

Class : XII (Humanities)
(SUMMER HOLIDAYS' HOMEWORK)
(Session:2026-27)

ENGLISH

1. Newspaper Article Designing :- Write articles as per CBSE FORMAT on contemporary issue such as:

- * Social Media Impact
- * Climate Change
- * Mental Health
- * Artificial Intelligence in Education

Instructions:-

- * Design it like a real newspaper column with:
 - * Headlines. * Images/sketches
 - * Quotes. * Facts/statistics. * Do on A4 sheets.
 - * Follow proper article format.
 - * Use attractive newspaper-style layout.
 - * Word limit: 150–200 words.

Rubrics:- * Format & Content – 4 Marks , * Creativity – 3 Marks
* Language Accuracy – 2 Marks, * Presentation – 1 Mark

2. Poetic Devices Creative Album :- Create a creative album on poetic devices used in the poems from the Class XII syllabus.

Instructions :-

- * At least 15 poetic devices
 - * Definition of each device
 - * Example from syllabus poems
 - * Creative visual representation/doodles/sketches for each
- * Examples: Imagery, Metaphor, Alliteration, Symbolism , Personification, Enjambment, Simile, Personification, Anaphora, Antithesis, Oxymoron, Transferred Epithet
 - * Use A3 sized sheets.
 - * Make each page colourful and informative.
 - * Mention poem and poet name clearly.

Rubrics: * Understanding of Poetic Devices – 5 Marks
* Creativity & Visual Presentation – 5 Marks
* Content Accuracy – 5 Marks
* Organisation & Neatness – 5 Marks

3. Revised syllabus covered till date :-

- * The Last Lesson, The Third Level, Lost Spring, Tiger King, Journey To The End Of The World , Poem 1, 2 and 3, Articles, Letters To Editor, Notices , Reading Passages.

GEOGRAPHY

CARTOGRAPHY SKILLS

Instructions

- Use **separate outline maps** for World and India.
- Label neatly with **blue/black ink** and highlight with **color pencils**.
- Compile all maps in a **single notebook** as your holiday homework file.
- Revise NCERT exercises alongside map work for exam readiness.

Airports

- Tokyo, Beijing, Mumbai, Jeddah, Aden
- Johannesburg, Nairobi
- Moscow, London, Paris, Berlin, Rome
- Chicago, New Orleans, Mexico City
- Buenos Aires, Santiago
- Darwin, Wellington

Sea Ports

- ⚓ London, Hamburg, North Cape
- ⚓ Vancouver, San Francisco, New Orleans
- ⚓ Rio de Janeiro, Colon, Valparaiso
- ⚓ Cape Town, Suez
- ⚓ Yokohama, Shanghai, Hong Kong, Aden, Karachi, Kolkata
- ⚓ Perth, Sydney, Melbourne

Inland Waterways

- Suez Canal
- Panama Canal
- Rhine Waterways
- St. Lawrence Seaway

Railways

- Trans-Siberian
- Trans-Canadian
- Trans-Australian

Agricultural Activities

- Subsistence gathering areas
- Nomadic herding regions
- Commercial livestock rearing regions
- Extensive grain farming regions
- Mixed farming regions

Part B – India Map Items

Major Sea Ports

- ⚓ Kandla, Mumbai, Marmagao, Kochi, Mangalore
- ⚓ Tuticorin, Chennai, Vishakhapatnam, Paradwip, Haldia

International Airports

- Ahmedabad, Mumbai, Bengaluru, Chennai, Kolkata
- Guwahati, Delhi, Amritsar, Thiruvananthapuram, Hyderabad

Population Indicators

- Highest density: Bihar (2011 Census)
- Lowest density: Arunachal Pradesh (2011 Census)

Crop Producing States

- Rice, Wheat, Cotton, Jute, Sugarcane, Tea, Coffee

Minerals and Industries

- ☐ Iron ore: Mayurbhanj, Bailadila, Ratnagiri, Bellary
- ☐ Manganese: Balaghat, Shimoga
- ☐ Copper: Hazaribagh, Singhbhum, Khetri
- ☐ Bauxite: Katni, Bilaspur, Koraput
- ☐ Coal: Jharia, Bokaro, Raniganj, Neyveli

- ☐ Oil refineries: Mathura, Jamnagar, Barauni

Industrial Locations

- Iron & Steel: Bhilai, Bokaro, Durgapur, Rourkela, Jamshedpur
- ☐ Cotton Textiles: Surat, Varanasi, Coimbatore, Solapur, Murshidabad
- Software Parks: Bengaluru, Hyderabad, Noida, Mohali, Gandhinagar, Indore

POLITICAL SCIENCE

Q1. Which of the following is a traditional security threat?

- A. Global warming B. Terrorism C. Poverty D. Pandemic

Q2. The term “Human Security” mainly focuses on:

- A. Protection of borders B. Nuclear weapons
C. Welfare and dignity of people D. Military alliances

Q3. Which organisation was formed after World War II to maintain international peace?

- A. NATO B. ASEAN C. United Nations D. SAARC

Q4. India’s nuclear policy is based on:

- A. First Use Policy B. No First Use Policy
C. Immediate Attack Policy D. Aggressive Defence Policy

Q5. Which one is considered a non-traditional security threat?

- A. Border war B. Arms race C. Climate change D. Military invasion

Assertion–Reason Questions

Q6. Assertion (A): Human security is as important as national security.

Reason (R): Security threats today include hunger, disease and natural disasters.

- A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true but R is not the correct explanation of A.
C. A is true but R is false.
D. A is false but R is true.

Q8. Assertion (A): India supports disarmament.

Reason (R): India believes nuclear weapons guarantee permanent peace.

- A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true but R is not the correct explanation of A.
C. A is true but R is false.
D. A is false but R is true.

Q9. Which conference focused on environmental protection in 1992?

- A. Kyoto Conference B. Rio Summit C. Stockholm Conference D. Earth Day Summit

Q10. “Sustainable Development” means:

- A. Industrial growth only B. Development without harming future generations
C. Using all natural resources rapidly D. Increasing population growth

Q11. Which gas is mainly responsible for global warming?

- A. Oxygen B. Nitrogen C. Carbon dioxide D. Hydrogen

Q12. Kyoto Protocol is related to:

- A. Trade agreements B. Human rights C. Climate change D. Nuclear weapons

Q13. Assertion (A): Developed countries are more responsible for environmental degradation.

Reason (R): They have historically produced more industrial pollution.

- A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true but R is not the correct explanation of A.
C. A is true but R is false.
D. A is false but R is true.

Q14. Assertion (A): Sustainable development encourages balanced use of resources.

Reason (R): Natural resources are unlimited.

- A. Both A and R are true and R is the correct explanation of A.
- B. Both A and R are true but R is not the correct explanation of A.
- C. A is true but R is false.
- D. A is false but R is true

Q15. Globalisation refers to:

- A. Isolation of countries
- B. Increasing interconnection among countries
- C. Military expansion
- D. Cultural separation

Q16. Which organisation promotes international trade?

- A. WHO
- B. UNESCO
- C. WTO
- D. IMF

Q17. Which sector has benefited most from globalisation in India?

- A. Agriculture
- B. IT Sector
- C. Handicrafts only
- D. Mining only

Q18. One major criticism of globalisation is:

- A. Increased communication
- B. Economic inequality
- C. Better technology
- D. More employment opportunities everywhere

Q19. Assertion (A): Globalisation has increased cultural exchange.

Reason (R): Improved communication and transport connect people worldwide.

- A. Both A and R are true and R is the correct explanation of A.
- B. Both A and R are true but R is not the correct explanation of A.
- C. A is true but R is false.
- D. A is false but R is true.

Q20. Assertion (A): WTO works for free and fair trade.

Reason (R): WTO only supports developed countries.

- A. Both A and R are true and R is the correct explanation of A.
- B. Both A and R are true but R is not the correct explanation of A.
- C. A is true but R is false.
- D. A is false but R is true.

Q21. The “Balance of Power” is associated with:

- A. Human security
- B. Military security
- C. Environmental security
- D. Economic security

Q22. Terrorism mainly affects:

- A. Economic growth only
- B. Political stability and security
- C. Climate only
- D. Cultural traditions only

Q23. “Alliance Building” means:

- A. Trade agreement
- B. Joining hands for military cooperation
- C. Environmental protection
- D. Educational exchange

Q24. The concept of “Global Security” suggests that:

- A. Nations can remain isolated
- B. Security of one country affects others
- C. Only powerful countries matter
- D. Military is the only solution

Q25. Migration and refugee crises are related to:

- A. Traditional security only
- B. Human security
- C. Military alliances
- D. Arms control only

Q1. Study the picture given below and answer the questions that follow:



1.1. What is represented by the cartoon?

- (A) Poverty in the third world countries (B) Poverty in South African countries
(C) Humanitarian crisis in Darfur, Sudan. (D) All of the above

1.2. What type of crises is shown in the cartoon?

- (A) Pandemic (B) Epidemic
(C) Starvation and genocide (D) War crisis

1.3. What message is conveyed by the cartoon?

- (A) That international NGOs only debated about the issue and never sent any aid
(B) Urgent requirement of help
(C) International attention over the issue
(D) Deteriorating conditions of Sudan

1.4. What was the cause of Darfur crisis?

- (A) War
(B) Famine
(C) Environmental degradation and violence
(D) Colonization of the country

Q2. Study the given Cartoon and answer the questions that follow:



2.1 Border disputes between India and China erupted in 1960. Pandit Nehru was having talks with his counterpart _____ in China which proved futile.

- (a) Mao Tsetung (b) President Jinping (c) Zhou Enlai (d) Dalai Lama

2.2 Name the place in Indian territory which was occupied by China in the year 1962?

- (a) Chagai hills (b) Aksai Chin
(c) Balochistan (d) Nagaland

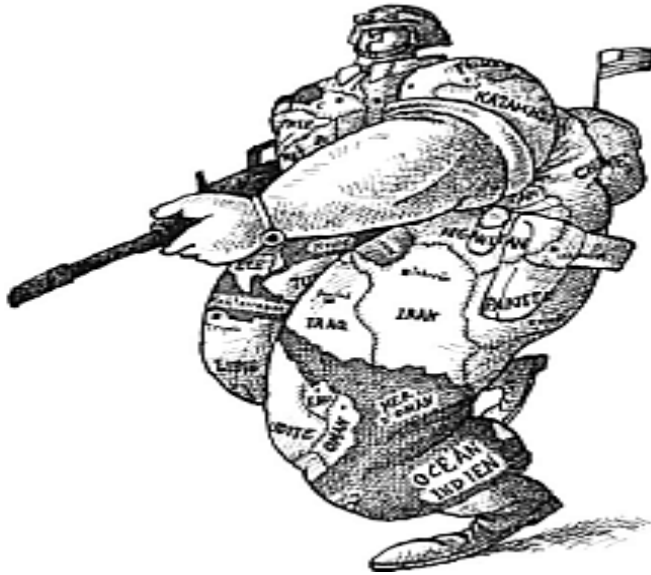
2.3 _____ was the defence minister of India during the Indo-china war?

- (a) Kailash Nath Katju (b) V.K. Krishna Menon
(c) Baldev Singh (d) Jawaharlal Nehru

2.4 Name the agreement signed between India and China on April 29, 1954.

- (a) Peace Agreement (b) Panchsheel Agreement
(c) Standstill Agreement (d) Tashkent Agreement

Q3. Study the cartoon given below carefully and answer the questions that follow.



3.1 Which country is represented by this mighty soldier?

- (A) Russia (B) China (C) USA (D) Canada

3.2 Why have the names of so many countries been written on the uniform of the soldier?

- (A) It symbolizes the union of these countries.
(B) It symbolizes the colonization of these countries by USA.
(C) USA has invaded these countries.
(D) None of the above.

3.3 What message does this cartoon give to the international community?

- (A) It reminds world about the peace and unity.
(B) It urges the world to fight against terrorism.
(C) It urges the need to have military rule over democratic governments.
(D) It conveys that the US is a superpower and has the might to push its interests into any part of the world.

3.4 Which of the countries listed below was never invaded by USA?

- (A) Japan (B) England (C) Iraq (D) Afghanistan

HISTORY

1. Identify the medieval globe-trotter with the help of the following information:

- Before he set-off for India he made pilgrimage trips to Mecca before 1332-33 C.E.
- The Delhi Sultan Muhammad Bin Tughlaq made him Qazi or the judge of Delhi.

Options:

- A. Abd-al-Razzak B. Al-Biruni C. Ibn Battuta D. Seydi Ali Reis

2. Consider the following:

- | | |
|----------------------|--------------------------------|
| (1) Al-Biruni | (i) Rihla |
| (2) Ibn Battuta | (ii) Kitab-ul-Hind |
| (3) Francois Bernier | (iii) Travels in Mughal Empire |

Now, correctly match them.

- (a) 1 - (ii), 2(i), 3(iii)
(b) 1 (i), 2 (ii), 3-(iii)
(c) 1(iii), 2 (i), 3(iii)
(d) 1 (ii), 2- (iii), 3 (i)

3. Match the following:

List-I

- (i) Manucci
- (ii) Jean Baptist Tavernier
- (iii) Duarte Barbosa
- (iv) Abdur Razzak

List-II

- (a) Samarqand
- (b) Italy
- (c) French
- (d) Portuguese

4. Ibn Battuta found Indian cities full of exciting opportunities. Identify the appropriate reason from the following options:

- (a) Large population, Bazaars and efficient communication
- (b) Crown ownership of land
- (e) Autonomous and equalitarian village command
- (d) Traders exported gold and silver

5. Who among the following developed the concept of the Asiatic mode of production?

- (a) Karl Marx
- (b) Voltaire
- (c) Montesquie
- (d) Rousseau

6. Which of the following statements is appropriate about Ibn Battuta?

- (a) He was the Qazi during Muhammad Bin Tughlaq's empire.
- (b) He had written Kitab-ul-Hind in Arabic.
- (c) He translated Sanskrit, Pali and Prakrit work in Arabic.
- (d) He was a physician, philosopher and historian.

7. Who among the following western theorists developed the idea of oriental despotism in the 19th century?

- (a) Montesquieu
- (b) Rousseau
- (c) Voltaire
- (d) Karl Marx

8. Consider the following statements and select the correct from the following options:

- I. François Bernier was closely associated with the Prince Dara Shikoh.
- II. Bernier travelled to several parts of the country, and wrote accounts.
- III. He dedicated his major writing to the king of France and Aurangzeb.

Options:

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

9. Assertion (A): As per Ibn Battuta, families kept at least one or two of female slaves as domestic labour.

Reason (R): The price of female slaves for domestic labour was very low.

10. Assertion (A): Al-Biruni wrote in English language.

Reason (R): He adopted a critical approach in his writings.

11. Which one of the following countries did 'Afanasi Nikitin' belong to?

- (a) Russia
- (b) Portugal
- (c) Spain
- (d) France

12. Identify the British official with the help of the following information and select the correct option:

- He was a Physician, came to India during 1794 to 1815.
- He served in the Bengal Medical Services.
- He served as Surgeon to the Lord Wellesley.
- He organised 'Calcutta Alipore Zoo'.

Options:

- (a) Marco Polo
- (b) Francis Buchanan
- (c) François Bernier
- (d) Colonel Meckenzie

13. Read the source given below and answer the questions that follow:

A language with an enormous range

Al-Biruni described Sanskrit as follows:

If you want to conquer this difficulty (i.e. to learn Sanskrit), you will not find it easy, because the language is of an enormous range, both in words and inflections, something like the Arabic, calling one and the same thing by various names, both original and derivative, and using one and the same word for a variety of subjects, which, in order to be properly understood, must be distinguished from each other by various qualifying epithets.

13.1 What motivated Al-Biruni to study Sanskrit ?

13.2. How did Al-Biruni's observations about Sanskrit contribute to cross cultural understanding?

13.3 In what ways Al-Biruni compare Sanskrit to Arabic?

14. "The conception of social pollution intrinsic to the caste system was contrary to the law of nature". Examine Al-Biruni's statement on Indian caste system.
15. "India had a unique system of communication during the 14th C." Examine the statement of Ibn Battuta.
16. Mention Bernier's views on private property and crown ownership of land.
17. Explain how the accounts of Ibn Battuta and Bernier provide us with tantalizing glimpses of the life of Indian women during the 16th and 17th centuries.
18. "Ibn Battuta found Delhi as a city full of exciting opportunities." Support your answers with evidences given by him.
19. "Bernier's description of imperial land ownership influenced western theorists like French philosopher Montesquieu and German Karl Marx." Justify it with suitable arguments.
20. **Assertion (A):** In the 8th C, the Kailashnath Temple was carved out of mountain.

Reason (R): King Ashoka had given the directive to create artificial caves by cutting into the mountains to resemble Temples.

21. Who among the Sikh Gurus compiled 'Adi Granth Sahib'? _____
22. **Choose the correct option regarding the Virashaiva tradition from the following:**
- A. This tradition emerged in Karnataka
- B. They are the followers of Vishnu.
- C. They believed in the theory of Rebirth.
- D. They practiced funerary rites.

23. Match column-I with column-II and choose the correct option:

Column-I(Temple)	Column-II(Region)
I. Brihadeshwara	A. Vijaynagara
II. Channekeshwar	B. Tanjavur
III. Hazara Ram	C. Tamil Nadu
IV. Chidambaram	D. Belur

Options:

- I II III IV
- a. C B D A
- b. A C B B
- c. B D A C
- d. D A C B
24. Which 'Guru' consolidated the sikh community into socio-religious and military force? _____
25. **Read the following statements regarding Alvar saints in Medieval India and choose the correct ones.**

- I. Alvars were devoted to Lord Shiva.
- II. The hymns of Alvars were compiled in Nalayara Divya Prabhandam.
- III. Andal was from Alvar tradition.

26. Which one of the following statement is correct about Kabir?

- I. Kabir's verses are compiled in 'Kabir Bijak' only.
- II. Kabir was and is a source of inspiration to many.
- III. He advocated only Saguna Bhakti.
- IV. Kabir believed in Polytheism.

27. Read the following information:

- It is fourteen century dargah.
- Mohd. Bin Tuglaq was the first sultan to visit this shrine.
- It is located in Ajmer.

Identify whose Dargah is this. _____

28. **Assertion (A):** Pilgrimage, called Ziyarat, to tombs of Sufi Saints is prevalent all over the Islamic World.

Reason (R): The Kanqah was a chief centre of social and cultural life.

29. Consider the following statements regarding the early traditions of Bhakti and select the correct ones:

- I. Historians draw on hagiographies of Saints for knowing traditions.
- II. Many beliefs and practices were shaped through 'great' and 'little' Sanskrit Puranic traditions.
- III. Bhakti tradition was classified into two broad categories Saguna and Nirguna.
- IV. God was worshipped with attributes in the Nirguna Bhakti.

30. Name the major anthological composition of the Alvars which is described as Tamil Veda. _____

31. Name the composer of 'Padmavat'. _____

32. The verses of Kabir are compiled in _____, _____ and _____.

33. Who was the preceptor of Meera Bai. _____

34. Name the woman devotee of Alvar tradition whose compositions were widely sung. _____

35. Name the woman devotee of Nayanar tradition who adopted the path of extreme asceticism in order to attain her goal. _____.

36. "Baba Guru Nanak Dev Ji advocated a form of "Nirguna Bhakti". Substantiate the statement.

37. What were the five pillars or basic principles of Islam?

38. The Lingayats disapproved certain practices of the Dharmashastras. Give any two.

39. Identify the relation between the Sufis and the state from 8th to 18th centuries.

40. On the Outline political Map of India :

A. Three major sufi shrines

B. Three places associated with temples (one each of a form Of Vishnu, Shiva and the goddess).

SOCIOLOGY

1. Prepare a research study for sociology . Guidelines for which are shared as under:

- a. Carry out a research study on any social issue that we are facing in our society or any other social problem in a detailed manner using 20 interviews, questionnaire, direct or indirect observation.
- b. The research design should contain all the necessary sub-topics including analysis.

Topics to be included while writing the content in the research study:

- Statement of Purpose (what made one pick up a certain topic)
- Research Question or Hypothesis (only one)
- Methodology (definition of the method chosen, why the method is appropriate for the topic chosen, advantages and disadvantages of the method)
- Presentation of secondary evidence such a newspaper articles, magazines articles and so on.

Following is the list of suggested topics:

Choose any one from the below or select your own topic related to social life.

- Disintegration of joint family
- Cyber bullying
- Gender inequality
- Role of women in society
- Social change
- Child Labour

Steps to be followed:

- Select a topic from the above list or identify your own topic related with social life.
- Get your topic approved by the subject teacher.
- Start the research work.
- Research should include primary and secondary sources.
- Formulate the hypothesis.

- Prepare a rough draft of the matter to be written in final file.
- Prepare for verification of your hypothesis with the help of method chosen for research (interview, questionnaire, survey, observation etc. whichever suits your hypothesis.)
- Perform the verification task.
- Note the conclusion.

Note : the entire work has to be done in A-4 Sheets.

PHYSICAL EDUCATION

Prepare a project file on yoga as preventive measure of lifestyle diseases. (Use A4 colour sheets)**

Three asana each for the following lifestyle diseases:-

1. Obesity
2. Diabetes
3. Asthma
4. Hypertension
5. Back pain.

Each Lifestyle disease should contain 3 Asanas and details about-

1. Causes,
2. Procedure
3. Benefits
4. Contraindications

Suitable pictures should be pasted along each asana (size and posture, prefer colour pic's from magazines, newspaper etc.

**** (Use self/your own color printed pic's against the described asanas)**

Informative & printed matter in sort of research, medical, nutrition, etc. can also be pasted in your project.

***** Video diary with standing, sitting and lying posture asana. Use a good app with proper effects and text details etc. to be maintained and shared to the teacher concerned. (Approx. 30-35 sec. video clip with at least 8-10 asanas, also keep your video below 12mb)**

*****Try regular practice of asanas for first 20 days and then make a video; it will help you get perfect pose for the digital diary.**

HOLIDAY HOMEWORK

ASSIGNMENT CLASS XII DIFFERENTIATION

1. Find $\frac{dy}{dx}$ for the following:

(a) $y = \frac{1}{\sqrt{a^2 - x^2}}$

(b) $y = \frac{5x}{\sqrt[3]{1-x^2}} + \sin^2(2x+3)$

(c) $y = \frac{\cos x + \sin x}{\cos x - \sin x}$

(d) $y = \log \sqrt{\frac{1+\cos^2 x}{1-e^{2x}}}$

(e) $y = \log(x + \sqrt{1+x^2})$

(f) $y = \sqrt{\frac{1-\sin 2x}{1+\sin 2x}}$

2. Show that $\frac{d}{dx} \left[\frac{x}{2} \sqrt{a^2 - x^2} + \frac{a^2}{2} \sin^{-1} \left(\frac{x}{a} \right) \right] = \sqrt{a^2 - x^2}$.

3. If $y = \sqrt{\frac{1-x}{1+x}}$, prove that $(1-x^2) \frac{dy}{dx} + y = 0$.

4. If $y = (x + \sqrt{x^2 + a^2})^n$, prove that $\frac{dy}{dx} = \frac{ny}{\sqrt{x^2 + a^2}}$.

5. Find $\frac{dy}{dx}$ for the following:

(a) $\sin^{-1}(\cos x) + \cos^{-1}(\sin x)$

(b) $\tan^{-1} \left(\frac{1 - \cos x}{\sin x} \right)$

(c) $\tan^{-1} \left(\frac{\cos x - \sin x}{\cos x + \sin x} \right)$

(d) $\tan^{-1} \left(\sqrt{\frac{1+\sin x}{1-\sin x}} \right)$

(e) $\tan^{-1} \left(\frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}} \right)$

6. Find $\frac{dy}{dx}$ for the following:

(a) $\cos^{-1}(4x^3 - 3x)$

(b) $\cot^{-1} \left(\frac{1-x}{1+x} \right)$

(c) $\tan^{-1} \left(\frac{\sqrt{1+x^2} - 1}{x} \right)$

(d) $\tan^{-1} \left(\frac{\sqrt{1+x^2} - \sqrt{1-x^2}}{\sqrt{1+x^2} + \sqrt{1-x^2}} \right)$

(e) $\sin^{-1} \left(\frac{5x + 12\sqrt{1-x^2}}{13} \right)$

7. If $\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y)$, prove that $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$.

8. If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$, prove that $2x \frac{dy}{dx} + y = 2\sqrt{x}$.

9. If $y\sqrt{x^2+1} = \log(\sqrt{x^2+1} - x)$, show that $(x^2+1) \frac{dy}{dx} + xy + 1 = 0$.

10. If $y \log x = x - y$, prove that $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$.

11. If $\log(\sqrt{x^2 + y^2}) = \tan^{-1} \frac{y}{x}$, prove that $\frac{dy}{dx} = \frac{x + y}{x - y}$.

12. If $y = \frac{\sin^{-1} x}{\sqrt{1 - x^2}}$, prove that $(1 - x^2) \frac{dy}{dx} = xy + 1$.

13. If $y = x^{\cos x} + \cos x^{\sin x}$, find $\frac{dy}{dx}$.

14. If $x^a y^b = (x + y)^{(a+b)}$, prove that $\frac{dy}{dx} = \frac{y}{x}$.

15. If $f(x) = \left(\frac{3+x}{1+x} \right)^{2+3x}$, find $f'(0)$.

16. Differentiate $\tan^{-1} \left(\frac{2x}{1-x^2} \right)$ w.r.t. $\sin^{-1} \left(\frac{2x}{1+x^2} \right)$.

17. If $x = a \sin 2t (1 + \cos 2t)$, $y = b \cos 2t (1 - \cos 2t)$, show that $\left(\frac{dy}{dx} \right)_{at=\frac{\pi}{4}} = \frac{b}{a}$.

18. If $x = a \left(\frac{1+t^2}{1-t^2} \right)$, $y = \frac{2t}{1-t^2}$, show that $\frac{dy}{dx} = \frac{1+t^2}{2at}$.

19. If $x = 2 \cos \theta - \cos 2\theta$ and $y = 2 \sin \theta - \sin 2\theta$, find $\left(\frac{d^2 y}{dx^2} \right)_{\theta=\frac{\pi}{2}}$.

20. If $y = A \cos nx + B \sin nx$, prove that $\frac{d^2 y}{dx^2} + n^2 y = 0$.

21. If $y = e^x (\sin x + \cos x)$, prove that $\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + 2y = 0$.

22. If $y = \tan^{-1} x$, show that $(1+x^2) \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} = 0$.

23. If $y = \left[\log(x + \sqrt{x^2 + 1}) \right]^2$, show that $(1+x^2) \frac{d^2 y}{dx^2} + x \frac{dy}{dx} = 2$.

Application of Derivatives

1. Water is dripping out from a conical funnel of semi vertical angle $\frac{\pi}{4}$ at a uniform speed of $2 \text{ cm}^3 / \text{sec}$ through a tiny hole at the vertex of the bottom. When the slant height of water is 4cm , find the rate of decrease of slant height of the water.
2. A man is moving away from a tower 49.6 m high at the rate of 2 m/s. Find the rate at which the angle of elevation of the top of the tower is changing, when he is at a distance of 36 m from the foot of the tower. Assume that the eye level of the man is 1.6 m from the ground.
3. Evaluate following up to three decimal places using differentiation:
 $\sqrt{25.2}$, $\sqrt[3]{29}$, $\sqrt{0.037}$
4. Find the intervals in which the function $f(x) = \log(1+x) - \frac{2x}{2+x}$ is increasing or decreasing.
5. Find the intervals in which the function $f(x) = (x+1)^3 (x-3)^3$ is increasing or decreasing. Also find the points at which the function has local maxima, local minima and the point of inflexion.
6. Find all the points of local maximum and minimum and the corresponding maximum and minimum values of the following function $\frac{3}{4}x^4 - 8x^3 + \frac{45}{2}x^2 + 105$.
7. Find the point on the curve $y^2 = 4x$ which is nearest to the point $(2, -8)$
8. Find the equation of the tangent to the curve $y = (x^3 - 1)(x - 2)$ at the points where the curve cuts the x-axis.
9. Find the intervals in which the function $f(x) = 2x^3 - 9x^2 + 12x + 15$ is increasing and decreasing.
10. Separate $\left[0, \frac{\pi}{2}\right]$ into sub intervals in which $f(x) = \sin^4 x + \cos^4 x$ is increasing or decreasing.

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11. Find the points of local maxima and local minima and also the local maximum and local minimum values of the following functions : (i) $f(x) = 2\cos x + x, x \in (0, \pi)$
(ii) $f(x) = 2\sin x - x, x \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
12. Find the equation of the tangent and normal to the curve
 $x = 1 - \cos \theta, y = \theta - \sin \theta$ at $\theta = \frac{\pi}{4}$
13. Prove that the radius of the right circular cylinder of greatest curved surface area which can be inscribed in a given cone is half of that of cone.
14. An open box with a square base is to be made of given iron sheet of area 27 sq.m. Show that the maximum volume of the box is 13.5 cu. m.
15. Show that the triangle of maximum area that can be inscribed in a given circle is an equilateral triangle.
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ASSIGNMENT CLASS XII INDEFINITE INTEGRALS

Evaluate the following Integrals:

1. $e^{x \log a} + e^{a \log x} + e^{a \log a}$
2. $\frac{1}{1 + \cos x}$
3. $\frac{\sin x}{1 + \sin x}$
4. $\tan^{-1}(\sec x + \tan x)$
5. $\frac{\sin^6 x + \cos^6 x}{\sin^2 x \cos^2 x}$
6. $\tan^{-1} \sqrt{\frac{1 - \sin x}{1 + \sin x}}$
7. $\frac{1}{\sqrt{3x+4} - \sqrt{3x+1}}$
8. $\frac{x^3}{x+2}$
9. $\sin^3 x \cos^3 x$
10. $\cos^4 x$
11. $\cos 2x \cos 4x$
12. $\frac{x^4 + 3}{x^2 + 1}$
13. $\sin 4x \cos 7x$
14. $\frac{1 + \cos x}{1 - \cos x}$
15. $\frac{e^x - e^{-x}}{e^x + e^{-x}}$
16. $\frac{\sin 2x}{a^2 \sin^2 x + b^2 \cos^2 x}$
17. $\frac{\sin x}{\sin(x-a)}$
18. $\frac{1}{\sin(x-a) \sin(x-b)}$
19. $\frac{1 - \cot x}{1 + \cot x}$
20. $\frac{1}{e^x + 1}$
21. $\frac{1}{\sqrt{x}(\sqrt{x} + 1)}$
22. $\frac{\sin 2x}{(a + b \cos x)^2}$
23. $\frac{\sec^2(2 \tan^{-1} x)}{1 + x^2}$
24. $\sin^2 x \cos^5 x$
25. $\sin^5 x$
26. $\tan^3 x$
27. $\left(\frac{x+1}{x}\right)(x + \log x)^2$
28. $\frac{\cos^5 x}{\sin x}$
29. $\frac{1}{\sqrt{9 - 25x^2}}$
30. $\frac{x^4 + 1}{x^2 + 1}$
31. $\frac{1}{3 + 2x - x^2}$
32. $\frac{1}{x^2 + 8x + 20}$
33. $\frac{e^x}{e^{2x} + 6e^x + 5}$
34. $\frac{1}{x(x^n + 1)}$
35. $\frac{x}{x^4 - x^2 + 1}$
36. $\frac{1}{\sqrt{9 + 8x - x^2}}$
37. $\frac{1}{\sqrt{16 - 6x - x^2}}$
38. $\frac{2x}{\sqrt{1 - x^2 - x^4}}$
39. $\frac{2x - 3}{x^2 + 3x - 18}$
40. $\frac{2 \sin 2\phi - \cos \phi}{6 - \cos^2 \phi - 4 \sin \phi}$
41. $\frac{x + 2}{2x^2 + 6x + 5}$
42. $\frac{x^2}{x^2 + 6x + 12}$
43. $\sqrt{\frac{a-x}{a+x}}$
44. $\frac{3x + 1}{\sqrt{5 - 2x - x^2}}$
45. $\frac{1}{a^2 \sin^2 x + b^2 \cos^2 x}$
46. $\frac{\sin x}{\sin 3x}$
47. $\frac{1}{2 - 3 \cos 2x}$
48. $\frac{\sin 2x}{\sin^4 x + \cos^4 x}$
49. $\frac{1}{1 - 2 \sin x}$
50. $\frac{1}{5 + 4 \cos x}$
51. $\frac{1}{3 + 2 \sin x + \cos x}$
52. $\frac{3 \sin x + 2 \cos x}{3 \cos x + 2 \sin x}$
53. $(\log x)^2$
54. $\sin^{-1} x$
55. $\frac{x - \sin x}{1 - \cos x}$
56. $\sec^3 x$

57. $\frac{\sin^{-1} x}{(1-x^2)^{3/2}}$ 58. $x^2 \tan^{-1} x$ 59. $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ 60. $\frac{\sin^{-1} x}{x^2}$
61. $e^x \left(\frac{1-\sin x}{1-\cos x}\right)$ 62. $\frac{\log x}{(1+\log x)^2}$ 63. $\frac{2-x}{(1-x)^2} e^x$ 64. $\frac{1}{\log x} - \frac{1}{(\log x)^2}$
65. $e^{ax} \cos bx$ 66. $\sqrt{7x-10-x^2}$ 67. $\frac{\sqrt{16+(\log x)^2}}{x}$ 68. $(3x-2)\sqrt{x^2+x+1}$
69. $(x+1)\sqrt{1-x-x^2}$ 70. $\frac{2x-1}{(x-1)(x+2)(x-3)}$ 71. $\frac{1}{\sin x - \sin 2x}$ 72. $\frac{3x+1}{(x-2)^2(x+2)}$
73. $\frac{8}{(x+2)(x^2+4)}$ 74. $\frac{x^2}{(x^2+1)(x^2+4)}$ 75. $\frac{\tan \theta + \tan^3 \theta}{1 + \tan^3 \theta}$ 76. $\frac{\sin 2x}{(1+\sin x)(2+\sin x)}$
77. $\frac{1}{x(x^5+1)}$ 78. $\frac{x^2-1}{x^4+x^2+1}$ 79. $\frac{x^2+4}{x^4+16}$ 80. $\frac{1}{x^4+1}$
81. $\sqrt{\tan x}$ 82. $\sqrt{\cot x}$ 83. $\frac{1}{\sin^4 x + \cos^4 x}$ 84. $\frac{x^2-1}{x^4+1}$
85. $\frac{1}{(x-3)\sqrt{x+1}}$ 86. $\frac{1}{(x^2-4)\sqrt{x+1}}$ 87. $\frac{1}{(x+1)\sqrt{x^2-1}}$ 88. $\frac{1}{x^2\sqrt{1+x^2}}$
89. $\frac{x}{x^3+x^2+x+1}$ 90. $\frac{\sin(x-\alpha)}{\sin(x+\alpha)}$ 91. $\frac{(x+1)e^x}{(x+2)^2}$ 92. $\frac{1-\tan x}{x+\log(\cos x)}$
93. $\frac{\sqrt{x^2+a^2}}{x}$ 94. $\frac{e^x}{\sqrt{5-4e^x-e^{2x}}}$ 95. $\frac{1}{x^4-5x^2+16}$ 96. $\sqrt{1+2\tan x(\sec x + \tan x)}$
97. $e^{\sqrt{x}} \frac{\cos e^{\sqrt{x}}}{\sqrt{x}}$ 98. $\cos(\log x)$ 99. $\frac{2\sin 2\theta - \cos \theta}{6 - \cos^2 \theta - 4\sin \theta}$ 100. $\tan^{-1}\left(\sqrt{\frac{1-\cos 2x}{1+\cos 2x}}\right)$