{O} + \text{energy}$
 (2) Carbohydrates → Glycolysis → Pyruvic acid → Krebs cycle → Acetyl CoA → $\text{CO}_2 + \text{H}_2\text{O} + \text{energy}$
 (3) Carbohydrates → Glycolysis → Acetyl CoA → Pyruvic acid → Krebs cycle → $\text{CO}_2 + \text{H}_2\text{O} + \text{energy}$
 (4) Carbohydrates → Glycolysis → Acetyl CoA → Krebs cycle → Pyruvic acid → $\text{CO}_2 + \text{H}_2\text{O} + \text{energy}$

Sol. Answer is 1st option
Carbohydrates are broken by glycolysis into pyruvic acid with converts into acetyl-co which than enters kreb cycle to produce CO_2 and H_2O and energy.

39. Identify the function of columnar epithelium

- (1) Selective transport of substances (2) Prevention of wearing of organs
 (3) Secretion of digestive juice (4) Reabsorption of useful materials from urine

Sol. Answer is 3rd option
Columnar epithelium secretes digestive juices in stomach.

40. Body structure of different animals is given below. Identify to which phylum the animal belongs.

- 1 Long cylindrical metamerically segmented
 2 Triploblastic bilaterally symmetrical eucoelomate
 3 They have satae or parapodia or suckers for locomotion.

- (1) Arthropoda (2) Annelida (3) Aschelminthes (4) Mollusca

Sol. Answer is 2nd option
Phylum Annelida shows all mentioned characters.

41. Who was the founder of modern Historiography ?

- (1) Voltair (2) Michel Foucault (3) Karl Marx (4) Mollusca

Sol. Answer is 1st option

42. Identify the wrong pair from the pairs feven below.

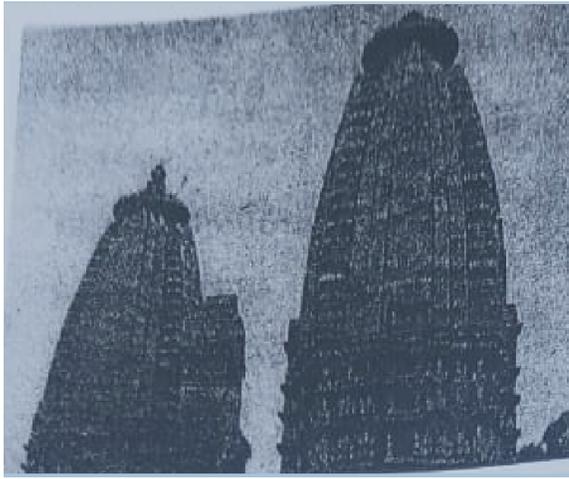
- (1) Who were the shudras - History of Subaltern
 (2) Stri Purush Tulana - Feminist writing
 (3) Cambridge History of India - Colonial Historiography
 (4) The indian war of independence - Marxist History

Sol. Answer is 4th option

43. The main Office of national Film Archives of india is at
- (1) Mumbai (2) Pune (3) Kolkata (4) Delhi.

Sol. Answer is 2nd option

44. Identify the style of the temple architecture that has been shown in the above picture ?



- (1) Dravid (2) Vesara (3) Nagara (4) Bhoomija

Sol. Answer is 3rd option

45. Who started the First English Newspaper in India ?

- (1) Alen Hume (2) Sir John Marshal
(3) James Augustus Hickey (4) Michel Foucault

Sol. Answer is 3rd option

46. Who is known as the first Keertankar of Maharashtra

- (1) Saint Dnyaneshwar (2) Saint Tukaram (3) Saint Namdev (4) saint Eknath

Sol. Answer is 3rd option

47. Write the name of the Wooden dolls made in Maharashtra.

- (1) Thaki (2) Kali Chandika (3) Gangavati (4) Champavati

Sol. Answer is 1st option

48. 'Bhilar' the village near Mahableshwar is famos as the village of ,...

- (1) Plants (2) Books (3) Forts (4) Mangoes

Sol. Answer is 2nd option

49. Identify the wrong pair from the famous museums and its location in India.

- (1) Kolkata Indian Museum (2) Delhi National Museum
(3) Hyderabad Salarjang (4) Mumbai The Calico Museum of Textiles

Sol. Answer is 4th option

50. Who said that, the prevailing practice of arranging historical events in a chronological order is not right ?

- (1) Michel Foucault (2) Seamaw The Bolya
(3) Leopold von Ranke (4) George Wilhelm Friendrich Hegel

Sol. Answer is 1st option

51. Which style of architecture has been used to build, Chhatrapati Shivaji Maharaj Railway Terminus' ?

- (1) Muslim (2) Nagara (3) Dravid (4) Indo Gothic

Sol. Answer is 4th option

52. 6th January is celebrated as Day
 (1) Right to information (2) Journalist (3) Dravid (4) Indo Gothic
 Sol. Answer is 2nd option
53. is the birthdate of Major Dhyhan Chand is celebrated as the 'National Sports Day' in India
 (1) 28 October (2) 29 August (3) 10 December (4) 14 April
 Sol. Answer is 2nd option
54. Under the leadership of socialist leader women in Mumbai participated in a demonstration which came to be known as 'Laatne Morcha'
 (1) Pramila Dandavate (2) Mrinal Gore (3) Gaura Devi (4) Dr. Phulrenu Guha
 Sol. Answer is 2nd option
55. Which industry is known as 'Sunrise Sector' of India ?
 (1) Jute Industry (2) Automobile industry (3) Cement Industry (4) Khadi and village industry
 Sol. Answer is 2nd option
56. In the year 1983, The Indian cricket team won the World Cup under the captainship of
 (1) Sunil Gavaskar (2) Sandip Patil (3) Sayyed Kirmani (4) Kapil Dev
 Sol. Answer is 4th option
57. Several attempts were made towards democratic decentralisation. One of these attempts the amendment to Indian constitution.
 (1) 71 and 72 (2) 72 and 73 (3) 73 and 74 (4) 74 and 75
 Sol. Answer is 3rd option
58. Identify the article of the Indian Constitution, which has established Election Commission as an autonomous body?
 (1) Art. 314 (2) Art - 324 (3) Art. 334 (4) Art. 344
 Sol. Answer is 2nd option
59. Who appoints the Election Commissioner in India ?
 (1) President (2) Prime Minister (3) Speaker of Lok Sabha (4) Vice President
 Sol. Answer is 1st option
60. Which one of the following is incorrect / wrong pair in concern with the region & the movement raised in it ?
 (1) Chota Nagpur - Ramoshi (2) Orissa - Gond
 (3) Maharashtra - Koli (4) Bihar - Munda
 Sol. Answer is 1st option
61. Which one of the following is irrelevant to the challenges faced by the Indian Democracy ?
 (1) Terrorism (2) Corruption
 (3) Naxalism (4) Environmental Degradation
 Sol. Answer is 4th option
62. The essence of Democracy is
 (1) Universal Adult Franchise (2) Decentralization of power
 (3) Policy of reservation of seats. (4) Judicial decisions
 Sol. Answer is 1st option
63. Identify the Nation which is not a Member of 'BRICS' an International Organization ?
 (1) India (2) England (3) China (4) Russia
 Sol. Answer is 2nd option

64. In 2005 The Indian. U.S Civil Nuclear Agreement was signed by The Prime Minister of india and George W. Bush the American President
 (1) Rajiv Gandhi (2) P.V. NarshimaRao
 (3) Dr. Manmohan Singh (4) AtalBihari Vajpayee
- Sol. Answer is 3rd option
65. India has no coastline along the..... Direction
 (1) East (2) West (3) South (4) North.
- Sol. Answer is 4th option
66. Identify the oddman out
 (1) Snow (2) hailstone (3) Ice (4) rainfall.
- Sol. Answer is 3rd option
67. Though India has higher national income as compared to Brazil, the per capita income of India is lower than Brazil because
- (1) The Population of India is more (2) The Population of India is less.
 (3) The Population of Brazil is more (4) The Population of Brazil and India is equal.
- Sol. Answer is 1st option
68. Identify the wrong statement, regarding Importance of Population
- (1) Expansion of trade (2) Rapid Industrialization
 (3) Tourism Development (4) Lack employment opportunities.
- Sol. Answer is 1st option
69. India too has a large longitudinal extent. The difference between the two extreme most points is
- (1) 110 (2) 120 (3) 130 (4) 140
- Sol. Answer is 2nd option
70. Find out the odd man out from given options.
 (1) Ganga (2) Sabarmati (3) Sindhu (4) Yamuna
- Sol. Answer is 2nd option
71. Which type of settlement has been found at the uneven topography of Himalaya ?
 (1) Nucleated (2) Linear (3) Dispersed (4) Star - Shaped
- Sol. Answer is 3rd option
72. Which one is not the mean of communication ?
 (1) Computer (2) Mobiles (3) Internet (4) Encyclopadia
- Sol. Answer is 4th option
73. Identify the correct option from pairs given below
- | <u>State</u> | <u>Travel Place</u> |
|----------------|---------------------|
| A. Maharashtra | I Udagmandalam |
| B. Rajasthan | II Masoori |
| C. Utrakhand | III Aajinta |
| D. Tamilnadu | IV Jaisalmer |
- (1) A - III, B - IV, C - II, D - I (2) A - IV, B = III, C - I, D - II
 (3) A - II, B - I, C - III, D - IV (4) A - I, B - II, C - IV, D - III
- Sol. Answer is 1st option
74. Which country do not share their border with Brazil ?
 (1) Argentina (2) Myanmar (3) Peru (4) French Guiana
- Sol. Answer is 2nd option

75. Identify the correct options of pairs given below.

- | | |
|----------------------------|----------------------------|
| 'A' Group | 'B' Group |
| (A) Temperate Grasslands | (I) Savanna |
| (B) Thorny Shrubs | (II) Amazon River Basin |
| (C) Tropical Grasslands | (III) Coatinga |
| (D) Equatorial forests | (IV) Pampas |
| (1) A-I, B-II, C-IV, D-III | (2) A-II, B-IV, C-III, D-I |
| (3) A-II, B-I, C-II, D-IV | (4) A-IV, B-III, C-I, D-II |

Sol. Answer is 4th option

76. Which river has been shown with letter 'A' in the given outline map of Brazil ?

- (1) Paraguay
 (2) Parana
 (3) Uruguay
 (4) Purus



77. is a large coastal island located between the mouths of River Amazon and River Tocantins

- (1) Sao Francisco (2) Marajo (3) Marcos (4) Rio

Sol. Answer is 2nd option

78. Identify the correct option of pairs given below

- | <u>Group 'A'</u> | <u>Group 'B'</u> | <u>Group 'C'</u> |
|---|------------------------------------|----------------------------|
| <u>Region</u> | <u>Average Rain fall</u> | <u>Type of Forest</u> |
| (A) Giana Highlands | (I) 1500 mm | (P) Temperature Grasslands |
| (B) Amazon Basin | (II) 600mm | (Q) Deciduous Forests |
| (C) Paraguay Parana Basin | (III) 1600mm | (R) Tropical Forest |
| (D) Brazilian Highland | (IV) 2000mm | (S) Equatorial Forest |
| (1) (1) A-III, R, B-IV S, C-I-Q, D-II-P | (2) A-IV-S, B-III-R, C-II-P, D-I-Q | |
| (3) A-I-P, B-II - Q, C-III-R, D-IV-S | (4) A-II-Q, B-I-P, C-IV-S, D-III-R | |

Sol. Answer is 1st option

79. Chose the correct option of favorable factors for highest population density

- (1) fertile land plain lands availability of water
 (2) fertile land agricultural development dry desert area
 (3) plain lands development of industry hilly regions
 (4) hilly regions dense forest area fertile land.

Sol. Answer is 1st option

80. In which district of Meghalaya the highest rainfall place Mawsynram is situated ?

- (1) Garo (2) Jaitiya (3) Khasi (4) Dispur

Sol. Answer is 3rd option

81. Which of the following two linear equations have only one unique solution $x = 2$ and $y = -3$.
- (1) $x + y = 1$; $2x - 3y = -5$ (2) $2x + 5y = -11$; $4x + 10y = 22$
(3) $2x - y = 1$; $3x + 2y = 0$ (4) $x - 4y - 14 = 0$; $5x - y - 13 = 0$

Sol. Answer is 4th option
 $x = 2, y = -3$
Putting in the option, we see

82. If $\alpha + \beta = -3$ and $\alpha\beta = -\frac{5}{2}$ then find the quadratic equation whose roots are α and β ?
- (1) $2x^2 - 5x + 6 = 0$ (2) $2x^2 - 6x + 5 = 0$ (3) $2x^2 + 6x - 5 = 0$ (4) $2x^2 - 6x - 5 = 0$

Sol. Answer is 3rd option
 $\alpha + \beta = -3, \alpha\beta = -5/2$
Roots are α, β
 \therefore Equation will be
 $x^2 - (\text{sum of roots})x + \text{product of roots} = 0$

$$x^2 + 3x + \left(\frac{-5}{2}\right) = 0$$

$$\Rightarrow 2x^2 + 6x - 5 = 0$$

83. What is the probability of having 53 Thursday in ordinary year (except leap year)?
- (1) $2/7$ (2) $3/7$ (3) $1/7$ (4) $4/7$

Sol. Answer is 3rd option
Normal year has 52 weeks.
But Number of days = 365
 $\therefore 52 \times 7 = 364$ days are covered in 52 weeks
 $\therefore 1$ remaining day can be Sun, Mon, Tue, Wed, Thurs, Fri, Sat.
 $\therefore P(1 \text{ remaining day} = \text{Thursday}) = \frac{1}{7}$

84. How many natural numbers between 15 to 500 when divided by 6 leave remainder 5?
- (1) 80 (2) 81 (3) 82 (4) 83

Sol. Answer is 2nd option
Natural Number = (15 to 500)
AP - 17, 23, 29.....497
 $a = 17, d = 6, a_n = 497$
 $\therefore a_n = a + (n-1)d$
 $497 = 17 + (n-1)6$
 $\rightarrow 6(n-1) = 480$
 $\rightarrow n = 81$

85. $\begin{vmatrix} 5 & 7 \\ 3 & 2 \\ 3 & 3 \\ 4 & 2 \end{vmatrix}$ Choose correct alternative for the value of determinat.

- (A) $\frac{1}{8}$ (B) $\frac{-1}{8}$ (C) $\left(\frac{-1}{2}\right)^3$ (D) $\frac{-1}{\sqrt[3]{512}}$

(1) A and C

(2) B, C and D

(3) A, B and C

(4) A, C and D

Sol. Answer is 2nd option

$$\left| \begin{array}{cc} \frac{5}{3} & \frac{7}{2} \\ \frac{3}{3} & \frac{3}{2} \end{array} \right| = \left(\frac{5}{3} \times \frac{3}{2} \right) - \left(\frac{3}{4} \times \frac{7}{2} \right)$$

$$= \frac{5}{2} - \frac{21}{8} = \frac{-1}{8}$$

86. If roots of the quadratic equation $3ax^2 + 2bx + c = 0$ are in the ratio 2:3 then which of the following statement is true?

(1) $8ac = 25b$

(2) $8ac = 9b^2$

(3) $8b^2 = 9ac$

(4) $8b^2 = 25ac$

Sol. Answer is 4th option

$$3ax^2 + 2bx + c = 0$$

Roots are in ratio = 3:2 $\therefore \alpha : \beta = 3:2$

$$\alpha + \beta = \frac{-2b}{3a} \quad \alpha\beta = \frac{c}{3a} \dots\dots (B)$$

$$\alpha^2 + \beta^2 + 2\alpha\beta = \frac{4b^2}{9a^2} \dots\dots (A)$$

$$A \div B = \frac{\alpha}{\beta} + \frac{\beta}{\alpha} + 2 = \frac{4b^2}{9a^2} \times \frac{3a}{c}$$

$$\frac{3b^2}{\alpha} + \frac{2}{3} + 2 = \frac{4b}{3ac} \Rightarrow 8b^2 = 25ac$$

87. In Arithmetic Progression there are n terms (n is odd) and middle term is m then what is $S_n = ?$

(1) $mn/2$

(2) mn

(3) $2mn$

(4) mn^2

Sol. Answer is 2nd option

Number of terms = n

Middle Term = m

$$S_n = 1$$

Let there be n term n = odd

$$\therefore \text{Middle term} = \frac{n+1}{2}$$

$$\therefore \frac{a_n + 1}{2} = m = a + \left(\frac{n+1}{2} - 1 \right) d$$

$$m = \frac{2a(n-1)d}{2}$$

$$\therefore S_n = \frac{n}{2} [2a + (n-1)d]$$

$$= \frac{n}{2} 2m \Rightarrow nm \Rightarrow S_n = nm$$

88. If $N = 70$, $h = 10$, $c.f. = 22$, $f = 10$, $L = 30$ then using this information find median?

- (1) 42 (2) 45 (3) 43 (4) 34

Sol. Answer is 3rd option

$$N = 70, h = 10, c.f = 22, f = 10$$

$$L = 30$$

$$\text{Median} = L + \frac{\left(\frac{n}{2} - cf\right)h}{f}$$

$$= 30 + \frac{(35 - 22)}{10}$$

$$\text{Median} = 43$$

89. Two dice are rolled simultaneously, what is the probability of getting sum of the digits on the upper face as a prime number?

- (1) $5/36$ (2) $5/12$ (3) $5/18$ (4) $11/36$

Sol. Answer is 2nd option

2 dies are rolled

Total sample space = 36

Sum as prime number =

- | | | |
|------------|---|-----------------|
| 2 - 1 way | } | 15 possible way |
| 3 - 2 ways | | |
| 5 - 4 ways | | |
| 7 - 6 ways | | |
| 11 - 2ways | | |

$$\therefore P(\text{sum} = \text{prime}) = 15/36 = 5/12$$

90. The number formed when 5 is subtracted after multiplying by 8 to the sum of digits of a two digit number is equal to the number formed when 3 is added after multiplying by 16 to the difference of digits in a number. what is the number?

- (1) 83 (2) 84 (3) 85 (4) 78

Sol. Answer is 1st option

Let the numbers xy on unit place = y , ten's place x (xy)

$$10x + y$$

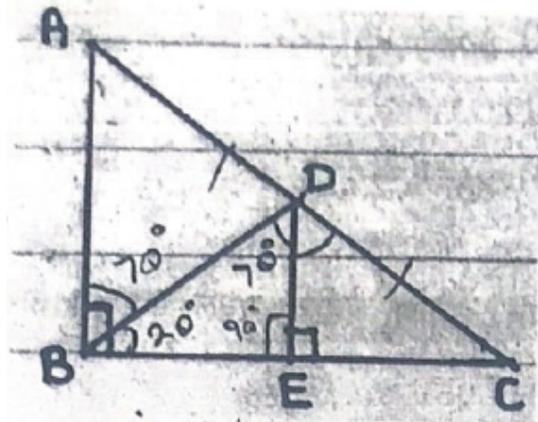
$$\text{ATQ, } 8(x + y) - 5 = 16(x - 4) + 3$$

$$8x + 8y - 5 = 16x - 16y + 3$$

$$24y = 8x + 8$$

$$\Rightarrow x + 1 = 3y$$

91. In the adjoining figure $\triangle ABC$ is a right angled triangle. Point D is the midpoint of hypotenuse AC. Segment $DE \perp$ side BC. $m\angle ABD = 70^\circ$ then find $m\angle CDE - m\angle DBE = ?$



- (1) 70° (2) 20° (3) 50° (4) 30°

Sol. Answer is 3rd option

Given

$\triangle ABC$ is its Δ

$AD = DC$

$DE \perp BC$

$\angle ABD = 70^\circ$

$\angle ABD = \angle BDE$ (70° each)

$\angle DEB = \angle ABC$ (90° each)

If D is the midpoint of AC, and D ABC is at Δ

\therefore D is the circumcentre

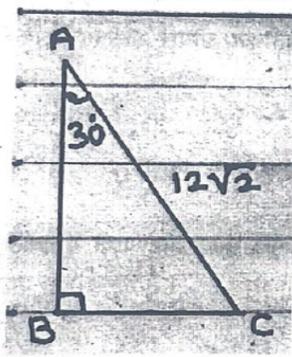
$\therefore AD = BD = CD$

$\therefore \angle DCE = 20^\circ$

$\therefore \angle CDE = 70^\circ$

$\therefore \angle CDE - \angle DBE = 70^\circ - 20^\circ$
 $= 50$

92. Observe the adjoining figure. From the given information the perimeter of the triangle is given below. Choose the correct alternative.



- (1) $(18\sqrt{2} + 6\sqrt{6})$ (2) $(6\sqrt{3} + 12\sqrt{2})$ (3) $(18 + 6\sqrt{3})\sqrt{2}$ (4) $(18 + 6\sqrt{6})\sqrt{2}$
 (1) A and B (2) A and C (3) C and D (4) only D

Sol. Answer is 2nd option

$$\angle C = 60^\circ$$

In a $30^\circ - 60^\circ - 90^\circ \Delta$

sides are in ratio

$$1 : \sqrt{3} : 2$$

$$\therefore 2x = 12\sqrt{2} \Rightarrow x = 6\sqrt{2}$$

$$\therefore BC = 6\sqrt{2} \text{ \& } AB = \sqrt{3} \times 6\sqrt{2} \Rightarrow 6\sqrt{6}$$

$$\text{Perimeter} = 6\sqrt{2} + 6\sqrt{6} + 12\sqrt{2}$$

$$\Rightarrow 18\sqrt{2} + 6\sqrt{6} \text{ ---(A)}$$

$$\Rightarrow \sqrt{2} (18 + 6\sqrt{3}) \text{ ---(C)}$$

93. Read the following statements carefully and choose the correct alternative

(A) The ratio of the circumference of a circle to its diameter is denoted by the Greek letter π .

(B) π is non terminating, recurring decimal fraction and its exact value is $\frac{22}{7} \left(\pi = \frac{22}{7} \right)$.

Alternatives

(1) Statements A and B false

(2) Statement A and B correct

(3) Statement A correct but B false

(4) Statement A false but B correct

Sol. Answer is 3rd option

$$A : \frac{C}{D} = \pi \quad (\text{correct})$$

B : π is non terminating, recurring (False)

94. Read the following statement carefully and choose the correct alternative.

(A) The slope of the line parallel to X-axis can be derived by the formula $\frac{x_2 - x_1}{y_2 - y_1}$

(B) The slope of the line parallel to Y-axis is 1

(C) The cotangent ratio of an angle made by the line with the positive direction of X-axis is called the slope of that line.

(D) The slope of the line which makes acute angle with X-axis is less than zero and the slope of the line making obtuse angle with X-axis is greater than zero.

Alternative:

(1) Statement A and B correct

(2) Statement C and D correct

(3) only statement C is wrong

(4) All statements are wrong

Sol. Answer is 4th option

$$A = \text{Slope of x-axis } \frac{x_2 - x_1}{y_2 - y_1} \text{ [False]}$$

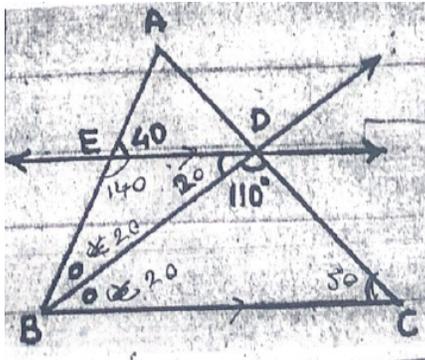
$$B = \text{Slope of y-axis} = 1 \text{ [False]}$$

$$C = \text{Slope} = \cot \theta$$

$$D = \text{False}$$

95. In the adjoining figure ray BD bisects $\angle ABC$ of $\triangle ABC$ seg ED \parallel side BC $m\angle AED = 40^\circ$ and $m\angle BDC = 110^\circ$ then find the measurements of $\angle EDB$ and $\angle DCB$ respectively. Choose the correct alternative from the following.

- (1) 20° and 50°
 (2) 50° and 20°
 (3) 40° and 50°
 (4) 40° and 70°



Sol. Answer is 1st option

BD bisects $\angle ABC$

ED \parallel BC

$\angle AED = 40^\circ$

$\angle BDC = 110^\circ$

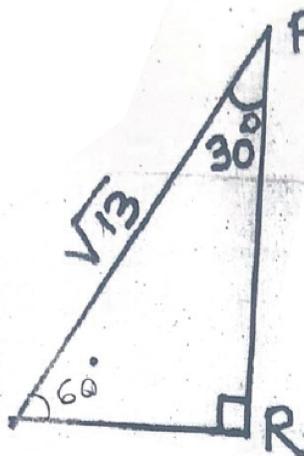
$\angle EDB ? \angle DCB = ?$

$2x = 40^\circ \implies x = 20 \implies \angle EDB = 20^\circ$

$\angle DCB = 180^\circ - (110 + 20) = 50^\circ$

96. In $\triangle PQR$ $\angle R = 90^\circ$, $\angle P = 30^\circ$ $PQ = \sqrt{13}$. From the given information find the value of $\operatorname{cosec} 60^\circ - \sec 60^\circ$?

- (1) $\left(\frac{2}{\sqrt{3}} - \frac{1}{\sqrt{3}}\right)$
 (2) $\left(\frac{\sqrt{13}}{2} - \frac{\sqrt{39}}{2}\right)$
 (3) $\left(\frac{\sqrt{39}}{2} - \frac{\sqrt{13}}{2}\right)$
 (4) $2\left(\frac{1}{\sqrt{3}} - 1\right)$



Sol. Answer is 4th option

$\angle R = 90^\circ$

$\angle P = 30^\circ$

$PQ = \sqrt{13}$

$\operatorname{cosec} 60^\circ - \sec 60^\circ$

$$\Rightarrow \frac{2}{\sqrt{3}} - 2 \Rightarrow 2\left(\frac{1}{\sqrt{3}} - 1\right)$$

$$\Rightarrow 2\left(\frac{1 - \sqrt{3}}{\sqrt{3}}\right)$$

97. In right angled triangle ABC $\angle MB = 90^\circ$ ΔABC is in the first and second quadrant on the graph paper. The co-ordinator of the points A and C are (2, 5) and (-2, 3) respectively. Find the possible pairs of co-ordinates of point B from the following alternative.

- (1) (-2, 5) or (2, 3) (2) (5, 2) or (3, 2) (3) (-2, 2) or (5, 3) (4) (2, -2) or (5, 3)

Sol. Answer is 1st option

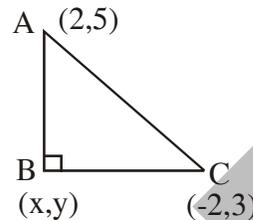
$$\text{Slope BC} = \frac{3 - y}{-2 - x}$$

$$\text{Slope AB} = \frac{5 - y}{2 - x}$$

$$\frac{(3 - y)(5 - y)}{-(2 + x)(2 - x)} = -1$$

$$\Rightarrow 15 - 3Y - 5Y + Y^2 = 4 - x^2$$

$$\Rightarrow x^2 + y^2 + 11 = 8y$$

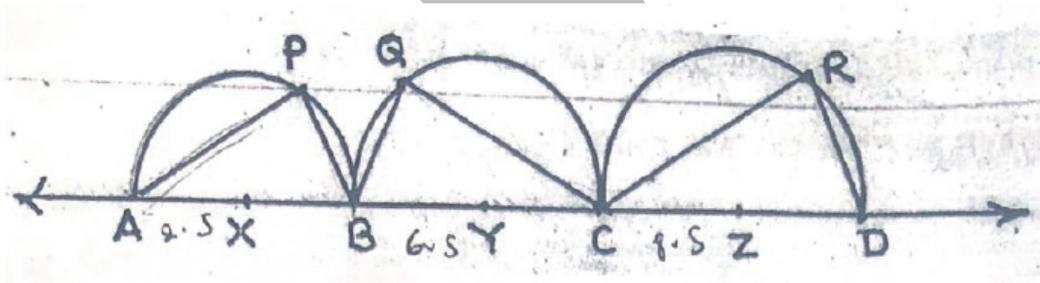


98. Choose the correct figure that has all the following properties.

- (A) Both the diagonals are congruent
 (B) It is called a rectangle
 (C) The perimeter of the figure is four times its length or breadth
 (D) It is a rhombus
- (1) Rhombus (2) Rectangle (3) Trapezium (4) Square

Sol. Answer is 4th option

99. In the figure, semi-circles are drawn whose centre are X, Y, Z respectively. Points (X, Y, Z) are collinear points (X-Y-Z) $AX = 2.5$, $BY = 6.5$, $CZ = 8.5$ and $AP + QC = 16$; $QC + CR = 27$ and $CR + AP = 19$ then find the value of $AP + PB + BQ + QC = CR + RD = ?$



- (1) 37 (2) 41 (3) 53 (4) 47

Sol. Answer is 4th option

$$AX = 2.5 \Rightarrow AB = 5$$

$$BY = 6.5 \Rightarrow BC = 13 \text{ -----Hypotenuse}$$

$$CZ = 8.5 \Rightarrow CD = 17$$

$$AP + QC = 16 \text{ ---(1)} \quad QC + CR = 27 \text{ ---(2)} \quad CR + AP = 19 \text{ ---(3)}$$

$$\therefore CR + AP - AP - QC = 19 - 16$$

$$CR - QC = 3 \text{ ---(4)}$$

$$(2) + (4) \Rightarrow 2CR = 30 \Rightarrow CR = 15$$

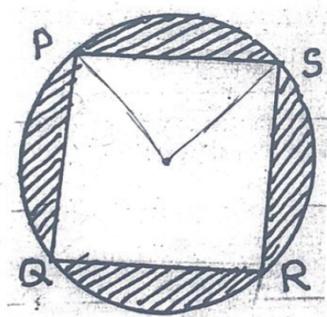
$$\therefore CR = 15, AP = 4, BP = 3, QB = 5, QC = 12, RD = 8$$

$$\begin{aligned}
 \therefore AP + PB + BQ + QC + CR + RD \\
 &= 15 + 8 + 12 + 5 + 3 + 4 \\
 &= 47
 \end{aligned}$$

100. In the figure PQRS is a cyclic quadrilateral. If the area of the shaded part is $\frac{72}{7}$ sq. units then find the radius of the circle.

- (1) $\sqrt{7}$ units
- (2) 4 units
- (3) 3 units
- (4) 2 units

Sol. BONUS



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