

Atomic Energy Central School No. 4 Rawatbhata
Multiple Choice Question Examination (October 2019)

Class X

Subjects: Mathematics, Science and Social Science

MM: 120

Name: _____ Class/Sec: _____

OMR Roll No: _____ Invigilator's Sign: _____

Instruction: 1) Fill & darken roll number field correctly on OMR Sheet. In case of any error, OMR Answer Sheet will be not be read by the OMR Scanner.

2) Darken the most suitable option no. on OMR Answer Sheet.

3) There is no negative marking.

Mathematics

1. If $\sin \theta + \cos \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$, then $q(p^2 - 1) =$ 1
 - a) $2p$
 - b) None of these
 - c) $\frac{q}{p^2}$
 - d) 2
2. The value of $\operatorname{cosec}^4 A - 2 \operatorname{cosec}^2 A + 1$ is 1
 - a) $\tan^4 A$
 - b) $\sec^4 A$
 - c) $\operatorname{cosec}^4 A$
 - d) $\cot^4 A$
3. If $x = a \sec \theta \cos \varphi$, $y = b \sec \theta \sin \varphi$ and $z = c \tan \theta$, then the value of $\frac{x^2}{a^2} + \frac{y^2}{b^2}$ is 1
 - a) $1 + \frac{z^2}{c^2}$
 - b) $-1 - \frac{z^2}{c^2}$
 - c) $\frac{z^2}{c^2} - 1$
 - d) $1 - \frac{z^2}{c^2}$
4. If $(\alpha + \beta) = 90^\circ$, then the value of $\sqrt{\cos \alpha \operatorname{cosec} \beta - \cos \alpha \sin \beta}$ is 1
 - a) $\cos \alpha$
 - b) $\cos \beta$
 - c) $\sin \alpha$
 - d) $\sin \beta$
5. If $\cot A + \frac{1}{\cot A} = 2$ then $\cot^2 A + \frac{1}{\cot^2 A} =$ 1
 - a) 1
 - b) -1
 - c) 2
 - d) 0
6. $(\sec^2 \theta - 1)(1 - \operatorname{cosec}^2 \theta) =$ 1
 - a) -1
 - b) 0
 - c) 1
 - d) 2
7. If $\sin \alpha = \frac{1}{\sqrt{2}}$ and $\tan \beta = 1$, then the value of $\cos(\alpha + \beta)$ is 1
 - a) 3
 - b) 1
 - c) 2
 - d) 0
8. If $\sqrt{3} \tan \theta = 3 \sin \theta$, then the value of $\sin^2 \theta - \cos^2 \theta$ is 1
 - a) 1
 - b) $\frac{1}{2}$
 - c) 0
 - d) $\frac{1}{3}$
9. If $\sin A + 2 \cos A = 1$, then the value of $2 \sin A - \cos A$ is 1
 - a) 2
 - b) 0
 - c) -2
 - d) 1
10. If $x = a \cos \theta$ and $y = b \sin \theta$, then the value of $b^2 x^2 + a^2 y^2$ is 1
 - a) $a + b$
 - b) $a^2 b^2$
 - c) $a - b$
 - d) ab
11. Choose the correct option and justify your choice: $\frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ}$ 1
 - a) $\cos 60^\circ$
 - b) $\sin 30^\circ$
 - c) $\sin 60^\circ$
 - d) $\tan 60^\circ$
12. If A and B are acute angles and $\tan A = \cot B$, then the value of $(A + B)$ is 1

- a) 45°
c) 75°

- b) 30°
d) 60°

27. A tower and a building standing on the ground are 20 m apart. The height of the tower is 2 times the height of the building. If at the mid-point of the line joining their feet, the angular elevation of their tops are complementary, then the height of the building is 1
- a) $\sqrt{3}$ m
c) $\frac{2}{\sqrt{2}}$ m
- b) $\sqrt{2}$ m
d) $5\sqrt{2}$ m
28. If the length of a shadow of a tower is increasing, then the angle of elevation of the sun is 1
- a) neither increasing nor decreasing
c) decreasing
- b) zero
d) increasing
29. In a right $\triangle XYZ$, XZ is the hypotenuse of length 12 cm and $\angle X = 45^\circ$. The area of the triangle is 1
- a) 72cm^2
c) 24cm^2
- b) 12cm^2
d) 36cm^2
30. If the height of a tower and the distance of the point of observation from its foot, both, are increased by 10%, then the angle of elevation of its top 1
- a) decreases
c) remains unchanged
- b) none of these
d) increases
31. _____ is an instrument for measuring the angles of elevation and depression. 1
- a) Periscope
c) Telescope
- b) Microscope
d) Theodolite
32. If two trees of height 'x' and 'y' standing on the two ends of a road subtend angles of 30° and 60° respectively at the midpoint of the road, then the ratio of x : y is 1
- a) 1 : 3
c) 3 : 1
- b) 1 : 2
d) 1 : 1
33. In a right $\triangle ABC$, AC is the hypotenuse of length 10cm. If $\angle A = 30^\circ$, then the area of the triangle is 1
- a) $25\sqrt{3}\text{cm}^2$
c) $\frac{25}{3}\sqrt{3}\text{cm}^2$
- b) 25cm^2
d) $\frac{25}{2}\sqrt{3}\text{cm}^2$
34. A ramp for disabled people in a hospital must slope at not more than 30° . If the height of the ramp has to be 1 m, then the length of the ramp be 1
- a) 3 m
c) 2 m
- b) 1 m
d) $\sqrt{3}$ m
35. If in a $\triangle ABC$, $\angle C = 90^\circ$ and $\angle B = 45^\circ$, then state which of the following is true? 1
- a) Perpendicular = Hypotenuse
c) Base = Hypotenuse + Perpendicular
- b) Base = Hypotenuse
d) Base = Perpendicular
36. The angles of elevation of the top of a tower from two points on the ground at distances 8 m and 18 m from the base of the tower and in the same straight line with it are complementary. The height of the tower is 1
- a) 12 m
c) 8 m
- b) 18 m
d) 16 m
37. A tree 12m high is broken by the wind in such a way that its top touches the ground and makes an angle $\tan 30^\circ$ with the ground. The height at which from the bottom the tree is broken by the wind is 1
- a) 8 m
c) 4 m
- b) 6 m
d) 9 m
38. If the altitude of the sun is 60° , the height of a tower which casts a shadow of length 90 m is 1
- a) 60 m
c) 90 m
- b) $90\sqrt{3}$ m
d) $60\sqrt{3}$ m
39. In a right triangle ABC , $\angle B = 90^\circ$ and $2 AB = \sqrt{3}AC$, then $\angle C$ is 1
- a) 90°
c) 75°
- b) 60°
d) 30°
40. A vertical stick 20 cm long casts a shadow 15 cm long. At the same time, a tower casts a shadow 30 m long. The height of the tower is 1
- a) 15 m
c) 30 m
- b) 20 m
d) 40 m

Science

41. What are the main impurities present with bauxite ore? 1
- a) Silica, Calcium carbonate b) Silica, Iron oxide
c) Sulphur, Iron oxide d) All of the above
42. Which of the following has electrovalent bond(s)? 1
- A. CaF
B. NaCl
C. MgO
D. CO₂
- a) A and C b) A, B and C
c) All of these d) C and D
43. Before keeping any eatables in the jar, Riya always keeps anhydrous CaCl₂ in the bottle to: 1
- a) All of these b) To absorb moisture.
c) Kill germs d) To clean the bottle.
44. Which of the following metal reacts neither with cold water nor with hot water but reacts with hot steam to produce hydrogen gas? 1
- a) Mg b) Fe
c) Ca d) Na
45. Which one of the following is not a method for enrichment of an ore? 1
- a) Hydraulic washing b) Electromagnetic separation
c) Froth floatation d) Roasting and Calcination
46. Which one of the following elements symbolised as A and B is a metal: ${}^3_1A, {}^{40}_{20}B$? 1
- a) Neither A nor B is a metal b) Both A and B are metals
c) A is metal d) B is metal
47. Name the reducing agent in the following reaction $3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$ 1
- a) Al₂O₃ b) Al
c) MnO₂ d) Mn
48. HNO₃ is a strong acid because: 1
- a) None of these b) It doesn't dissociate into ions at all.
c) It dissociates partially in aqueous solution. d) It dissociates completely in aqueous solution.
49. Metals are alloyed to: 1
- A. Decrease hardness.
B. Lower melting point.
C. Decrease resistance towards corrosion.
D. Increase tensile strength.
- a) A and C b) All of these
c) B and D d) A and D
50. Match the following with the correct response: 1
- | | |
|------------------------------|-------------------|
| (1) Electrolytic reduction | (A) Sodium |
| (2) Electrolytic refining | (B) Zinc |
| (3) Reduction with carbon | (C) Impure copper |
| (4) Reduction with aluminium | (D) Chromium |
- a) 1-C, 2-B, 3-D, 4-A b) 1-A, 2-C, 3-B, 4-D
c) 1-B, 2-D, 3-A, 4-C d) 1-D, 2-A, 3-C, 4-B
51. The component of a chromosome that controls heredity is 1
- a) Histones b) Proteins
c) RNA d) DNA
52. Checkerboard method of calculations was developed by 1
- a) Mendel b) Bateson
c) Morgan d) Punnett

53. Which is the genetic material in retrovirus? 1

- a) DNA b) Neither RNA nor DNA
c) Both RNA and DNA d) RNA

54. Between which two groups of vertebrates does archaeopteryx serve as connecting Link? 1

- a) Reptiles and Aves b) Amphibian and Aves
c) Reptiles and Amphibian d) Reptiles and fishes

55. Which of the following statement is correct?

A. For every hormone there is a gene B. For every protein there is a gene C. For every enzyme there is a gene D. For every fat molecule there is gene

1

- a) A and C b) B and C
c) A, B and C d) A, B and D

56. The principle of inheritance of acquired characters was given by 1

- a) Weismann b) Darwin
c) Hugo De Vries d) Lamarck

57. match the following with correct response. 1

- (1) Genes
- (2) Factors
- (3) Fossils
- (4) sex chromosomes

- (A) Units of inheritance
- (B) Impressions of past organism
- (C) Entities which control the expression of traits
- (D) Determine sex of an individual

- a) 1-B, 2-D, 3-A, 4-C b) 1-A, 2-C, 3-B, 4-D
c) 1-C, 2-B, 3-D, 4-A d) 1-D, 2-A, 3-C, 4-B

58. Match the following with correct response. 1

(1) Group of tissues working together	(A) Homologous organs
(2) Organs structurally similar functionally different	(B) Vestigial organs
(3) Organs functionally similar but develop from different ways	(C) Analogous organs
(4) Functionless organs present in body	(D) Organs

- a) 1-D, 2-A, 3-C, 4-B b) 1-B, 2-D, 3-A, 4-C
c) 1-C, 2-B, 3-D, 4-A d) 1-A, 2-C, 3-B, 4-D

59. Statement A : Genetic recombination is one of the source of variation, 1
 Statement B : Natural selection may lead to the evolution of a new group. (which is correct)

a) Statement A is true, B is false b) Statement B is true, A is false
 c) Both the statement A and B are true d) Neither statement A nor Statement B is true

60. How many pairs of contrasting characters of pea were selected by Mendel for cross fertilization? 1

a) Five b) Six
 c) Twelve d) Seven

61. What will be the sex of the embryo if an egg is fertilized by a sperm having a '22 + X' composition? 1

a) Female b) Can be male or female
 c) Neither male nor female d) Male

62. A trait in an organism is influenced by 1

a) Both maternal & Paternal DNA b) Paternal DNA only
 c) Neither maternal nor paternal DNA. d) Maternal DNA only

63. Which of the following organism has only one type of sex chromosome called X – chromosome? 1

a) Cricket b) Lizard
 c) Bee d) Ant

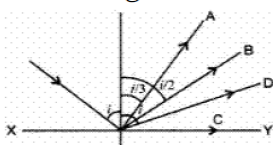
64. The genetic constitution of an organism is called 1

a) genome b) trait
 c) genotype d) phenotype

65. The egg of an animal contains 10 chromosomes, of which one is X – chromosome. How many autosomes would be there in the karyotype of this animal? 1

a) 9 b) 18
 c) 8 d) 20

66. On regular reflection from the surface XY, the reflected ray will go along: 1

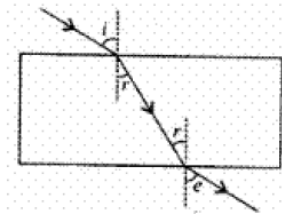


a) A b) D
 c) B d) C

67. A teacher gives a convex lens and a concave mirror of focal length of about 20 cm each to his student and asks him to find their focal lengths by obtaining the image of a distant object. The student uses a distant tree as the object and obtains its sharp image, one by one, on a screen. The distances d_1 and d_2 between the lens / mirror and the screen in the two cases and the nature of their respective sharp images are likely to be:

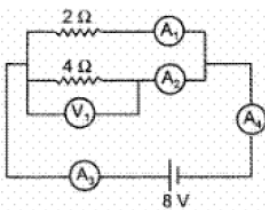
- a) (20 cm, 20 cm) and (inverted, inverted) b) (20 cm, 40 cm) and (erect, erect)
 c) (20 cm, 40 cm) and (inverted, erect) d) (20 cm, 20 cm) and (erect, inverted)

68. While performing the experiment on tracing the path of a ray of light passing through a glass slab as shown in the given diagram, four students interpreted the results as given below. Which one of the four interpretations is correct?



- a) $\angle r = \angle e$ b) $\angle i = \angle r$
 c) $\angle r > \angle e$ d) $\angle i > \angle r$

69. Using the given circuit with ammeter and voltmeter answer the question.



The current indicated by A_3 is :

- a) 6A b) 2A
 c) 1A d) 4A

70. If "e" and "i" are the emergent and incident angles, then for a rectangular glass slab

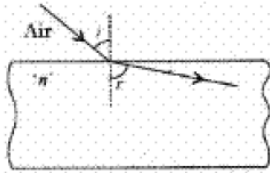
- a) $e = \frac{i}{2}$ b) $e = 2i$
 c) $e = i$ d) $e > i$

71. Refraction cannot cause bending as light moves from one surface to another if the incident and refraction angles i and r are related as:

- a) $i = r = 90^\circ$ b) $i = 0^\circ = r = 90^\circ$
 c) $i \neq r = 0^\circ$ d) $i = r = 0^\circ$

72. The value of n for the incident ray through air medium is:

1



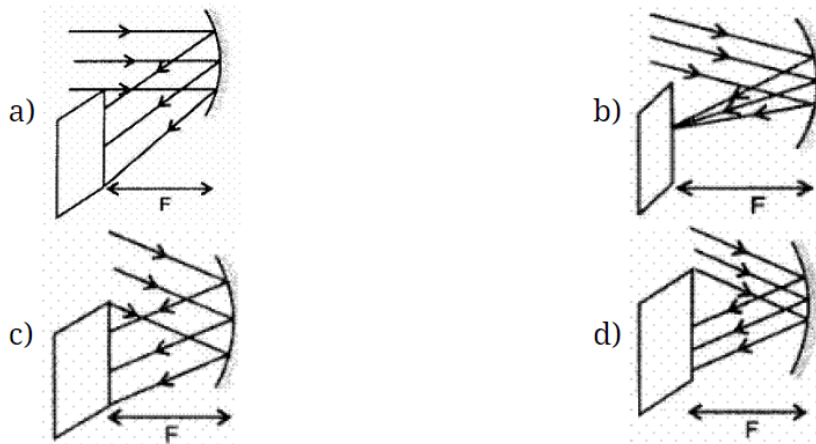
- a) > 3
- b) < 1
- c) $= 1$
- d) > 1

73. A lens of focal length ' f ' is cut into two equal parts without affecting its curvature. The two pieces will have equal focal length of:

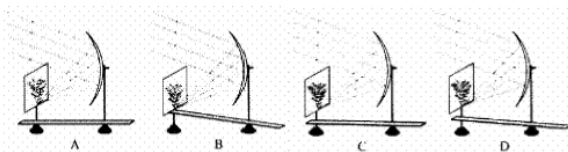
- a) $\frac{f}{2}$
- b) f
- c) $\frac{f}{3}$
- d) $2f$

74. Which of the following pictures depict the correct image formation

1



75. Four students A, B, C and D carried out measurement of focal length of a concave mirror as shown in the following four diagrams.

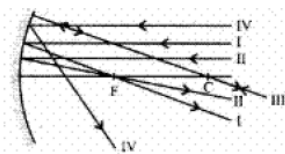


The best result will be obtained by student

- a) A
- b) B
- c) D
- d) C

76. Out of the four rays shown to fall on the concave mirror, the incorrect one is:

1



- a) I
- b) IV
- c) III
- d) II

77. Four students reported the following observation tables for the experiment, to trace the path of a ray of light passing through a glass slab for different angles of incidence. The observations, likely to be correct are those of student. 1

$\angle i$	$\angle r$	$\angle e$
30°	40°	30°
40°	50°	40°
50°	60°	50°

(I)

$\angle i$	$\angle r$	$\angle e$
30°	20°	30°
40°	30°	40°
50°	40°	50°

(II)

$\angle i$	$\angle r$	$\angle e$
30°	20°	40°
40°	30°	50°
50°	40°	60°

(III)

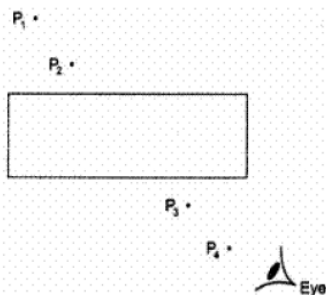
$\angle i$	$\angle r$	$\angle e$
30°	20°	20°
40°	30°	30°
50°	40°	40°

(IV)

- a) IV b) III
 c) I d) II

78. In the glass slab experiment shown below, four students A, B, C and D did the following: 1

- A : kept the eyes far from the glass slab while placing both the pins P_3 and P_4
 B : kept the eyes close to the glass slab while placing both the pins P_3 and P_4
 C : kept the eyes close to the glass slab while placing pin P_3 and far from the slab while placing pin P_4
 D : kept the eyes far from the glass slab while placing pin P_3 and close to the slab while placing pin P_4



The correct procedure is that of student

- a) D b) B
 c) C d) A

79. When red, blue and green light coming parallel to principal axis fall on a convex lens, they will converge on the axis at : 1

- a) one point b) three different points
 c) always at one point d) two different points

80. As incident angle is increased for a given pair of medium, the refraction angle will 1

- a) decrease b) always remains same
 c) may increase or decrease d) increase

Social Science

81. What is Suffrage? 1
 a) The right to information b) The right to Speech
 c) The right to vote d) The right to freedom
82. In 1848, Frédéric Sorrieu, a French artist, prepared a series of four prints visualising his dream of a world made up of ____ 1
 a) Democratic and Social Republics b) Absolutist and Democratic
 c) Communal-it and Social Republics d) Majority and Minority
83. Which of the following factor played an important role in developing nationalist sentiments? 1
 a) Technology b) Language
 c) Industrialisation d) Conservatism
84. Who believed that established, traditional institutions of state and society – like the monarchy, the Church, social hierarchies, property and the family – should be preserved? 1
 a) Conservatives b) Communalist
 c) Moderates d) Liberals
85. A new 'British nation' was forged through the propagation of a dominant ____ culture. 1
 a) Latin b) French
 c) English d) Vietnamese
86. What do the saints, angels and Christ symbolise in the utopian vision? 1
 a) Resentment against nations b) Equality among people
 c) Freedom of nations d) Fraternity among nations
87. In which treaty Greece was recognised as an independent nation? 1
 a) Treaty of Geneva b) Treaty of Vienna
 c) Versailles treaty d) Treaty of Constantinople
88. When were the 'Conservatives Regimes' set up? 1
 a) 1815 b) 1832
 c) 1830 d) 1820
89. Ideas of national unity in early-nineteenth-century Europe were closely allied to the ideology of ____ . 1
 a) Liberalism b) Centralism
 c) Globalism d) Privatization
90. What kind of societies sprang up in many European states to train revolutionaries and spread their ideas? 1
 a) Noble b) Linguistic
 c) Ethnic d) Secret
91. The term 'liberalism' derives from the ____ root liber, meaning free. 1
 a) Dutch b) Greek
 c) Sanskrit d) Latin
92. Match the following : 1

Attribute	Significance
Broken chains	Symbol of the German empire - strength
Breastplate with eagle	Heroism
Crown of oak leaves	Being freed
Sword	Readiness to fight

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

93. Identify the personality from the given information. 1
 i. He led the movement to unify the regions of Italy was neither a revolutionary nor a democrat.
 ii. Through his tactful diplomatic alliance with France, Sardinia-Piedmont succeeded in defeating the Austrian forces in 1859.
- a) Giuseppe Garibaldi b) Victor Emmanuel II
 c) Cavour d) Otto von Bismarck
94. Who said, "When France sneezes, the rest of Europe catches cold"? 1
 a) Metternich b) Giuseppe
 c) Lord Byron d) T S Eliot
95. The term 'absolutist' is referred to: 1
 a) A vision b) None of these
 c) Monarchical government d) Abstract theory
96. The 1830s were years of great economic hardship in ____ . 1
 a) USA b) India
 c) Germany d) Europe
97. In revolutionary France, who were granted exclusive rights to vote? 1
 a) All men b) Property-owning men
 c) All women d) Property-owning women
98. Who were called Junkers? 1
 a) The painters b) The common people of Germany
 c) Romantic artists and poets d) Large landowners
99. MNCs set up their production unit at a place where they get cheap labour and other resources because 1
 a) They want to help the people of that place b) They want to protect that area
 c) They want to interact with the people of that place d) It increases their profit
100. Broadly speaking there are how many types of foreign investment? 1
 a) 1 b) 4
 c) 3 d) 2
101. Which of the following is the most important principle on which WTO has been founded? 1
 a) promotion of fair competition b) Stability in the trading system
 c) special concern for developing countries d) Non-discrimination
102. The entry of MNCs into India was opened up in the year 1
 a) 1993 b) 1992
 c) 1990 d) 1991
103. Where is the headquarter of World Trade Organisation? 1
 a) Geneva b) London
 c) Hague d) Washington
104. Why did the consumer movement start in an organised form in 1960's? 1
 a) To protect sellers b) To introduce new brands
 c) Rampant food shortages d) To form consumer groups
105. When we are purchasing gold jewellery, we should look for which mark to ensure its quality? 1
 a) ISI b) Hallmark
 c) Agmark d) ISO
106. Which act was enacted by the Indian Government in 1986 for the consumers. 1
 a) Right to Information Act b) Consumer Movement Act
 c) Consumer Protection Act (COPRA) d) Right to be Educated
107. Give an example where producers need to strictly follow the required safety rules and regulations? 1
 a) Making a bag b) Making a shirt
 c) Making a chair d) Producing pressure cooker

108. If a case is dismissed in district level court, a consumer can appeal in the _____. 1
 a) Sessions court b) National commission
 c) District forum d) State level court
109. The housing societies or colonies in the cities have their own 1
 a) under ground water sources b) groundwater pumping devices to meet their water needs
 c) rivers connection d) streams of rain water
110. A little less than 30 per cent is stored as groundwater in the _____. 1
 a) Sea b) world's aquifers
 c) Rivers d) Oceans
111. In the year 2006, floods occurred in the states of 1
 a) Tamil Nadu & Andhra b) Gujarat & Maharashtra
 c) Karnataka & Kerala d) Maharashtra & Karnataka
112. The reservoirs that are created on the floodplains also submerge _____. 1
 a) lakes and ponds b) Tribal areas in Narmada valley.
 c) the existing vegetation . d) plain regions and its wild life
113. Irrigation has also changed the cropping pattern of many regions with farmers shifting to water 1
 a) more consuming b) intensive and commercial crops.
 c) less required crops d) required crops
114. _____ cloth was often more expensive than mass produced mill cloth. 1
 a) Cotton b) jute
 c) Khadi d) silk
115. The main features of the Poona Pact of September 1932 were: 1
 a) Reserved seats for Depressed Classes in provincial and central legislative councils b) To be voted by special electorates
 c) The Dalits to be called Depressed Classes and not Harijans d) Separate electorates for Dalits
116. Which of the following was a cause for the withdrawal of the Non-Cooperation Movement? 1
 a) Outbreak of violence at Chauri Chaura b) Lack of coordination among the satyagrahi
 c) Gandhiji wanted to start Civil Disobedience d) Other nationalists persuaded Gandhiji
117. Who led the peasants in Awadh? 1
 a) Mahatma Gandhi b) None of these
 c) Baba Ramchandra d) Jawaharlal Nehru
118. In which movement did Gandhi see an opportunity to bring Muslims under the umbrella of a unified national movement: 1
 a) A nationwide satyagraha against the proposed Rowlatt Act of 1919 b) A satyagraha movement to support the peasants of the Kheda district of Gujarat
 c) the oppressive plantation system in Champaran movement d) A non-cooperation movement in support of Khilafat as well as Swaraj
119. What did Mahatma Gandhi in his book, Hind Swaraj, declare? 1
 a) British ruled India because the latter was militarily weak b) British ruled India because they got international support
 c) British ruled India because Indians cooperated with them d) None of these
120. Name two industrial organizations established by Indian merchants and industrialists to protect their business interests. 1
 a) The Indian Industrial and Commercial Congress (1920) and The Confederation of Indian Industry (CII) b) The Indian Industrial and Commercial Congress (1920) and Federation of the Indian Chamber of Commerce and Industries (FICCI) in 1927
 c) The Confederation of Indian Industry (CII) and Union of Commerce and Trade d) The Federation of the Indian Chambers of Commerce and Industry (FICCI) in 1927 and The Confederation of Indian Industry (CII)

Solution
Class 10 - Mathematics
Multiple Choice Examination (October-2019)

Section A

1. (a)
2p

Explanation:

Given: $\sin \theta + \cos \theta = p$

squaring both sides we get

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

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

$$2\sin \theta \cos \theta = p^2 - 1 \dots\dots\dots (i)$$

and also $\sec \theta + \operatorname{cosec} \theta = q$ (given)

$$\frac{1}{\cos \theta} + \frac{1}{\sin \theta} = q$$

$$\frac{\sin \theta + \cos \theta}{\sin \theta \cos \theta} = q$$

but $\sin \theta + \cos \theta = p$ (given)

$$\frac{p}{\sin \theta \cos \theta} = q \dots\dots\dots (ii)$$

from (i) and (ii) we get

$$q(p^2 - 1) = 2p$$

2. (d)
 $\cot^4 A$

Explanation:

Given: $\operatorname{cosec}^4 A - 2\operatorname{cosec}^2 A + 1$

$$= (\operatorname{cosec}^2 A - 1)^2$$

$$= (\cot^2 A)^2$$

$$= \cot^4 A$$

3. (a)
 $1 + \frac{z^2}{c^2}$

Explanation:

Given: $x = a \sec \theta \cos \phi$, $y = b \sec \theta \sin \phi$

and $z = c \tan \theta$,

$$\therefore \frac{x^2}{a^2} + \frac{y^2}{b^2}$$

$$= \frac{a^2 \sec^2 \theta \cos^2 \phi}{a^2} + \frac{b^2 \sec^2 \theta \sin^2 \phi}{b^2}$$

$$= \sec^2 \theta (\cos^2 \phi + \sin^2 \phi) = \sec^2 \theta$$

$$\Rightarrow \frac{x^2}{a^2} + \frac{y^2}{b^2}$$

$$= 1 + \tan^2 \theta$$

$$= 1 + \frac{z^2}{c^2}$$

[Given: $z = c \tan \theta$]

4. (c)
 $\sin \alpha$

Explanation:

Given: $\alpha + \beta = 90^\circ$

$\Rightarrow \beta = 90^\circ - \alpha$

$$\begin{aligned} \therefore & \sqrt{\cos \alpha \operatorname{cosec} \beta - \cos \alpha \sin \beta} \\ &= \sqrt{\cos \alpha \operatorname{cosec} (90^\circ - \alpha) - \cos \alpha \sin (90^\circ - \alpha)} \\ &= \sqrt{\cos \alpha \sec \alpha - \cos \alpha \cos \alpha} \\ &= \sqrt{\cos \alpha \times \frac{1}{\cos \alpha} - \cos^2 \alpha} \\ &= \sqrt{1 - \cos^2 \alpha} \\ &= \sqrt{\sin^2 \alpha} \\ &= \sin \alpha \end{aligned}$$

5. (c)
2

Explanation:

Given: $\cot A + \frac{1}{\cot A} = 2$

Squaring both sides, we get

$\Rightarrow \cot^2 A + \frac{1}{\cot^2 A} + 2 \times \cot A \times \frac{1}{\cot A} = 4$

$\Rightarrow \cot^2 A + \frac{1}{\cot^2 A} = 2$

6. (a)
-1

Explanation:

Given: $(\sec^2 \theta - 1)(1 - \operatorname{cosec}^2 \theta)$

$= \tan^2 \theta (-\cot^2 \theta)$

$[\because \sec^2 \theta - 1 = \tan^2 \theta \text{ and } \operatorname{cosec}^2 \theta - 1 = \cot^2 \theta]$

$= \tan^2 \theta \times \frac{-1}{\tan^2 \theta} = -1$

7. (d)
0

Explanation:

Given: $\sin \alpha = \frac{1}{\sqrt{2}}$

$\Rightarrow \sin \alpha = \sin 45^\circ$

$\Rightarrow \alpha = 45^\circ$

And $\tan \beta = 1$

$\Rightarrow \tan \beta = \tan 45^\circ$

$\Rightarrow \beta = 45^\circ$

$\therefore \cos(\alpha + \beta) = \cos(45^\circ + 45^\circ) = \cos 90^\circ = 0$

8. (d)
 $\frac{1}{3}$

Explanation:

Given: $\sqrt{3} \tan \theta = 3 \sin \theta$

$\Rightarrow \sqrt{3} \frac{\sin \theta}{\cos \theta} = 3 \sin \theta$

$\Rightarrow \frac{\sqrt{3}}{3} = \cos \theta$

$\Rightarrow \cos \theta = \frac{1}{\sqrt{3}}$

And $\sin \theta = \sqrt{1 - \cos^2 \theta} = \sqrt{1 - \frac{1}{3}} = \sqrt{\frac{2}{3}}$

$\therefore \sin^2 \theta - \cos^2 \theta = \frac{2}{3} - \frac{1}{3} = \frac{1}{3}$

9. (a)

Explanation:

Given: $\sin A + 2 \cos A = 1$

Squaring both sides, we get

$$\Rightarrow \sin^2 A + 4 \cos^2 A + 4 \sin A \cos A = 1$$

$$\Rightarrow 1 - \cos^2 A + 4(1 - \sin^2 A) + 4 \sin A \cos A = 1$$

$$\Rightarrow 1 - \cos^2 A + 4 - 4 \sin^2 A + 4 \sin A \cos A = 1$$

$$\Rightarrow \cos^2 A + 4 \sin^2 A - 4 \sin A \cos A = 4$$

$$\Rightarrow (2 \sin A - \cos A)^2 = 4$$

\Rightarrow taking square root of both sides

$$\Rightarrow 2 \sin A - \cos A = 2$$

10. (b)
 $a^2 b^2$

Explanation:

Given: $x = a \cos \theta$ and $y = b \sin \theta$

$$\therefore b^2 x^2 + a^2 y^2$$

$$= b^2 (a \cos \theta)^2 + a^2 (b \sin \theta)^2$$

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

$$\Rightarrow b^2 x^2 + a^2 y^2$$

$$= a^2 b^2 (\cos^2 \theta + \sin^2 \theta)$$

$$= a^2 b^2$$

$$[\because \sin^2 \theta + \cos^2 \theta = 1]$$

11. (d)
 $\tan 60^\circ$

Explanation:

$$\frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ}$$

$$= \frac{2 \times \frac{1}{\sqrt{3}}}{1 - \left(\frac{1}{\sqrt{3}}\right)^2} = \frac{\frac{2}{\sqrt{3}}}{1 - \frac{1}{3}}$$

$$= \frac{\frac{2}{\sqrt{3}}}{\frac{2}{3}} = \frac{2}{\sqrt{3}} \times \frac{3}{2} = \sqrt{3} = \tan 60^\circ$$

12. (b)
 90°

Explanation:

Given: $\tan A = \cot B$

Since A and B are acute angles, then

$$\tan A = \tan(90^\circ - B)$$

$$\Rightarrow A = 90^\circ - B$$

$$\Rightarrow A + B = 90^\circ$$

13. (b)
2

Explanation:

Since $\sec \theta = \sqrt{1 + \tan^2 \theta}$

$$\therefore \sec \theta = \sqrt{1 + (\sqrt{3})^2}$$

$$= \sqrt{1 + 3} = \sqrt{4} = 2$$

14. (b)

$\sin 60^\circ$

Explanation:

$$\frac{2\tan 30^\circ}{1+\tan^2 30^\circ} = \frac{2 \times \frac{1}{\sqrt{3}}}{1+(\frac{1}{\sqrt{3}})^2}$$
$$\frac{\frac{2}{\sqrt{3}}}{1+\frac{1}{3}} = \frac{\frac{2}{\sqrt{3}}}{\frac{4}{3}} = \frac{2}{\sqrt{3}} \times \frac{3}{4} = \frac{\sqrt{3}}{2}$$
$$= \sin 60^\circ$$

Hence, the correct option is $= \sin 60^\circ$

15. (a)
 $\sqrt{2} \sin \theta$

Explanation:

Given: $\sin \theta + \cos \theta = \sqrt{2} \cos \theta$

Squaring both sides, we get

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

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

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

$$\Rightarrow (\cos \theta - \sin \theta)^2 = 2 \sin^2 \theta$$

$$\Rightarrow \cos \theta - \sin \theta = \sqrt{2} \sin \theta$$

16. (a)
0

Explanation:

Given: $\frac{\tan 45^\circ}{\operatorname{cosec} 30^\circ} + \frac{\sec 60^\circ}{\cot 45^\circ} - \frac{5 \sin 90^\circ}{2 \cos 0^\circ}$

$$= \frac{1}{2} + \frac{2}{1} - \frac{5 \times 1}{2 \times 1}$$
$$= \frac{1}{2} + \frac{2}{1} - \frac{5}{2}$$
$$= \frac{1+4-5}{2} = \frac{5-5}{2}$$
$$= \frac{0}{2} = 0$$

17. (a)
 90°

Explanation:

Given: $\sin \alpha = \frac{1}{\sqrt{2}}$

$$\Rightarrow \sin \alpha = \sin 45^\circ$$

$$\Rightarrow \alpha = 45^\circ$$

And $\cos \beta = \frac{1}{\sqrt{2}}$

$$\Rightarrow \cos \beta = \cos 45^\circ$$

$$\Rightarrow \beta = 45^\circ$$

$$\therefore \alpha + \beta = 45^\circ + 45^\circ = 90^\circ$$

18. (a)
 $\sqrt{a^2 + b^2 - c^2}$

Explanation:

Given: $a \sin \theta + b \cos \theta = c$

Squaring both sides, we get

$$\Rightarrow a^2 \sin^2 \theta + b^2 \cos^2 \theta + 2ab \sin \theta \cos \theta = c^2$$

$$\Rightarrow a^2 (1 - \cos^2 \theta) + b^2 (1 - \sin^2 \theta) + 2ab \sin \theta \cos \theta = c^2$$

$$\Rightarrow a^2 - a^2 \cos^2 \theta + b^2 - b^2 \sin^2 \theta + 2ab \sin \theta \cos \theta = c^2$$

$$\begin{aligned} &\Rightarrow a^2 \cos^2 \theta - b^2 \sin^2 \theta - 2ab \sin \theta \cos \theta = a^2 + b^2 - c^2 \\ &\Rightarrow (a \cos \theta - b \sin \theta)^2 = a^2 + b^2 - c^2 \\ &\Rightarrow a \cos \theta - b \sin \theta = \sqrt{a^2 + b^2 - c^2} \end{aligned}$$

19. (a)
 $\frac{m^2-1}{n^2-1}$

Explanation:

Given: $\tan A = n \tan B$

$$\begin{aligned} &\Rightarrow \frac{1}{\tan B} = \frac{n}{\tan A} \\ &\Rightarrow \cot B = \frac{n}{\tan A} \end{aligned}$$

And $\sin A = m \sin B$

$$\begin{aligned} &\Rightarrow \frac{1}{\sin B} = \frac{m}{\sin A} \\ &\Rightarrow \operatorname{cosec} B = \frac{n}{\sin A} \end{aligned}$$

Now, $\operatorname{cosec}^2 B - \cot^2 B = 1$

$$\begin{aligned} &\Rightarrow \frac{m^2}{\sin^2 A} - \frac{n^2}{\tan^2 A} = 1 \\ &\Rightarrow \frac{m^2}{\sin^2 A} - \frac{n^2 \cos^2 A}{\sin^2 A} = 1 \\ &\Rightarrow m^2 - n^2 \cos^2 A = \sin^2 A \\ &\Rightarrow m^2 - n^2 \cos^2 A = 1 - \cos^2 A \\ &\Rightarrow m^2 - 1 = (n^2 - 1) \cos^2 A \\ &\Rightarrow \cos^2 A = \frac{m^2-1}{n^2-1} \end{aligned}$$

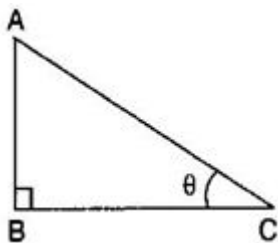
20. (a)
 $\tan \theta$

Explanation:

$$\begin{aligned} &\text{Here } \sqrt{(1 - \cos^2 \theta) \sec^2 \theta} \\ &= \sqrt{\sin^2 \theta \times \frac{1}{\cos^2 \theta}} \\ &\left[\because 1 - \cos^2 \theta = \sin^2 \theta \text{ and } \sec^2 \theta = \frac{1}{\cos^2 \theta} \right] \\ &= \sqrt{\frac{\sin^2 \theta}{\cos^2 \theta}} \\ &= \sqrt{\tan^2 \theta} \\ &= \tan \theta \end{aligned}$$

21. (c)
 6 km

Explanation:

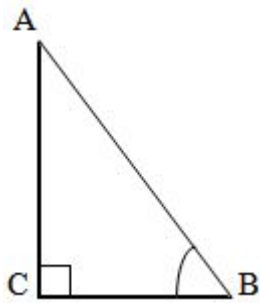


Let the height of the flying plane be $AB = h$ meters, distance from the point of observation $AC = 12$ m and angle of elevation $\theta = 30^\circ$

$$\therefore \sin 30^\circ = \frac{AB}{AC} \Rightarrow \frac{1}{2} = \frac{h}{12} \Rightarrow h = 6 \text{ meters}$$

22. (d)
 60°

Explanation:

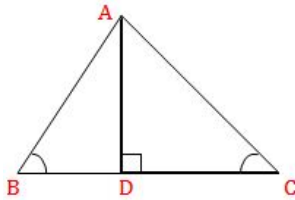


Given: $\angle C = 90^\circ$. If $AC = \sqrt{3} BC$ and $\angle B = \phi$,

$$\begin{aligned} \therefore \tan \phi &= \frac{AC}{BC} \\ \Rightarrow \tan \phi &= \frac{\sqrt{3}BC}{BC} = \sqrt{3} \\ \Rightarrow \tan \phi &= \tan 60^\circ \\ \Rightarrow \phi &= 60^\circ \end{aligned}$$

23. (d)
 $20(\sqrt{3} + 3)m$

Explanation:



Let the height of the tower = $AD = 60$ m and angles of elevation of the top of the tower of two men are 60° and 45° respectively.

To find: Distance between two men = BC

In triangle ABD ,

$$\begin{aligned} \tan 60^\circ &= \frac{60}{BD} \Rightarrow \sqrt{3} = \frac{60}{BD} \\ \Rightarrow BD &= \frac{60}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = 20\sqrt{3}m \end{aligned}$$

In triangle ADC ,

$$\tan 45^\circ = \frac{60}{DC}$$

$$\Rightarrow 1 = \frac{60}{DC}$$

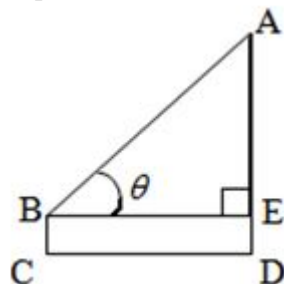
$$\Rightarrow DC = 60 \text{ m}$$

$$\therefore BC = BD + DC = 20\sqrt{3} + 60$$

$$= 20(\sqrt{3} + 3) \text{ m}$$

24. (d)
 45°

Explanation:



Let θ be the angle of elevation,

The height of the tower $AD = 25$ m

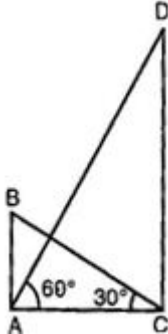
And $CD = 23.5$ m

In triangle ABE ,

$$\begin{aligned} \therefore \tan \theta &= \frac{AE}{BE} = \frac{AD-ED}{CD} \\ \Rightarrow \tan \theta &= \frac{25-1.5}{23.5} = \frac{23.5}{23.5} = 1 \\ \Rightarrow \tan \theta &= \tan 45^\circ \\ \Rightarrow \theta &= 45^\circ \end{aligned}$$

25. (b)
150m

Explanation:



Let the height of the hill be h h m.

$$\begin{aligned} \tan 60^\circ &= \frac{DC}{AC} \\ \Rightarrow \sqrt{3} &= \frac{h}{AC} \\ \Rightarrow AC &= \frac{h}{\sqrt{3}} \text{ m.....(i)} \end{aligned}$$

In right triangle ABC,

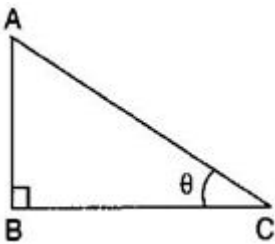
$$\begin{aligned} \tan 30^\circ &= \frac{50}{AC} \\ \Rightarrow \frac{1}{\sqrt{3}} &= \frac{50}{AC} \\ \Rightarrow AC &= 50\sqrt{3} \text{ m.....(ii)} \end{aligned}$$

From eq. (i) and (ii),

$$\begin{aligned} 50\sqrt{3} &= \frac{h}{\sqrt{3}} \\ \Rightarrow h &= 50 \times \sqrt{3} \times \sqrt{3} = 150 \text{ m} \end{aligned}$$

26. (d)
 60°

Explanation:

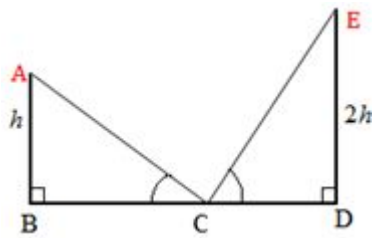


Let the height of the pole be $AB = \sqrt{3}x$ meters and the length of the shadow be $BC = x$ meters and angle of elevation = θ

$$\begin{aligned} \therefore \tan \theta &= \frac{\sqrt{3}x}{x} \\ \Rightarrow \tan \theta &= \sqrt{3} \\ \Rightarrow \tan \theta &= \tan 60^\circ \\ \Rightarrow \theta &= 60^\circ \end{aligned}$$

27. (d)
 $5\sqrt{2}$ m

Explanation:



Let the height of the building = $AB = h$ meters, then

Height of the tower = $ED = 2h$ meters

According to question, $\angle ACB = \theta$ then $\angle EDC = 90^\circ - \theta$ And $BC = CD = 10$ m

Now, in triangle ABC, $\tan \theta = \frac{AB}{BC} \Rightarrow \tan \theta = \frac{h}{10}$ (i)

Now, in triangle EDC, $\tan(90^\circ - \theta) = \frac{ED}{CD}$

$\Rightarrow \cot \theta = \frac{2h}{10} = \frac{h}{5}$ (ii)

$h \cdot 2h$ Multiplying eq. (i) and (ii), we get

$$\tan \theta \cdot \cot \theta = \frac{h}{10} \times \frac{h}{5} \Rightarrow 1 = \frac{h^2}{50}$$

$$\Rightarrow h^2 = 50 \Rightarrow h = 5\sqrt{2} \text{ m}$$

28. (c)
decreasing

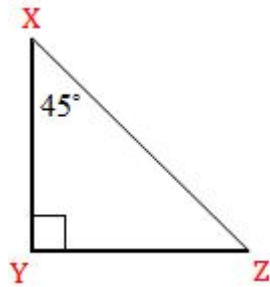
Explanation:

If the elevation moves towards the tower, it is increase and if its elevation moves away the tower, it decrease. Hence if the shadow of a tower is increasing, then the angle of elevation of sun is not increasing.

29. (d)
 36 cm^2

Explanation:

In triangle XYZ,



$$\cos 45^\circ = \frac{XY}{XZ} \Rightarrow \frac{1}{\sqrt{2}} = \frac{XY}{12}$$

$$\Rightarrow XY = \frac{12}{\sqrt{2}} \text{ cm and } \sin 45^\circ = \frac{YZ}{XZ}$$

$$\Rightarrow \frac{1}{\sqrt{2}} = \frac{YZ}{12}$$

$$\Rightarrow YZ = \frac{12}{\sqrt{2}} \text{ cm}$$

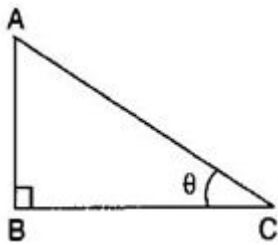
$$\therefore \text{ar}(\triangle XYZ)$$

$$= \frac{1}{2} \times \frac{12}{\sqrt{2}} \times \frac{12}{\sqrt{2}}$$

$$= 36 \text{ cm}^2$$

30. (c)
remains unchanged

Explanation:



Let height of the tower be h meters and distance of the point of observation from its foot be x meters and angle of elevation be θ $\therefore \tan \theta = \frac{h}{x}$ (i)

Now, new height = $h + 10\%$ of $h = h + \frac{10}{100}h = \frac{11h}{10}$ And new distance = $x + 10\%$ of $x = x + \frac{10}{100}x = \frac{11x}{10}$ \therefore

$$\tan \theta = \frac{\frac{11h}{10}}{\frac{11x}{10}} = \frac{h}{x} \text{(ii)}$$

From eq. (i) and (ii), it is clear that the angle of elevation is same i.e., angle of elevation remains unchanged.

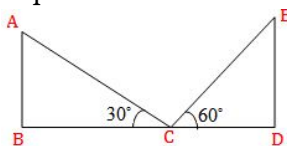
31. (d)
Theodolite

Explanation:

A theodolite is an instrument for measuring the angles of elevation and depression. A Theodolite is more accurate instrument for measuring horizontal and vertical angles.

32. (a)
1 : 3

Explanation:



Here two trees AB and ED are of height x and y respectively. And $BC = CD$

$$\therefore \tan 30^\circ = \frac{x}{BC}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{x}{BC}$$

$$\Rightarrow x = \frac{BC}{\sqrt{3}} \text{ And } \tan 60^\circ = \frac{y}{CD}$$

$$\Rightarrow \sqrt{3} = \frac{y}{CD}$$

$$\Rightarrow y = CD\sqrt{3} = BC\sqrt{3} \text{ [BC = CD]}$$

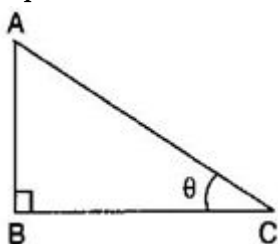
$$\text{Now, } \frac{x}{y} = \frac{BC}{\sqrt{3} \times BC\sqrt{3}}$$

$$= \frac{1}{3}$$

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

33. (d)
 $\frac{25}{2}\sqrt{3}cm^2$

Explanation:



In triangle ABC, AC is hypotenuse of the length = 10 cm $\angle A = 30^\circ$ Now, $\sin 30^\circ = \frac{BC}{AC}$

$$\Rightarrow \frac{1}{2} = \frac{BC}{10}$$

$$\Rightarrow BC = \frac{10}{2} = 5 \text{ cm}$$

$$\begin{aligned}
 \text{Now, } AB &= \sqrt{(AC)^2 - (BC)^2} \\
 &= \sqrt{(10)^2 - (5)^2} \\
 &= \sqrt{100 - 25} = \sqrt{75} = 5\sqrt{3} \text{ cm} \\
 \therefore \text{ar}(\triangle ABC) &= \frac{1}{2} \times BC \times AB \\
 &= \frac{1}{2} \times 5\sqrt{3} \times 5 = \frac{25\sqrt{3}}{2} \text{ sq. cm}
 \end{aligned}$$

34. (c)
2 m

Explanation:

Let height of the ramp be $AB = 1$ m, the slope of the ramp AC and angle of elevation $= \theta = 30^\circ$

In triangle ABC ,

$$\sin 30^\circ = \frac{AB}{AC}$$

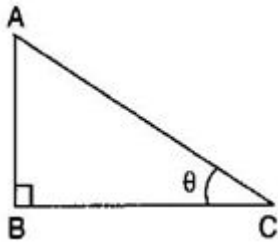
$$\Rightarrow \frac{1}{2} = \frac{1}{AC}$$

$$\Rightarrow AC = 2 \text{ meters}$$

Therefore, the length of the ramp is 2 m.

35. (d)
Base = Perpendicular

Explanation:



Given: in triangle ABC , $\angle C = 45^\circ$, and $\angle B = 90^\circ$,

$$\text{Since, } \tan \theta = \frac{\text{Perpendicular}}{\text{Base}}$$

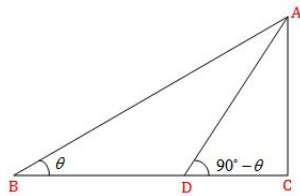
$$\Rightarrow \tan 45^\circ = \frac{\text{Perpendicular}}{\text{Base}}$$

$$\Rightarrow 1 = \frac{\text{Perpendicular}}{\text{Base}}$$

$$\Rightarrow \text{Base} = \text{perpendicular}$$

36. (a)
12 m

Explanation:



$$\text{In triangle } ABC, \tan \theta = \frac{h}{18} \dots(i)$$

$$\text{And in triangle } ADC, \tan(90^\circ - \theta) = \frac{h}{8} h$$

$$\Rightarrow \cot \theta = \frac{h}{8} \dots(ii)$$

Multiplying eq. (i) and (ii), we get

$$\tan \theta \cdot \cot \theta = \frac{h}{18} \times \frac{h}{8}$$

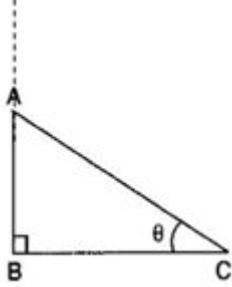
$$\Rightarrow 1 = \frac{h^2}{144}$$

$$\Rightarrow h^2 = 144$$

$$\Rightarrow h = 12 \text{ m}$$

37. (c)
4 m

Explanation:



Let tree broke from the height of x from point A, then length of the broken tree be $(12 - x)$ meters and angle of elevation = $\theta = 30^\circ$

$$\text{In triangle ABC, } \sin 30^\circ = \frac{AB}{AC} \Rightarrow \frac{1}{2} = \frac{x}{12-x}$$

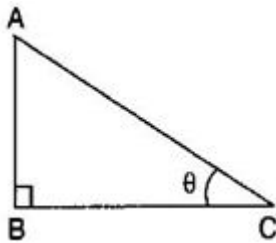
$$\Rightarrow 2x = 12 - x$$

$$\Rightarrow 3x = 12$$

$$\Rightarrow x = 4\text{m}$$

38. (b)
 $90\sqrt{3}$ m

Explanation:



Let Height of the tower = $AB = h$ meters,

Length of the shadow = $BC = 90$ m

And angle of elevation $\theta = 60^\circ$

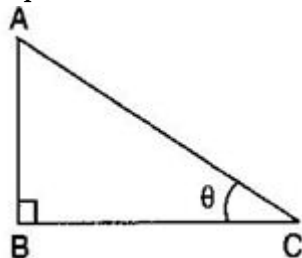
$$\therefore \tan 60^\circ = \frac{AB}{BC}$$

$$\Rightarrow \sqrt{3} = \frac{h}{90}$$

$$\Rightarrow h = 90\sqrt{3} \text{ meters}$$

39. (b)
 60°

Explanation:



$$\text{Given: } 2AB = \sqrt{3}AC$$

Let DC be θ

$$\Rightarrow AB = \frac{\sqrt{3}}{2}AC$$

$$\therefore \sin \theta = \frac{AB}{AC}$$

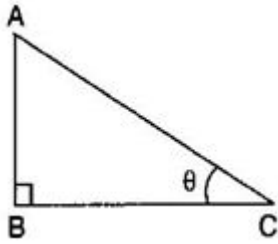
$$\Rightarrow \sin \theta = \frac{\frac{\sqrt{3}}{2}AC}{AC}$$

$$\Rightarrow \sin \theta = \frac{\sqrt{3}}{2}$$

$$\Rightarrow \sin \theta = \sin 60^\circ \Rightarrow \theta = 60^\circ$$

40. (d)
40 m

Explanation:

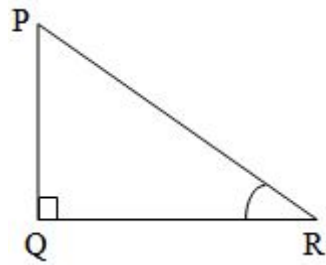


Let the height of the vertical stick be $AB = 20$ cm, the length of the shadow of the stick be $BC = 15$ cm and angle of elevation θ

At the same time the height of the tower be h meters and the shadow of the tower = $QR = 30$ cm and the angle of elevation

$$\angle PRQ = \theta \text{ Now, in triangle ABC, } \tan \theta = \frac{AB}{BC} \Rightarrow \tan \theta = \frac{20}{15} = \frac{4}{3} \dots\dots(i)$$

Again in triangle PQR,



$$\tan \theta = \frac{PR}{QR}$$

$$\Rightarrow \frac{4}{3} = \frac{h}{30} \text{ [From eq. (i)]}$$

$$\Rightarrow h = \frac{30 \times 4}{3} = 40 \text{ meters}$$

Solution
Class 10 - Science
MCQ TEST
Section A

41. (b)
Silica, Iron oxide

Explanation:

Bauxite usually contains silica (SiO₂), iron oxides and titanium oxide (TiO₂) as impurities.

42. (b)
A, B and C

Explanation:

Carbon is a tetravalent element and does not lose or gain electrons easily to form electrovalent bonds. It forms covalent bonds with other elements.

43. (b)
To absorb moisture.

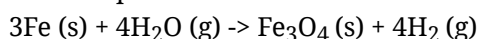
Explanation:

Anhydrous calcium chloride is used to absorb moisture or as a packaging aid to ensure dryness.

44. (b)
Fe

Explanation:

Sodium reacts vigorously with water. Such is the reaction that it has to be stored under kerosene. Calcium can react with cold water. Magnesium reacts with hot water. Heated iron reacts with water when hot steam is passed over it.



45. (d)
Roasting and Calcination

Explanation:

Roasting and Calcination are used for conversion of ore to metal oxide. Hydraulic washing, Froth floatation and Electromagnetic separation are used for concentration, dressing or benefaction of an ore.

46. (b)
Both A and B are metals

Explanation:

A is Sodium (Atomic number 11) and B is Calcium (Atomic number 20). Both are metals.

47. (b)
Al

Explanation:

Aluminium is the reducing agent in the reaction. It reduces manganese dioxide (MnO₂) to manganese (Mn) and itself gets oxidised to aluminium oxide. Manganese dioxide acts as an oxidising agent.

48. (d)
It dissociates completely in aqueous solution.

Explanation:

Nitric acid is a mineral acid. It is a strong acid because it dissociates completely in aqueous solution to form hydronium ions.

49. (c)
B and D

Explanation:

Metals are alloyed to improve the properties of metals. An alloy is a homogeneous mixture of two or more metals. They are stronger, harder and more resistant to corrosion. They have a lower melting point and lower thermal conductivity than that of the constituent metals.

50. (b)
1-A, 2-C, 3-B, 4-D

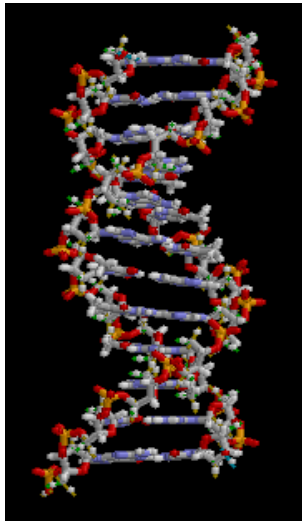
Explanation:

Highly reactive metals like **sodium**, which cannot be obtained by reducing their oxides with carbon, are obtained by electrolysis of their chlorides (**electrolytic reduction**) in molten state. **Electrolytic refining** is used for refining impure copper. **Zinc oxide** can be reduced with **carbon** (or coke). **Chromium** can be obtained from its oxide ore by **reduction** with **aluminium powder**.

51. (d)
DNA

Explanation:

Heredity is the passing on of traits from parents to their offspring, either through asexual reproduction or sexual reproduction; the offspring cells or organisms acquire the genetic information of their parents. Heritable traits are known to be passed from one generation to the next via DNA, a molecule that encodes genetic information.



52. (d)
Punnett

Explanation:

Punnett's gametic checkerboard method is of great use in deducing the genotype and phenotype of the F₂ offsprings of a hybridization cross. The gametic checkerboard has the equal number of squares in horizontal and vertical lines according to the number of gametic combinations of F₁ hybrid.

53. (d) RNA

Explanation:

A retrovirus is any virus belonging to the viral family Retroviridae. All the genetic material in retroviruses is in the form of RNA molecules, while the genetic material of their hosts is in the form of DNA. When a retrovirus infects a host cell, it will introduce its RNA together with some enzymes into the cell.

54. (a) Reptiles and Aves
Explanation:

Paleontologists view Archaeopteryx as a transitional fossil between dinosaurs and modern birds. With its blend of avian and reptilian features, it was long viewed as the earliest known bird. Discovered in 1860 in Germany, it's sometimes referred to as Urvogel, the German word for "original bird" or "first bird." Recent discoveries, however, have displaced Archaeopteryx from its lofty title.

55. (c) A, B and C

Explanation:

Hormones, proteins and enzymes are the result of specific gene sequences and different type of hormones, proteins and enzymes are secreted by varying gene codings.

Fats are combination of fatty acids and glycerol and is completely not a gene based secretion.

56. (d)

Lamarck

Explanation:

Lamarckism – Theory of Inheritance of Acquired Characters is the first theory of evolution, which was proposed by Jean Baptiste de Lamarck (1744-1829), a French biologist. Although the outline of the theory was brought to notice in 1801, his famous book “Philosophic Zoologique” was published in 1809, in which he discussed his theory in detail.

57. (b) 1-A, 2-C, 3-B, 4-D

Explanation:

A) genes are the primary unit of inheritance which are specific for specific individual.

B) factors are the traits which are transferred from parents to offsprings.

C) fossils are the dead remains of extinct species.

D) sex chromosomes decide the sex of an organism whereas autosomes decide the phenotypic expressions.

58. (a)

1-D, 2-A, 3-C, 4-B

Explanation:

A. Cells functioning together form tissue and tissue in turn form organs.

B. organs with same origin but different function- homologous organs. e.g. limbs of bat and human.

C. organs with different origin but same function- analogous organs.e. g. Wings of butterfly and birds.

D. appendix is non functional part in human body.

59. (c)

Both the statement A and B are true

Explanation:

Genetic recombination is the production of offspring with combinations of traits that differ from those found in either parent.

Natural selection leads to evolutionary change when individuals with certain characteristics have a greater survival or reproductive rate than other individuals in a population and pass on these inheritable genetic characteristics to their offspring.

60. (d)

Seven

Explanation:

Mendel selected 14 different varieties of the pea and grouped them into seven pairs. Each pair was considered for a specific trait (characteristic) such as flower color or seed shape or stem length, etc. The two members of each pair showed contrasting forms of the chosen trait, ,e.g., in a pair selected for stem length, one variety had a tall stem (6-7 feet tall) while the other had a dwarf stem . These seven pairs of contrasting traits are shown in Table.

Sr. No.	Characters	Contrasting pairs (Allelic pairs)	
		(Dominant)	(RecBIOe)

1.	Form of seed	Round (R)	Wrinkled(r)
2.	Color of cotyledons	Yellow(Y)	Green(y)
3.	Color of seed coat	Colored(C)	White(c)
4.	Form of pod	Inflated (I)	Constricted(i)
5.	Color of pod	Green(G)	Yellow(g)
6.	Position of flower	Axial(A)	Terminal(a)
7.	Height of plant (Length of stem)	Tall(T)	Dwarf(t)

61. (a) Female

Explanation:

An egg or sperm only has half of the parent's sex chromosome pair. An egg will always have an X chromosome, since the woman's sex chromosome pair only has Xs. Sperm can have either an X chromosome or a Y chromosome.

If a sperm with an X chromosome fertilizes the egg, the new cell will have two X chromosomes. One came from the father's sperm and one came from the mother's egg. Since the sex chromosome that is made is XX, the cell will grow into a girl baby.

62. (a)

Both maternal & Paternal DNA

Explanation:

As during fertilisation, sperm only gives nucleus, but ova gives nucleus as well as cytoplasm. Therefore, the mitochondrial DNA and other cytoplasmic factors are inherited directly from mother. there are some traits which are exclusively linked with Y- chromosome and they are inherited by the male child directly from father.

63. (a)

Cricket

Explanation:

The X0 sex-determination system is a system that determines the sex of offspring among grasshoppers, crickets, cockroaches, and some other insects. In this system, there is only one sex chromosome, referred to as X. Males only have one X chromosome (X0), while females have two (XX).

The zero (sometimes, the letter O) signifies the lack of a second X. Maternal gametes always contain an X chromosome, so the sex of the animals' offspring depends on whether a sex chromosome is present in the male gamete. Its sperm normally contain either one X chromosome or no sex chromosomes at all

64. (c)

genotype

Explanation:

The genotype is the part (DNA sequence) of the genetic makeup of a cell, and therefore of an organism or individual, which determines a specific characteristic of that cell/organism/individual.

65. (b)

18

Explanation:

Karyotype is the number and appearance of chromosomes in a nucleus of somatic cell. Somatic cells are diploid cells which make up the body. They have two sets of chromosomes. So, if an egg cell (gamete cell) which is a haploid cell (with single set of chromosomes) has 10 chromosome, then number of chromosomes present in a somatic cell will be 20 chromosomes. As egg cells are produced by female body, then among 20 chromosomes, two X chromosomes will be sex chromosome. So, karyotype of that animals will be showing 18 autosomes.

66. (b)

D

Explanation:

On regular reflection $\angle r = \angle i$.

67. (a)
(20 cm, 20 cm) and (inverted, inverted)

Explanation:

Since the object is distant, the nature of the image on the screen in case of both convex lens and concave mirror will be real, inverted, highly diminished and point sized.

If the object is distant, then we get its image at focus on the other side of convex lens. Therefore, d_1 will be 20 cm.

In case of concave mirror, if the object is distant, then we get its image at focus in front of concave mirror. Therefore, d_2 will be 20 cm.

68. (d)
 $\angle i > \angle r$

Explanation:

When light is entering from optically rarer to optically denser medium, the angle of incidence will be greater than the angle of refraction.

So, for parallel surfaces, refracting light, $\angle e = \angle i$ and for a denser medium $\angle r < \angle i$.

69. (a)
6A

Explanation:

$$I = \frac{v}{R_{eq}} = \frac{8}{(4/3)} = 6 \text{ A}$$

70. (c)
 $e = i$

Explanation:

For parallel surfaces, $e = i$ should be obeyed.

71. (a)
 $i = r = 90^\circ$

Explanation:

It is because when i is 90 degrees, it means incident ray is perpendicular to the refracting surface and light travels in the shortest path that's why it bends towards the normal when it enters a denser medium. But we know that the shortest distance is perpendicular to the medium. So refracted ray doesn't bend and continues to move straight.

72. (b)
< 1

Explanation:

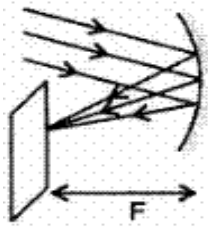
As light enters a rarer medium from a denser medium, it will bend away from the normal.

73. (b)
f

Explanation:

Since the lens is cut into two equal parts without affecting its curvature, it means the radius of curvature R is same for both parts and hence the focal length ($F = \frac{R}{2}$) will remain same.

74. (b)



Explanation:

Parallel beams getting reflected from the concave mirror will converge at focus to produce a sharp image.

75. (a)
A

Explanation:

For the correct measurement of focal length, must have a sharp image on the screen and the metre scale must be correctly positioned between (sharp image) screen and the centre of the concave mirror.

76. (b)
IV

Explanation:

All parallel beams are to pass through the focus.

77. (d)
II

Explanation:

When light is entering from optically rarer to optically denser medium, the angle of incidence will be greater than the angle of refraction.

Since $\angle i = \angle e$ and $\angle r < \angle i$ for dense glass slab.

78. (d)
A

Explanation:

We need to keep the eye far from the glass slab to have a good and proper alignment of the pins.

79. (b)
three different points

Explanation:

Red, blue and green lights have different wavelengths so they will be refracted accordingly. So three points of convergence on principal axis exist.

80. (d)
increase

Explanation:

Since $n = \frac{\sin i}{\sin r} = \text{constant}$, with increase in i , r will increase.

Solution
Class 10 - Social Science
Multiple Choice Examination (October-2019)

Section A

- 81 (c)
The right to vote

Explanation:
Suffrage – The right to vote

82. (a)
Democratic and Social Republics

Explanation:
In 1848, Frédéric Sorrieu, a French artist, prepared a series of four prints visualising his dream of a world made up of ‘democratic and social Republics’

83. (b) Language
Explanation:
Language played an important role in developing nationalist sentiments.

84. (a) Conservatives
Explanation:
Following the defeat of Napoleon in 1815, European governments were driven by a spirit of conservatism. Conservatives believed that established, traditional institutions of state and society – like the monarchy, the Church, social hierarchies, property and the family – should be preserved.

5. (c) English
Explanation:
A new ‘British nation’ was forged through the propagation of a dominant English culture. The symbols of the new Britain – the British flag (Union Jack), the national anthem (God Save Our Noble King), the English language – were actively promoted and the older nations survived only as subordinate partners in this union.

86. (d) Fraternity among nations
Explanation:
In an utopian vision, Christ, saints and angels gaze upon the scene from the heavens above. They have been used by the artist to symbolise fraternity among the nations of the world.

87. (d) Treaty of Constantinople
Explanation:
The Treaty of Constantinople of 1832 recognised Greece as an independent nation.

88. (a) 1815
Explanation:
Following the defeat of Napoleon in 1815, European governments were driven by a spirit of conservatism. Conservatives believed that established, traditional institutions of state and society – like the monarchy, the Church, social hierarchies, property and the family should be preserved.

89. (a) Liberalism
Explanation:
Ideas of national unity in early-nineteenth-century Europe were closely allied to the ideology of liberalism. The term ‘liberalism’ derives from the Latin root liber, meaning free.

90. (d)
Secret

Explanation:

During the years following 1815, the fear of repression drove many liberal-nationalists underground. Secret societies sprang up in many European states to train revolutionaries and spread their ideas.

91. (d)

Latin

Explanation:

Ideas of national unity in early-nineteenth-century Europe were closely allied to the ideology of liberalism. The term 'liberalism' derives from the Latin root liber, meaning free.

92. (b)

1-c , 2-a , 3-b , 4-d

Explanation:

1. Broken chains - Being freed 2. Breastplate with eagle - Symbol of the German empire – strength 3. Crown of oak leaves - Heroism 4. Sword - Readiness to fight

13. (c) Cavour

Explanation:

Chief Minister Cavour who led the movement to unify the regions of Italy was neither a revolutionary nor a democrat. Through a tactful diplomatic alliance with France engineered by Cavour, Sardinia-Piedmont succeeded in defeating the Austrian forces in 1859

94. (a) Metternich

Explanation:

'When France sneezes,' Metternich once remarked, 'the rest of Europe catches cold.' The July Revolution sparked an uprising in Brussels which led to Belgium breaking away from the United Kingdom of the Netherlands.

95. (c) Monarchical government

Explanation:

Absolutist literally mean a government or system of rule that has no restraints on the power exercised. In history, the term refers to a form of monarchical government that was centralised, militarised and repressive.

96. (d) Europe

Explanation:

The 1830s were years of great economic hardship in Europe. The first half of the nineteenth century saw an enormous increase in population all over Europe.

97. (b) Property-owning men

Explanation:

France, which marked the first political experiment in liberal democracy, the right to vote and to get elected was granted exclusively to property-owning men. Men without property and all women were excluded from political rights.

98. (d) Large landowners

Explanation:

Large Landowners were called Junkers. This liberal initiative to nation-building was, however, repressed by the combined forces of the monarchy and the military, supported by the large landowners (called Junkers) of Prussia.

99. (d) It increases their profit

Explanation:

The main motive of the MNCs is to earn profits due to which they prefer that place for production where they get cheap resources. This lowers their cost of production and ensures more profit.

100. (d) 2

Explanation:

Broadly speaking there are two types of foreign investment namely foreign direct investment (FDI) and foreign portfolio investment (FPI).

101. (d) Non-discrimination
Explanation:
Non-discrimination means that no discrimination will be done by a member state between different trading states who are also members of WTO. Further foreign goods, services, trade marks and copyrights should be given same treatment as is given to nationals of a country.
102. (d) 1991
Explanation:
In India the policy of liberalisation was initiated in the year 1991. This opened up the entry of MNCs into India in a big way.
103. (a) Geneva
Explanation:
Prior to the creation of WTO global trading system was under the responsibility of GATT which had its headquarter in Geneva. In 1995 GATT was replaced by WTO, however its headquarter was kept the same as that of GATT.
104. (c) Rampant food shortages
Explanation:
Rampant food shortages, hoarding, black marketing, adulteration of food and edible oil gave birth to the consumer movement in an organised form in 1960's.
105. (b) Hallmark
Explanation:
The BIS hallmark is a hallmarking system for gold as well as silver jewellery sold in India certifying the purity of the metal. It certifies that the piece of jewellery confirms to a set of standards laid by the Bureau of Indian Standards, the national standards organization of India.
106. (c) Consumer Protection Act (COPRA)
Explanation:
Consumer Protection Act, 1986 is an Act of the Parliament of India enacted in 1986 to protect the interests of consumers in India. It makes provision for the establishment of consumer councils and other authorities for the settlement of consumers' disputes and for matters connected therewith also.
107. (d) Producing pressure cooker
Explanation:
Pressure cookers have a safety valve which, if is defective can cause a serious accident the manufacturers of the safety valve have to ensure high quality.
108. (d) State level court
Explanation:
The State Commission also has Appellate jurisdiction over the District Forum.
109. (b) groundwater pumping devices to meet their water needs
Explanation:
If you look into the housing societies or colonies in the cities, you would find that most of these have their own groundwater pumping devices to meet their water needs.
110. (b) world's aquifers
Explanation:
Nearly 70 per cent of this freshwater occurs as ice sheets and glaciers in Antarctica, Greenland and the mountainous regions of the world, while a little less than 30 per cent is stored as groundwater in the world's aquifers. aquifer definition: a layer of rock, sand, or earth that contains water or allows water to pass through it.
111. (b) Gujarat & Maharashtra
Explanation:
The release of water from dams during heavy rains aggravated the flood situation in Maharashtra and Gujarat in 2006.
112. (c)
the existing vegetation .

Explanation:

The reservoirs that are created on the floodplains also submerge the existing vegetation and soil leading to its decomposition over a period of time.

113. (b)
intensive and commercial crops.

Explanation:

Irrigation has also changed the cropping pattern of many regions with farmers shifting to water intensive and commercial crops. This has great ecological consequences like salinization of the soil.

114. (c) Khadi

Explanation:

Khadi cloth was often more expensive than massproduced mill cloth and poor people could not afford to buy it.

- 35 115. (a) Reserved seats for Depressed Classes in provincial and central legislative councils

Explanation:

Gandhiji began a fast unto death. He believed that separate electorates for dalits would slow down the process of their integration into society. Ambedkar ultimately accepted Gandhiji's position and the result was the Poona Pact of September 1932. It gave the Depressed Classes (later to be known as the Schedule Castes) reserved seats in provincial and central legislative councils, but they were to be voted in by the general electorate.

116. (a) Outbreak of violence at Chauri Chaura

Explanation:

At Chauri Chaura(1922) in Gorakhpur, a peaceful demonstration in a bazaar turned into a violent clash with the police. Hearing of the incident, Mahatma Gandhi called a halt to the Non-Cooperation Movement.

117. (c) Baba Ramchandra

Explanation:

In Awadh, peasants were led by Baba Ramchandra.

Baba Ramchandra was a sanyasi who had earlier been to Fiji as an indentured labourer.

118. (d) A non-cooperation movement in support of Khilafat as well as Swaraj

Explanation:

A young generation of Muslim leaders like the brothers Muhammad Ali and Shaukat Ali, began discussing with Mahatma Gandhi about the possibility of a united mass action on the issue in support of Khilafat and Swaraj . Gandhiji saw this as an opportunity to bring Muslims under the umbrella of a unified national movement.

119. (c) British ruled India because Indians cooperated with them

Explanation:

In his famous book Hind Swaraj (1909) Mahatma Gandhi declared that British rule was established in India with the cooperation of Indians and had survived only because of this cooperation.

If Indians refused to cooperate, British rule in India would collapse within a year, and swaraj would come.

120. (b)

The Indian Industrial and Commercial Congress (1920) and Federation of the Indian Chamber of Commerce and Industries (FICCI) in 1927

Explanation:

To organize business interests, they formed the Indian Industrial and Commercial Congress in 1920 and the Federation of the Indian Chamber of Commerce and Industries (FICCI) in 1927. Led by prominent industrialists like Purshottamdas Thakurdas and G. D. Birla, the industrialists attacked colonial control over the Indian economy, and supported the Civil Disobedience Movement when it was first launched.