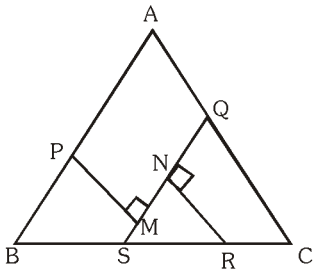
NATIONAL TALENT SEARCH EXAMINATION
(NTSE-2021) STAGE -1
STATE : HARYANA PAPER : SAT SET : A

Date: 13/12/2020

Max. Marks: 100 **SOLUTIONS** ***Time allowed: 120 mins***

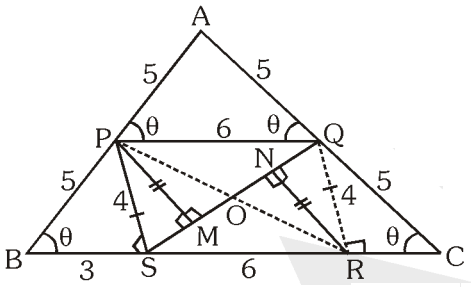
1. In the figure, in ΔABC, AB = AC = 10 cm and BC = 12 cm. P and Q are the midpoints of AB and AC, respectively. PM and RN are perpendiculars on SQ. If BS : SR ; RC = 1 : 2 : 1, then the length of MN is :



(1) $\frac{14}{\sqrt{13}}$cm (2) $\sqrt{13}$ cm (3) $\frac{12}{\sqrt{13}}$cm (4) $\frac{10}{\sqrt{13}}$cm

Ans. (4)

Sol.



P, Q are mid points of AB and AC

using mid-point theorem

$PQ \| BC, PQ = \frac{1}{2}BC = 6$

BS = 3, SR = 6, RC = 3

PQ = SR, $PQ \| SR$

Join diagonal PR, intersecting SQ at O

$\Delta RON \cong \Delta POM(A - S - A)$

CPCT OM = ON

OS = OQ, SM = QN

MN = 2(OM) = 2(ON)

PQRS $\rightarrow$ parallelogram

ar(ΔSPQ) = ar(ΔSRQ)

$$\frac{1}{2} \times SQ \times PM = \frac{1}{2} \times SQ \times RN$$

PM = RN

$\Delta PBS \cong \Delta QCR(S - A - S)$

$\angle PSR = \angle QRS = 90^\circ$ (co-interior), PQRS $\rightarrow$ Rectangle

$$SQ = \sqrt{6^2 + 4^2} = \sqrt{36 + 16} = \sqrt{52} = 2\sqrt{13}$$

$$OR = OQ = OS = OP = \sqrt{13}$$

$$ar(\Delta ORQ) = \frac{1}{4} \times (6 \times 4) = 6$$

$$ar(\Delta ORQ) = \frac{1}{2} \times OQ \times NR = 6 \Rightarrow NR = \frac{12}{\sqrt{13}}$$

$$ON = \sqrt{OR^2 - NR^2} = \sqrt{13 - \frac{144}{13}} = \sqrt{\frac{25}{13}} = \frac{5}{\sqrt{13}}$$

$$MN = 2(ON) = 2 \times \frac{5}{\sqrt{13}} = \frac{10}{\sqrt{13}}$$

2. Which one is the incorrect statement ?

(1) The activities in primary, secondary and tertiary sector are interdependent.

(2) Workers in the tertiary sectors do not produce goods.

(3) Irrigating his field by a farmer is an economy activity.

(4) None of the above

Ans. (3)

3. Where was Indian National Congress founded in 1885 ?

(1) Poona (2) Calcutta (3) Bombay (4) Sabarmati

Ans. (3)

Sol. On 28 December 1885, the Indian National Congress was founded at Gokuldas Tejpal Sanskrit College in Bombay, with 72 delegates in attendance. Hume assumed office as the General Secretary, and Womesh Chunder Bonnerjee of Calcutta was elected President.

4. Choose the hormone which regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth :

(1) adrenaline (2) insulin (3) thyroxin (4) oestrogen

Ans. (3)

Sol. Thyroxine is the hormone which regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth.

5. The first DMU Train of India with solar power coaches was launched in which of the following station ?

(1) Gorakhapur Railway Station (2) Safdarjung Railway Station

(3) Delhi Cantonment Railway Station (4) Ambala Cantonment Railway Station

Ans. (2)

6. Sexual reproduction in human beings involves the introduction of sperms in the vagina of the female after that in which part of the female reproductive system fertilization takes place ?

(1) ovary (2) uterus (3) cervix (4) fallopian tube

Ans. (4)

Sol. Fertilization takes place in fallopian tube.

7. In 1928 whose image was used popularised Baby Products India ?

(1) Sweet little girl (2) Innocent boy (3) Lord Krishna (4) Balak (Dhruv)

Ans. (3)

Sol. In early 20th century, the image of Baby Krishna was used to popularise baby products like gripe water, etc.

8. The flower which contains both stamens and carpels they are called bisexual flowers which of the following flower pair is bisexual ?

(1) papaya, watermelon (2) hibiscus, mustard (3) cucumber, maize

(4) muskmelon, pumpkin

Ans. (2)

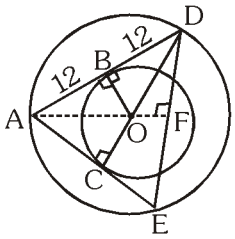
Sol. Hibisucs and mustard are bisexual flower.

9. Two concentric circles with center O, have radii 15 cm and 9 cm. From a point A on the bigger circle tangents AB and AC are drawn to the smaller circle at B and C, respectively, intersecting bigger circles at D and E, respectively. OF $\perp$ DE at F. The length of OF is :

(1) 3.8 cm (2) 4.2 cm (3) 4.5 cm (4) 5.1cm

Ans. (2)

Sol.



OB = 9
OD = 15

$\Delta OBD, BD^2 = \sqrt{OD^2 - OB^2} = \sqrt{15^2 - 9^2}$

BD = 12 = AB

(AB = AC), similarly AC = EC = 12

AD = AE, ΔADE is isosceles triangle

join AO, AF is perperdicular bisector

let OF = x, ΔOFD, $x^2 + DF^2 = 15^2$ ....(1)

ΔAFD, $(15 + x)^2 + DF^2 = 24^2$ ....(2)

subtract (1) from (2)

$(15 + x)^2 - x^2 = 24^2 - 15^2$

$(15)(15 + 2x) = 9 \times 39$

$$15 + 2x = \frac{9 \times 39}{15} = \frac{3 \times 39}{5}$$

$$2x = \frac{3 \times 39}{5} - 15 = \frac{117 - 75}{5}$$

$$2x = \frac{42}{5}, x = \frac{21}{5} = 4.2\text{cm}$$

10. Where was 'cattle - Plague' spread in 1890 ?

(1) India (2) Africa (3) Europe (4) China

Ans. (2)

Sol. The rinderpest epidemic of the 1890's was apparently the first in Africa; it swept through a whole continent of susceptible animals at a time when the only country to have a veterinary service was Cape Colony, and when the ox was the principal means of transport.

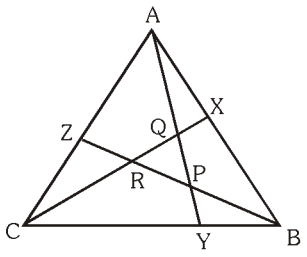
11. From A. D. 768 to 770 who introduced the hand Printing technology in Japan ?

(1) Chinese People (2) Chinese Government (3) Christian Missionaries (4) Buddhist Missionaries

Ans. (4)

Sol. The Buddhist missionaries from China introduced hand-printing technology into Japan around 768 - 770 AD.

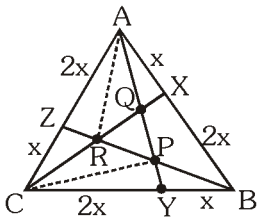
12. In the figure, ABC is a an equilateral triangle with side 14 cm, AX= $\frac{1}{3}$ AB, BY= $\frac{1}{3}$ BC and CZ= $\frac{1}{3}$ AC. What is the area (in cm^2) of ΔPQR ?



(1) $7\sqrt{3}$ (2) $14\sqrt{3}$ (3) $\frac{28\sqrt{3}}{9}$ (4) $\frac{49\sqrt{3}}{9}$

Ans. (1)

Sol.



Let AB = BC = CA = 3x = 14

AX = x = BY = CZ

BX = CY = AZ = 2x

join AR, BQ, CP

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

$\Delta BCZ \cong \Delta CAX \cong \Delta ABY$ (S–A–S), CPCT

ar(ΔBCZ) = ar(ΔCAX) = ar(ΔABY)

$\Delta CZR \cong \Delta AXQ \cong \Delta BYP$ (A–S–A)

ar(ΔCZR) = ar(ΔAXQ) = ar(ΔBYP) = A (let)

ar(ΔCRP) = ar(ΔARQ) = ar(ΔBQP) = B (let), ar(PQR) = C

$$\frac{ar(\Delta QCY)}{ar(\Delta QBY)} = \frac{C+B+2A}{B+A} = \frac{2}{1}, \quad \frac{ar(\Delta ABZ)}{ar(\Delta BCZ)} = \frac{5A+2B+C}{4A+B} = \frac{2}{1}$$

$C = B, \; C = 3A$

$$ar(\Delta ABC) = 9A + 3B + C = 3C + 3C + C = 7C = \frac{(14)^2\sqrt{3}}{4} \Rightarrow C = 7\sqrt{3}$$

$ar(\Delta PQR) = 7\sqrt{3} \text{ cm}^2$

13. Choose, the incorrect statement:

(1) A country which is not Republic is also not democratic.

(2) A state which has elected head is called as republic.

(3) In Britain King / Queen is the head of state.

(4) USA has elected head.

Ans. (1)

Sol. As with other democracies, not all persons in a democratic republic are necessarily citizens, and not all citizens are necessarily entitled to vote.

14. Which state has highest national park in India out of the following ?

(1) Gujarat (2) Assam (3) Madhya Pradesh (4) Andhra Pradesh

Ans. (3)

15. Choose correct statement for human :

(1) Arteries always carry oxygenated blood while veins always carry deoxygenated blood.

(2) Arteries are provide with valves while veins are devoid of valves.

(3) Arteries always carry blood away from heart, while veins always carry blood towards the heart.

(4) Venous blood is returned to left auricle.

Ans. (3)

Sol. Arteries always carry blood away from the heart.

Veins always carry blood towards the heart.

16. pH of .001 M NaOH will be :

(1) .001 (2) 1 (3) 10^{-3} (4) 11

Ans. (4)

Sol. $[OH^-] = 10^{-3}$

$pOH = -\log(10^{-3}) = 3$

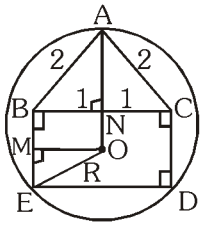
$pH = 14 - pOH = 14 - 3 = 11$

17. ABEDC is a pentagon such that ABC is an equilateral triangle and BEDC is a square of side 2 cm. A circle passes through its vertices A, E and D. What is the circumference (in cm) of the circle ?

(1) $3\sqrt{3}\,\pi$ (2) $4\sqrt{3}\,\pi$ (3) $4\,\pi$ (4) $8\,\pi$

Ans. (3)

Sol.



Draw perpendicular $OM \perp BE$, $BE = 2$

Let $BM = x$, $ME = 2 - x$ $(OM = NB = 1), (ON = BM = x)$

ΔMOE, $OM^2 + ME^2 = OE^2$

$1 + (2 - x)^2 = R^2$ ...(1)

AN = height of $\Delta ABC = \dfrac{2\sqrt{3}}{2} = \sqrt{3}$

$AO = R = AN + ON = \sqrt{3} + x$ ....(2)

$1 + (2 - x)^2 = (x + \sqrt{3})^2$

$1 + 4 + x^2 - 4x = x^2 + 3 + 2x\sqrt{3}$

$x(2\sqrt{3} + 4) = 2$

$x = \dfrac{2}{2\sqrt{3}+4}, R = \sqrt{3} + \dfrac{2}{2\sqrt{3}+4}$

$R = \dfrac{6+4\sqrt{3}+2}{2\sqrt{3}+4} = r = \dfrac{4(2+\sqrt{3})}{2(2+\sqrt{3})}$

$R = 2$

circumference $= 2\pi R = 4\pi$ .. ..(3)

18. Who said state is Association of associations ?

(1) Plato (2) M. K. Gandhi (3) Machiavelli (4) Aristotle

Ans. (BONUS (4))

Sol. Aristotle said that state is association of associations.

19. The crossing of homozygous tall plant with a dwarf would yield plants in the ratio of :

(1) two tall and two dwarf

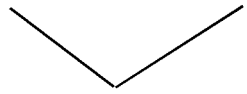
(2) one homozygous tall, one homozygous dwarf and two heterozygous tall

(3) all homozygous tall

(4) all homozygous dwarf

Ans. (Bonus)

Sol. Homozygous Tall (TT) Homozygous dwarf (tt)



(Tt) (F_1 generation Heterozygous Tall plants)

↓

Selfing

	T	t
T	TT	Tt
t	Tt	tt

F_2 generation Phenotypic ratio Tall : Dwarf **3 : 1**

Genotypic ratio TT : Tt : tt

1 : 2 : 1

If F_2 generation is considered then the asnwer would be (b)

Else it will be a **bonus.**

20. One mole of SO_2 means :

(1) 6.4 g of SO_2 (2) 2.24 L gas at STP

(3) 6.022×10^{23} molecules of SO_2 (4) 64 L of gas

Ans. (3)

Sol. 1 mole of SO_2 contains 6.022×10^{23} molecules or SO_2.

21. Growing two or more crops but indefinite row pattern is known as :

(1) intercropping (2) crop rotation (3) mixed farming (4) mixed cropping

Ans. (4)

Sol. Growing two or more crops but indefinite row pattern is called mixed cropping

22. Which of the following hill station is one of the "Eco-Hot Spot" in India ?

(1) Drass (Ladakh) (2) Pachmarhi (M.P.) (3) Palampur (H.P.) (4) Amboli (Maharashtra)

Ans. (4)

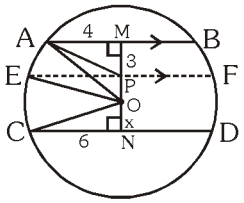
Sol. Amboli is one of the world's "Eco Hot-Spots" in India. It is situated in the state of Maharashtra at an altitude of 690 meters.

23. Two parallel chords AB and CD in a circle are of lengths 8 cm and 12 cm, respectively and the distance between them is 6 cm. The chord EF, parallel to AB and CD and midway between them is of length $\sqrt{k}$, where k is equal to:

(1) 100 (2) 140 (3) 144 (4) 150

Ans. (2)

Sol.



MN = 6, AB = 8, CD = 12 (AB || EF || CD)

MP = PN = 3, AM = 4, CN = 6

Let ON = x, MP = 3, OP = 3 – x

ΔAMO, $R^2 = 4^2 + (6 - x)^2$ ....(1)

ΔCNO, $R^2 = 6^2 + x^2$ ....(2)

subtract (1) from (2)

$0 = 6^2 - 4^2 + x^2 - (6 - x)^2$

$x^2 - (6 - x)^2 = 4^2 - 6^2$

$6(2x - 6) = (10)(-2)$

$12x - 36 = -20 = 12x = 16$

$$x = \frac{4}{3}, OP = 3 - \frac{4}{3} = \frac{5}{3}$$

$$R^2 = \frac{340}{9}$$

ΔEPO

$$EP^2 + \frac{25}{9} = \frac{340}{9}$$

$$EP^2 = \frac{340}{9} - \frac{25}{9} = \frac{315}{9}$$

$EP = \sqrt{35}$

$EF = 2\sqrt{35} = \sqrt{4 \times 35} = = \sqrt{140} = \sqrt{k}$

k = 140

24. Who personified the statue of liberty as female figure ?

(1) french artists (2) British artists (3) American artists (4) All of the above

Ans. (1)

Sol. French artist personified liberty as a female statue. we can recognize it by torch of enlightenment she is bearing in one hand and the charter of rights of man in the other.

25. Which of the following is correctly matched ?

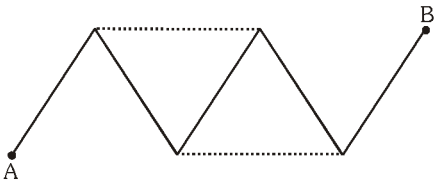
(1) Mettur Dam - Krishna River (2) Koyna Dam - Kaveri River

(3) Pravara Dam - Godavari River (4) Narora Dam - Ganges River

Ans. (4)

Sol. Narora is located on the banks of river Ganges, in district Bulandshahar, Uttar Pradesh. Narora has several bathing locations or steps (Ghats) for holy dip in the Ganges. The view from Narora Dam is very scenic.

26. Five identical resistance wires of 1Ω each, are connected as shown in figure as clear lines. If two similar wires are added as shown by dashed lines, find the change in resistance between A & B :



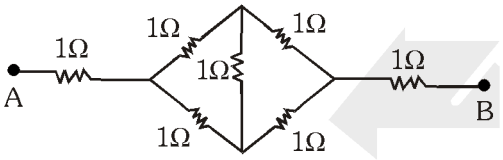
(1) $2\ \Omega$ (2) $1\ \Omega$ (3) $3\ \Omega$ (4) $4\ \Omega$

Ans. (1)

Sol. Initial Resistance :

Five Resistance in series , $1\ \Omega$ each, $= 5\ \Omega$

Final circuit will become wheatstone bridge,



$\therefore$ Net Resistance will be $3\ \Omega$

so, the change in resistance will be $5\ \Omega - 3\ \Omega = 2\ \Omega$

27. When sound is refracted from air to water, which of the following will remain unchanged ?

(1) Frequency (2) Wavelength (3) Wave number (4) Wave velocity

Ans. (1)

Sol. Frequency of a wave is always constant it is independent of the medium

28. The reaction of burning of carbon in oxygen is represented by equation

$C(s) + O_2(g) \rightarrow CO_2(g) + \text{heat} + \text{Light}.$

When 9.0 g of solid carbon in burnt in 16.0 g of oxygen gas the mass of carbon dioxide gas formed would be :

(Note: atomic mass of C = 12.0 μ, 0= 16.0 μ)

(1) 2.33 g (2) 22.0 g (3) 25.0 g (4) 33.00 g

Ans. (2)

Sol. O_2 is limiting regent, 0.5 mole of O_2 gives 0.5 moles of CO_2.

$\therefore$ Amount of $CO_2 = 22g$

29. Which one among the following metal is more reactive than hydrogen ?

(1) Mercury (2) Copper (3) Silver (4) Tin

Ans. (4)

Sol. Tin is placed at higher position in reactivity series.

30. Which of the following compound do not contain aldehydic group (-CHO) in them ?

A. Formaldehyde B. Propanal C. Butanol D. Pentan-3-one

E. 3- Methyl hexanal

(1) C & D (2) D & E (3) A & C (4) B & C

Ans. (1)

Sol. Butanol is an alcohol, pentan–3–one is a ketone.

31. Comparing different countries as per Human Development Index, which of the following is/are the basis of ranking:

(i) Literacy rate of people (ii) Health status of people (iii) Per capita income

(1) only (i) and (ii) (2) only (iii) (3) only (i) and (iii) (4) All of the above

Ans. (4)

Sol. Literacy rate, health, PCI are the basis of comparing different countries as per Human Development Index.

32. Match the following column with A and B in a correct manner and answer.

Column - A	**Column - B**
(a) Manchester of India	(i) Information Technology
(b) Sunrise Industry	(ii) Jute
(c) Natural fiber	(iii) Ahraadabad
(d) Silicon valley of India	(iv) Bangalore

(1) a (ii), b (iv), c (i), d (iii) (2) a (iv), b (ii), c (iii), d (i)

(3) a (i), b (iii), c (iv), d (ii) (4) a (iii), b (i), c (ii), d (iv)

Ans. (4)

Sol. a) The city of Ahmedabad in the Gujarat state is famously known as the "Manchester City of India".

b) A new and growing industry especially in electronics and telecommunications is known as the sunrise industry

c) Natural fibers sourced from the plant kingdom include cotton, flax, hemp, bamboo, sisal, and jute.

d) Bangalore is widely regarded as the "Silicon Valley of India" because of its role as the nation's leading information technology (IT) exporter.

33. Electrolysis of sodium chloride produces a gas A when A is passed through solution of compound B another compound C is formed which is used as oxidizing agent in many chemical industries A, B and C will be respectively:

(1) CO_2 NaCl $NaHCO_3$

(2) CO_2 $Ca(COOH)_2$ CaC_2

(3) Cl_2 $Ca(OH)_2$ $CaOCl_2$

(4) Cl_2 Na_2CO_3 NaCl

Ans. (3)

Sol. $NaCl(aq) \rightarrow NaOH(aq) + H_2(g) + Cl_2(g)$

$Cl_2 + Ca(OH)_2 \rightarrow CaOCl_2$

(A) (B) (C)

34. Where was first Printing developed in 1430?

(1) England (2) Germany (3) America (4) France

Ans. (2)

Sol. In Germany, the first printing press developed in 1430.

35. An octahedral die whoso faces are numbered 1 through 8 (only one number on one face) is thrown three times. What is the probability that the product of the numbers obtained in first two throws is equal to the number obtained in the third throw ?

(1) $\frac{9}{216}$ (2) $\frac{3}{128}$ (3) $\frac{3}{64}$ (4) $\frac{5}{128}$

Ans. (4)

Sol. Total possible $= 8^3$

$= 512$

Possible favourable outcomes

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

(1, 6, 6) (1, 7, 7) (1, 8, 8) (2, 1, 2) (3, 1, 3)

(4, 1, 4) (5, 1, 5) (6, 1, 6) (7, 1, 7) (8, 1, 8)

(2, 2, 4) (2, 3, 6) (3, 2, 6) (2, 4, 8) (4, 2, 8)

$= 20$

$P = \frac{20}{512} = \frac{5}{128}$

36. On which date Bengal was partitioned by British Government in 1905 ?

(1) 10 October (2) 12 October (3) 14 October (4) 16 October

Ans. (4)

Sol. The partition separated the largely Muslim eastern areas from the largely Hindu western areas on 16 October 1905 after being announced on 19 July 1905 by Lord Curzon, the then Viceroy of India.

37. Two metal pieces when imiaowad m liquid experience aqual upthrust on them, then :

(1) Moth pieces must have equal weights

(2) Both pieces must have equal densities

(3) Both pieces must have equal volumes

(4) Both pieces must are at equal depths.

Ans. (3)

Sol. UPTHRUST = Vfg,

V = Volume immersed of an object or volume of liquid displaced

f = Density of liquid

g = Acceleration due to gravity

38. In an imaginary economy, the monetary value of contributions of private sector, public sector, primary sector, secondary sector and tertiary sector arc Rs. 500, Rs. 1,000, Rs. 10,000, Rs. 5,000 and Re. 7,000. The Gross Domestic Product of the economy is :

(1) Rs. 23.500 (2) Rs. 22,000 (3) Rs. 23,000 (4) Rs. 22,500

Ans. (2)

39. If $\frac{\sqrt{28-10\sqrt{3}}+\sqrt{7+4\sqrt{3}}}{\sqrt{16+6\sqrt{7}}} = a+b\sqrt{7}$, then what is the value of (2a + b) ?

(1) 7 (2) 14 (3) $15\frac{1}{2}$ (4) $17\frac{1}{2}$

Ans. (4)

Sol. $\frac{\sqrt{28-10\sqrt{3}}+\sqrt{7+4\sqrt{3}}}{\sqrt{16+6\sqrt{7}}} a+b\sqrt{7}$

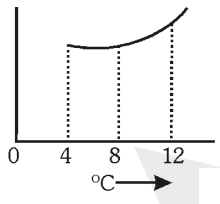
$$=\frac{\sqrt{\left(5-\sqrt{3}\right)^2}+\sqrt{\left(2+\sqrt{3}\right)^2}}{\sqrt{\left(3+\sqrt{7}\right)^2}}$$

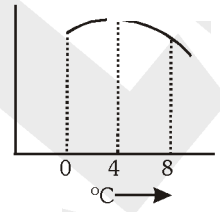
$$=\frac{\left(5-\sqrt{3}\right)+\left(2+\sqrt{3}\right)}{3+\sqrt{7}}=\frac{7}{3+\sqrt{7}}\times\frac{3-\sqrt{7}}{3-\sqrt{7}}=\frac{21-7\sqrt{7}}{2}$$

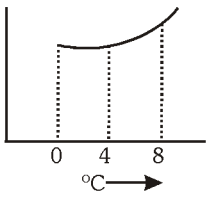
$$=\frac{21}{2}-\frac{7}{2}\sqrt{7}=a+b\sqrt{7} \text{ Compare } a=\frac{21}{2},\ b=-\frac{7}{2}$$

$$=2a+b=2\left(\frac{21}{2}\right)-\frac{7}{2}=\frac{42-7}{2}=\frac{35}{2}=17\frac{1}{2}$$

40. Which of the following curves best represent the variation in density of water with temperature :

(1)


(2)


(3)


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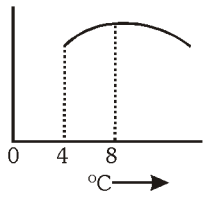


Ans. (2)

Sol. Water has maximum density at 4° C

41. The number of neutrons in $^{27}_{13}Al$ is :

(1) 40 (2) 27 (3) 14 (4) 13

Ans. (3)

Sol. $^{27}_{13}Al$ number of nuetrons = 27 – 13 = 14.

42. There are three types of muscle fibers, striated, unstriated and cardiac muscles. Choose the correct statement for unstriated muscles :

(1) cylindrical, unbranched, nonstriated, multinucleate and involuntary

(2) spindle shaped, unbranched, unstriated, uninucleate and involuntary

(3) spindle shaped, unbranched, non striated, multinucleate and involuntary

(4) cylindrical, striated, unbranched, multinucleate and voluntary

Ans. (2)

Sol. Unstriated muscles are spindle shaped, unbranched, uninucleated and involuntary.

43. Who was the author of the famous book "Hind Swaraj" ?

(1) Mahatma Gandhi (2) S. C. Bose (3) Bhagat Singh (4) Sarojini Naidu

Ans. (1)

Sol. Hind Swaraj or Indian Home Rule is a book written by Mohandas K. Gandhi in 1909.

44. If $ax^3 + bx + c$ is divisible by $x^2 + dx + 1$, then ;

(1) $a^2+b^2=ac$ (2) $a^2-c^2=ac$ (3) $a^2-b^2=ac$ (4) $a^2+c^2=ab$

Ans. (2)

Sol. $ax^3 + bx + c = (x^2 + dx + 1)(ax + k)$

$= ax^3 + kx^2 + adx^2 + dxk + ax + k$

$= ax^3 + x^2(k + ad) + x(dk + a) + k$

compare, $k + ad = 0$, $dk + a = b$, $k = c$

$ad = -c$, $dc = b - a$

$$\Rightarrow \left(-\frac{c}{a}\right)c = b - a \Rightarrow a^2 - c^2 = ab$$

45. Match the items of Column - I with Column - II and choose the correct option :

Column - I	**Column - II**
a. $4HNO_3 + C \rightarrow 4NO_2 + CO_2 + 2H_2O$	(i) Double displacement
b. $2KClO_3(s) \xrightarrow[MnO_2]{heat} 2KCl + 3O_2$	(ii) Displacement
c. $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$	(iii) Oxidation - reduction
d. $N_2 + 3H_2 \xrightarrow[410°C]{Fe} 2NH_3$	(iv) Decomposition
e. $Na + CuSO_4 \rightarrow Na_2SO_4 + Cu(s)$	(v) Combination

(1) a - v, b - iii, c - ii, d - i, e - iv (2) a - iii, b - iv, c - i, d - v, e - ii

(3) a - ii, b - iii, c - iv, d - v, e - i (4) a - iv, b - iii, c - ii, d - v, e- i

Ans. (2)

Sol. (a) Carbon undergoes oxidation while N in HNO_3 undergoes reduction.

(b) $KClO_3$ decomposes into KCl and O_2– decomposition.

(c) Exchange of ions takes place –double displacement.

(d) Nitrogen and hydrogen combine to form ammonia–combination.

(e) Sodium displaces copper from its salt solution–displacemnt.

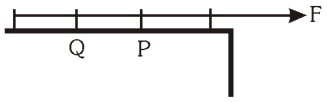
46. Medulla oblongata is a part of hind brain and is located beneath the cerebellum. It controls various functions of body through number of centers. Which function of body is controlled by this ?

(1) heart beat (2) rate of respiration (3) secretion of saliva (4) all of the above

Ans. **(4)**

Sol. Heart beat, rate of respiration and secretion of saliva are controlled by Medulla oblongata.

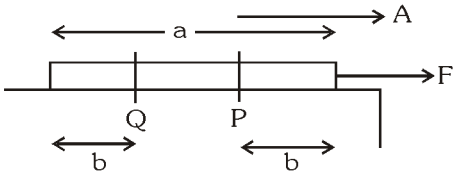
47. A force 'F' is applied on one end of a rope of length 'a'. P and Q are two points of length 'b' from nearest end. The ratio of tensions in string at P & Q is :



(1) b/(a – b) (2) (a – b)/b (3) (a – 2b)/b (4) b/(a – 2b)

Ans. **(2)**

Sol.



Let mass of rope = M

F = M A ——(1)

Where , A = acceleration of rope

Now , at point P , Let the tension be T_P

$T_P = m_pA$; m_p = Mass pulled by point P ——(2)

$$m_p = \frac{M}{a}(a-b)$$

$$\therefore T_P = \frac{M}{a}(a-b)\left(\frac{F}{M}\right) \text{ (Using (1) \& (2))}$$

Similarly : At point Q , $T_Q = m_QA$

$$T_Q = \frac{M}{a}(b)\left(\frac{F}{M}\right)$$

$$\therefore \frac{T_P}{T_Q} = \left(\frac{a-b}{b}\right)$$

48. Through which one of the following group of Asian Countries does tropic of cancer pass ?

(1) India, Saudi Arabia & Sri lanka (2) India, Bangladesh & Indonesia

(3) Saudi Arabia, United Arab Emirates & Oman (4) Venezuela, Ethiopia & Indonesia

Ans. **(3)**

Sol. Tropic of Cancer passes through saudi arabia, united arab emirates and indonesia.

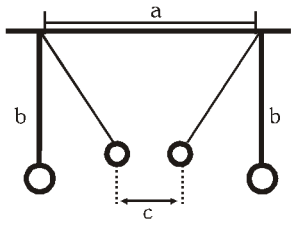
49. Vinegar is prepared from :

(1) Ethanoic acid (2) Citric acid (3) Methanoic acid (4) Butanoic acid

Ans. **(1)**

Sol. Vinegar is prepared from ethanoic acid

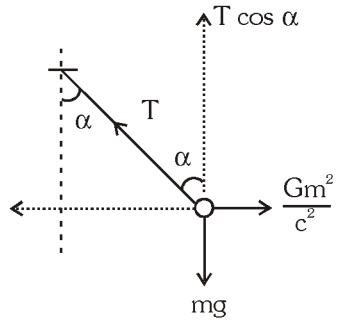
50. Two masses of 'm' each are suspended side by side at distance 'a', by two equal threads of length 'b'. If 'α' is the angle that threads make with vertical due to attracation between masses, then α =



(1) $\tan^{-1}\left(\frac{cg}{mG}\right)$ (2) $\tan^{-1}\left(\frac{mG}{c^2g}\right)$ (3) $\tan^{-1}\left(\frac{cg}{m^2G}\right)$ (4) $\tan^{-1}\left(\frac{c^2g}{mG}\right)$

Ans. **(2)**

Sol.



At equilibrium,

$T\cos\alpha = mg$ ——(1)

$T\sin\alpha = \frac{Gm^2}{c^2}$ ——(2)

Using (1) & (2) ,

$\tan\alpha = \frac{Gm}{c^2g}$

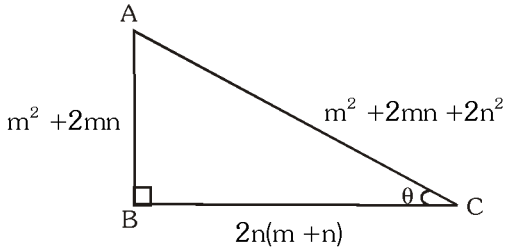
$\therefore \alpha = \tan^{-1}\left(\frac{mG}{c^2g}\right)$

51. If $\sin\theta = \frac{m^2+2mn}{m^2+2mn+2n^2}$, then $\frac{1}{\sec\theta-\tan\theta} - \frac{1}{\cos\theta}$ is equal to :

(1) $\frac{m^2+mn}{n^2+2mn}$ (2) $\frac{n^2+mn}{m^2+mn}$ (3) $\frac{m^2+mn}{n^2+mn}$ (4) $\frac{m^2+2mn}{2(n^2+mn)}$

Ans. (4)

Sol. Given $\sin\theta = \frac{m^2+2mn}{m^2+2mn+2n^2}$



$\sin\theta = \frac{AB}{AC} = \frac{m^2+2mn}{m^2+2mn+2n^2}$

$\frac{1}{\sec\theta-\tan\theta} - \frac{1}{\cos\theta} = \frac{\cos\theta}{1-\sin\theta} - \frac{1}{\cos\theta} = \frac{\cos^2\theta-1+\sin\theta}{\cos\theta(1-\sin\theta)} = \frac{\sin\theta-\sin^2\theta}{\cos\theta(1-\sin\theta)}$

$\frac{\sin\theta}{\cos\theta} = \tan\theta = \frac{AB}{BC} = \frac{m^2+2mn}{2n(m+n)} = \frac{m^2+2mn}{2(n^2+mn)}$

52. What is the number of the pairs of positive integers, the difference of whose squares is 45 ?

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

Ans. (3)

Sol. a, b $\in N$ (a>b)

$a^2 - b^2 = 45$

$(a-b)(a+b) = 1 \times 45$
$= 3 \times 15$
$= 5 \times 9$

$a-b=1$, $a+b=45$	$a-b=3$, $a+b=15$	$a-b=5$, $a+b=9$
$a=23$, $b=22$	$a=9$, $b=6$	$a=7$, $b=2$
(23, 22)	(9, 6)	(7, 2)

Three pairs **(3)**

53. Shyam has taken a domestic gas connection from IOC but local agency manager insisted him to purchase a gas stove @ Rs 4,000 from them. Which of the following rights does this practice violate under Consumer Protection Act ?

(1) Right to Represent (2) Right to Information (3) Right to Choose (4) Right to Safety

Ans. (3)

Sol. The Right to Choose as per the Consumer Protection Act 1986 is 'the right to be assured, wherever possible, to have access to a variety of goods .

54. Pandu port is a riverine developed on the which of following bank of the river ?

(1) Ganga (2) Tapi (3) Brahmaputra (4) Krishna

Ans. (3)

Sol. Pandu Port is a river port in the Indian state of Assam, serving Guwahati. This port has been developed on the bank of the Brahmaputra river.

55. In which of the following areas Lok Sabha and Rajya Sabha have equal powers ?

(1) Legislative (2) Financial

(3) Constitutional Amendment (4) Executive Power

Ans. (3)

Sol. Rajya Sabha enjoys equal powers with Lok Sabha in matters like the impeachment ofthe President, removal of the vice-president, constitutional amendments, and removal of the judges of the Supreme Court and the High Courts.In matter of creating All India Services Rajya sabha enjoys special powers.

56. Water flows at the rate of 10 m per minute through a cylindrical pipe with internal diameter 2 cm. How long (in minutes) would it take to fill completely a conical vessel whose radius is 50 cm and depth 45 cm ?

(1) 35 (2) 37.5 (3) 40 (4) 42.5

Ans. (2)

Sol. $\pi r^2 \times \ell = \frac{1}{3}\pi R^2 h$

$\pi r^2 \times \text{flow} \times \text{time} = \frac{1}{3}\pi R^2 h$

$\pi(1)^2 \times 1000 \times t = \frac{1}{3}\pi \times (50)^2 \times 45$

$t = \frac{2500 \times 45}{3000} = \frac{75}{2} = 37.5 \text{min.}$

57. Which of following elements form basic oxides ?

(a) an element with atomic number 10 (b) an element with atomic number 12

(c) an element with atomic number 16 (d) an element with atomic number 19

(1) a and c (2) b and c (3) c and d (4) b and d

Ans. (4)

Sol. Atomic number 12 = Mg

Atomic number 19 = Ca

Both forms basic oxides.

58. Which of the following is ***true*** about the two statements ?

Statement - I : Ordinarily H_2S is a gas and H_2O is liquid.

Statement - II : Sulphur is more electronegative so that it forms hydrogen bond.

(1) I is correct but II is incorrect.

(2) I is incorrect but II is correct.

(3) Both statement are correct and II is also correct explanation of I.

(4) Both are correct but II is not correct explanation of I.

Ans. **(1)**

Sol. Sulphur is less electronegative and do not form hydrogen bonds.

59. Which is the other name of Sahyadri Range ?

(1) Western Ghats

(2) Teaser Himalayas

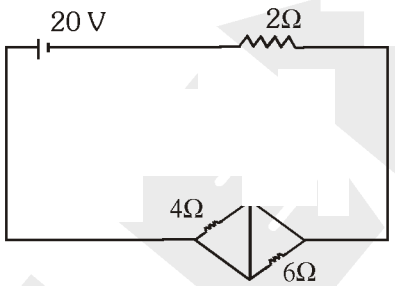
(3) Shivalik

(4) Arakanyoma Mountain

Ans. **(1)**

Sol. The Western Ghats, also the "Sahyadri" is a mountain range that covers an area of 160,000 square kilometres (62,000 sq mi) in a stretch of 1,600 kilometres (990 mi) parallel to the western coast of the Indian peninsula, traversing the states of Tamil Nadu, Kerala, Karnataka .

60. In the circuit shown :



(1) Current flowing from battery is 5 A.

(2) Power supplied by battery is 200 W.

(3) Potential difference across 4Ω is equal to the potential difference across 6 Ω.

(4) Both (2) & (3)

Ans. **(4)**

Sol. Net Resistance = 2 Ω

$$I = \frac{V}{R} = \frac{20}{2} = 10A$$

Now , $P = I^2 R = (10)^2 (2) = 200$ W

Also , Potential difference across both 4 Ω & 6 Ω is zero

61. Plants absorb water through its roots, stems and leaves. But, mainly water is absorbed by root hairs. These hair roots absorb water, when :

(1) plants respire rapidly

(2) soil solution is isotonic

(3) salt concentration of soil is high

(4) salt concentration of cell sap is high

Ans. **(4)**

Sol. Plant abosrb water through its roots, stems and leaves. But mainly water is absorbed by root hairs from the soil when the salt concentration of cell sap is high.

62. The value of $\frac{(\sec\theta+\tan\theta)(1-\sin\theta)\sec\theta}{(1+\tan\theta+\sec\theta)(1+\cot\theta-\operatorname{cosec}\theta)}$

(1) 0.2 and 0.4 (2) 0.4 and 0.6 (3) 0.6 and 0.8 (4) 0.8 and 1

Ans. (2)

Sol. $\frac{(\sec\theta+\tan\theta)(1-\sin\theta)\sec\theta}{(1+\tan\theta+\sec\theta)(1+\cot\theta-\operatorname{cosec}\theta)} = \frac{\left(\frac{1+\sin\theta}{\cos\theta}\right)(1-\sin\theta)\frac{1}{\cos\theta}}{\left(\frac{\cos\theta+\sin\theta+1}{\cos\theta}\right)\times\frac{(\sin\theta+\cos\theta-1)}{\sin\theta}}$

$= \frac{\cos\theta\sin\theta}{(\cos\theta+\sin\theta)^2-1} = \frac{\cos\theta\,\sin\theta}{1+2\sin\theta.\cos\theta-1} = \frac{1}{2} = 0.5$ (lies between 0.4 and 0.6)

63. Who founded the Swaraj Party within the Congress ?

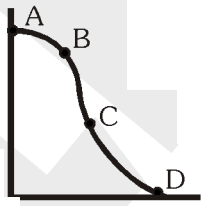
(1) S. C. Bose and Pt. J. L. Nehru (2) Mahatma Gandhi and S. C. Bose

(3) Pt. J. L. Nehru and Moti Lai Nehru (4) C. R. Das and Moti Lai Nehru

Ans. (4)

Sol. In December 1922, Chittaranjan Das, Narasimha Chintaman Kelkar and Motilal Nehru formed the Congress-Khilafat Swarajaya Party with Das as the president and Nehru as one of the secretaries.

64. The variation in momentum with time, for a body under collision is shown in figure. The max. & min. instantaneous forces are respectively on these points :



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

Ans. (2)

Sol. Slope of momentum - time graph gives force

$$F = \frac{KdP}{dt}$$

Slope of the curve is maximum at 'c' and minimum at 'A' . Hence maximum at 'C' and minimum at

65. If $x^2 - 3x + 1 = 0$, then what is the value of $(x^5 + x^{-5})$?

(1) 119 (2) 122 (3) 123 (4) 125

Ans. (3)

Sol. $x^2 - 3x + 1 = 0$

$x^2 + 1 = 3x$

divided by x, $x + \frac{1}{x} = 3$

$\left(x + \frac{1}{x}\right)^3 = 27$, $\left(x + \frac{1}{x}\right)^2 = 9$

$x^3 + \frac{1}{x^3} + 3(3) = 27$, $x^2 + \frac{1}{x^2} = 7$

$x^3 + \frac{1}{x^3} = 18$, $\left(x^3 + \frac{1}{x^3}\right)\left(x^2 + \frac{1}{x^2}\right) = 18 \times 7$

$$x^5 + x + \frac{1}{x} + \frac{1}{x^5} = 126 \Rightarrow x^5 + \frac{1}{x^5} = 126 - 3 = 123$$

66. Match the following Iron ore and minerals areas in India with the correct states.

(a) Karnataka	(i) West Singhbhum
(b) Odisha	(ii) Kudiremukh
(c) Jharkhand	(iii) Bailadaila
(d) Chhattisgarh	(iv) Cuttack

(1) a (ii), b (iv), c (i), d (iii) (2) a (i), b (iii), c (ii), d (iv)

(3) a (iii), b (ii), c (iv), d (i) (4) a (iv), b (i), c (iii), d (ii)

Ans. (1)

Sol. 1) Kudremukha is a mountain range and name of a peak located in Chikkamagaluru district, in Karnataka, India.

2) Cuttack is a city in the eastern Indian state of Odisha.

3) West Singhbhum or Pashchimi Singhbhum is one of the 24 districts of Jharkhand state,

4) Bailadila Range, is a mountain range rising in the Deccan Plateau about 200 km west of the Eastern Ghats. It has been named 'Bailadila' because it resembles the hump of an ox. It is located near Kirandul town in the Dantewada district of southern Chhattisgarh, India.

67. If there are two economy having same per capital income of $ 50000, then can we state that :

(i) Income distribution in both countries should be equal.

(ii) One might have equitable distribution of income while other might have great disparities between rich and poor.

(1) only (i) (2) only (ii) (3) both (i) and (ii) (4) none

Ans. (2)

Sol. One might have equitable distribution of income while other might have great disparities between rich and poor.

68. If the radius of a cylinder is increased by 12 cm, its volume increases by x cm^3. If its height is increased by 12 cm, then its volume is also increased by x cm^3. If the original height is 4 cm, then, its original curved surface area (in cm^2) is :

(1) 48π (2) 72π (3) 96π (1) 108π

Ans. (3)

Sol. h = 4 cm

$V = \pi R^2(4) = 4\pi R^2$ (1)

$V + x = 4\pi (R+12)^2$ (2)

$V + x = \pi R^2 (4 + 12) = 16\pi R^2$ (3)

$x = 12\pi R^2$

$16\pi R^2 = 4\pi (R+12)^2 \Rightarrow 4R^2 = (R + 12)^2, 2R = R + 12$

R = 12, h = 4

$CSA = 2\pi Rh = 2\pi (12)(4) = 96\pi$

69. In which of the following groups would you place a plant that produces spores and embryos but lacks seeds and vascular tissues ?

(1) pteridophytes (2) bryophytes (3) gymnosperms (4) thallophyta

Ans. (2)

Sol. Brophytes are the plants that produces spores and embryos but lacks seeds and vascular tissue

70. In 1772 who remarked that demand for Indian textiles could never reduce in ?

(1) Henry Patallo (2) Henry Smith (3) Henry George (4) Henry Joseph

Ans. (1)

Sol. In 1772, Henry Patullo had ventured to say that the demand for Indian textiles could never reduce, since no other nation produced goods of the same quality.

71. Choose the group of two states having coalition government :

(a) Orissa

(b) Haryana

(c) Maharashtra

(d) M. P.

(1) a, c (2) b, d (3) b, c (4) c, d

Ans. (3)

Sol. Currently Haryana and Maharashtra have coalition government.

72. Development and formation pollen grains in anther of stamen is known as :

(1) microsporogenesis (2) fertilization (3) megasporogenesis (4) spermiogenesis

Ans. (1)

Sol. Microsporogenesis is the development and formation of pollen grains in anther of the stamen.

73. Which of the following ***not*** a pollutant ?

(1) SO_2 (2) CO_2 (3) CO (4) NO_2

Ans. (2)

Sol. SO_2, CO and NO_2 are pollutants where as CO_2 is not a pollutant.

74. Which is *not* the aim of liberalization and globalization ?

(1) More production at all levels

(2) Increase in the trade of goods and services

(3) Generation of more employment opportunities

(4) Increase the subsidies to the poor and deprived section of the society

Ans. (4)

Sol. Increase the subsidies to the poor and deprived section of the society is not the aim of liberalisation and globalisation.

75. The deepest landlocked port in India is :

(1) Paradip Port (2) Madras Port (3) Calcutta Port (4) Visakhapatnam Port

Ans. (4)

Sol. The Deepest landlocked port in India is Vishakhapatnam, AP.

The port which is encircled by land from all sides with a water passage towards the sea or ocean is termed as a land-locked port.

It is often called "The Jewel of the East Coast", situated in the state of Andhra Pradesh, located on the eastern shore of India. It is nestled among the hills of the Eastern Ghats and facing the Bay of Bengal to the east.

76. Which two of the following statements are true ?

(i) India is Unitary state (ii) India is federal State

(iii) India is union of states (iv) India is federal state unitary federal

(1) i, iv (2) iii, iv (3) ii, i (4) i, iii

Ans. (2)

Sol. The Indian Constitution is both federal & unitary in nature as it is a combination of federal & unitary features. The federation is a Union because it is indestructible. The country is an integral whole and divided into different states only for the convenience of administration.

77. Which of the following reflects situation where a person is employed but do not contribute in adding to the total product ?

(1) Open unemployment (2) Disguished unemployment

(3) Season unemployment (4) Frictional unemployment

Ans. (2)

Sol. Disguised unemployment is unemployment that does not affect aggregate economic output. It occurs when productivity is low and too many workers are filling too few jobs. It can refer to any part of the population that is not employed at full capacity.

78. A person decides to live exclusively on a diet of milk, egg and bread. He would suffer from :

(1) scurvy (2) beri-beri (3) night blindness (4) rickets

Ans. (1)

Sol. A person decides to live exclusively on a diet of milk, egg and bread. He would suffer from scurvy.

79. The efforts made to increase farm production in order to meet the growing demand of increasing population is called :

(1) Agricultural Quotient (2) Agricultural Degeneration

(3) Agricultural Development (4) Agricultural Index

Ans. (3)

Sol. Agriculture development is efforts made to increase farm production in order to meet the growing demand of increasing population.

80. Who decides the nature of bill in Lok sabha ?

(1) Prime Minister (2) Leader of Opposition

(3) Speaker of Lok Sabha (4) General Secretary of Lok Sabha

Ans. (3)

Sol. Money/appropriation bills and financial bills can be introduced only in the Lok Sabha, Articles 109, 110 and 117. The Speaker of Lok Sabha decides whether a bill is a money bill or not.

81. Two bodies of masses m_a & m_b ($m_a > m_b$) are dropped from heights 'a' & 'b' respectively. The ratio of velocities with which they reach ground is :

(1) $m_a m_b$ (2) a/b (3) $\sqrt{(am_a / bm_b)}$ (4) $\sqrt{(a/b)}$

Ans. (4)

Sol. $v = \sqrt{2gh}$

$$\frac{V_a}{V_b} = \frac{\sqrt{a}}{\sqrt{b}}$$

82. If $\sqrt{x^2 + \sqrt[3]{x^4y^2}} + \sqrt{y^2 + \sqrt[3]{x^2y^4}} = k$, then which of the following is **true** ?

(1) $x^2 + y^2 = k^2$ (2) $x^{3/2} + y^{3/2} = k^{3/2}$ (3) $x^{2/3} + y^{2/3} = k^{2/3}$ (4) $x^{1/3} + y^{1/3} = k^{1/3}$

Ans. (3)

Sol. $\sqrt{x^2 + \sqrt[3]{x^4y^2}} + \sqrt{y^2 + \sqrt[3]{x^2y^4}} = k$

$$\sqrt{x^2 + x^{4/3}y^{2/3}} + \sqrt{y^2 + x^{2/3}y^{4/3}} = k$$

$$\sqrt{x^{4/3}(x^{2/3} + y^{2/3})} + \sqrt{y^{4/3}(x^{2/3} + y^{2/3})} = k$$

$$\sqrt{x^{2/3} + y^{2/3}}\ \left(x^{2/3} + y^{2/3}\right) = k$$

$$\left(x^{2/3} + y^{2/3}\right)^{3/2} = k$$

$$\left(x^{2/3} + y^{2/3}\right) = k^{2/3}$$

83. What is the other name code of 1804 in France ?

(1) French code of law (2) People's code of law (3) Napoleonic code (4) Code of law

Ans. (3)

84. TWO pendulums of lengths 1 m & 25 m are given a small displacement at same instant in same direction. After how many oscillations of smaller pendulum, both will be in same phase ?

(1) 5/4 (2) 4/5 (3) 3/5 (4) 5/3

Ans. (1)

Sol. Let after 'n' oscillations of larger pendulum they are in same phase and for smaller pendulum it is (n+1)

$nT_l = (n + 1)\, T_S$

$$n \times \sqrt{\frac{25}{g}} \times 2\lambda = (n+1)\sqrt{\frac{1}{g}} \times 2\lambda$$

$n(5) = (n + 1)$

$$n = \frac{1}{4}$$

for smaller pendulum it is $\left(\frac{1}{4}+1\right) = \frac{5}{4}$

85. An element X (atomic number 20) reacts with another element Y (atomic number 17) form a compound Z. Which of the following statement are **true** regarding this compound ?

I. Molecular formula of Z is XY_2

II. X and Y are joined by sharing of electrons

III. Z imparts characteristic flame colour

IV. It is soluble in water

(1) II & III (2) I, III & IV (3) II, III & IV (4) I, II & III

Ans. (2)

Sol. Atomic number 20 = X^{+2} i.e. Ca^{+2}

Atomic number 17 = Y^{-1} i.e. Cl^{-1}

Ionic compound (Z) = XY_2

Due to calcium, it imparts characteristic colour to flame.

XY_2 is an ionic compound, so solube in water.

86. In an arithmetic progression, the sum of its fourth, seventh and tenth terms is 17 and the sum of its first 14 terms excluding first three terms is 77. If its kth terms is 13, then the value of k is ;

(1) 16 (2) 17 (3) 18 (4) 20

Ans. (3)

Sol. $T_4 + T_7 + T_{10} = 17$

$a + 3d + a + 6d + a + 9d = 17 \Rightarrow 3a + 18\,d = 17$ ————(1)

$$S_{14} - S_3 = 77 \Rightarrow \frac{14}{2}[2a + (13)d] - \frac{3}{2}[2a + 2d] = 77$$

$\Rightarrow 149 + 91d - 3a - 3d = 77$

$11a + 88d = 7$

$a + 8d = 7$ ————(2)

$3a + 18d = 17$

$3a + 24d = 21$

$-6d = -4$ $\Rightarrow d = \frac{2}{3}$ $\quad a = 7 - \frac{16}{3} = \frac{5}{3}$

$T_k = a + (k-1)\,d = 13 \Rightarrow \frac{5}{3} + (k-1)\frac{2}{3} = 13 \Rightarrow \frac{5}{3} - \frac{2}{3} + \frac{2k}{3} = 13 \Rightarrow \frac{2k}{3} = 12$

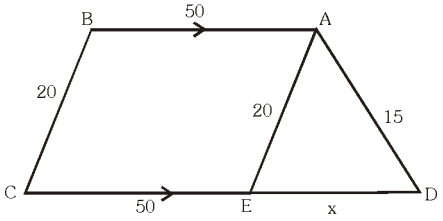
$\Rightarrow k = 18$

87. ABCD is a trapezium in which AB || DC, AB = 50 cm, BC = 20 cm, AD = 15 cm and the difference (in cm) between DC and AB is a whole number. The area of the trapezium is :

(1) 625 cm^2 (2) 650 cm^2 (3) 750 cm^2 (4) 780 cm^2

Ans. (3)

Sol.



Let DE = x

DC – AB = $x \in W$

ΔAED , $5 < x < 35$

ΔAED , $s = \frac{35+x}{2}$

ar (ΔAED) = $\sqrt{s(s-20)(s-15)(s-x)} = \sqrt{\left(\frac{35+x}{2}\right)\left(\frac{x-5}{2}\right)\left(\frac{x+5}{2}\right)\left(\frac{35-x}{2}\right)} = \sqrt{\frac{(x^2-25)(35^2-x^2)}{16}}$

Putting x = 6, 7, 8,..... 34

at x = 25

$\angle EAD = 90^\circ$, ar (ΔAED) = $\sqrt{\frac{600 \times 10 \times 60}{16}} = \frac{600}{4} = 150$

Height of $\Delta AED(h) = \frac{2 \times 150}{25} = 12$

area of trapezium = $\frac{1}{2} \times h \times (AB + CD) = \frac{1}{2} \times 12 \times 125 = 750\ cm^2$

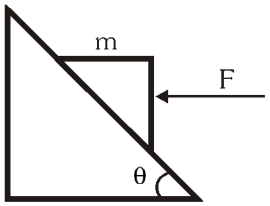
88. Which Agency of UN got Nobel Prize for peace of 2020 ?

(1) UNICEF (2) WHO (3) WFP (4) UNESCO

Ans. (3)

Sol. The Norwegian Nobel Committee decided to award the Nobel Peace Prize 2020 to the United Nation's (UN) World Food Programme (WFP) for its efforts to combat hunger and for its contribution to bettering conditions for peace in conflict-affected areas and for preventing the use of hunger being weaponised in war .

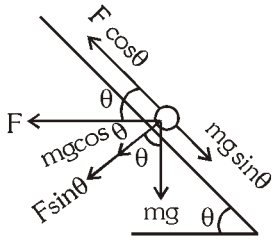
89. A horizontal force 'F' is applied to keep the block stationary on a frictionless inclined plane. Find the angle of incline, for which the applied force is equal to the weight of body :



(1) 30° (2) 45° (3) 60° (4) 90°

Ans. (2)

Sol.



F. B. D of block

for equillibrium,

$m g \sin\theta = F \cos\theta$

$\frac{F}{mg} = \tan\theta$

for $\theta = 45°$

$F = mg$

90. In which of the following states India's first textile University will be set up ?

(1) Maharashtra (2) Gujarat (3) Madhya Pradesh (4) Uttar Pradesh

Ans. (2)

Sol. "The first textile university of India will be setup in Gujarat.

91. Which country has the tradition which once a speaker, always a speaker ?

(1) USA (2) France (3) China (4) U.K

Ans. (4)

Sol. UNITED KINGDOM

92. There are two spheres of same material and radius. One is solid and other is hollow. If they are heated to same temperature the expansion of :

(1) Solid sphere is more

(2) Hollow sphere is more

(3) Solid & hollow spheres are equal

(4) Solid is outwards while hollow is inwards

Ans. (3)

Sol. If they are heated to same temperature expansion will be same in both

93. The metal atom which is present in superphosphate is :

(1) Sodium (Na) (2) Potassium (K)

(3) Calcium (Ca) (4) Magnesium (Mg)

Ans. (3)

Sol. Calcium metal atom is present in superphosphate.

94. The mean of three numbers is 11 more than the least of the given numbers and 15 less than the greatest number among them. If the median of the three numbers is 10, then their sum is :

(1) 42 (2) 44 (3) 45 (4) 48

Ans. (1)

Sol. $x_1 < x_2 < x_3$, Median $= x_2 = 10$

$$\frac{x_1 + x_2 + x_3}{3} = 11 + x_1$$

$x_1 + x_2 + x_3 = 33 + 3x_1$ (1) $\rightarrow x_3 = 23 + 2x_1$

$$\frac{x_1 + x_2 + x_3}{3} = x_3 - 15$$

$x_1 + x_2 + x_3 = 3x_3 - 45$

$x_1 + x_2 = 2x_3 - 45$ (2) $\rightarrow x_1 = 2x_3 - 55$

$x_3 = 23 + 2(2x_3 - 55) \Rightarrow 3x_3 = 110 - 23 = 87$

$x_3 = 29, x_1 = 3$

$x_1 = 3, x_2 = 10, x_3 = 29$

sum $= x_1 + x_2 + x_3 = 42$

95. What is the main theme of the book "Istri Dharm Vichar" written by Ram Chaddha ?

(1) To teach women how to react against injustice

(2) To teach women how to behave in the family

(3) To teach women how to compete with the western world

(4) To teach women how to be obedient wives.

Ans. (4)

Sol. Ram Chaddha wrote the fast-selling 'Istri Dharm Vichar' to teach women how to be obedient wives.

96. AB is a line segment with A = (–2, 3) and B = (5, 5), It is reflected in the x-axis. Then, its image is reflected in the y-axis. What is the sum of the coordinates of the midpoint of the final image ?

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

Ans. (3)

Sol. A(–2, 3), B(5, 5) $\xrightarrow[\text{X – Axis}]{\text{Reflected}}$ A(–2, –3), B(5, –5)

↓ Reflected y-axis

A(2, –3), B(–5, –5)

mid point $\left(\frac{-3}{2}, -4\right)$ sum $= \frac{-3}{2} - 4 = \frac{-11}{2} = -5\frac{1}{2}$

97. In human beings, excretory products are removed by exeretory system. Which part of the excretory system help in removing nitrogenous waste such as urea or uric acid from blood ?

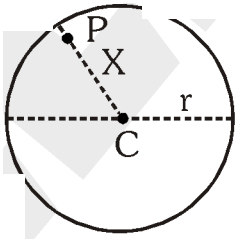
(1) Ureter (2) Urethera (3) Kidney (4) Urinary bladder

Ans. (3)

Sol. Kidney help in removing nitrogenous waste such so urea or uric acid from blood.

98. The force between a hollow sphere of mass M and a point mass 'm' at P inside it (Shown in figure) :

(PC = X, Radius = r)



(1) $\frac{GMm}{X^2}, attractive$ (2) $\frac{GMm}{(r-X)^2}, attractive$

(3) $\frac{GMm}{(r-X)^2}$, Repulsive (4) Zero

Ans. (4)

Sol. According to shell theorem, if an object is kept inside a hollow sphere , net force on it due to hollow sphere is zero

99. The area (in square units) of the region bounded by the graphs of $|x| + y = 4$ and $x + 5y = -4$ lies between:

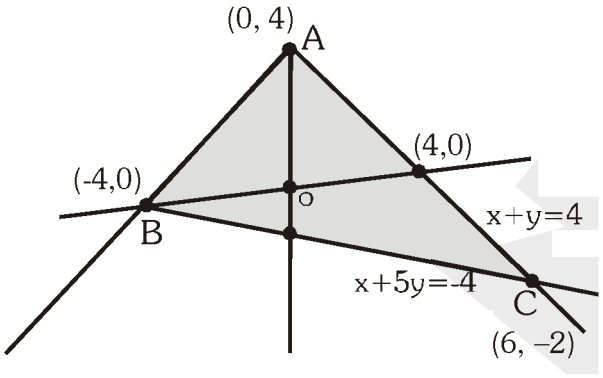
(1) 14 and 17 (2) 17 and 21 (3) 21 and 25 (4) 25 and 29

Ans. (3)

Sol. $|x| + y = 4$, $x + 5y = -4$

$x \geq 0 \quad x + y = 4$

$x < 0 \quad -x + y = 4$, $x + 5y = -4$



$$\begin{array}{r} x + y = 4 \\ x + 5y = -4 \\ - \quad - \quad - \\ \hline -4y = 8 \end{array}$$

$y = -2$, $x = 6$, C(6, –2)

A (0, 4), B (–4, 0) , C (6, – 2)

$$\text{Area of } \Delta ABC = \frac{1}{2} \left| \; 0\,(0 + 2) - 4\,(-2 - 4) + 6\,(4 - 0) \; \right|$$

$$= \frac{1}{2} \; | \, 24 + 24 \, | \; = 24 \text{ (lies between 21 and 25)}$$

100. Mr. Anil lives in village and is engaged in agriculture occupation. He needs some money and takes loan of Rs. 1,00,000 from co-operative bank situated in his village. He also borrows Rs. 50,000 from money lender of the village and Rs. 25,000 from his friend. In this situation, what is the ratio of his loan from formal and informal sector?

(1) 4 : 3 (2) 1 : 2 (3) 1 : 5 (4) 3 : 4

Ans. (1)