INDIAN ASSOCIATION OF PHYSICS TEACHERS
NATIONAL STANDARD EXAMINATION IN JUNIOR SCIENCE 2010 - 2011

Date of examination: 28th November 2010

Time 15.00 to 17.00 Hrs.

Instructions to Candidates **www.AmansMathsBlogs.com**

1. In addition to this question paper, you are given a separate answer sheet.
2. On the answer sheet fill up all the entries carefully in the space provided, **ONLY IN BLOCK CAPITALS.**
   Incomplete / incorrect / carelessly filled information may disqualify your candidature.
3. On the answer sheet, use only **BLUE or BLACK BALL PEN** for making entries and marking answers.
4. The question paper contains 80 multiple-choice questions. Each question has 4 options, out of which only one is correct. Choose the correct answer and mark a **cross** in the corresponding box on the answer sheet as shown below :

Q.	a	b	c	d
22			X	

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5. Any rough work should be done only on the sheet provided at the end of question paper.
6. A correct answer carries 3 marks and 1 mark will be deducted for each wrong answer.
7. Use of nonprogrammable calculator is allowed.
8. No candidate should leave the examination hall before the completion of the examination.
9. The answers / solutions to this question paper will be available on our website - **www.iapt.org.in** by 3 rd December 2010.
10. Result sheets and the "centre top 10%" certificates of NSEJS are dispatched to the Professor in charge of the centre. Thus you will get your marks from the Professor in charge of your centre by January 2011 end.
11. TOP 300 (or so) students are called for the next examination-Indian National Junior Science Olympiads (INJSO). Individual letters are sent to these students ONLY.
12. No querries will be entertained in this regard.

PLEASE DO NOT MAKE ANY MARK OTHER THAN (X) IN THE SPACE PROVIDED ON THE ANSWER SHEET.

Answer sheets are evaluated with the help of a machine. Due to this, **CHANGE OF ENTRY IS NOT ALLOWED.**

Scratching or overwriting may result in wrong score.

DO NOT WRITE ANYTHING ON BACK SIDE OF ANSWER SHEET.

CERTIFICATES & AWARDS

Following certificates are awarded by the I.A.P.T. to students successful in NSEJS.

i) Certificate for "Centre Top 10%" students.

ii) Merit certificates to statewise Top 1% students.

iii) Merit certificate and a prize in the form of a book to Nationwise Top 1% students.

INDIAN ASSOCIATION OF PHYSICS TEACHERS

NATIONAL STANDARD EXAMINATION IN JUNIOR SCIENCE
2010 – 2011

Total time: 120 minutes **Marks: 240**

ONLY ONE OUT OF FOUR OPTIONS IS CORRECT

1) Which one of the following statements is INCORRECT?

(a) If the net force on a body is zero, its velocity is constant or zero.
(b) If the net force on a body is zero, its acceleration is constant and nonzero.
(c) If the velocity of a body is constant, its acceleration is zero.
(d) A body may have a varying velocity yet a constant speed.

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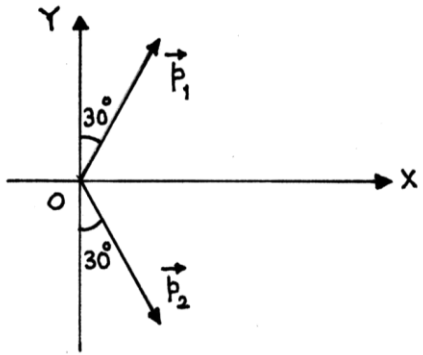
2) Two forces each of magnitude P act on a body placed at a point O force necessary to keep the body at rest is of magnitude



(a) P along + X axis.
(b) P along – X axis.
(c) $2P$ along + X axis.
(d) $P/2$ along – X axis.

3) Two spheres having masses 10 g and 25 g are projected horizontally from the same height with velocities v_1 and v_2 and they fall to the ground in time intervals t_1 and t_2 respectively. If the ratio $v_1 : v_2$ is 1:3, the ratio $t_1 : t_2$ will be

(a) 10 : 25
(b) 25 : 10
(c) 1 : 1
(d) 1 : 3

4) The SI unit of temperature is

(a) degree fahrenheit (^{0}F).
(b) degree celsius (^{0}C).
(c) degree kelvin (^{0}K).
(d) none of the above.

5) A convex lens L_1 forms an image of the same size as that of the object at a distance of 24 cm. If the lens L_1 is replaced by another convex lens L_2, the image formed is magnified and erect. Therefore, the focal length of L_2 is

(a) less than 12 cm.
(b) 12 cm.
(c) between 12 cm and 24 cm.
(d) more than 24 cm.

6) A wooden ball of density 0.8 g / cm^3 is placed in water. The ratio of the volume above the water surface to that below the water surface is

(a) 0.25
(b) 0.20
(c) 2.0
(d) 4.0

7) The order of corrosion of metals, namely aluminum, iron, tin and zinc is

(a) Fe > Sn > Al > Zn
(b) Sn > Fe > Al > Zn
(c) Al > Zn > Fe > Sn
(d) Fe > Zn > Sn > Al

8) A stone is released from an elevator moving upwards with an acceleration a. The acceleration of the stone after the release is

(a) a upwards.
(b) $(g - a)$ upwards.
(c) $(g - a)$ downwards.
(d) g downwards.

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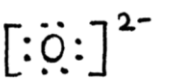
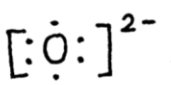
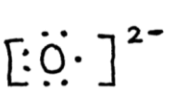
9) A converging beam of light falls on a convex mirror of radius of curvature 20 cm, the point of convergence being 10 cm behind the mirror. The image is

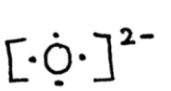
(a) virtual and formed 10 cm in front of the mirror.
(b) real and formed in front of the mirror.
(c) formed at infinity.
(d) virtual and formed 10 cm behind the mirror.

10) $[O^{2-}]$ ion is represented as

(a) 

(b) 

(c) 

(d) 

11) The different coloured dyes present in black ink can be separated by

(a) evapouration.
(b) distillation.
(c) centrifugation.
(d) chromatography.

12) Bacteria cannot survive in a highly salted pickle because

(a) they become plasmolysed and consequently die.
(b) they do anaerobic respiration.
(c) water is not available to them.
(d) of all the reasons mentioned above.

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13) In the absence of atmospheric refraction

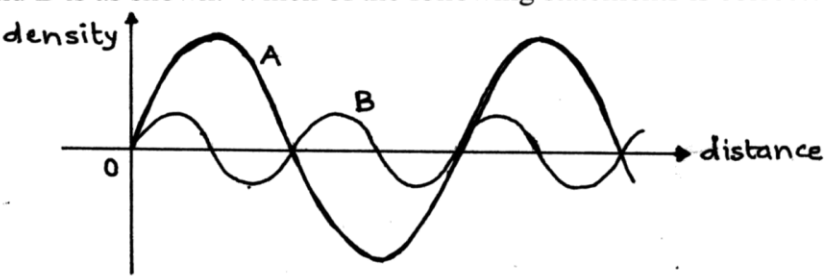
(a) both the sunrise and the sunset would be delayed.

(b) both the sunrise and the sunset would occur earlier.

(c) the sunrise would be delayed and the sunset would occur earlier.

(d) the sunrise would occur earlier and the sunset would be delayed.

14) When a sound wave moves through air along X axis, there is a variation in density of air in this direction. The graphical representation of this variation for two sound waves A and B is as shown. Which of the following statements is correct?



(a) Frequency of A is greater than that of B.
(b) Velocity of B is greater than that of A.
(c) Wavelength of B is greater than that of A.
(d) Loudness of A is greater than that of B.

15) Cycas is classified as gymnosperm because of
(i) presence of naked seeds, (ii) lack of vessels in the xylem, (iii) presence of sieve tubes, (iv) fruit formation.
The correct reason is

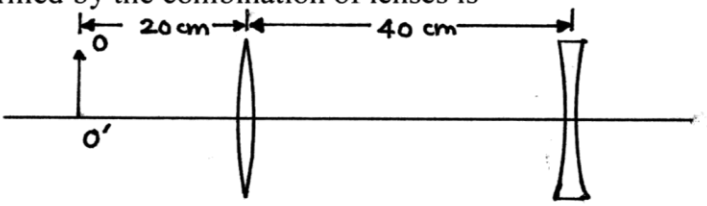
(a) (i) and (iv).

(b) (i) and (iii).

(c) (i) and (ii).

(d) (ii) and (iii).

16) In the figure shown below, each of the lenses has a focal length of 10 cm. Therefore, the image formed by the combination of lenses is



(a) virtual, erect and magnified.
(b) virtual, inverted and diminished.
(c) virtual, erect and diminished.
(d) real, erect and diminished.

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17) A convex mirror used as the rear view mirror of a motor vehicle has a warning written on it – 'Objects in this mirror are nearer than they appear'. The reason for this warning is that

(a) the image is diminished.
(b) the image distance is less than the focal length of the mirror.
(c) the image distance is less than the object distance.
(d) the image distance is more than the object distance.

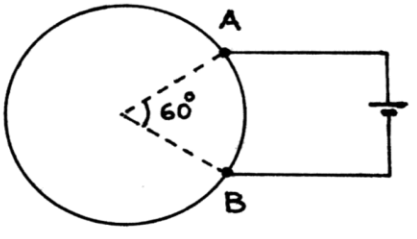
18) While picking up a pair of eye glasses dropped by a friend, you notice that they form an inverted image of the background and that the image is stretched horizontally as well. Your friend suffers from

(a) only myopia.
(b) only hypermetropia.
(c) only astigmatism.
(d) hypermetropia as well as astigmatism.

19) In additive primary colour processes, which of the following is NOT possible?

(a) (red + green + blue) gives white
(b) (blue + green) gives cyan
(c) (red + cyan) gives white
(d) (green + cyan) gives white

20) A uniform wire of resistance 36 ohm is bent into a circle. A battery is connected between points A and B as shown. The effective resistance between A and B is



(a) 36 ohm.
(b) 30 ohm.
(c) 6 ohm.
(d) 5 ohm.

21) When 2.8 g of nitrogen reacts with 0.6 g of hydrogen, 3.4 g of ammonia gas is produced. If 5.8 g of nitrogen is allowed to react with 0.6 g of hydrogen, then the amount of ammonia produced is

(a) 1.7 g.
(b) 3.4 g.
(c) 4.7 g.
(d) 7.4 g.

22) Which one of the following is NOT poisonous?

(a) spider
(b) platypus
(c) millipede
(d) centipede

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23) On north pole, when the surface of sea gets frozen due to cold weather, eskimos can still fish by cutting a portion of ice at the surface to find water underneath. This is possible because water

(a) has low thermal conductivity.
(b) has high specific heat.
(c) has high surface tension
(d) shows anomalous behavior.

24) A DC current flows through a vertical wire in the downward direction. For an observer looking at the wire, the direction of magnetic field at a point between him and the wire is *

(a) upward.
(b) to the right.
(c) to the left.
(d) downward.

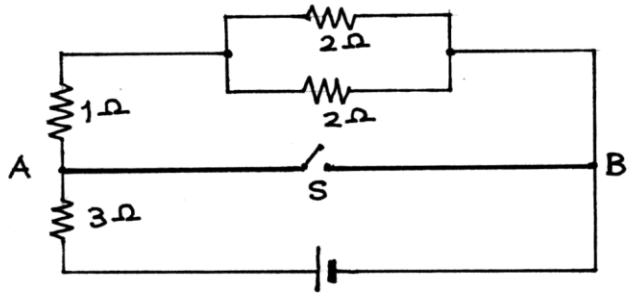
25) The valencies of two elements A and B are +2 and +3 respectively. Then, the formulae of sulphate of B and chloride of A respectively are

(a) $B_3(SO_4)_2$ and ACl_2.
(b) $B_2(SO_4)_3$ and ACl_2.
(c) BSO_4 and A_2Cl.
(d) B_2SO_4 and ACl.

26) A number of electric bulbs of rating 220 volt, 100 watt are to be connected in parallel to a 220 volt supply. If a 5 A fuse wire is used for this arrangement of bulbs, the maximum number of bulbs that can be included in the arrangement will be

(a) 10.
(b) 11.
(c) 22.
(d) 44.

27) In the circuit given below, AB is a thick copper wire and S is a switch. When the switch is closed, the effective resistance of the circuit will be



(a) 5 ohm.
(b) 6 / 5 ohm.
(c) 3 ohm.
(d) zero.

28) In Fig.(1) ammeter reads I_1 and voltmeter reads V_1. Similarly, in Fig.(2) ammeter reads I_2 while voltmeter reads V_2. Then which of the following statements is correct?

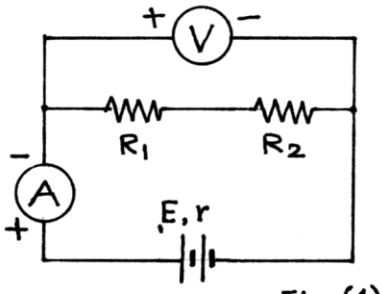


Fig. (1)

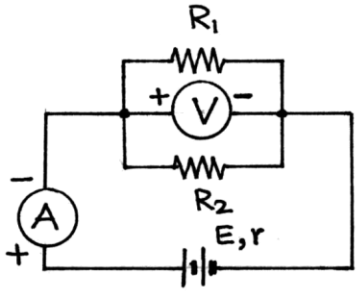


Fig. (2)

(a) $V_1 > V_2$ and $I_1 > I_2$
(b) $V_1 > V_2$ and $I_1 < I_2$
(c) $V_1 < V_2$ and $I_1 > I_2$
(d) $V_1 < V_2$ and $I_1 < I_2$

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29) Copper sulphate is the salt of

(a) a weak acid and a strong base.
(b) a weak acid and a weak base.
(c) a strong acid and a weak base.
(d) a strong acid and a strong base.

30) The correct order of evolutionary advancement among the plants is

(a) spirogyra → diatom → hornwort → fern
(b) blue green alga → liverwort → fern → seed bearing plant
(c) liverwort → cyanobacterium → moss → gymnosperm
(d) red alga → fern → moss → liverwort

31) A solution having pH 2 is mixed with excess of solution of washing soda, the pH of mixture is

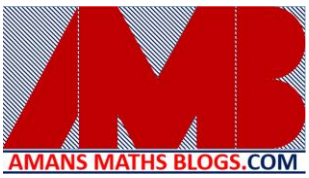
(a) 4
(b) 5
(c) 6
(d) 8

32) If the altitudes of a triangle are in the ratio 2 : 3 : 4, then the lengths of the corresponding sides are in the ratio

(a) 2 : 3 : 4
(b) 6 : 4 : 3
(c) 3 : 2 : 4
(d) 3 : 2 : 1

33) In case of a right circular cylinder the radius of base and height are in the ratio 2 : 3. Therefore, the ratio of lateral surface area to the total surface area is

(a) 5 : 3.
(b) 3 : 5.
(c) 2 : 5.
(d) 2 : 3.



34) Number of molecules present in a given amount of CO_2 and O_2 is the same at STP. If the weight of CO_2 is 5.5 g, then the weight of O_2 is

(a) 5.5 g.
(b) 4.4 g.
(c) 4.0 g.
(d) 2.0 g.

35) Lamina of a palm tree is dissected so as to adapt to

(a) intense light.
(b) high wind velocity.
(c) scarcity of moisture.
(d) high temperature.

36) Isotope used as a fuel in the reactors of nuclear power plants for generating electricity is

(a) As 74.
(b) U 235.
(c) Co 60.
(d) I 131.

37) If $\sin\theta + \text{cosec}\,\theta = 2$, then $[\sin^8\theta + \text{cosec}^8\theta]$ will have the value

(a) 2.
(b) 2^4.
(c) 2^6.
(d) 2^8.

38) Which of the following pigments is different from others?

(a) cyanoglobin.
(b) myoglobin.
(c) haemoglobin.
(d) cytochrome.

39) The mass of one molecule of phosphorus (P 31) is

(a) 31 g.
(b) 2.059×10^{-22} g.
(c) 5.147×10^{-23} g.
(d) 124 g.

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40) All the three sides of a Δ ABC have lengths in integral units, with AB = 2001 units and BC = 1002 units. The possible number of triangles with this condition is

(a) 2001.
(b) 2002.
(c) 2003.
(d) 2004.

41) The fragrance of burning incense stick spreads all around due to

(a) the sublimation of incense stick.
(b) the vapourization of incense stick.
(c) the sublimation of fragrance matter into the air.
(d) the diffusion of its smoke into the air.

42) In the familiar decimal number system the base is 10. In another number system using base 4, the counting proceeds as 1, 2, 3, 10, 11, 12, 13, 20, 21…. The twentieth number in this system will be

(a) 40.
(b) 320.
(c) 210.
(d) 110.

43) The boiling point of water at STP is

(a) 100 K.
(b) 373 K.
(c) 273 K.
(d) 373^0 C.

44) If $4a - 18b + 13c = 0$ and $3a + 3b - 4c = 0$, then the ratio $a : b : c$ will be

(a) 3 : 6 : 5
(b) 5 : 3 : 6
(c) 3 : 5 : 6
(d) 5 : 6 : 3

45) The feature indicating omnivorous nature of man is

(a) presence of canines and molars.
(b) long intestine and vestigial appendix.
(c) ability to taste salty and sweet material.
(d) spacious stomach and caecum.

46) Considering the root system, the plant that has adapted to the arid conditions is

(a) hydrilla.
(b) sunflower.
(c) hibiscus.
(d) khus.

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47) The random motion of visible particles caused by the much smaller invisible particles of water is an example of

(a) Brown motion.
(b) Brownian motion.
(c) Brownmat motion.
(d) Browniz's motion.

48) The graph of the equation $y = 2x^2 + 4x + 3$ has its lowest point at

(a) (–1, 9)
(b) (1, 9)
(c) (–1, 1)
(d) (0, 3)

49) When a cell fails to communicate with other cells in a multicellular organism, it

(a) becomes cancerous.
(b) enters mitotic phase.
(c) chooses to die.
(d) is eaten up by other cells.

50) A desert room cooler cools better on hot and dry day due to

(a) increase in the rate of evapouration.
(b) decrease in the rate of evapouration.
(c) decrease in the rate of vapourization.
(d) increase in the rate of diffusion.

51) If a, b, c are in continued proportion, the expression $\frac{a^2+ab+b^2}{b^2+bc+c^2}$ can be simplified to

(a) $\frac{a+c}{a+b}$

(b) $\frac{a}{c}$

(c) $\frac{c}{a}$

(d) $\frac{a-c}{b}$

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52) The body of hydra is cut transversely into three pieces and the middle piece is kept upside down on the substratum. Then,

(a) it fails to regenerate into an independent hydra.
(b) it would form tentacles and foot in the same locations as oriented.
(c) it would form tentacles and foot at the original upper and lower ends.
(d) it will form a hydra with tentacles at both the ends.

53) Unacceptable odour of water can be removed by filtering it through

(a) sand.
(b) activated charcoal.
(c) alum.
(d) saw dust.

54) The latent heat of fusion of a solid is the quantity of heat in joules required to convert

(a) 1 mg of the solid to liquid, without any change in temperature.
(b) 1 g of the solid to liquid, without any change in temperature.
(c) 100 g of the solid to liquid, without any change in temperature.
(d) 1000 g of the solid to liquid, without any change in temperature.

55) The signal for mitotic division is generated when the ratio of volume of nucleus to that of cell becomes

(a) less than a certain value.
(b) greater than a certain value.
(c) reaches a certain value.
(d) closer to one.

56) Ammonium chloride is purified by

(a) sublimation.
(b) crystallization.
(c) fractional crystallization
(d) distillation.

57) The diameter of a solute particle in a solution is

(a) $\leq 10^{-9}$ m.
(b) $> 10^{-9}$ m.
(c) $\leq 10^{-3}$ m.
(d) $< 10^{-4}$ m.

58) AD, BE and CF are the medians of Δ ABC. The sum of lengths of segments BE and CF is

(a) $< \frac{3}{2}$BC
(b) $> \frac{5}{3}$BC
(c) $> \frac{3}{2}$BC
(d) $< \frac{2}{3}$BC

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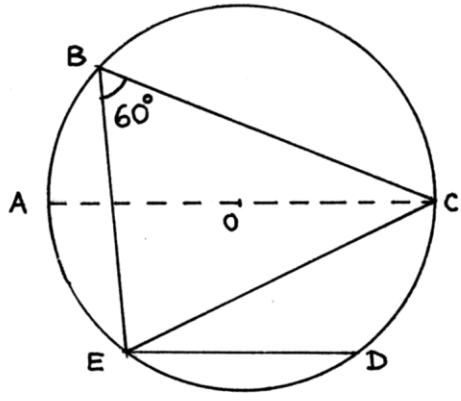
59) In the figure shown, chord ED is parallel to diameter AC of a circle. If $\angle$ CBE = 60°, then $\angle$DEC must be



(a) 15°.
(b) 30°.
(c) 10°.
(d) 20°.

60) Maximum vitamin A content is likely to be found in the extract of

(a) sprout of a pulse.
(b) cod liver.
(c) white muscles.
(d) rose petals.

61) Soaps do not clean clothes in hard water because

(a) hard water contains sodium and potassium ions.
(b) soluble soap is formed in hard water.
(c) the precipitate of soap adheres onto the fibre of the cloth as gummy mass.
(d) sodium or potassium soap is formed in hard water.

62) Complete digestive juice having enzymes to digest all types of organic materials is secreted by

(a) salivary gland and pancreatic gland.
(b) gastric gland and pancreatic gland.
(c) salivary gland and intestinal gland.
(d) pancreatic gland and intestinal gland.

63) If the pressure of a given mass of a gas is reduced to half and temperature is doubled simultaneously, the volume will be

(a) the same as before.
(b) twice as before.
(c) four times as before.
(d) one fourth as before.

64) If $a^2 + b^2 + c^2 = 1$ and $p = ab + bc + ca$, then

(a) $\frac{1}{2} \le p \le 2$

(b) $-\frac{1}{2} \le p \le \frac{1}{2}$

(c) $-\frac{1}{2} \le p \le 1$

(d) $-1 \le p \le \frac{1}{2}$

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65) The animal in which coelomic fluid has a significant role in locomotion is

(a) earthworm.
(b) leech.
(c) crab.
(d) sea cucumber.

66) Oxygen exhibits (–1) oxidation state in *

(a) OF_2
(b) H_2O
(c) H_2O_2
(d) HClO

67) The hypotenuse of a right angled triangle is 10 cm and the radius of its inscribed circle is 1 cm. Therefore, perimeter of the triangle is

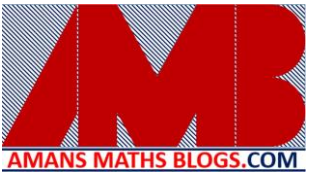
(a) 22 cm.
(b) 24 cm.
(c) 26 cm.
(d) 30 cm.

68) The tissue whose activity is important in vegetative propagation of a plant by grafting is

(a) meristem.
(b) phloem.
(c) cambium.
(d) pith.

69) If $x^2 - 5x + 1 = 0$, then $\dfrac{x^{10}+1}{x^5}$ has the value

(a) 2524.
(b) 2525.
(c) 2424.
(d) 2010.



70) Which of the following hydroxides is NOT an alkali?

(a) ammonium hydroxide
(b) calcium hydroxide
(c) copper hydroxide
(d) sodium hydroxide

71) The area of a circle is doubled when its radius r is increased by a. Therefore, radius r equals

(a) $\left(\sqrt{2}+1\right)a$.
(b) $\left(\sqrt{2}-1\right)a$.
(c) a.
(d) $\left(2-\sqrt{2}\right)a$.

72) The product of the roots of the equation $\sqrt[3]{8+x}+\sqrt[3]{8-x}=1$ is

(a) -21.
(b) -189.
(c) 9.
(d) -5.

73) An animal with chitinous exoskeleton, haemocoel and gills belongs to

(a) aschelminthes.
(b) arthropoda.
(c) echinodermata.
(d) urochordata.

74) The sides of a triangle are in the ratio 6 : 8 : 9. Therefore,

(a) angles of the triangle are in the ratio 6 : 8 : 9.
(b) it is an acute angled triangle.
(c) it is a right angled triangle.
(d) it is an obtuse angled triangle.

75) The perimeter of an isosceles right angled triangle is $2p$. Its area is

(a) $\left(2+\sqrt{2}\right)p^2$
(b) $\left(2-\sqrt{2}\right)p^2$
(c) $\left(3-2\sqrt{2}\right)p^2$
(d) $\left(3+2\sqrt{2}\right)p^2$

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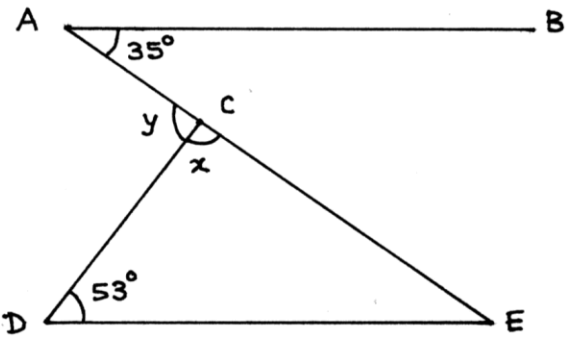
76) A point P is outside a circle at a distance of 13 cm from its centre. A secant from P cuts the circle in Q and R such that QR = 7 cm and the segment PQ of the secant exterior to the circle is 9 cm. Therefore, the radius of circle is

(a) 3 cm.
(b) 4 cm.
(c) 5 cm.
(d) 6 cm.

77) The ointment prescribed for burns usually contains, among other ingredients,

(a) vitamin A.
(b) vitamin B.
(c) vitamin D.
(d) vitamin E.

78) In the figure shown AB is parallel to DE. The difference between angles x and y is



(a) 0°.
(b) 4°.
(c) 10°.
(d) 12°.

79) A child having protruding belly, bulging eyes, thin and curved legs and peeling skin is likely to be suffering from

(a) kwashiorkor.
(b) rickets.
(c) marasmus.
(d) xerophthalmia.

80) If α, β, γ are the roots of the equation $(x - 2)(x^2 + 6x - 11) = 0$, therefore, $(\alpha + \beta + \gamma)$ equals

(a) -4.
(b) $23 / 6$.
(c) 13.
(d) -8.

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