

FUTA Post UTME Past Questions and Answers



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Technology for Self Reliance

English Language questions

OPTION I

Read the passage below and answer the questions that follow.

Our planet is at risk. Our environment is under threat. The air we breathe, the water we drink, the seas we fish in, the soils we farm, the forest, animals and plants which surround us are in danger. More and more gases and rubbish escape from our factories. Rubbish, oil spillage and detergents damage our rivers and seas. The loss of forests results in soil erosion and also endangers wildlife.

The richer countries of the world are mainly responsible for industrial pollution. This is where most of the commercial energy is consumed. In developing countries, poverty causes people to overgraze grasslands and to cut down trees for timber building, furniture and fuel. They are also destroyed to provide land on which to graze animals and build new villages and towns.

But trees are needed to protect the land from heavy down pour of rain and their roots help hold the soil together. In our forests, there may be plants and animals which could help in the discovery of new medicines or crops.

To rescue and conserve our beautiful world, we must act cooperatively. Individuals, communities, nations and international associations, all have a responsibility. By learning to protect the natural environment, we can manage the earth's resources for generations to come.

1. The risk referred to in the passage is
 - A. sociologically produced
 - B. environmentally induced
 - C. industrially produced
 - D. man-made.

2. According to the passage, the size of the forest depleted annually is
 - A. minimal
 - B. colossal
 - C. infinitesimal
 - D. infinite.

3. The writer holds the advanced nations responsible for industrial pollution because of their
 - A. technological innovations
 - B. energy requirements
 - C. industrial revolution
 - D. environmental production.

4. The writer's message is that
 - A. developed countries need to assist the poorer ones.
 - B. global warming will increase



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- C. researchers should produce medicines from forests
D.. the natural environment needs to be protected.
5. Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase. The presence of the principal makes the students *ill at ease*.
- A. easily ill
B impatient
C uncomfortable
D sickly.
6. Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase. In spite of the harsh realities at home, Tutu treats her studies with considerable *levity*.
- A. lassitude
A. wastefulness
C. seriousness
D. enthusiasm
7. Choose the most appropriate option opposite in meaning to the italicized word/phrase. I find *open-ended* questions more challenging in tests.
- A. easy
B. multiple-choice
C. essay-type
D. gap-completion
8. Choose the most appropriate option opposite in meaning to the italicized word/phrase. Ojo's knowing smile *infuriated* his sister
- A. confused
B. surprised
C. annoyed
D. pleased



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9. Which of the following highlighted consonants is pronounced differently from the others?

- A. fife
- B. off
- C. laugh
- D. of

10. Which of these words has a vowel pronounced differently from the others?

- A. steak
- B. break
- C leak
- D. strange

OPTION II

Read the passage below and answer the questions that follow.

Delinquency describes actions that would not be crimes if performed by adults. If a young person performs one of such actions then he or she has committed a crime. Delinquency is one of several status offences – offences that can be committed only by people in particular stations of life as determined by age, profession or a person's role in society. For young people such offences include drinking, driving and smoking under age. Usually they are offences only to the extent that they help preserve some of the good things of life for the exclusive enjoyment of the adult world. Delinquency is therefore a weapon forged in adult minds and directed by adult hands against young people. It is born out of envy, adult pride and intolerance. If the world changed overnight and the responsibility to make and enforce laws fell on juvenile shoulders, the adults should expect a raw deal in return. Delinquency would then certainly refer only to many of the adult actions now freely committed by them.

11 The writer of the passage believes that delinquency laws are

- A. only fit for young people
- B. not relevant to human society
- C unfair to the juveniles
- D. very fair to the adult world.

12 In the view of the writer drinking under age is an offence because

- A. adults do not want the juveniles to get drunk



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- B. adults have a duty to protect young persons
C adults want to have all the drinks to themselves
D. drunken juveniles can cause disorder in the society.
- 13 Status offences are
A. very fair to the adult world.
B. not relevant to human society
C. unfair to the young people
D. only fit for young people.
14. If the world changed overnight
A delinquency would no longer be a crime
C. delinquency would also change in meaning
C. there would be no more delinquency
D. delinquency would refer to all adult actions.
15. Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase People could not understand why a man of means should live a Spartan life.
A. foreign
B. frugal
C. extravagant
D. flamboyant
- 16 choose the most appropriate option nearest in meaning to the italicized word/phrase.
My boss is an exacting taskmaster.
A. hardworking
B. easygoing
C demanding



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- D. cooperative

17. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase. The *explosive* growth in world population is partly due to improved healthcare.

- A. gradual
- B. sudden
- C. combustible
- D. dangerous

18. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase. I would have enjoyed the novel but for its *convoluted* theme.

- A. simple
- B. complex
- C. immoral
- D. boring

19. Which of the following highlighted consonants is pronounced differently from the others?

- A. chef
- B. shoe
- C. chief
- D. ocean

20. Which of these words has a vowel pronounced differently from the others?

- A. key
- B. quay
- C. steak
- D. greed



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OPTION III

Read the passage below and answer the questions that follow.

Standard English refers to the authoritative and correct use of the language, the medium of expression for government and education. Its opposite is a dialectal variant of the language, that is, accepted and recognized words, expressions and structures peculiar to a smaller group of language users who are generally set apart from standard usage by cultural group or geographical region. For example, Nigerian, American, Irish and British English differ from one another in many respects and each is identifiable, yet in every case the standard (formal) variety approaches a single and hypothetical classification known as International English. As one moves towards informality and away from the observance of strict rules, emphasis falls on the difference between dialects. In addition to American English being distinguishable from British English, it is also true that British English is not uniform within the United Kingdom. The level of formality is determined by education and aspiration, while dialects vary from region to region.

21. One characteristic of a dialect as mentioned in the passage is its

- A. possession of variants
- B. informality
- C. distinction from British English
- D. restricted area of usage

22. According to the author, Nigerian and American English are

- A. standard varieties
- B. registers
- C. different languages
- D. different styles

23. The author considers International English

- A. an arbitrary classification
- B. an informal standard
- C. an imaginary classification
- D. a recognized formal standard



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24. The observance of strict rules is a feature of
- A. variety
 - B. unconventionality
 - C. formality
 - D. languages.
- 25 **Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase.** He was under pressure to **retract** his statement before the panel.
- A. reiterate
 - B. withdraw
 - C. assert
 - D. repeat
26. **Choose the most appropriate option nearest in meaning to the italicized bold word/phrase** His family wishes he would stop his **nefarious** activities
- A. nocturnal
 - B. respectable
 - C. promiscuous
 - D. degenerate
27. **Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase.** The nouveau riche tend to be **niggardly** in their ways.
- A. Stingy
 - B. miserly
 - C. generous
 - D. beggarly



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28. Choose the most appropriate option nearest in meaning to the italicized word/phrase.
Mrs Ojodu may be well-heeled but her dressing is often tasteless.

- A. vulgar
- B. garish
- C sophisticated
- D. salty

- 29 Which of the following highlighted consonants is pronounced differently from the others?

- A. tight
- B. Thames
- C though
- D. team

30. Which of these words has a vowel pronounced differently from the others?

- A. gloom
- B. glum
- C. glue
- D. glume

OPTION IV

Read the passage below and answer the questions that follow.

Erosion in nature is a beneficent process without which the world would have died long ago. The same process, accelerated by human mismanagement, has become one of the most vicious and destructive forces that have ever been released by man. ‘Geological erosion’ or ‘denudation’ is an early and important process in soil formation, whereby the original rock material is continuously broken down and sorted by wind and water until it becomes suitable for colonization by plants. Plants, by the binding effects of their roots, by the protection they afford against rain and wind and by the fertility they impart to the soil, bring denudation almost to a standstill. Nevertheless, some slight denudation is always occurring. As each superficial film of plant-covered soil becomes exhausted it is removed by rain or wind, to be deposited mainly in the rivers and sea, and a corresponding thin layer of soil forms by slow weathering of the



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underlying rock. The depth is sometimes only a few inches, occasionally several feet deep, but within it lies the whole capacity of the earth to produce life. Below that thin layer comprising the delicate organism known as soil is a planet as lifeless as the moon.

31. ‘Geological erosion’ means the same as

- A. soil erosion
- B. natural erosion
- C. erosion by man
- D. all of the above

32. Denudation

- A. is an important process in soil formation
- B. destroys the surface of the earth
- C. results from man’s reduction of soil fertility
- D. will bring national extinction

33. One important function of plants is to:

- A. denude the soil
- B. bind and fertilize the soil
- C. erode the soil to smoothness
- D. look pretty

34. The layer of soil is generally

- A. between a few inches and a few feet deep.
- B. miles deep
- C. never more than a few inches deep
- D. as lifeless as the moon.



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35. Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase. Practising law is not as lucrative as people think.

- A. know
- B. understand
- C assume
- D. consider

36 Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase. The family puts up a brave face but their financial situation is precarious

- A. buoyant
- B. precious
- C. unjustifiable
- D. insecure

37. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase. As is usually the case when Tanus got involved, the discussion became animated.

- A. unruly
- B. specialized
- C. lively
- D. boring

38. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase. Gender-sensitivity is part of the new political correctness.

- A. inclusiveness
- B. naiveté
- C insensitivity
- D. ideology



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39. Which of the following highlighted consonants is pronounced differently from the others?

- A. world
- B. **w**hore
- C. hoar
- D. **w**hole

40. Which of these words has a vowel pronounced differently from the others?

- A. beast
- B. heft
- C. breast
- D. wealth

OPTION V

Read the passage below and answer the questions that follow.

When, in the course of human events, it becomes necessary for one people to dissolve the bands that have connected them with another, and to assume, among the powers of the earth, the separate and equal station to which the laws of nature and nature's God entitle them, a decent respect to the opinions of humanity requires that they declare the causes which impel them to the separation.

We hold these truths to be self-evident, that all human beings are created equal, that they are endowed by their creator with certain inalienable rights; that among these are life, liberty, and the pursuit of happiness. We affirm also that to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed. Whenever any form of government becomes destructive of these ends, it is the right of the people to alter or abolish it, and to institute a new government, laying its foundations on such principles, and organising its power in such form, as to them shall seem most likely to secure their safety and happiness.

Adapted from *The Declaration of Independence*

41. Why does the writer find it necessary to state the reasons that the colonies have for breaking away from their colonial masters ?

- A. because they have had a long relationship with the colonial power



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- B. because they were obedient to God's laws
- C in order to show that they respect world opinion
- D. because they have been a colony for a long time.
42. When, according to the author, can people excusably put an end to any form of government?
- A. when that government rigs elections
- B. when the literate citizens no longer respect the government
- C. when the government has stayed too long in power
- D. when the government stops protecting the rights of the people
43. By saying that some truths are 'self-evident', the writer means that those assertions
- A. can be defended
- B. cannot be disputed
- C. need evidence
- D. none of the above
44. The right of a nation to self-governance derives ultimately from
- A. the strength of that nation
- B. a respect for the opinions of human beings
- C the laws of God
- D. the laws of nature
45. Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase. The little village became more enchanting at dusk.
- A. bewitched
- B accommodating
- C attractive



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- D. fascinating
46. Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase. More students are relying on virtual resources for study and entertainment.
A. fundamental
B. righteous
C. automated
D. computer-generated
47. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase.. I wonder why her brother is indifferent to her financial situation.
A. Interested in
B. troubled by
C. discouraged by
D. filled with
48. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase. I would have enjoyed the novel but for its convoluted theme.
A. simple
B. complex
C. immoral
D. boring
49. Which of the following highlighted consonants is pronounced differently from the others?
A. hiccough
B. poppy
C. cup
D. tough



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50. Which of these words has a vowel pronounced differently from the others?

- A. height
- B. high
- C. heist
- D. eight

OPTION VI

Read the passage below and answer the questions that follow.

We knew early in life that the atmosphere in our home was different from that in many other homes where husbands and wives quarrel and where there was drunkenness, laziness or indifference – things we never saw in our family. We also knew that our father was an uncommon man. Whenever my mother was away, my father could and did do all the household jobs. We lived in this way in a community in which housework was regarded as being beneath male dignity. In our family, however, boys did girls' work and my father did it with us.

We had to get water at the public tap nearly a kilometre away from our house and make the trek back with water tins balanced on our heads. All the children in the neighbourhood knew we did women's work, and I can still hear their derisive laughter. We did our jobs doggedly because our parents expected it of us. Out of choice, our father did everything we did, including fetching water on occasion, and commanded us by sheer force of his example.

51. By describing his father as *an uncommon man*, the writer means that he is

- A. aristocratic
- B. lazy
- C. remarkable
- D. amenable

52. Which of the following was likely to be true of the writer's family when he was young?

- A. his mother was lazy
- B. his father was a drunk
- C. the family was happy
- D. the sons were ruffians



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53. Which of the following describes the father's role in the family?

- A.. serving the wife
- B. being too hard on the children
- C leading by example
- D. usurping the wife's role

54. Now that the writer is grown up, he

- A. thinks that he had a miserable childhood.
- B. thinks that his father was a bully
- C is grateful for his upbringing
- D. sad about his upbringing

55. **Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase.** He was under pressure to retract his statement before the panel

- A. reiterate
- B. withdraw
- C. assert
- D. repeat

56. **Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase.** He was told to forget the niceties and go straight to his main point

- A. specifics
- B. politeness
- C. greetings
- D. nice things



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57. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase. Our visit to the village was *nothing to write home about*.

- A. not interesting
- B. not a home affair
- C quite pleasant
- D. nobody's business

58. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase. Ojo's knowing smile infuriated his sister

- A. confused
- B. surprised
- C. annoyed
- D.C pleased

59. Which of the following highlighted consonants is pronounced differently from the others?

- A. dung
- B. dog
- C. dagger
- D. agog

60. Which of these words has a consonant pronounced differently from the others?

- A. tough
- B. Thames
- C though
- D. team



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OPTION VII

Read the passage below and answer the questions that follow.

Creoles, according to the most general account, arise when a pidgin language becomes the native language of a new generation of children. One way this can come about is when a man and woman who speak different languages marry, both know a pidgin, and neither learns the other's language. The pidgin then becomes the shared home language and becomes the mother tongue of the children. A setting in which this has happened occurred during the bleakest days of slavery in the Western hemisphere, when efforts were made to separate African slaves with the same native language in order to forestall insurrections. Only pidgin languages were available as common languages and they became the basis for the mother tongue of new generations.

Once a pidgin language becomes a mother tongue, it must support all the interactive needs of its speakers, since they have no other language to fall back on. A creole becomes simpler (in the sense of more regular) and expands its grammatical machinery, as well as stabilizing and expanding its lexicon. If a creole is in touch with its lexifier language, it may 'decreolize' and develop varieties increasingly like the lexifier language. If the less decreolized varieties fall out of use, the decreolized remnants of the old creole may be seen simply as substandard dialects of the lexifier language. As we will see, this has been proposed as the origin for the US Vernacular Black English.

61 . Creoles may be defined as:

- (A) a pidgin spoken by West African slaves,
- (B) a pidgin that has acquired native speakers,
- (C) a native language of a new generation of children,
- (D) the mother tongue of children born in an inter-ethnic marriage.

62. African slaves who spoke the same language were separated ...

- (A) in order to make them forget their first languages,
- (B) so that there would be no rebellion,
- (C) so that they would learn their master's language,
- (D) to make their days bleaker.

63 The following are characteristics of a creole language except...

- (A) an expanded vocabulary,



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- (B) varieties similar to the lexifier language,
(C) young native speakers,
(D) a more regular grammatical system.
64. Vernacular Black English is ...
(A) a pidgin,
(B) a creole,
(C) a decreolized variety,
(D) a less decreolized variety.
65. Choose the most appropriate option nearest in meaning to the italicized word/phrase.
He is a prolific writer as well as a human rights activist.
A. well-known
B. productive
C. promising
D. promiscuous
66. Choose the most appropriate option nearest in meaning to the italicized word/phrase.
Her meddlesome husband ruined her business relationships.
A. uncaring
B. detached
C prying
D. intimidating
67. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase. The government is making concerted efforts at improving the standard of living in the rural areas.
A. dissipated



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- B. unconcerned
C. uncontrolled
D. unsuccessful
68. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase. The politician's passionate appeal doused the tension
A. heightened
B. smothered
C. lifted
D. drowned
69. Which of the following highlighted consonants is pronounced differently from the others?
A. dodge
B. doge
C. dogged
D. drudge
70. Which of these words has a vowel pronounced differently from the others?
A. stead
B. stealth
C steam
D. bread

OPTION VIII

Read the passage below and answer the questions that follow.



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Underlying any relationship between Haiti and Africa is the fact that the population of that country originated from Africa to a far greater extent than on other Caribbean Islands; 90% of the Haitians are full-blooded Negroes, the rest mulattoes. The total eradication of the white element was the consequence of a particular political and economic situation of the island Saint-Domingue, which was the name of Haiti under French colonization. Other than on the other Caribbean islands where the early arrival of European settlers resulted in a development of a white indigenous population, Saint-Domingue remained untouched until 1697, when the peace treaty of Riswyck ended the dispute between France and Spain over the ownership of this island. At that time it had already been proved that the production of sugar was the most profitable industry in this area particularly if the estates were large enough and labour costs could be kept low by extensive use of slave labour, which was brought over from Africa. So the new settlers of Saint-Domingue belonged to two groups greatly contrasted in social condition and number. On the one side, there was a small group of French noblemen, owners of immense sugar estates maintaining in Saint-Domingue the privileges which they had lost in France under Louis XIV, on the other side there were the African slaves living in miserable conditions but conscious that they outnumbered their masters by hundreds of thousands. These contradictions within the society led to the outbreak of the slave revolt in 1792, which differed from other revolts in that area in that it was successful, and in 1804 after many ups and downs the victorious slaves of Saint-Domingue proclaimed a new state, named Haiti. Most of the white landlords had fled the island during the hostilities and the few remaining ones were killed after independence.

71. The population of Haiti

- A. is made up predominantly of mulattoes
- B. originated from Spain and France
- C. originated predominantly from Africa
- D. came from other Caribbean Islands

72. Haiti did not develop a white indigenous population as early as other Caribbean Islands because

- A. it was less suited for sugar cultivation
- B. there was a controversy over the ownership of the island
- C. the indigenous Negro population was very hostile
- D. the island was not discovered early enough

73. The French settlers preferred to live in Saint-Domingue because

- A. Louis XIV allowed them their usual privileges there



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- B. the African slaves there lived in miserable conditions
- C. they could enjoy the rights they had lost in France
- D. they were not patriotic
74. The clause, ‘which differed from other revolts in that area in that it was successful,’ suggests that
- A. there were many successful slave revolts
- B. slave revolts were not unusual then in the Caribbean
- C. the islands of the Caribbean are ruled by rebel slaves
- D. the slaves in Saint-Domingue differed with slaves on other islands
75. Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase.
- A. The young groom is quite an astute businessman.
- A. acute
- B. shrewd
- C. honest
- D. considerate
76. Choose the most appropriate option nearest in meaning to the italicized or bold word/phrase.

The family puts up a brave face but their financial situation is precarious.

- A. buoyant
- B. precious
- C. unjustifiable
- D. insecure



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77. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase.

The volume contains the **complete** works of Shakespeare.

- A. reprinted
- B. abridged
- C. edited
- D. selected

78. Choose the most appropriate option opposite in meaning to the italicized or bold word/phrase .I find **open-ended** questions more challenging in tests.

- A. easy
- B. multiple-choice
- C. essay-type
- D. gap-completion

79. Which of the following highlighted **consonants** is pronounced differently from the others?

- A. **chalet**
- B. **champion**
- C. **chagrin**
- D. **chaise**

80. Which of these words has a **vowel** pronounced differently from the others?

- A. steak
- B. break
- C. leak
- D. strange



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English language Answers

1 D 21 D 41 C 61 B 11 C 31 B 51 D 71 C
2 B 22 A 42 D 62 B 12 C 32 A 52 C 72 B
3 B 23 C 43 B 63 B 13 C 33 B 53 C 73 C
4 D 24 C 44 C 64 C 14 B 34 A 54 C 74 C
5 C 25 B 45 D 65 B 15 B 35 C 55 B 75 B
6 C 26 D 46 D 66 C 16 C 36 D 56 A 76 D
7 B 27 C 47 A 67 A 17 A 37 D 57 C 77 D
8 C 28 C 48 A 68 A 18 B 38 C 58 D 78 B
9 D 29 C 49 D 69 C 19 C 39 A 59 A 79 B
10 C 30 D 50 D 70 C 20 C 40 A 60 C 80 C



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Chemistry Questions

1. What is the molecular formula of a compound whose empirical formula is CH_2O and molar mass is 180? ($\text{H}=1, \text{C}=12, \text{O}=16$): (A) $\text{C}_6\text{H}_{12}\text{O}_6$ (B) $\text{C}_4\text{H}_8\text{O}_3$ (C) $\text{C}_6\text{H}_{10}\text{O}_5$ (D) $\text{C}_4\text{H}_8\text{O}_2$
2. Which of the following pollutants is biodegradable? (A) Plastics (B) Sewage compounds (C) Metal scraps (D) Hydrogen sulphide
3. Which of the following equations represents the reaction leading to the removal of permanent hardness of water? (A) $\text{MgSO}_4 + \text{Na}_2\text{CO}_3 \rightarrow \text{MgCO}_3 + \text{Na}_2\text{SO}_4$ (B) $\text{Ca}(\text{OH})_2 + 2\text{HCl} \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O}$
(C) $\text{Ca}(\text{HCO}_3)_2 + \text{Ca}(\text{OH})_2 \rightarrow 2\text{CaCO}_3 + 2\text{H}_2\text{O}$ (D) $\text{MgSO}_4 + \text{BaCl}_2 \rightarrow \text{MgCl}_2 + \text{BaSO}_4$
4. How many mole of AgNO_3 are there in 500 cm^3 of 0.01 M AgNO_3 solution? A. 0.005 mole B. 0.05 mole C. 0.5 mole D. 1 mole
5. Which of the following statements explains why tetraoxosulphate (IV) acid is regarded as a strong acid? A. Tetraoxosulphate (VI) acid is dibasic. B. The acid is concentrated. C. The acid is completely ionized in aqueous solution. D. Tetraoxosulphate (VI) ions are very reactive.
6. To what temperature must a gas be raised from 273K in order to double both its volume and pressure? A. 300K B. 546K C. 819K D. 1092K
7. If 3 moles of electrons are required to deposit 1 mole of a metal, M during the electrolysis of its molten chloride, the empirical formula of the metallic chloride is: A. M_3Cl B. M_3Cl_2 C. M_2Cl_3 D. MCl_3
8. Nuclear reactions can be used in the following except: A. gauging the thickness of objects. B. making atomic bombs. C. curing cancer. D. purifying water
9. Which of the following compounds crystallizes without water of crystallization? A. Na_2Co_3 B. CuSO_4 C. MgSO_4 D. NaCl
10. The products of the electrolysis of dilute sodium chloride solution with platinum electrodes are A. hydrogen and oxygen. B. oxygen and chlorine. C. chlorine and water. D. sodium amalgam and chlorine.
11. Which of the following statements is not correct of Group 7 elements? A. They are diatomic B. They are good oxidizing agent C. They are highly electronegative. D. They have relatively low ionization Potentials.
12. Which of the following statements is not correct? Cathode rays A. are positive charged B. travel in straight lines. C. are deflected away from negative plates. D. are very light,
13. $\text{CH}_4(g) + 2\text{O}_2 \rightarrow 2\text{H}_2\text{O}_{(l)} + \text{CO}_{2(g)}$ $\Delta H = -890 \text{ kJ mol}^{-1}$ ΔH in the reaction represented by the equation is called the enthalpy of: A. formation. B. combustion. C. activation D. neutralization.





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15. Compounds that have the same molecular formula but different structures are said to be
A. isomeric B. isotopic. C. polymeric D. allotropic
16. When a crystal was added to its solution, it did not dissolve and the solution remained unchanged, showing that the solution was: A. concentrated B. unsaturated C. colloidal D. saturated.
17. When steam is passed over white-hot coke, the products are: A. carbon (IV) oxide and nitrogen. B. carbon (II) oxide and hydrogen. C. carbon (II) oxide and nitrogen D. carbon (IV) oxide and hydrogen.
18. The maximum number of electrons that can be accommodated in the shell having the principal quantum number 3 is; A. 3 B. 9 C. 18 D. 32
19. Methanol is obtained from wood by A. esterification. B. destructive distillation.
C. combustion D fractional distillation.
20. Study carefully the reaction represented by the equation $2\text{H}_2\text{O}_{2(\text{l})} \rightarrow \text{O}_{2(\text{g})} + 2\text{H}_{2\text{o}(\text{l})}$ Which of the following will not increase the reaction rate? A. Heating the hydrogen peroxide B Adding a pinch of MnO_2 to the reactant. C Increasing the concentration of the H_2O_2 D. Adding water to the reactant
21. Which of the following processes is a physical reaction? A. Electrolysis B Hydrolysis C, Allotropic change D. Neutralization
22. The following acids are monobasic except A. methanoic acid B. dioxonitrate (III) acid.
C. ethanedioic acid. D. oxochlorate I acid
23. The rate of a reaction is proportional to the number of effective collisions occurring per second between the reactants" This statement is associated with the A. kinetic theory, B rate law. C. atomic theory.
D. collision theory
24. In the reaction represented by the following equation; $2\text{H}_2\text{S}_{(\text{q})} + \text{SO}_{2(\text{g})} \rightarrow 2\text{H}_2\text{O}_{(\text{l})} + 3\text{S}_{(\text{s})}$ SO_2 is acting as
A. a reducing agent. B. an oxidizing agent, C. a dehydrating agent. D. a bleaching agent.
25. When iron rusts, it undergoes A.chemical decomposition. B.hydrolysis. C. redox reaction,
D. combustion.
26. The following salts are readily soluble in water except: A. Na_2CO_3 B. $\text{Pb}(\text{NO}_3)_2$ C. KCl D. FeSO_4
27. When sucrose is warmed with Fehling's solution. A. a silver mirror is produced. B. solution turns milky.
C. brick-red precipitate is formed D. there is no precipitate.
28. The ionic radii of metals are usually A.greater than their atomic radii. B.unaffected by the charge on the ion.
C less than their atomic radii D.greater than those of non-metals.





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31. Which of the following compounds is not a raw material for the manufacture of plastics? A. Ethene B. Ethane C. Monochloroethene D. Propene
32. The energy required to remove the most loosely bound electron from an atom in the gaseous state is known as the A. bond energy B. ionization energy, C. potential energy. D. activation energy.
33. If a reaction is said to be exothermic, which of the following statements is a correct deduction from the information? A. The reaction vessel gets hotter as the reaction proceeds. B. ΔH for the reaction is positive C. The rate of reaction increases with time D. The activation energy of the reaction is high.
34. Which of the following pH values is likely to be that of a slightly alkaline solution? A. 2 B. 5 C. 7 D. 8
35. Which of the following minerals contains fluorine as one of its constituent elements? A. Cryolite B. Bauxite. C. Potash alum D. Kaolin
36. The product of the reaction between propanoic acid and ethanol is A. ethylpropanoate. B. ethylethanoate. C. methylpropanoate. D. propylethanoate
37. Which of the following accounts for the difference in the mode of conduction of electricity by metals and aqueous salt solutions? A. electrons are present in metals but not in salt solutions. B. Metals are conductor while salts are electrolytes. C. electricity is carried by mobile electrons in metals but by ions in aqueous salts solution. D. Salts ionize in aqueous solution while metals do not.
38. Starch undergoes complete hydrolysis to produce A. maltose. B. lactose. C. fructose. D. glucose.
39. Which of the following solids has a network structure? A. Diamond B. Iodine C. Sulphur D. Graphite
40. The properties of electrovalent compounds include the following except: A. high melting point and boiling point. B. conduction of electricity in the molten state. C. high volatility at room temperature. D. ionization in aqueous solution,
41. Which of the following pairs illustrates isotopy? A. But-1-ene and but 2-ene B. carbon and hydrogen C. Oxygen and ozone D. Hydrogen and deuterium
42. Carbon is often deposited in the exhaust-pipe of cars because of the A. presence of carbon in petrol. B. dehydrogenation of petrol. C. incomplete combustion of petrol, D. presence of additives in petrol.
43. Sulphur burns in air to form: A. an acidic oxide B. a basic oxide C. an amphoteric oxide D. a neutral oxide.
44. Chlorine is used in water treatment as: A. a germicide. B. a decolorizing agent. C. an antioxidant D. a coagulating agent.
45. What amount of copper will be deposited if a current of 10 A was passed through a solution of copper (II) salt for 965 seconds? (F= 96500 C): A. 0.005 mole B. 0.025 mole C. 0.05 mole D. 1.00 mole





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47. Consider the reaction represented by the following equation:
 $\text{CaCl}_{2(\text{aq})} + \text{H}_2\text{C}_2\text{O}_{4(\text{aq})} \rightarrow \text{CaC}_2\text{O}_{4(\text{s})} + 2\text{HCl}_{(\text{aq})}$ which of the following would dissolve the precipitate of $\text{CaC}_2\text{O}_{4(\text{s})}$ formed? A. Stirring the mixture vigorously B. adding more calcium chloride solution, C. Increasing the concentration of the ethanedioic acid D. Adding concentrated hydrochloric acid.
48. What volume of distilled water should be added to 400 cm^3 of 2.0 mole dm^{-3} H_2SO_4 to obtain $0.20 \text{ mole dm}^{-3}$ of solution? A. 600 cm^3 B. 800 cm^3 C. $1,000 \text{ cm}^3$ D. $3,600 \text{ cm}^3$
49. What volume of propane is left unreacted when 20 cm^3 of oxygen and 20 cm^3 of propane react according to the following equation? $\text{C}_3\text{H}_8 + 5\text{O}_{2(\text{g})} \rightarrow 3\text{CO}_{2(\text{g})} + 4\text{H}_2\text{O}$ A. 16 cm^3 B. 5 cm^3 C. 14 cm^3 D. 15 cm^3
50. The component of air that is removed when air is bubbled into alkaline pyrogallol solution is: A. Carbon (IV) oxide. B. oxygen C. water vapour. D. nitrogen.
51. Which of the following compounds of tin is a strong reducing agent? A. SnCl_2 B. SnCl_4 C. SnO_2 D. SnH_4
52. Which of the following pairs are both substances deliquescent? A. CaCl_2 and H_2S_4 B. NaOH and $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ C. CaCl_2 and NaOH D. CuO and NaCl
53. An alkene may be converted to an alkane by A. halogenation. B. hydrolysis. C. dehydration. D. hydrogenation.
54. The product of the reaction between ethanol and excess acidified $\text{K}_2\text{Cr}_2\text{O}_7$ is; A. ethanal B. ethylethanoate C. ethanoic acid D. ethyne.
55. What does the following equation illustrate? $^{238}_{92}\text{U} \rightarrow ^{234}_{90}\text{Th} + ^4_2\text{He}$
A. Nuclear fission B. Nuclear fusion C. Artificial radioactivity D. Spontaneous disintegration
56. Zinc displaces copper from an aqueous solution of copper (II) salt because A. copper is a transition element. B. copper is moderately reactive metal C. zinc and copper have reducing properties. D. zinc is more reactive than copper.
57. The components of universal indicator solution can best be separated by: A. evaporation. B. chromatography C. crystallization. D. fractional distillation.
58. When naphthalene on heating changes from the solid state directly to the gaseous state, it undergoes: A. evaporation. B. sublimation. C. decomposition. D. ionisation.
59. How many faradays of electricity are required to liberate 9 g of aluminium? ($\text{Al} = 27$) A. 0.1 B. 0.3 C. 1.0 D. 3.0
60. $\text{Mg}_{(\text{s})} + 2\text{HCl}_{(\text{aq})} \rightarrow \text{MgCl}_{2(\text{aq})} + \text{H}_{2(\text{g})}$ From the equation above, what mass of hydrogen would be produced if 12.0 g magnesium reacted completely with dilute hydrochloric acid? ($\text{H} = 1, \text{Mg} = 24$) A. 1.0 g B. 2.0 g C. 6.0 g D. 12.0 g





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- D. oxiaizing agent
62. Alkanols have unexpectedly high boiling points relative to their molar masses because of intermolecular
A. hydrogen bonding. B. metallic bonding. C. covalent bonding. D. ionic bonding.
63. If an element X with electronic configuration 2,8,3, combines with another element Z with electronic configuration 2,8,6, the compound formed will have the formula A. XZ. B. XZ₂. C. X₂Z. D. X₂Z₃
64. Which of the following molecules is linear in shape? A. CH₄ B. H₂O C. H₂S D. Cl₂
65. What is the percentage by mass of copper in copper (I) oxide (Cu₂O)? [O = 16; Cu = 64] A. 88.9%
B. 80.0% C. 66.7% D. 20.0%
66. The most suitable method for preparing lead (II) chloride is by A. action of dilute HCl on PbSO₄. B. action of dilute HCl on lead. C. mixing aqueous solutions of Pb (NO₃)₂ and NaCl. D. bubbling chlorine into a solution of Pb (NO₃)₂.
67. Sodium chloride cannot conduct electricity in the solid state because it A. is a normal salt. B. is highly soluble in water. C. is an electrovalent compound. D. does not contain mobile ions.
68. Alums are classified as: A. simple salts. B. acid salts. C. anhydrous salts. D. double salts.
69. H₃O⁺_(aq) + OH⁻_(aq) 2H₂O(l). The heat change accompanying the process represented by this equation is the heat of: A. neutralization. B. formation. C. solution. D. dilution
70. In which of the following processes are larger molecules broken down into smaller molecules?
A. Vulcanization of rubber B. Hydrogenation of palm oil C. Hydrolysis of starch
D. Polymerization
71. What is the amount (in mole) of hydrogen gas that would be produced if 0.6 mole of hydrochloric acid reacted with excess zinc according to the following equation? Zn_(s) + 2HCl_(aq) ZnCl_{2(aq)} + H_{2(g)} A. 0.1 mole B. 0.2mole C. 0.3mole D. 1.0 mole
72. Chlorine is prepared on a large scale by the A. electrolysis of concentrated sodium chloride solution.
B. action of manganese (IV) oxide on hot concentrated hydrochloric acid. C. action of concentrated tetraoxosulphate (VI) acid on sodium chloride. D. oxidation of concentrated hydrochloric acid with potassium tetraoxomanganate (VII)
73. Which of the following statements is correct about the following system at equilibrium? PCl_{5(g)}
PCl_{3(g)} + Cl_{2(g)} ΔH positive A. Increase in temperature increases the yield of PCl₅. B. PCl₅ is less stable at high pressures. C. The concentrations of PCl₃ and Cl₂ increase at higher pressures. D. Decrease In pressure favours the forward reaction.
74. Isotopes of a given element have the same: A. Neutron B. atomic number C. chemical properties.





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76. Which of the following statements is correct about catalysts? They A. alter the rate of chemical reactions, B. are generally specific in action. C. remain changed chemically at the end of the reaction. D. shift the equilibrium position in a reversible reaction.
77. If the change in free energy (ΔG) of a reaction is negative, it can be deduced that the reaction will: A. not proceed in the direction indicated. B. be reversible. C. not occur at room temperature. D. be feasible.
78. Which of the following denotes an alpha particle? A. 1_0n B. 4_2He C. ${}^0_{-1}e$ D. ${}^9_{-4}Be$
79. When an atom gains an electron, it becomes: A. chemically inactive B. negatively charged C. oxidized D. a cation.
80. "Equal volumes of all gases at the same temperature and pressure contain the same number of molecules" is an expression of: A. Charle's Law B. Boyle's Law C. Graham's Law D. Avogadro's Law.
81. The following acids are monobasic except: A. trioxonitrate (V) acid B. hydrochloric acid C. ethanoic acid. D. tetraoxophosphate (V) acid.
82. An arrangement of two different metals in aqueous solutions of their salts to produce an electric current is known as: A. electrochemical cell B. activity series C thermocouple. D. voltameter.
83. The rate of production of hydrogen gas from the reaction between zinc granules and hydrochloric acid can be increased by: A. cooling the reaction mixture B. using zinc powder instead of zinc granules. C. using zinc rod instead of zinc granules. D, carrying out the reaction at a higher pressure.
84. Nitrogen is prepared on a large scale by the A. fractional distillation of liquefied air. B. decomposition of ammonium dioxonitrate (III). C. electrolysis of brine. D. Haber process
85. Which of the following metals will be the most suitable for use where lightness and resistance to corrosion are of importance? A. Lead B aluminum. C. Iron. D. Copper
86. The products formed when sodium hydrogen trioxocarbonate (IV) is heated strongly are: A. carbon (IV) oxide and sodium hydride. B. carbon (IV) oxide and sodium trioxocarbonate (IV). C. carbon (IV) oxide and steam. D. sodium trioxocarbonate (IV), carbon (IV) oxide and steam.
87. Pipe-borne water is usually chlorinated in order to: A. improve the taste of the water. B. remove the hardness in the water. C. coagulate sediments in the water. D. kill harmful bacteria in the water.
88. In linear molecules, the bond angle is: A. 90° B. 104° C. 180° D. 120°
89. An increase in the pressure of a gas results in a decrease in its: A. mass. B. vapour density. C. volume. D. concentration.
90. An acid is a substance which in the presence of water produces: A. salts. B. oxygen. C. effervescence. D. hydroxonium ions.





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92. Which of the following ions will migrate to the cathode during electrolysis? A. Zinc ions. B. Chloride ions. C. Sulphide ions. D. Tetraoxosulphate (VI) ions.
93. What quantity of electrons (in mole) is lost when one mole of iron (II) ions is oxidized to iron (III) ions?
A. 5 mole B. 4 mole C. 3 mole D. 1 mole.
94. The position of equilibrium in a reversible reaction is affected by: A. particle size of the reactants B. change in concentration of the reactants. C. change in size of the reaction vessel. D. vigorous stirring of the reaction mixture.
95. Ethene undergoes mainly additional reactions because it is A. a gas. B. a hydrocarbon. C. unsaturated. D. easily polymerized.
96. The reaction between alkanoic acids and alkanols in the presence of a mineral acid is known as:
A. saponification. B. hydrolysis. C. polymerization. D. esterification.
97. Which of the following is used widely in the manufacture of flavours and perfumes?
A. Alkanoates. B. Alkanines. C. Alkanes reaction. D. complex sugars
98. When chlorine is added to slaked lime, the product obtained is A. bleaching powder. B. chlorinated water C. hydrochloric acid. D. oxochlorate (I) acid.
99. Which of the following, when heated strongly in air will leave a metal as residue?
A. Sodium trioxonitrate (V) B. Potassium trioxonitrate (V) C. Silver trioxonitrate (V) D. Lead trioxonitrate (V).
100. Which of the following methods is suitable for the preparation of an insoluble salt? A. Action of an acid on a metal. B. Double decomposition. C. Neutralization. D. Action of an acid on a trioxocarbonate (IV) salt



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Chemistry Answers

- 1.A 2.B 3.A 4.A 5.C 6.D 7.D 8.D 9.D 10 11.D 12.A 13.B
14.C 15. 16.D 17.B 18.C 19.B 20.D 21.C 22.C 23.D 24.B 25.C 26.D
27.D 28.C 29.C 30.C 31.B 32.B 33.A 34.D 35.A 36.A 37.C 38.D 39.D
40.C 41.D 42.C 43.A 44.A 45.C 46.C 47.D 48.D 49.A 50.B 51.D 52.C
53.D 54.C 55.A 56.D 57.B 58.B 59.B 60.A 61.A 62.A 63.D 64.D 65.A
66.A 67.D 68.D 69.A 70.C 71.C 72.A 73.D 74.B 75.D 76.A 77.D 78.B
79.B 80.D 81.D 82.A 83.B 84.A 85.B 86.D 87.D 88.C 89.C 90.D 91.A
91.A 93.D 94.B 95.C 96.D 97.D 98.A 99.D 100.B





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Physics Questions

1. A boy runs 100 m due north and then 100 m due east. What is his displacement?
A. 200m 45°E B. 10,000m 45°E
C. 200m 45°N D. 100m 45°N
2. The speed of an air force jet was 400 m/s when it flew past an anti-aircraft gun. Calculate its distance from the gun 4 s later when the gun was fire
A. 100 m B. 1600 m
C D. 1600 km
3. A mango fruit dropped to the ground from the top of a tree 40 m tall. Find how long it takes the fruit to reach the ground if acceleration due to gravity $g = 10 \text{ m/s}^2$
A. 2 s B. 80 s
C 4 s D. 2 s
4. A 0.1-m long elastic band extends 5 mm when a load of 80 N is hung from its end. Calculate the strain on the band
A. 5 B. 0.5 C. 0.05 D. 16
5. Which of the following statements describes what happened when an ice block that floats in a glass of water that is filled to the brim melts?
A. The level of the water remains the same.
B. There is a drop in the level of water in the glass due to condensation on its outside.
C. The water in the glass overflows
D. The water level drops because melted ice occupies less volume.
6. A machine with a mass of 4 kg fires a 45 g bullet at a speed of 100 m/s. Find the recoil speed of the machine gun.
A. 1.1 m/s B. 2 m/s C. 3.5 m/s D. 0 m/s
7. Which of the following would you use to determine the weight of an object?
A. chemical balance B. beam balance
C. spring balance D. weight balance
8. The force that causes an object to move in a circular path is called
A. centrifugal force B. centripetal force
C. centre-seeking force <C>none of the above
9. A solid suspended by a piece of string is completely immersed in water. On attempting to lift the solid out of the water, the string breaks when the solid is partly out of the water. This is because
A. the tension in the string decreases as the solid is lifted
B. the mass of the solid has increase
C. the solid apparently weighs less when completely immersed in water than when partially immersed
D. part of the solid still in water is exerting more force on the string
10. The following statements were made by some students describing what happened during and experiment to determine the melting point of solids
i. The temperature of the solid was constant until melting started
ii. The temperature of the solid rose until melting started
iii During melting, the temperature was rising
iv. During melting, the temperature was constant
v.. The temperature continued to rise after all the solid had melted
vi. temperature stopped rising after the solid had melted
which of the following gives correct statements in the right order?





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- A. 2, 4 and 5 B. 2, 3 and 6
C. 1, 3 and 6 D. 1, 3 and 5
11. When some grains of table salt were put in a cup of cold water, kept at constant temperature and left undisturbed, all the water tasted salty after some time. This is due to
A. capillarity B. surface tension
C. mixing D. diffusion
12. Given that the latent heat of fusion of ice is 80 cal/g, how much heat will change 100 g of ice at 0oC into water at the same temperature?
A. 8kcal B. 8 cal C. 800 cal
D. 8000 kcal
13. A blacksmith dropped a 1.5 kg iron bead at 300oC into some quantity of water. If the temperature of the water rose from 15oC to 18oC, what is the mass of the water assuming no heat is lost to the surrounding? (Take the specific heat of iron as 0.46 J kg⁻¹ C⁻¹ and that of water as 4.2x103 J kg⁻¹ C⁻¹)
A. 15.44 kg B. 194.58 g C. 15.44 g
D. 194.58 kg
14. Which of the following properties are not those of a suitable thermometric liquid?
I. It should be a good conductor of heat
II. It should be opaque
III. Its expansion should be regular
IV. It should wet glass
V. It should have a high melting point and low boiling point
A. I and II B. II and III
C. III and IV D. IV and V
15. A gas at pressure P1 N/m² and temperature 30oC is heated to 61oC at constant volume. Find its new pressure.
A. 1.1 N/m² B. 1.2 P1 N/m²
C. 1.01 P1 N/m² D. 1.1 P1 N/m²
16. A steel bar has a width of 10 cm at 50oC At what temperature will it fit exactly into a hole of constant width 10.005 cm if coefficient of linear expansion of steel is 11x10⁻⁶ C⁻¹)?
A. 75oC B. 0.005oC C. 75.5oC D. -75.5oC
17. The amount of heat that is required to raise the temperature of unit mass of a substance one degree Celsius is called
A. Heat capacity B. thermal capacity
C. Specific heat D. Heat energy
18. Two lamps rated 60 W and 240 V each are connected in series. What is the total power dissipated in both?
A. 30W B. 60W C. 90W D. 120W
19. Three 3 Ω resistors connected in parallel have a potential difference of 24 V applied across the combination. What is the current in each resistor?
A. 8A B. 3A C. 24A D. 4A
20. If PHCN charges 25 k per kWh, find the cost of operating for 36 hours a lamp requiring 1.5 A on a 240 V line.
A. N324 B. N32.4 C. N3.24 D. N0.324
21. In order to convert a galvanometer to a voltmeter
A. a low resistance shunt is connected in parallel
B. a low resistance shunt is connected in series
C. a high resistance multiplier is connected in parallel
D. a high resistance multiplier is connected in series





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22. Which of the following is not applicable to an ac generator?
 A. Armature B. Commutator
 C. Field magnet D. Slip rings
23. A potential difference of 5 V is used to produce a current of 4 A for 4 hours through a heating coil. What is the heat produced?
 A. 80 J B. 4.8 kJ C. 20 J D. 4800 kJ
24. Determine the absolute temperature at which the Fahrenheit temperature is twice the Celsius temperature.
 A. 299.82K B. 433.15K
 C. 273.25K D. 406.35K
25. Which of the following law forms the basis of the thermometry?
 A. Charles' and Gay-Lussac's law
 B. Fist law of thermodynamics
 C. Boyle's and pressure law
 D. Zeroth law of thermodynamics
26. A 500m long aluminium chair expands when it was placed in the sun. Its temperature increases from 20°C to 60°C. Determine its new length. [$\alpha = 2.30 \times 10^{-5} K^{-1}$].
 A. 500.46m B. 456.65m
 C. 540.28m D. 460.32m
27. An electric heater which produces 900 W of power is used to vaporize water. How much water at 100°C can be changed to steam in 3 mins by the heater? [Heat of vaporization = $2.26 \times 10^6 \text{ J/kg}$, Specific heat capacity of water = $4.2 \times 10^3 \text{ J/kg.K}$]
 A. 0.0226 kg B. 0.275 kg
 C. 0.072 kg D. 0.167 kg
28. The amount of heat required to produce unit temperature rise in a substance is called:
 A. Latent heat B. Heat capacity
29. An ideal gas has a volume 100 cm³ at $1 \times 10^5 \text{ Pa}$ and 27°C. What is its volume at $2 \times 10^5 \text{ Pa}$ and 60°C?
 A. 42.5 cm³ B. 55.5 cm³
 C. 50.2 cm³ D. 40.5 cm³
30. Which of the following thermometer can be used to measure high temperature up to 1000°C?
 A. Electrical thermometer B. Pyrometer
 C. Bimetal thermometer D. Thermoelectric thermometer
31. 4000 J of heat is applied to a 1.5 kg silver pendant initially at temperature of 150°C. Determine its final temperature [Latent heat = 336 J kg^{-1} , specific heat capacity = 233 J/kg.K].
 A. 26.4°C B. 38.4°C
 C. 41.5°C D. 15.5°C
32. The specific heat capacity of a substance depends on all the following except:
 A. Mass of the substance
 B. Change in temperature
 C. Surface area of the substance
 D. Energy needed
33. Which of the following quantities is a vector?
 A. Mass B. Velocity C. Distance D. Speed
34. A hose ejects water at 80 cl/s through a hole 2 mm in diameter. The water impinges on a wall and drops off without rebounding. What is the force on the wall?
 A. 2.04 N B. 240.0 N C. 20.4 N D. 24.0 N
35. A train travelling at 72 km/h undergoes a uniform retardation of 2 m/s when brakes are applied. Find the distance travelled from the place where the brakes were applied





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- A. 10 m B. 50 m C. 100 m D. 250 m 43.
36. A force of 200 N pulls a sledge of mass 50 kg and overcomes a constant frictional force of 40 N. What is the acceleration of the sledge?
 A. 4.0 m/s B. 50 m/s C. 4.5 m/s D. 3.2 m/s
37. An object A of mass 2 kg is moving with a velocity of 3 m/s and collides head-on with another object B of mass 1kg moving in the opposite direction with a velocity of 4 m/s. Assuming the objects move off together after collision, calculate their common velocity.
 A. 0.67 m/s B. 0.50 m/s
 C. 0.35 m/s D. 0.55 m/s
38. In elastic collision, which of the following quantities is conserved?
 A. Kinetic energy B. Potential energy
 C. Activation energy D. Conservation energy
39. A weight of 20 N hangs from a fixed point by a light inextensible string. It is pulled aside by a horizontal force with the string inclined at an angle of 30° to the vertical. The tension in the string is
 A. 11 N B. 40 N C. 5 N D. 30 N
40. A stone of mass 50 kg released from a height of 2 m above the ground If the stone falls freely to a height of 5 m above the ground, its velocity is
 A. 19.6 m/s B. 49.0 m/s C. 17.15 m/s
 D. 39.2 m/s
41. Calculate the kinetic energy of a trolley of mass 40 kg moving with a velocity 0.5 m/s
 A. 20 J B. 5 J C. 15 J D. <C>10 J
42. A car of mass 500 kg accelerates from rest at 1 m/s². What is the total distance covered in 1 minute?
 A. 2000 m B. 3600 m C. 1800 m D. 2400 m
43. Niagara falls are 50 m high. Calculate the potential energy of 0.1 cubic meter of water at the top relative to the bottom. Density of water is 1000 kg m^{-3} . Take $g = 10 \text{ m/s}^2$
 A. 48 kJ B. 50 kJ C. 51 kJ D. 61 kJ
44. A bullet of mass 15 g is fired from a rifle with a velocity 100 m/s. If the mass of the rifle is 1 kg. What is the recoil velocity of the rifle?
 A. 1.5 m/s B. 1.8 m/s C. 1.2 m/s D. 2.1 m/s
45. A ball is thrown vertically upwards with a velocity of 30 m/s. Find the greatest height attained
 A. 40 m B. 50 m C. 55 m D. 45 m
46. The tension in a rope pulling a log is 100 N, the mass of the log is 50 kg and the frictional force on the log is 20 N. What is the acceleration of the log?
 A. 2 m/s² B. 1.6 m/s² C. 1.8 m/s² D. 2.2 m/s²
47. A body of mass 1 kg falls freely from rest through a height of 150 m. Calculate the velocity of the body when it strikes the floor ($g=10 \text{ m/s}^2$).
 A. 54.8 m/s B. 45.2 m/s C. 38.7 m/s D. 65.8 m/s
- 48.. A car moving with a velocity of 16 m/s accelerates uniformly at the rate of 1 m/s² to reach a velocity of 20 m/s. Find the distance covered
 A. 85 m B. 75 m C. 82 m D. 72 m
49. An athlete runs 100 m in 12 s. What is his speed in km/h?
 A. 33 km/h B. 36 km/h
 C. 30 km/h D. 27 km/h
50. Which of the following statements best describes the specific heat capacity of a substance?
 A. The quantity of heat required to produce a unit temperature rise;
 B. The random kinetic energy of the particles composing a system;





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- C. The quantity of heat required to change the temperature of a unit mass of the substance by one degree;
D. The quantity of heat required to vaporise a unit mass of the substance at constant temperature.
51. Determine the temperature whose Fahrenheit and Kelvin scales have the same reading to the nearest degree.
A. 273K B. 300K C. 500K D. >574K
52. The SI unit of specific heat capacity of a substance is:
A. JK^{-1} B. $\text{Jkg}^{-1}\text{K}^{-1}$ C. Joules D. $\text{Cal/g}^{\circ}\text{C}$
53. The density of nitrogen at standard temperature and pressure is 1.251 kgm^{-3} . Calculate the root mean square velocity of nitrogen molecules.
A. 240 m/s B. 1×10^4 m/s C. 340 m/s
D. 493 m/s
54. A malaria patient has a body temperature of 98.6°F . What is this temperature on the Celsius scale?
A. 37°C B. 20°C C. 32°C D. 35°C
55. A thermos bottle containing 250 g of coffee at 90°C is added with a 20 g of milk at 5°C . After thorough mixing, what is the final temperature? c for water, coffee and milk is $1.00\text{Cal/g}^{\circ}\text{C}$
A. 84°C B. 84°K C. 84°F D. 55°C
56. Determine the temperature T_f that results when 150 g of ice at 0°C is mixed with 300 g of water at 50°C
A. 67°C B. 6.7°C C. 48°C D. 80°C
57. The only mode of heat energy transfer that needs no material medium is:
A. Convection B. Radiation
C. Conduction D. Thermal conduction
58. When heat energy is added to a system which of the following observations usually occur:

(I) The internal energy of the system increases;
(II) Work may be done on the surroundings;
(III) The volume of system is directly proportional to the temperature.
A. I and II only B. I, II and III C. III only
D. None of the above.
- 59 The transfer of heat energy from one part of a body to another part without the actual movement of any part of the body is called convection.
A. True B. False C. Neither true nor false
D. I cannot tell.
- 60.. Which of the following quantities are scalars?
I. Mass II. Work III. force IV. Magnetic flux
A. II and III only B. I and II only
C. IV only D. I and IV only
61. A force $(15\mathbf{i} - 16\mathbf{j} + 27\mathbf{k})\text{N}$ is added to a force $(23\mathbf{j} - 40\mathbf{k})\text{N}$. What is the magnitude of the resultant?
A. 17N B. 28N C. 63N D. 21N
62. Which of the following statements is/are correct about an object in equilibrium under parallel forces?
I. The total force in one direction equals the total force in the opposite direction.
II. The body must not rotate.
III The resolved components along the x-axis equals the resolved components along the y-axis.
A. I and II only B. I, II and III
B. II and III only C. I and III only.
63. A car moving with a speed of 90 km/h was brought to rest in 10 s by the application of the brakes. How far did the car travel after the brakes were applied
A. 150 m B. 15 m C. 250 m D. 125 m
64. A metre rule is found to balance at the 48 cm mark. When a body of mass 60 g is suspended at the 6 cm mark, the balance point is found to be at the 30 cm





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- mark. Find the mass of the metre rule.
A. 60 g B. 360 g C. 80 g D. 180 g.
65. A ball of mass 0.1 kg moving with a horizontal velocity of 15 m/s is shot into a wooden block of mass 0.4 kg lying at rest on a smooth horizontal surface. Find their common velocity after impact.
A. 15.0 m/s B. 3.8 m/s C. 7.5 m/s
D. 3.0 m/s
66. A body of mass 2 kg moves velocity of 10 m/s. Neglecting air resistance, determine the kinetic energy of the body.
A. 200 N B. 200 J C. 100 J D. 100 N
67. Three forces of magnitude 15 N, 10 N and 5 N act on a particle in the direction which make 120° with one another. Find the resultant and the angle the resultant makes with the x-axis.
A. 8.66 N, 30° B. 4.33 N, 60°
C. 7.4 N, 45° D. 2.52 N, 60°
681. Which of the following statements best defines a couple?
A. Two parallel and opposite forces acting on one another.
B. Two equal forces acting in the same direction.
C. Two parallel and opposite forces acting on a body whose lines of action do not coincide
D. None of the above.
69. A force $F = (5i + 3j)N$ acts on a body and causes a displacement $r = (7i - j)m$. Determine the work done.
A. 53 J B. 32 J C. 35 J D. 21 J.
- 70.. A force of 0.6 N acts on a body of mass 40 g, initially at rest. What is the resulting acceleration?
A. 35 m/s² B. 40 m/s² C. 15 m/s²
D. 25 m/s²
71. Which of the following statements is not correct about stable equilibrium?
A. the body returns to its original position when it is slightly displaced and released
B. a slight displacement raises its centre of gravity.
C. a slight displacement lowers its centre of gravity.
D. a slight displacement does not raise or lower its centre of gravity.
72. A body is projected vertically upwards with a velocity of 9.78 m/s. How high does it travel before it comes to rest momentarily at the top of its motion? (g=9.78 m/s²)
A. 2.45 m B. 4.89 m C. 6.89 m D. 9.78 m
73. Calculate the time taken for a car to cover a distance of 125 m if the initial speed is 5 m/s and it has a constant acceleration of 1.5 m/s²
A. 8 s B. 10 s C. 15 s D. 12 s
74. Calculate the braking force to bring a body of mass 1 kg to rest from 25 m/s on a level ground in 60 m with uniform retardation.
A. 5.2 N B. 5.5 N C. 5.6 N D. 5.0 N
75. A drop hammer is lifted to a height of 50 m above the ground and then allowed to fall from rest on to a forging at ground level. Calculate the downward velocity of the hammer when it strikes the forging. (g=10 m/s²)
A. 10.95 m/s B. 25.8 m/s C. 31.6 m/s
D. 35.5 m/s
76. A uniform rod of weight 10 N is balanced at a point 75 cm from the end B. The pivot is removed to point 30 cm from A. What force must be applied at A to balance the rod horizontally?
A. 25 N B. 10 N C. 30 N D. 15 N
77. An equilateral triangular lamina has each side equal to 50 cm. How far is the centre of gravity





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- from each vertex?
- A. 34.64 cm B. 33.3 cm C. 36.9 cm D. 28.9 cm
78. A man can row a boat at 13 m/s in still water. If he aims at crossing to the opposite bank of a river flowing at 5 m/s, at what angle to the bank of the river must he row the boat?
- A. 67.4° B. 21° C. 56.8° D. 22.6°
79. The lower and upper fixed points of a thermometer are 30 mm and 180 mm respectively. Calculate the temperature in degrees Celsius when the thermometer reads 45 mm.
- A. 10.0°C B. 15.0°C C. 20.0°C D. 30.0°C
80. An immersion heater rated 400 W, 220 V is used to heat a liquid of mass 0.5 kg. If the temperature of the liquid increases uniformly at the rate of 2.5°C per second, calculate the specific heat capacity of the liquid assuming no heat loss,
- A. 1100 J/kg.K B. 320 J/kg.K C. 200 J/kg.K D. 176 J/kg.K
81. A balloon filled with 1000 cm³ of gas at 127°C and pressure of 70 cm Hg. If the pressure changes to 28 cm Hg and temperature to -23.3°C, calculate the new volume of the gas.
- A. 136 cm³ B. 218 cm³ C. 250 cm³ D. 485 cm³
82. A density glass bottle contains 44.25 g of a liquid at 0°C and 42.02 g at 50°C. Calculate the real cubic expansivity of the liquid (Linear expansivity of glass = $1.0 \times 10^{-5} \text{ K}^{-1}$)
- A. $1.09 \times 10^{-3} \text{ K}^{-1}$ B. $1.06 \times 10^{-3} \text{ K}^{-1}$ C. $3.0 \times 10^{-5} \text{ K}^{-1}$ D. $1.03 \times 10^{-3} \text{ K}^{-1}$
83. Which of the following properties is not used to measure the temperature of a substance?
- A. variation of pressure with temperature
B. mass of a liquid
C. change in resistance of a conductor
D. change in colour with temperature
84. The clinical thermometer is characterized by having a
- A. wide range of temperatures B. wide bore
C. long stem D. constriction
85. The amount of heat given out or absorbed when a substance changes its state at a constant temperature is known as
- A. latent heat B. heat capacity
C. specific heat capacity D. specific latent heat
86. A block of aluminium is heated electrically by a 25 W heater. If the temperature rises by 10°C in 5 minutes, what is the heat capacity of aluminium?
- A. 850 J/K B. 750 J/K C. 650 J/K D. 500 J/K
87. In a gas experiment, if the volume of the gas is plotted against the reciprocal of the pressure, the unit of the slope of the resulting curve is:
- A. power B. work C. temperature D. force
88. Thermal equilibrium between two objects exist when:
- A. the heat capacity of both objects are the same
B. one object loses heat continuously to the other
C. temperature of both objects are equal
D. the quantity of heat in both objects is the same.
89. A shepherd calling to fellow shepherd heard his voice reflected by a rock 3 s later. Calculate the velocity of sound in air if the rock is 510 m away.
- A. 510 m/s B. 1.5 m/s C. 340 m/s D. 170 m/s
90. An object 3 cm high placed on the axis of a converging lens form an image 30 cm from the lens.





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- If the focal length of the lens is 15 cm the height of the image is
A. 3 cm B. 1 cm C. 6 cm
D. none of the above
91. An object is placed between two plane mirrors inclined at 60° to each other. If the object is equidistant from each find the number of images formed
A. 2 B. 3 C. 4 D. 6
92. Before frying, the volume of 0.8 g/cm^3 vegetable oil was 500 cm^3 . If the density of the oil was 0.5 g/cm^3 after frying and there was no loss of oil due to spilling, what is the new volume of the oil?
A. 400 cm^3 B. 800 cm^3 C. 600 cm^3 D. 200 cm^3
93. A 650 kg car that was initially at rest traveled with an acceleration of 4 m/s^2 . Find its kinetic energy after 4 s.
A. 5200 J B. 31200 J C. 83200 J D. 832 kJ
94. The temperature at which the water vapour present in the air and begins to condense is called
A. condensation point B. dew point
C. boiling point D. critical point
95. Which of the following types of waves will travel through vacuum? I. light waves II. sound waves III. Radio waves
A. I only B. I and II only C. II and III only
D. I and III only
96. In a simple pendulum experiment, a student increased the length of the inextensible string by a factor of 9. By what factor is the period increased?
A. 3 B. $1/3$ C. 2 D. $1/2$
97. A vapour is said to be saturated when:
A. the vapour of a substance is in equilibrium with its own liquid
B. the vapour of a substance is in equilibrium with its own gas
C. the vapour of a substance is in equilibrium with its own solid-liquid phase
D. none of the above
98. A wave travels with a velocity of 360 m/s . If its wavelength is 120 cm then its period is:
A. 0.0017 s B. 0.33 s C. 33 s D. 1.7 s
99. The heights of the mercury thread in a mercury-in-glass thermometer when melting ice and then in steam are 2 cm and 22 cm respectively. What would be the height of the mercury thread at 70°C ?
A. 14 cm B. 12 cm C. 16 cm D. 18 cm
100. An object is placed 45 cm in front of a concave mirror of focal length 15 cm . What is the linear magnification produced?
A. $1/3$ B. 2 C. 3 D. $1/2$
101. A man has five 40 W electric light bulbs, six 60 W bulbs and two 100 W bulbs in his house. If all the points are on for five hours daily and PHCN charges 12 k per unit , what is his bill for 30 days?
A. $\text{N}13.68$ B. $\text{N}0.46$ C. $\text{N}2.74$
D. none of the above
102. In a resonance tube experiment, the first resonance position is 16 cm when the velocity of sound in air is 327.68 m/s . Find the frequency of the tuning fork used
A. 512 kHz B. 256 Hz C. 128 Hz D. 512 Hz
103. Half-life of a radioactive substance is:
A. the average life time of the substance
B. the time it takes the substance to decay to half of its original quantity
C. the time it takes the activity of the substance to





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- decay to half of its original value
D. all of the above
104. The headlamp bulb of a motor car is rated 60 W, 12 V. Calculate the resistance of its filament.
A. 0.2 Ω B. 5 Ω C. 2.4 Ω D. 2 V
105. In an electrolysis experiment, a cathode of mass 4.5 g weighs 4.52 g after a current of 4.5 A flows for 1 hour. The electrochemical equivalent of the deposited substance is:
A. 0.00444 g/C B. 0.00741 g/C
C. 0.00074 g/C D. 0.00007 g/C
106. An object falls freely under gravity from a given height. At half way point, its kinetic energy is:
A. exactly half of its initial potential energy
B. exactly half of its kinetic energy
C. exactly half of its final potential energy
D. zero
107. The silvered walls of a vacuum flask are used to prevent:
A. heat loss due to opacity
B. heat loss due to radiation
C. heat loss due to convection
D. heat loss due to conduction
108. The law of universal gravitation states that:
A. All bodies on the surface of the earth are attracted towards the centre of the universe
B. Any two bodies attract each other with a force which is directly proportional to product of their masses and inversely proportional to the square of the distance between them.
C. All bodies attract each other with a force which is directly proportional to product of their masses and inversely proportional to the square of the distance between them.
109. The nucleus of an atom consists of:
A. protons and neutrons B. protons and electrons
C. electrons and neutrons
D. electrons, protons and neutrons
110. A certain quantity of heat increases the temperature of 185 g of water from 10oC to 20oC and increases the temperature of an equal volume of 140 g of oil from 7oC to 18oC. The ratio of the specific heat of the oil to that of water is:
A. 0.83 B. 1.26 C. 1.07 D. 0.93
111. The motion of the pendulum bob is:
A. rotational B. circulatory
C. oscillatory D. none of the above
112. Which of the following is not one of the factors that affect the capacitance of a capacitor?
A. temperature B. area of plates
C. distance between the plate
D. dielectric between the plates
113. Which of the following statements is true of gamma-rays?
A. they are deflected by electric field
B. they ionize intensely
C. they carry no electric charge
D. they originate outside the nucleus of the atom
114. The virtual image formed of an object placed 10 cm from a convex lens is 2. Find the focal length of the lens.
A. 7.5 cm B. 15 cm C. 30 cm
D. 10 cm
115. A milliammeter of resistance 2.5 Ω and full scale deflection of 50 mA is to be used to measure a





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- potential difference of 50 V. What is the resistance of the multiplier?
- A. 99.75 B. 997.5 C. 9975 D. 9.98
117. The ice and steam points of a mercury-in-glass thermometer of centigrade scale and of uniform bore correspond respectively to 3 cm and 23 cm lengths of the mercury thread. What is the temperature when the length of the mercury thread is 12 cm?
- A. 40oC B. 60oC C. 75oC D. 45oC
118. When a ray of light passes from glass to air, it is:
- A. bent towards the normal
B. away from the normal
C. not deviated
D. spread out in a pure spectrum
119. What is the resistance of the filament of an electric lamp rated 220 V, 100 W?
- A. 0.45 B. 2.2 C. 484 D. 440
120. Pressure cooker cooks faster because
- A. the inside is polished
B. inside the cooker, the boiling point of water is raised
C. inside the cooker, the boiling point of water is lowered
D. inside the cooker, the pressure of water is raised
121. A gasoline generator is used to power ten 40 W lamps, five 60 W lamps and a musician's 1000 W amplifying system. If the generator runs for 5 hours, the energy used is
- A. 1.7 kWh B. 8.5 kWh C. 1.0 kWh
D. none of the above
122. Which of the following statements is not true about sound waves?
- A. Sound waves are longitudinal waves
B. Sound waves are transverse waves
- C. Sound waves are mechanical waves
D. Sound waves can not propagate through vacuum
123. Which of the following statements is not true about the human eye?
- A. the focal length of its lens is fixed
B. the focal length of its lens is variable
C. image distance is fixed
D. all of them
124. Hypermetropia can be corrected by using
- A. concave spectacle lenses
B. convex spectacle lenses
C. plano-concave spectacle lenses
D. plano-convex spectacle lenses
125. In the astronomical telescope
- A. there are three convex lenses
B. the eyepiece has a longer focal length than the objective
C. the eyepiece has a shorter focal length than the objective
D. the eyepiece and the objective have the same focal length
126. Which of the following apparatuses is not needed for the production of pure spectrum?
- A. source of light B. rectangular glass block
C. slit D. convex lens
127. The principle of moment states that:
- A. Action and reaction are equal and opposite
B. If a body is in equilibrium under the action of a number of parallel forces, sum of clockwise moment equals sum of anticlockwise moment
C. If a body is in equilibrium under the action of a number of parallel forces, sum of clockwise moment about a point equals sum of anticlockwise moment about the same point.
D. If a body is in equilibrium under the action of a number of parallel forces, all forces cancel out





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128. A uniform metre rule of mass 90 g is pivoted at the 40 cm mark. If the metre rule is in equilibrium with an unknown mass M placed at the 10 cm mark and a 72 g mass at the 70 cm mark, then M is
A. 162 g B. 30 g C. 72 g D. 102 g
129. A pole AB of length 10 m weighs 800 N and has its centre of gravity 4 m from the end A, and lies on horizontal ground. The least vertical force required to lift its end B is
A. 320 N B. 80 N C. 2000 N D. 20 N
130. A metre rule is found to balance horizontally at the 48 cm mark. When a body of mass 60 g is suspended at the 6 cm mark the balance point shifts to the 30 cm mark. The mass of the metre rule is:
A. 1.33 g B. 80 g C. 3.33 g D. 45 g
131. The elastic limit of a material is:
A. the yield point
B. the limit of stress within which the strain in the material completely disappears when the stress is removed
C. a point at which a sudden increase in elongation occurs with only a small increase in tension.
D. none of the above.
132. A 10 g mass placed on the pan of a spring balance causes an extension of 5 cm. If a 15 g mass is placed on the pan of the same spring balance, the extension produced is:
A. 2.0 cm B. 30.0 cm C. 7.5 cm D. 1.5 cm
133. Which of the following does not reduce surface of a liquid?
I. addition of impurities like detergent or alum to the liquid
II. heating the liquid
III. cooling the liquid
A. I only B. II only C. III only
134. Which of the following is not an application of capillarity?
A. sap from the soil rises up plant stem.
B. kerosene rises up the wick of a lamp
C. blotting paper absorbs ink
D. none
135. Which of the following statements is not correct?
A. electric charges can be produced by friction
B. electric charges can be produced by induction
C. electric charges can be produced by conduction
D. none
136. Which of the following is not simple harmonic motion?
A. The motion of the prongs of a sounding tuning fork
B. The motion of an object suspended from the free end of a spiral spring
C. The motion of the plucked string of a musical instrument
D. The motion of Earth around the sun
137. The period of a body making simple harmonic motion is defined as:
A. number of complete oscillation performed in one second
B. time taken to make one complete oscillation
C. time taken to make one oscillation
D. the maximum displacement of the body from its equilibrium position
138. A machine gun fires a bullet with an initial velocity of 200 m/s at an angle of 60° to the horizontal. If $g = 10 \text{ m/s}^2$, the total time of flight of the bullet is:
A. 34.64 s B. 17.32 s C. 51.96 s D. 69.28 s
139. A bullet of mass 20 g is fired horizontally at a stationary wooden block of mass 380 g with a





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- velocity of 200 m/s. If the bullet embeds itself in the block, their common velocity is:
- A. 10.0 m/s B. 0.1 m/s C. 4.0 m/s D. 0.0 m/s
140. The velocity ratio of a simple machine is defined as:
- A. the ratio of the distance moved by effort to the distance moved by load
B. the ratio of the distance moved by load to the distance moved by effort
C. the ratio of the useful work output of the machine to the total work input
D. none of the above
141. A machine has a velocity ratio of 6 and is 80% efficient. The effort needed to lift a load of 300 N with the aid of the machine is:
- A. 4.8 N B. 300 N C. 62.5 N D. 63.5 N
142. An open organ pipe has a length of 6 m. If the speed of sound in air is 340 m/s and neglecting the end-corrections, the frequency of its first overtone is
- A. 56.67 Hz B. 28.33 Hz C. 85 Hz D. 1.3 kHz
143. A piano wire 0.5 m long has a total mass of 0.01 kg and is stretched with a tension of 800 N. The frequency of its fundamental note is:
- A. 400 Hz B. 100 Hz C. 200 Hz D. 300 Hz
144. Two capacitors of $8 \mu\text{F}$ and $10 \mu\text{F}$ are connected in series to a 100 V dc supply. The charge on either place of each capacitor is:
- A. $2.25 \times 10^{-1}\text{C}$ B. 4.4 C
C. $4.4 \times 10^{-3}\text{C}$ D. $4.4 \times 10^{-4}\text{C}$
145. A conductor of length 5 m carrying a current of 15 A is placed in a uniform magnetic field of flux density 0.25 T. If the conductor is placed at 60° to the field then the force on it is:
- A. 18.75 N B. 9 N C. 16.24 N D. 35 N
146. When an inclined plane of angle θ is used as a simple machine, its velocity ratio is:
- A. $1/\cos \theta$ B. $\cos \theta$ C. $1/\sin \theta$ D. $\sin \theta$
147. Which of the following statements is not true of a real image formed by a concave mirror?
- A. It is inverted B. It is erect
C. It can be observed on a screen D. None
148. A 8 kg mass rests on an inclined plane. If the limiting frictional force 50 N and $g = 10 \text{ m/s}^2$, then the angle of inclination of the plane is:
- A. 37.8° B. 38.7° C. 87.3° D. 78.3°
149. Which of these gives the dimension of torque?
- A. MLT B. ML⁻¹T C. ML⁻¹T⁻²
D. ML²T⁻²
150. An object of mass 80 kg is kicked above the ground and in 20 s it has reached a height of 600 cm. Calculate the power of the object.
- A. 40 W B. 240 W C. 402 W D. 204 W
151. Which of these statements is true?
- A. Energy cannot be destroyed and cannot be transformed from one form to another
B. Momentum before impact is not necessarily equal to the momentum after impact
C. Impulse is the product of force and time
D. In perfectly elastic collision, there is a small loss of energy.
152. A load of 2 tonnes is raised with 10 N efforts. Calculate the mechanical advantage of the machine with which the load is raised
- A. 200 N B. 0.20 N C. 2000 D. 102
153. An object of mass 4000 g is 60 cm above the ground. Calculate its kinetic energy 50 cm above the ground (Take $g = 10 \text{ m/s}^2$)
- A. 4 J B. 40 J C. 4 N D. 40 N





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154. A fast moving object of mass 200 g travels at 100 m/s and hits a block of wood of mass 2 kg. The two bodies moved together after impact. Find the velocity with which they moved together after collision.
A. 9.09 m/s B. 90.9 m/s C. 0.910 m/s
D. 1.96m/s.
155. Determine the distance traveled by a particle whose initial velocity is 48 km/h. The particle accelerated uniformly at the rate of 1.8 m/s² and attained a velocity of 72 km/h.
A. 6.167m B. 61.67 m C. 616.7 m
D. 6167 m
156. An object floats in a liquid with one third of its volume above the liquid surface. Determine the density of the liquid, if the object density is 7100 kg/m³ (Take $g = 10\text{m/s}^2$)
A. 1056 kg/m³ B. 1560 kg/m³
C. 10650 kg/m³ D. 15.60 kg/m³
157. A metal block of mass 2125 g displaces 250 cm³ of water. What is its density?
A. 8300 kg/m³ B. 8800 kg/m³
C. 8500 kg/m³ D. 8700 kg/m³
158. A body starting from rest travels for 100 s with uniform acceleration of 1.5 m/s. What distance does it cover in the last 2 seconds?
A. 27.0 m B. 26.2 m C. 29.8 m D. 30.8 m
159. A pile driver of mass 125 kg falls through a height of 80 m before striking the pile. What is its momentum at the instance it strikes the pile? $g = 10\text{m/s}^2$
A. 40 kg.m/s B. 5000 kg.m/s C. 1600 kg.m/s
D. 5000 kg.m
160. A gun weighing 1500 kg fires a shot weighing 50 kg with a velocity 360 m/s. What is the recoil velocity of the gun?
A. 14.0 m/s B. 12.0 m/s C. 11.0 m/s
D. 13.0 m/s
161. A car of mass 1000 kg travels with a velocity 45 km/h on a rough road and it is brought to a rest after 10s. What is the force exerted on the car?
A. 1333 N B. 1250 N C. 1282 N D. 1067 N
162. A bridge 100m long weighs 500 kN. A lorry weighing 100 kN is 25 m from one end of it. Find the force exerted at this support.
A. 350 kN B. 300 kN C. 330 kN D. 325 kN
163. What is the kinetic energy of a rock of mass 220 g after it has fallen freely for 5 seconds? $g=10\text{ m/s}^2$.
A. 350 J B. 225 J C. 275 J D. 250 J
164. When equal masses of iron and water are given equal quantity of heat, the piece of iron becomes much hotter than water after a shorter time because:
A. the specific heat of iron is higher than that of water
B. the specific heat of iron is lower than that of water
C. iron is in solid state while water is in liquid state
D. heat flows faster in solids
165. The speed of light in air is 3.0×10^8 m/s. What is its speed in glass having a refractive index of 1.65?
A. 6.0×10^8 m/s B. 4.95×10^8 m/s
C. 1.65×10^8 m/s D. 1.82×10^8 m/s
166. Atmospheric pressure is 1.0×10^5 N/m². If the barometer liquid has a density of 1250 kg/m³, what is the minimum length of the tube required?
 $g=10\text{m/s}^2$.
A. 7.8 m B. 0.76 m C. 8.0 m D. 10 m
167. Young's modulus for steel is 2×10^{11} N/m². A





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- weight of 100 N hangs from a steel wire of length 3 m and cross-sectional area $1.5 \times 10^{-6} \text{ m}^2$. Calculate the extension is 0.25 mm, calculate the extension produced
- A. 1 mm B. 1.5 mm C. 0.1 mm D. 0.15 mm
168. A load of 50 N is attached to one end of a long vertical wire of length 4 m and diameter 2.4 mm whose other end is fixed If the extension is 0.25 mm, calculate the Young modulus of the material of the wire.
- A. 18 N/m^2 B. 1800 N/m^2 C. 180 N/m^2
D. $1.8 \times 10^{11} \text{ N/m}^2$
169. Which of the following statements is not true about friction force is not correct.
- A. The centre of gravity of a body is the point where the resultant force of attraction or weight of the body acts
B. The lower the centre of gravity of a body the more stable the body is
C. The higher the centre of gravity of a body the more stable the body is
D. it is the point at which the weight of the body appears to be acting
170. A car travels with a constant velocity of 45 km/h for 10 s. What is the distance it covers in this time?
- A. 450 m B. 400 m C. 125 m D. 45 m
171. A body is projected vertically upwards with a velocity of 9.78 m/s. How high does it travel before it comes to rest momentarily at the top of its motion?
- A. 4.89 m B. 500 m C. 48 m D. 9.78 m
172. Which of the following statements is not true about the friction force?
- A. Friction always act in such a direction that opposes motion
- B. The limiting frictional force is dependent on the area of contact of the two surfaces
C. until motion takes place, the frictionally force is always equal to the force tending to produce the motion
C. when motion takes place, the friction force is less than its limiting value.
173. A solid of mass 1 kg suspended by a string, is completely immersed in water. If the tension in the string is 5 N, calculate the upthrust on the solid Take $g = 9.78 \text{ m/s}^2$
- A. 8.0 N B. 4.78 N C. 47 N D. 9.78 N
174. The resistance of a piece of wire of length 20 m, cross-sectional area $8.0 \times 10^{-6} \text{ m}^2$ and resistivity $4.0 \times 10^{-7} \Omega\text{-m}$ is:
- A. 0.5 Ω B. 1.0 Ω C. 5.0 Ω D. 10.0 Ω
- 175.. A force of 0.6 N acts on a body of mass 40 kg, initially at rest. What is the resulting acceleration?
- A. 24 m/s^2 B. 0.6 m/s^2
C. 40 m/s^2 D. 15 m/s^2
176. An object of mass 10 kg is pulled over a rough surface by a 20 N force. The object accelerates at a rate of 1.5 m/s^2 . Determine the frictional force between the object and the surface.
- A. 30 N B. 20 N C. 2 N D. 5 N
177. A body of mass 2 kg, moving with velocity 5 m/s collides with stationary body of mass 0.5 kg if the two bodies move together after impact , calculate their common velocity.
- A. 10 m/s^2 B. 4 m/s^2 C. 2.5 m/s D. 0.5 m/s^2
178. A body of mass 200 g and specific heat capacity 0.4 J/g.K cools from 37°C to 31°C Calculate the quantity of heat released by the body.
- A. 4800 J B. 1200 J C. 480 J D. 202 J





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179. The length of mercury thread when it is at 0oC, 100oC and unknown temperature XoC is 200 mm, 220 mm and 270 mm respectively. Determine the value of X.
 A. 350oC B. 57 oC C. 133 oC D. 300 oC
180. The linear expansivity of a substance is $1.2 \times 10^{-4}/K$. A cube of this substance has a volume of $8.0 \times 10^3 \text{ cm}^3$ at 30oC. Calculate the increase in its volume at 80oC
 A. 48 cm³ B. 24 cm³ C. 96 cm³ D. 72 cm³
181. At what temperature will the volume of a given ideal gas be three times its volume at 0oC?
 A. 273oC B. 300oC C. 546oC D. 819oC
182. A rectangular metal block of volume $10 \times 10^{-6} \text{ m}^3$ at 273 K is heated to 573 K. If its coefficient of linear expansion is $12 \times 10^{-5}/K$, what is the percentage change of its volume?
 A. 18 B. 1.8 C. 1.08 D. 1.2
183. Calculate the time taken, in minutes, to heat 2.0 kg of water from 30oC to 100oC in an electric kettle that draws a current of 3.0 A from 240 V supply. (Specific heat capacity is $4.2 \times 10^3 \text{ J/kg}$) neglect heat losses to the surrounding.
 A. 0.2 B. 1.9 C. 3.6 D. 21.2
184. The amount of heat needed to raise the temperature of 10 kg of copper by 1k is its:
 A. internal energy B. Specific heat capacity
 C. Heat capacity D. Molar heat capacity
185. Calculate the heat energy required to vapourise 50 g of water initially at 80oC if the specific heat capacity of water is 4.2 J/g.K. (Specific latent heat of vapourisation of water is 2260 J/g)
 A. 1533000 J B. 1172200 J C. 230200 J
 D. 113000 J
186. A piece of copper mass 200 g is heated to 100oC and is then quickly transferred to a copper calorimeter of mass 10 g, containing 100 g of water whose initial temperature is 15oC. If the specific heat capacity of copper and water are 400 J/kg.K and 4200 J/kg.K, find the final temperature of the substance.
 A. 29.1oC B. 30.1oC C. 28.4oC
 D. 27.4oC
187. Which of the following statements is not correct about the assumptions of kinetic theory of gases?
 A. the attraction between the molecules is negligible
 B. the volume of molecules is negligible compared with the volume occupied by the gas
 C. the duration of a collision is negligible compared with the time between collisions
 D. the molecules of the gas behave like perfectly inelastic spheres
188. The ice and steam points of an ungraduated thermometer are 300 mm apart. Calculate the length of thermometric liquid above the ice points which will correspond to a temperature of 75oC
 A. 275 mm B. 250 mm C. 225 mm D. 215 mm
189. A piece of copper of mass 0.55 kg is heated from 57oC to 100oC. What is the increase in the internal energy of the copper? ($c=380 \text{ J/kg.K}$)
 A. $8.9 \times 10^3 \text{ J}$ B. $9.8 \times 10^3 \text{ J}$ C. $8.987 \times 10^3 \text{ J}$
 D. $9.879 \times 10^3 \text{ J}$
190. Two metals A and B lose the same quantity of heat when their temperatures drop from 20oC to 15oC. If the specific heat capacity of A is thrice that of B, calculate the ratio of mass of A to that of B
 A. 1:3 B. 1:2 C. 3:1 d. 3:4





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191. Which of the following is/are observed when heat energy is added to a system?

- (i) the internal energy of the system increases
 - (ii) the volume of the system is directly proportional to the temperature
 - (iii) work may be done in the surroundings.
- A. (i), (ii) and (iii) B. (iii) only
C. (i) and (iii) D. none of the above

192. A constant volume gas thermometer records a pressure of 240 mmHg at 0°C and 300 mmHg at 100°C. Calculate the new temperature when the gas pressure is 270 mm of Hg

- A. 99°C B. 95°C C. 9°C D. 90°C

193. In which of the following is expansion of solids a disadvantage?

- A. the balance wheel of a watch
B. fire alarms
C. the thermostat
D. the fitting of wheels in rims.

194. How long does it take a 800 W heater to raise the temperature of 2 kg of water from 20°C to 60°C?

(specific heat capacity of water = 4200 J/kg.K)

- A. 280 s B. 420 s C. 210 s D. 120 s

195. A room is heated by means of charcoal fire. A man in the room standing away from the fire is warmed by:

- A. convection B. radiation C. conduction
D. reflection



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Physics Answers

1	D	21	D	41	A	61	D	81	C	101	A	121	B	141	C	161	B	181	A
2	B	22	B	42	C	62	A	82	A	102	A	122	B	142	A	162	B	182	D
3	A	23	B	43	B	63	D	83	D	103	C	123	A	143	C	163	C	183	C
4	B	24	B	44	A	64	C	84	D	104	C	124	B	144	D	164	B	184	B
5	D	25	D	45	D	65	D	85	A	105	D	125	C	145	C	165	D	185	B
6	A	26	A	46	B	66	C	86	B	106	A	126	B	146	C	166	C	186	B
7	C	27	C	47	A	67	A	87	B	107	B	127	C	147	B	167	A	187	C
8	B	28	B	48	D	68	C	88	C	108	B	128	D	148	B	168	D	188	C
9	C	29	B	49	C	69	B	89	C	109	A	129	A	149	D	169	C	189	D
10	A	30	B	50	C	70	C	90	A			130	B	150	B	170	C	190	C
11	D	31	A	51	D	71	B	91	D	111	B	131	B	151	C	171	A	191	A
12	A	32	C	52	B	72	B	92	B	112	C	132	C	152	C	172	D	192	D
13	C	33	B	53	D	73	B	93	C	113	A	133	C	153	A	173	B	193	A
14	D	34	A	54	A	74	A	94	B	114	C	134	D	154	A	174	B	194	B
15	D	35	C	55	B	75	C	95	D	115	C	135	C	155	B	175	D	195	C
16	C	36	D	56	B	76	D	96	A	116	B	136	D	156	C	176	D		
17	C	37	A	57	B	77	B	97	A	117	D	137	B	157	C	177	B		
18	C	38	A	58	A	78	B	98	B	118	B	138	A	158	A	178	C		
19	D	39	B	59	B	79	A	99	C	119	C	139	A	159	B	179	A		
20	C	40	C	60	B	80	B	100	D	120	B	140	A	160	B	180	A		



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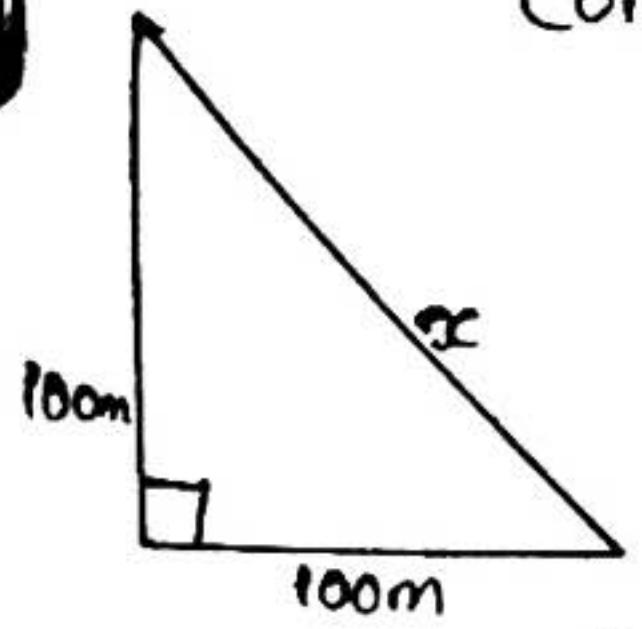
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$$x^2 = 100^2 + 100^2 \\ = 10000 + 10000$$

$$x^2 = 20000 \\ x = \sqrt{20000} \\ x = 141.42 \text{ or } 100\sqrt{2}$$

$$\tan \theta = 100/100 = 1$$

$$\theta = \tan^{-1} 1$$

$$\theta = 45^\circ //$$

2.] Speed = $\frac{\text{Distance}}{\text{Time}}$

$$\text{Speed} = 400 \text{ m/s, distance} = ? \text{ Time} = 4 \text{ secs.}$$

$$400 = \frac{\text{distance}}{4}$$

$$\text{distance} = 400 \times 4 = 1600 \text{ m.}$$

3.] $s = ut + \frac{1}{2}at^2$

$$s = 40 \text{ m}, u = 0, t = ?, a = 10 \text{ m/s}^2$$

$$40 = 0[t] + \frac{1}{2} \times 10 \times t^2$$

$$40 = \frac{1}{2} \times 10 \times t^2$$

$$40 = 5t^2$$

$$t^2 = 40/5$$

$$t^2 = 8$$

$$t = 2\sqrt{2} //$$

4.] Strain = $\frac{\text{extension}}{\text{original length}}$

$$\text{extension} = 5 \text{ mm} = 0.005 \text{ m}$$

$$\text{original length} = 0.1 \text{ m}$$

$$\text{Strain} = \frac{0.005}{0.1}$$

$$\text{Strain} = 0.05 //$$

5.] D → The water level drops because melted ice occupies less volume.

6.] momentum = $m_1 v_1 = m_2 v_2$

$$\text{mass of machine } m_1 = 4 \text{ kg}$$

$$\text{mass of bullet } m_2 = 4.5 \text{ g} = 0.0045 \text{ kg}$$

$$\text{speed of bullet } v_2 = 100 \text{ m/s}$$

$$\text{speed of machine } v_1 = x.$$

$$m_1 v_1 = m_2 v_2$$

$$4 \times x = 0.0045 \times 100$$

$$4x = 4.5$$

$$x = 4.5/4$$

$$x = 1.125 \rightarrow 1.1 \text{ m/s}$$

7.] C → Spring balance

The principle of spring balance is based on Hooke's law. When a weight is hung from the balance, the spring extends in proportion to the weight.

8.] B → Centripetal force

This is the force that is required to move an object in a circular path and it is directed towards the centre of the circle.

9.] P → Solid apparently weighs less when partially immersed in water than when partially immersed. [Archimedes's principle]

10.] A, [2, 4, 5]

11.] D → Diffusion

These is the movement of molecules from a region of lower concentration to a region of higher concentration.

12.] Heat = mL

$$\text{Heat} = ? \text{ } m = 100 \text{ g } L = 80 \text{ cal/g}$$

$$\text{Heat} = 100 \times 80$$

$$= 8000$$

$$= 8 \text{ Kcal} //$$

13.] $m_1 c_1 \theta_1 = m_2 c_2 \theta_2$

$$m_1 = 1.5 \text{ kg}, c_1 = 0.46 \text{ J/kg}^{-1} \text{ } ^\circ\text{C}^{-1}, \theta_1 = 300^\circ\text{C}$$

$$m_2 = ? \text{ } c_2 = 4.2 \times 10^3 \text{ J/kg}^{-1} \text{ } ^\circ\text{C}^{-1}, \theta_2 = 18^\circ - 15^\circ = 3^\circ\text{C}$$

$$1.5 \times 0.46 \times [300 - 18] = 4.2 \times 10^3 \times 3 \times m_2$$

$$194.58 = 12600 m_2$$

$$m_2 = \frac{194.58}{12600} = 0.0154 \text{ kg}$$

$$= 15.44 \text{ g} //$$

Note: Diffusion is the process by which substances mix intimately with one another due to the random motion of their molecules. Diffusion is due to movement of the molecules of a substance and takes place in gases and liquid and occurs slowly in solids. The rate of diffusion depends on density, mass and temperature.

14) D \rightarrow [U and V]

$$15) \frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$P_1 = ? \quad P_2 = ? \quad T = 30^\circ C \rightarrow 30 + 273 = 303 K$$
$$T_2 = 61^\circ C = 61 + 273 = 334 K.$$

$$\frac{P_1}{303} = \frac{P_2}{334}$$

$$P_1 334 = P_2 303$$

$$P_2 = \frac{P_1 334}{303}$$

$$P_2 = 1.1023 P_1$$

$$\therefore P_2 = 1.1 P_1 \text{ N/m}^2.$$

$$16) 2 = \frac{L_2 - L_1}{L_1 (\theta_2 - \theta_1)}$$

$$2 = 11 \times 10^{-6} C^{-1} \quad L_2 = 10.005 \text{ cm}$$

$$L_1 = 10 \text{ cm} \quad \theta_2 = ? \quad \theta_1 = 50^\circ C$$

$$11 \times 10^{-6} = \frac{10.005 - 10}{10 (\theta_2 - 50)}$$

$$(11 \times 10^{-6}) [10\theta_2 - 500] = 0.005$$

$$1.1 \times 10^{-4} \theta_2 - 5.5 \times 10^{-4} = 0.005$$

$$1.1 \times 10^{-4} \theta_2 = 0.005 + 5.5 \times 10^{-4}$$

$$\theta_2 = \frac{5.55 \times 10^{-3}}{1.1 \times 10^{-4}}$$

$$= 50.5^\circ C$$

17) C \rightarrow Specific Heat

Specific heat capacity of a substance is the quantity of heat required to raise the temperature of a unit mass [kg] of the substance through $1^\circ C$ or $1K$.

18) Total Power dissipated in both is

$$2 \times 60 \text{ W} = 120 \text{ W}$$

Where 60W is the power given.

$$19) V = IR$$

$$V = 24V, R = \frac{1}{R} = \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$$

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

$$\therefore R = 1 \quad I = ?$$

$$24V = I \times R$$

$$I = \frac{24}{1}$$

$$I = 24A$$

$$20) E = I \times r$$

$$E = ?, I = 1.5A, t = 36h, V = 240V$$

$$E = 1.5 \times 36 \times 240$$

$$= 12960 \text{ Wh}$$

$$= 12.96 \text{ kWh}$$

$$\text{Cost} = 12.96 \times 25$$

$$= 324 \text{ K}$$

$$= 3.24 \text{ Naira.}$$

21) D \rightarrow A high resistance multiplier is connected in series.

22) B \rightarrow Commutator

23) P = 4 hours, P.d = 54, I = 5A.

Heat produced = ?

$$\text{Heat} = I^2 R t$$

$$= 5 \times 5 \times 4$$

$$= 80J$$

24) B \rightarrow 433.15K

25) D \rightarrow Zeroth law of thermodynamics.

$$26) 2 = \frac{L_2 - L_1}{L_1 (\theta_2 - \theta_1)}$$

$$2 = 2.30 \times 10^{-5} K^{-1}, L_1 = 500 \text{ m}, L_2 = ?$$

$$\theta_2 = 60^\circ C \quad \theta_1 = 20^\circ C$$

$$2.30 \times 10^{-5} = \frac{L_2 - 500}{500 [60 - 20]}$$

$$2.30 \times 10^{-5} = \frac{L_2 - 500}{20,000}$$

$$L_2 - 500 = 0.46$$

$$L_2 = 500 + 0.46$$

$$= 500.46 \text{ m},$$

$$t = mc$$

$$P = 900 \text{ W}$$

$$t = 3 \text{ min} = 3 \times 60 = 180 \text{ s}$$

$$m = ?$$

$$L = 2.26 \times 10^6 \text{ J/kg.}$$

$$Pt = mc$$

$$900 \times 180 = m \times 2.26 \times 10^6$$

$$180000 = 2260000m$$

$$m = \frac{180000}{226000}$$

$$m = 0.072 \text{ kg},$$

28.) B \rightarrow Heat capacity.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$P_1 = 1 \times 10^5 \text{ Pa} \quad P_2 = 2 \times 10^5 \text{ Pa} \quad V_1 = 100 \text{ cm}^3$$

$$T_1 = 27 \rightarrow 27 + 273 = 300 \text{ K} \quad V_2 = ?$$

$$T_2 = 60 \rightarrow 60 + 273 = 333 \text{ K}$$

$$\frac{1 \times 10^5 \times 100}{300} = \frac{2 \times 10^5 \times V_2}{333}$$

$$V_2 = \frac{6 \times 10^7}{333 \times 10^5}$$

$$V_2 = \frac{3.33 \times 10^9}{6 \times 10^7}$$

$$= 55.5 \text{ cm}^3$$

30.) B \rightarrow Pyrometer.

31.) C \rightarrow Surface area of the substances

32.) B \rightarrow Velocity.

$$Q = mc\theta + mc$$

$$Q = 4000 \text{ J}$$

$$m = 1.5 \text{ kg}$$

$$\theta_2 = ? \quad \theta_1 = 15^\circ \text{ C}$$

$$C = 223 \text{ J/kg. K}$$

$$L = 336 \text{ J kg}^{-1}$$

$$4000 = 1.5 \times 223 \times [\theta_2 - 15^\circ] + 1.5 \times 336$$

$$4000 = 334.5 [\theta_2 - 15^\circ] + 504$$

$$4000 = 334.5 \theta_2 - 5017.5 + 504$$

$$4000 + 5017.5 - 504 = 334.5 \theta_2$$

$$8513.5 = 334.5 \theta_2$$

$$34) \quad \theta_2 = \frac{8513.5}{334.5}$$

$$= 25.45^\circ \text{ C}$$

34.)

$$35.) \quad S = ut + \frac{1}{2}at^2 \quad v^2 = u^2 + 2as$$

$$v = 72 \text{ km/h} \rightarrow \frac{72 \times 1000}{3600} = 20 \text{ m/s}$$

$$u = 0, a = 2, s = ?$$

$$20^2 = 0^2 + 2 \times 2 \times s$$

$$400^2 = 4s$$

$$s = 100 \text{ m}$$

36.) Net force = force applied - force dragging the body

$$\text{force applied} = 200 \text{ N}$$

$$\text{force dragging} = 40 \text{ N}$$

$$\text{Net force} = 200 - 40 = 160 \text{ N}$$

But force = mass \times acceleration

$$160 = 50 \times a$$

$$a = 160/50$$

$$a = 3.2 \text{ m/s}^2$$

$$37.) m_1 v_1 + m_2 v_2 = [m_1 + m_2] v$$

$$m_1 = 2 \text{ kg} \quad v_1 = 3 \text{ m/s}, \quad m_2 = 1 \text{ kg}, \quad v_2 = 4 \text{ m/s}$$

$$2 \times 3 - 1 \times 4 = [2 + 1] v$$

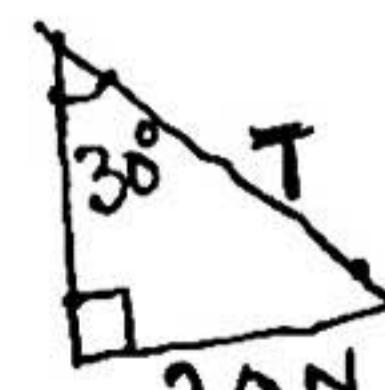
$$6 - 4 = [3] v$$

$$2 = 3 v$$

$$v = 0.66 \rightarrow 0.67 \text{ m/s}$$

38.) A \rightarrow Kinetic energy

39.)



$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 30 = \frac{20}{T}$$

$$0.5 = \frac{20}{T}$$

$$T = \frac{20}{0.5} = 40 \text{ N},$$

6 80 48

$$45.) \text{ } mgh = \frac{1}{2}mv^2$$

$$gh = \frac{1}{2}v^2$$

$$g = 10 \text{ m/s}, h = ? \text{ } v = 30 \text{ m/s}$$

$$10 \times h = \frac{1}{2} \times 30^2$$

$$10h = \frac{1}{2} \times 900$$

$$10h = 450$$

$$h = \frac{450}{10}$$

$$h = 45 \text{ m}$$

$$41.) \text{ Kinetic energy} = \frac{1}{2}mv^2$$

$$m = 40 \text{ kg} \quad v = 0.5$$

$$\begin{aligned} K.E. &= \frac{1}{2} \times 40 \times 0.5^2 \\ &= 20 \times 0.25 \\ &= 5 \text{ J} \end{aligned}$$

$$42.) \text{ } V = u + at$$

$$V = ? \text{ m/s} \quad u = 0 \quad a = ? \quad t = 1 \text{ m} = 1 \times 60 = 60 \text{ sec}$$

$$V = 0 + a \times 60$$

$$V = 60 \text{ m/s}$$

$$a = ? \quad V = 60 \text{ m/s}$$

$$Initial velocity \cdot V^2 = u^2 + 2as$$

$$60^2 = 0^2 + 2 \times 1 \times s$$

$$3600 = 2s$$

$$s = \frac{3600}{2}$$

$$s = 1800 \text{ m}$$

$$43.) \text{ Density} = \frac{\text{mass}}{\text{volume}}$$

$$\text{Density} = 1000 \text{ kg/m}^3, \text{ mass} = ?, \text{ volume} = 0.1$$

$$1000 = \frac{m}{0.1}$$

$$m = 100 \text{ kg}$$

$$\text{Potential energy} = mgh$$

$$\begin{aligned} &= 100 \times 10 \times 50 \\ &= 50000 \text{ J} \\ &= 50 \text{ kJ} \end{aligned}$$

$$44.) \text{ } m_1v_1 = m_2v_2$$

$$m_1 = 15 \text{ g}, v_1 = 100 \text{ m/s}, m_2 = 1 \text{ kg} \rightarrow 1 \times 1000 = 1000 \text{ g}$$

$$v_2 = ?$$

$$15 \times 100 = 1000 \times v_2$$

$$v_2 = \frac{1500}{1000}$$

$$v_2 = 1.5 \text{ m/s.}$$

$$45.) \text{ Net force} = \text{force applied} - \text{force dragging the body.}$$

$$\text{force applied} = 100 \text{ N}$$

$$\text{force dragging the body} = 20 \text{ N}$$

$$\therefore \text{Net force} = 100 - 20 = 80 \text{ N}$$

$$f = ma$$

$$80 = 50 \times a$$

$$a = 80/50$$

$$a = 1.6 \text{ m/s}^2$$

$$46.) \text{ } mgh = \frac{1}{2}mv^2$$

$$gh = \frac{1}{2}v^2$$

$$g = 10 \text{ m/s}^2, h = 150 \text{ m}, v = ?$$

$$10 \times 150 = \frac{1}{2}v^2$$

$$1500 = \frac{1}{2}v^2$$

$$3000 = v^2$$

$$v = \sqrt{3000}$$

$$v = 54.8 \text{ m/s}$$

$$47.) \text{ } V^2 = u^2 + 2as$$

$$V = 20 \text{ m/s}, u = 16 \text{ m/s}, a = 1 \text{ m/s}^2, s = ?$$

$$20^2 = 16^2 + 2 \times 1 \times s$$

$$400 = 256 + 2s$$

$$400 - 256 = 2s$$

$$s = \frac{144}{2}$$

$$s = 72 \text{ m}$$

$$48.) \text{ Speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{distance} \rightarrow 100 \text{ m}, \text{ time} \rightarrow 12 \text{ s}$$

$$= \frac{100}{1000} \times \frac{3600}{12}$$

$$= \frac{360000}{12000}$$

$$= 30 \text{ km/h}$$

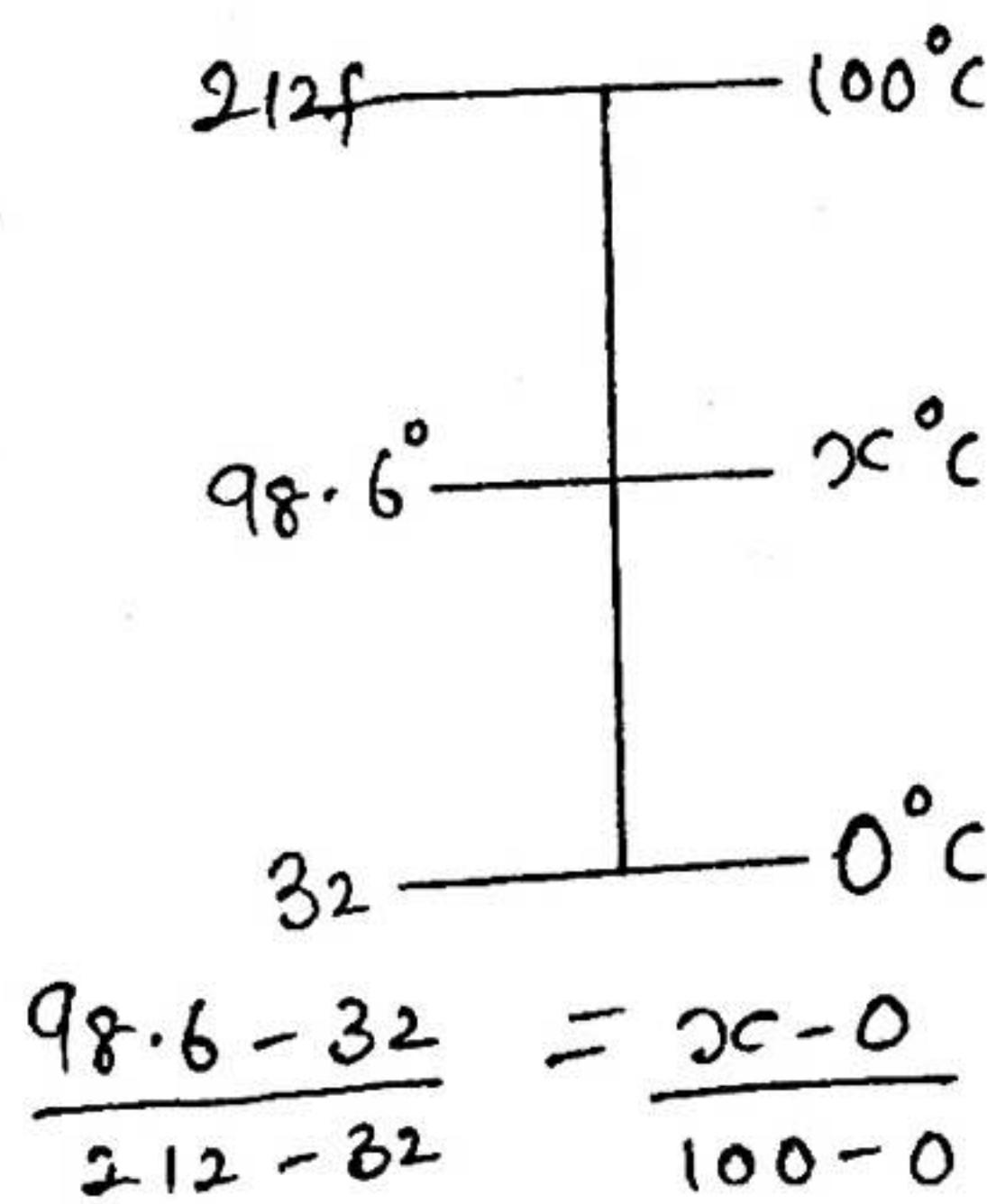
$G \rightarrow$ The quantity of heat required to change the temperature of a unit mass of the substance by one degree.

56.]

52.) $B \rightarrow \text{J kg}^{-1} \text{K}^{-1}$

53.)

54.)



$$\frac{98.6 - 32}{212 - 32} = \frac{x - 0}{100 - 0}$$

$$\frac{66.6}{180} = \frac{x}{100}$$

$$66.6 = 180x$$

$$x = 37^\circ\text{C}$$

55.)

57.) $B \rightarrow \text{Radiation}$

58.) $A \rightarrow \text{I and II only}$

59.) $B \rightarrow \text{false}$

60.) $B \rightarrow \text{I and II only}$

$$61.) [15i - 16j + 27k] + [23j - 40k] \text{N}$$

$$15i [-16 + 23] j [27 + (-40)] k$$

$$15i + 7j - 13k$$

$$\begin{aligned} A \cdot B &= \sqrt{i^2 + j^2 + k^2} \\ &= \sqrt{15^2 + 7^2 + 13^2} \\ &= \sqrt{225 + 49 + 169} \\ &= \sqrt{443} \\ &= 21 \text{ N.} \end{aligned}$$

62.) $A \rightarrow \text{I and II only}$

63.) Speed = $\frac{\text{distance}}{\text{time}}$

Speed $\rightarrow 90 \text{ km/h}$

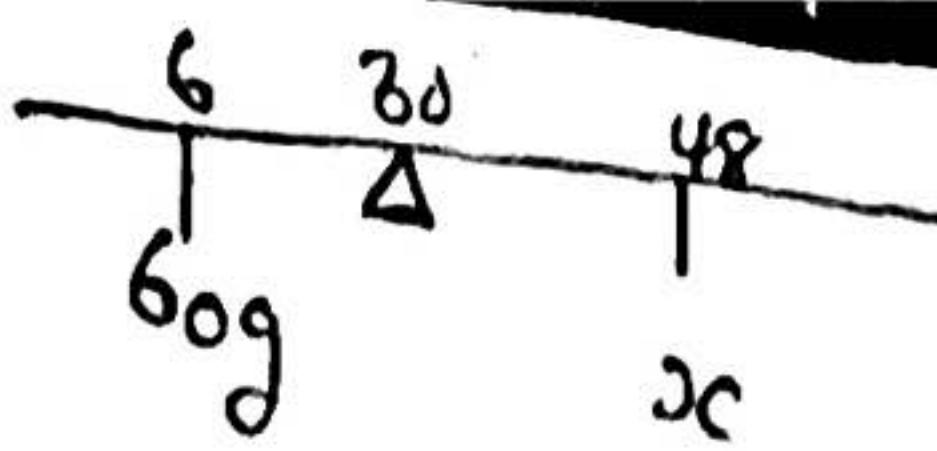
$$\begin{aligned} &\frac{90 \times 1000}{3600} \\ &= 25 \text{ m/s} \end{aligned}$$

distance = ?

Time = 10 sec

$$\therefore 25 = \frac{d}{10}$$

$$d = 250 \text{ m.}$$



Clockwise moment = Anticlockwise moment.

$$60 \times 24 = 30 \times 18$$

$$1440 = 180c$$

$$c = 80g.$$

68) $m_1v_1 = m_2v_2 = [m_1 + m_2]V$

$$m_1 = 0.1 \text{ kg} \quad v_1 = 15 \text{ m/s}$$

$$m_2 = 0.4 \text{ kg} \quad v_2 = ?$$

$$100 \times 15 - 400 = [100 + 400]V$$

$$1500 - 400 = [500]V$$

$$1100 = 500V$$

$$V = \frac{1100}{500}$$

69) $m_1v_1 = m_2v_2 = [m_1 + m_2]V$

$$m_1 = 0.1 \text{ kg} = 0.1 \times 1000 = 100g$$

$$v_1 = 15 \text{ m/s}$$

$$m_2 = 0.4 \text{ kg} = 0.4 \times 1000 = 400g$$

$$v_2 = 0$$

$$V = ?$$

$$100 \times 15 - 400 \times 0 = [100 + 400]V$$

$$1500 = 500V$$

$$V = 3 \text{ m/s}$$

70) Kinetic Energy = $\frac{1}{2}mv^2$

$$m = 2 \text{ kg} \quad v = 10 \text{ m/s}$$

$$K.E. = \frac{1}{2} \times 2 \times 10^2$$

$$= 100 \text{ J}$$

71.) $R^2 = A^2 + B^2 - 2AB \cos(180 - \theta)$

$$R^2 = 10^2 + 5^2 - 2 \times 10 \times 5 \cos(180 - 120)$$

$$R^2 = 100 + 25 - 100 \cos[60]$$

$$R^2 = 125 - 50$$

$$R^2 = 75$$

$$R = \sqrt{75}$$

$$R = 8.66 \text{ N}$$

68) C \rightarrow Two Parallel and Opposite forces on a body whose Parallel lines of action do not coincide.

69)

70.) force = mass \times acceleration

$$\therefore \text{force} = 0.6 \text{ N}, \text{ mass} = 40 \text{ g} = 40 \times 1000 = 0.04 \text{ kg}$$

$$0.6 = 0.04 \times A$$

$$A = \frac{0.6}{0.04}$$

$$A = 15 \text{ m/s}^2$$

71.) B \rightarrow A slight displacement raises it's centre of gravity.

72.) $mgh = \frac{1}{2}mv^2$

$$m = ? \quad g = 9.78, v = 9.78$$

$$mgh = \frac{1}{2}mv^2$$

$$9.78 \times h = \frac{1}{2} \times 9.78^2$$

$$9.78h = \frac{1}{2} \times 95.64$$

$$9.78h = 47.82$$

$$h = 4.89 \text{ m}$$

73.) ~~QUESTION~~

$$Sf^2 = u^2 + 2as$$

$$V^2 = 5^2 + 2 \times 1.5 \times 125$$

$$V^2 = 25 + 375$$

$$V^2 = 400$$

$$V = \sqrt{400}$$

$$V = 20$$

$$V = u + at$$

$$20 = 5 + 1.5t$$

$$20 - 5 = 1.5t$$

$$15 = 1.5t$$

$$t = \frac{15}{1.5}$$

$$t = 10 \text{ sec}$$

$$V^2 = U^2 + 2as$$

$$V = ?, U = 5 \text{ m/s}, a = 1.5 \text{ m/s}^2, s = 125 \text{ m}$$

$$V^2 = 5^2 + 2 \times 1.5 \times 125$$

$$V^2 = 25 + 375$$

$$V^2 = 400$$

$$V = \sqrt{400}$$

$$V = 20 \text{ m/s}$$

$$V = u + at$$

$$20 = 5 + 1.5t$$

$$20 - 5 = 1.5t$$

$$15 = 1.5t$$

$$t = 10 \text{ sec}$$

75.) $mgh = \frac{1}{2}mv^2$

$$gh = \frac{1}{2}v^2$$

$$g = 10 \text{ m/s}, h = 50 \text{ m}, V = ?$$

$$10 \times 50 = \frac{1}{2} \times v^2$$

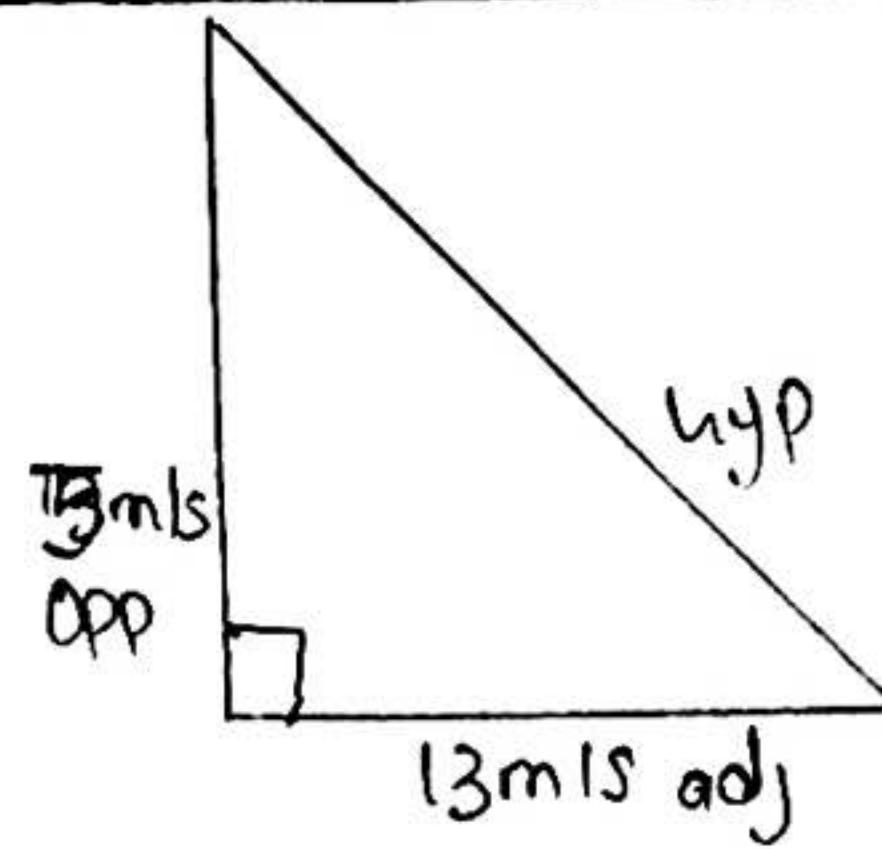
$$500 = \frac{1}{2} \times v^2$$

$$1000 = v^2$$

$$V = \sqrt{1000}$$

$$V = 31.6 \text{ m/s}$$

76.)



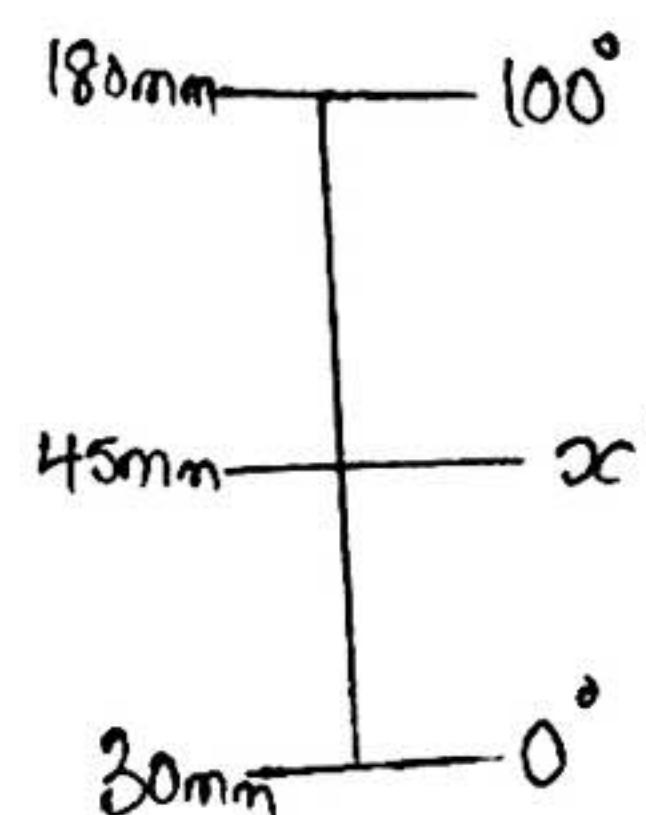
$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan \theta = \frac{5}{13}$$

$$\tan \theta = 0.3846$$

$$\theta = \tan^{-1} 0.3846 \\ = 21^\circ$$

77.)



$$\frac{x-0}{100-0} = \frac{45-30}{180-30}$$

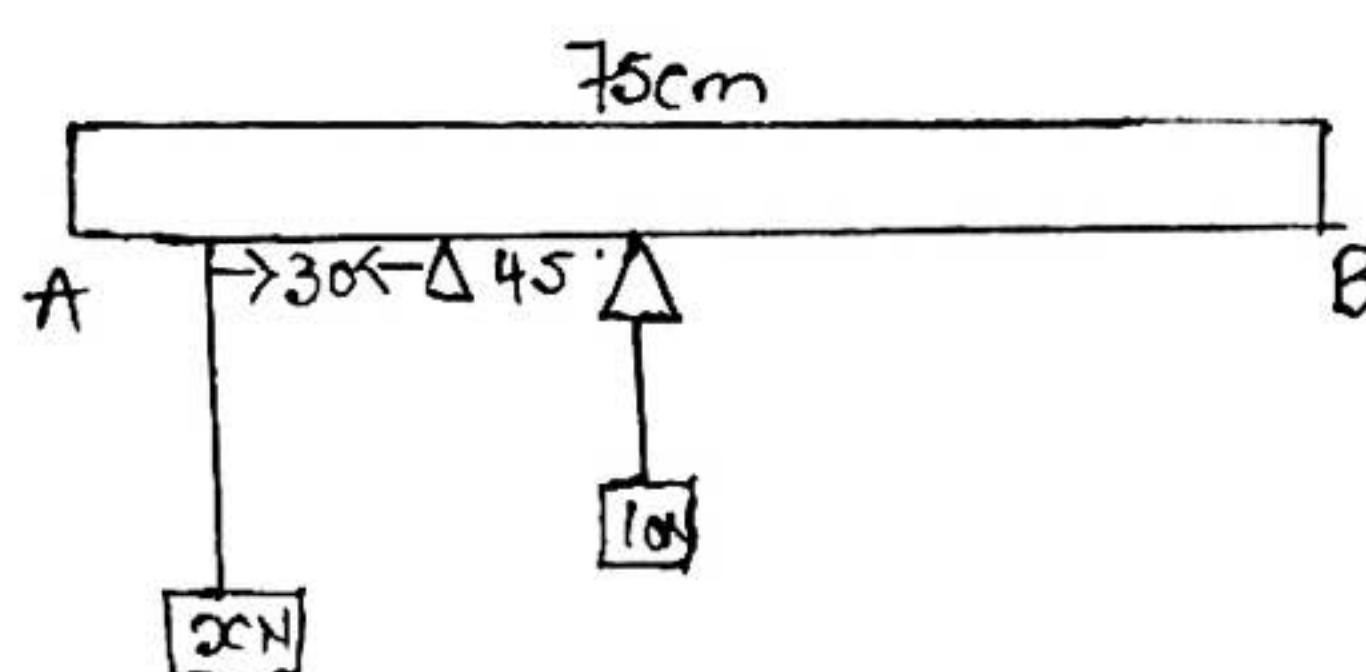
$$\frac{x}{100} = \frac{15}{150}$$

$$150x = 1500$$

$$x = \frac{1500}{150}$$

$$x = 10^\circ$$

78.)



Clockwise moment = Anticlockwise moment

$$20 \times 30 = 45 \times 10$$

$$30x = 450$$

$$x = \frac{450}{30}$$

$$x = 15 \text{ N}$$

80.) $P_t = mc\theta$

$$P = 400 \text{ W}, t = 18 \text{ sec}, m = 0.5, C = ? \quad \theta = 2.5^\circ$$

$$400 \times 1 = 0.5 \times C \times 2.5$$

$$400 = 1.25C$$

$$C = \frac{400}{1.25}$$

$$C = 320 \text{ J/kg} \cdot \text{K}$$

81.) $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$$P_1 = 70 \text{ cmHg}, V_1 = 1000 \text{ cm}^3, T_1 = 127 + 273 = 400 \text{ K}$$

$$P_2 = 28 \text{ cmHg}, V_2 = ?, T_2 = -23.3 + 273 = 249.7$$

$$T_2 = -23.3 + 273 = 249.7$$

$$\frac{70 \times 1000}{400} = \frac{28 \times V_2}{249.7}$$

$$70 \times 1000 \times 249.7 = 400 \times 28 \times V_2$$

$$17419000 = 11200 V_2$$

$$V_2 = 1560.62 \text{ cm}^3$$

$$82.) \frac{L_2 - L_1}{L_1 [\theta_2 - \theta_1]}$$

$$L_1 = 44.25, L_2 = 42.02 \text{ cm}, \theta_2 = 0^\circ \text{C}, \theta_1 = 50^\circ \text{C}$$

$$2 = \frac{44.25 - 42.02}{42.02 [50 - 0]}$$

$$2 = \frac{2.13}{210}$$

$$2 = 1.06 \times 10^{-3} \rightarrow \text{Apparent Cubic expansivity}$$

Cubic expansivity = $3 \times$ linear expansivity

$$= 3 \times 1.0 \times 10^{-5}$$

$$= 3 \times 10^{-5}$$

Real Cubic expansivity = Apparent Cubic expansivity + Cubic expansivity

$$= 1.06 \times 10^{-3} + 3 \times 10^{-5}$$

$$= 1.09 \times 10^{-3} \text{ K}^{-1}$$

$$\text{but } \frac{1}{V} = \frac{1}{V_0} + \frac{1}{U}$$

$$\frac{1}{30} = \frac{1}{30} + \frac{1}{U}$$

$$\frac{1}{30} - \frac{1}{30} = \frac{1}{U}$$

$$\frac{1-1}{30} = \frac{1}{U}$$

$$\frac{0}{30} = \frac{1}{U}$$

$$U = 30 \text{ cm}$$

$$\frac{V}{U} = \frac{h_1}{h_0}$$

$$\frac{30}{30} = \frac{h_1}{30}$$

$$h_0 = 30 \text{ cm}$$

$$h_1 = \frac{90}{30}$$

$$h_1 = 3 \text{ cm}$$

$$91.) n = \frac{360}{\theta} - 1$$

$$= \frac{360}{60} - 1$$

$$= 6 - 1$$

$$= 5$$

$$92.) P_1 V_1 = P_2 V_2$$

$$P_1 = 0.8, V_1 = 500 = P_2 = 0.5, V_2 = ?$$

$$0.8 \times 500 = 0.5 \times V_2$$

$$400 = 0.5 \times V_2$$

$$V_2 = \frac{400}{0.5}$$

$$V_2 = 800 \text{ cm}^3$$

6 83) D \rightarrow Change in colour with temperature

84) D \rightarrow Constriction

85) A \rightarrow Latent heat

86) Pt = mc θ

$$P = 25 \text{ W}, t = 5 \text{ min} = 5 \times 60 = 300 \text{ sec}$$

$$mc = ? \quad \theta = 10^\circ \text{C}$$

$$25 \times 300 = mc \times 10$$

$$7500 = 10mc$$

$$mc = \frac{7500}{10}$$

$$mc = \underline{\underline{750 \text{ J/K}}}$$

87) B \rightarrow work

6 88) C \rightarrow Temperature of both objects are equal.

$$S = \frac{2d}{t} \quad [\text{echoes}]$$

$$S = \frac{2 \times 510}{3}$$

$$S = \frac{1020}{3}$$

$$= 340 \text{ m/s}$$

$$90.) \frac{V}{U} = \frac{h_1}{h_0}$$

$$V = 30 \text{ cm} \quad U = ? \quad h_1 = ? \quad h_0 = 3 \text{ cm}$$

$$f = 35 \text{ cm}$$

$$93.) V = u + at$$

$$= 0 + 4 \times 4$$

$$V = 16 \text{ m/s}$$

$$K.E = \frac{1}{2} m v^2$$

$$= \frac{1}{2} \times 650 \times 16^2$$

$$= 83200 \text{ J}$$

94.) B \rightarrow Dew point

95.) D \rightarrow I and III Only

$$\frac{T_1^2}{L} = \frac{T_2^2}{l}$$

T = Period, L = Length

$$\frac{T_1^2}{L} = \frac{T_2^2}{9L}$$

$$\frac{T_1^2 \times q}{T_1} = \frac{T_2^2 \times q}{T_2}$$

$$T_2^2 = T_1^2 \times q$$

Square both sides

$$\sqrt{T_2^2} = \sqrt{q T_1^2}$$

$$T_2 = 3T_1$$

factor by which the period is increased is 3

- 97.) B → the vapour of a substance is in equilibrium with its own gas.

$$V = \lambda f$$

$$V = 360 \text{ ml}, \lambda = 120 \text{ cm } f = ?$$

$$360 = 120 \times f$$

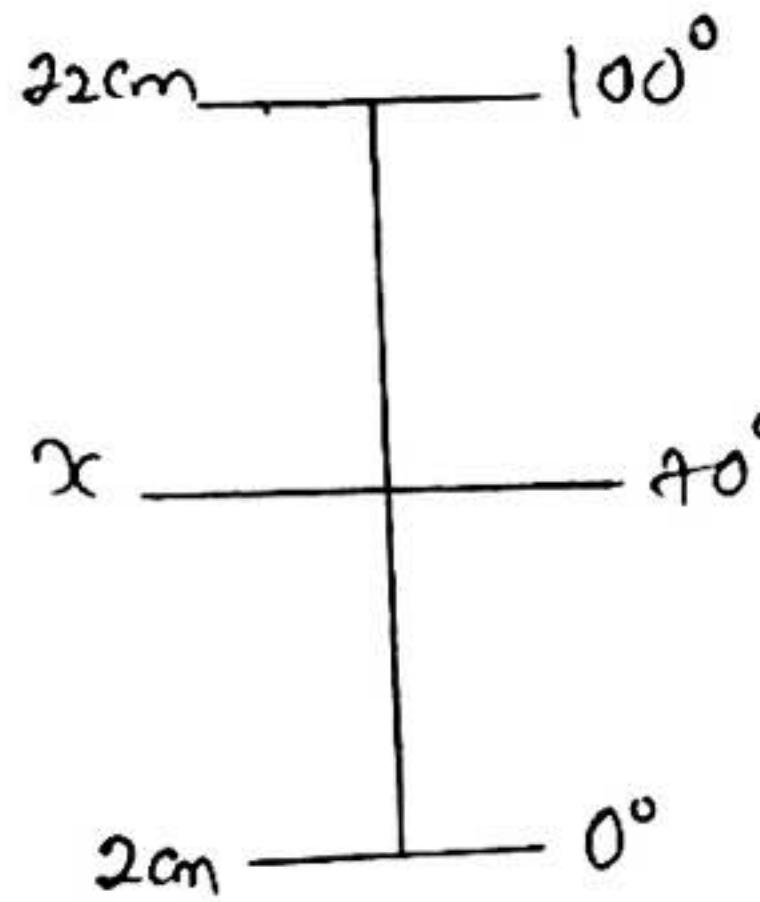
$$f = \frac{360}{120}$$

$$f = 3$$

$$f = \frac{1}{T}$$

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

$$T = 0.333 \text{ sec}$$



$$\frac{x-2}{22-2} = \frac{70-0}{100-0}$$

$$\frac{x-2}{20} = \frac{70}{100}$$

$$100x - 200 = 1400$$

$$100x = 1400 + 200$$

$$100x = 1600$$

$$x = \frac{1600}{100}$$

$$x = 16 \text{ cm}$$

$$\frac{1}{f} = \frac{1}{V} + \frac{1}{q}$$

$$\frac{1}{15} = \frac{1}{V} + \frac{1}{45}$$

$$\frac{1}{V} = \frac{1}{15} - \frac{1}{45}$$

$$\frac{1}{V} = \frac{3-1}{45}$$

$$\frac{1}{V} = \frac{2}{45}$$

$$2V = 45$$

$$V = 22.5$$

$$m = \frac{V}{4}$$

$$= \frac{22.5}{45}$$

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

$$\begin{aligned} 101.) \text{ Total Power} &= 5 \times 40 + 6 \times 60 \times 2 + 100 \\ &= 200 + 360 + 200 \\ &= 760 \text{ W} \\ &= 0.76 \text{ kW} \end{aligned}$$

$$\begin{aligned} \text{Bill for 30 days} &= 0.76 \times 12 \times 30 \\ &= 273.6 \text{ K} \\ &= 2.736 \text{ Naira.} \end{aligned}$$

$$102.) V = 327.8 \text{ ml}$$

$$l = 16 \text{ cm} = 0.16 \text{ m}$$

$$f = \frac{V}{4l}$$

$$\frac{327.60}{4 \times 0.16} = \frac{327.68}{0.68}$$

$$f = 512 \text{ Hz}$$

- 103.) B → The time it takes the substance to decay to half of its original quantity.

$$104.) P = \frac{V^2}{R}$$

$$P = 60, V = 12 \text{ V}$$

$$60 = \frac{12^2}{R}$$

$$60 = \frac{144}{R}$$

$$R = \frac{144}{60}$$

$$R = 2.4 \Omega$$

$$105.) \text{ mass} = Z I t$$

$$\text{mass} \rightarrow 4.5 \text{ g}$$

$$Z \rightarrow ?$$

$$I \rightarrow 4.5 \text{ A}$$

$$t \rightarrow 1 \times 60 \times 60 = 3600 \text{ sec}$$

$$4.5 = Z \times 4.5 \times 3600$$

$$4.5 = Z \times 16200$$

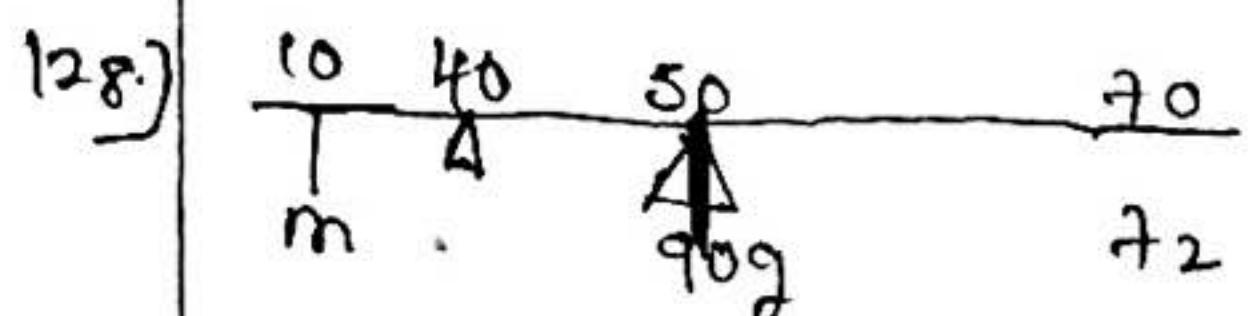
$$Z = 3600$$

106.) A → exactly half of its initial potential energy	116.) $R = \frac{V}{I_g} - R_g$ $R_g = 2.5\Omega, I_g = 50mA = 50 \times 10^{-3}A$ $V = 50V$
107.) B → Heat loss due to Radiation	
108.) B → Any two bodies attract each other with a force which is directly proportional to products of their masses and inversely proportional to the square of the distance between them.	$R = \frac{50}{0.05} - 2.5$ = 1000 - 2.5 = 997.5\Omega
109.) A → Protons and Neutrons.	
110.) $m_1 C_1 \theta_1 = m_2 C_2 \theta_2$ $m_1 \rightarrow 185g, C_1 = ? \theta_1 = 20^\circ - 10^\circ = 10^\circ C$ $m_2 = 140g \quad C_2 = ? \theta_2 = 18^\circ C - 7^\circ C = 11^\circ C$ $185 \times C_1 \times 10 = 140 \times C_2 \times 11$ $1850C_1 = 1540C_2$ $C_1 : C_2 = \frac{1540}{1850}$ = 0.83	117.)
112.) C → oscillatory	
113.) A → Temperature factors affecting the capacitance of a capacitor	$\frac{12-3}{23-3} = \frac{90-0}{100-0}$ $\frac{9}{20} = \frac{90}{100}$ $900 = 200C$ $2C = 45^\circ C$
1.) Area of Plate	
2.) Distance between the plates	
3.) Nature of Dielectric	
114.) C → They carry no electric charge	118.) B → away from the normal.
115.)	119.) $P = \frac{V^2}{R}$ $P = 100W, V = 220V, R = ?$ $100 = \frac{220^2}{R}$ $100R = 484000$ $R = \frac{484000}{100}$ = 4840\Omega
	120.) B → Inside the cooker, the boiling point of water is raised.
	121.) Total Power = $40 \times 40 + 5 \times 60 + 1000$ = 400 + 300 + 1000 = 1700W = 1.7 kW Energy = $P \times t$ = 1.7×5 = 8.5 kW/h.
	122.) B → Sound waves are transverse wave

- A → The focal length of its lens is fixed [31.]
 B → Convex spectacle lenses.
 C → The eyepiece has a shorter focal length than the objective.

26.) B → Rectangular glass Block.

127.) C → If a body is in equilibrium under the action of a number of parallel forces sum of clockwise moment about a point equals sum of anticlockwise moment about the same point.

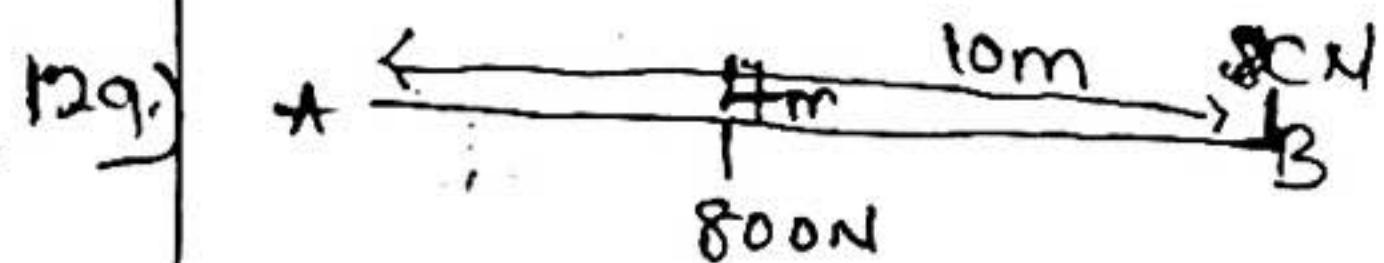


$$M \times 30 = 10 \times 90 + 72 \times 30 \\ = 900 + 2160$$

$$30m = 3060$$

$$m = \frac{3060}{30}$$

$$m = 120g$$



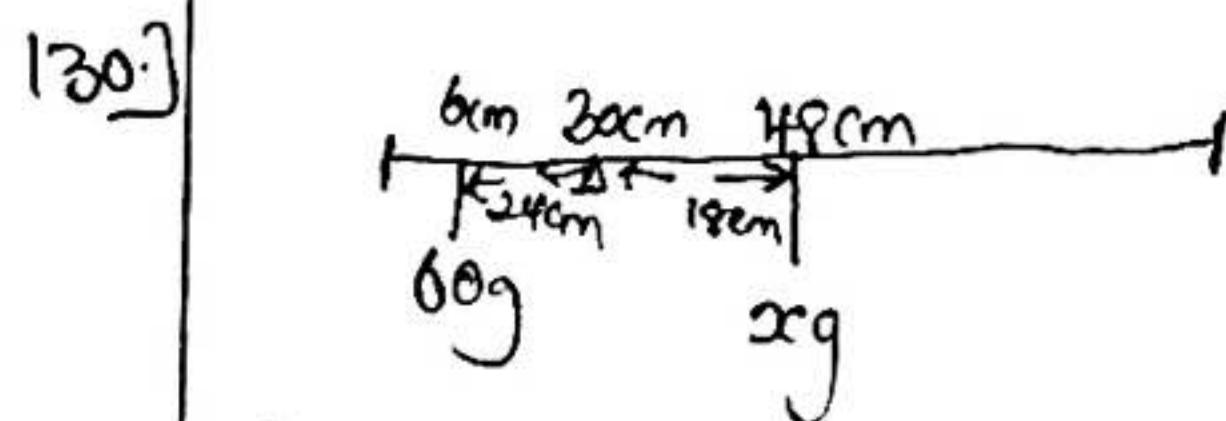
Clockwise moment = Anticlockwise moment

$$4 \times 800 = 10 \times x_c$$

$$3200 = 10x_c$$

$$x_c = \frac{3200}{10}$$

$$x_c = 320N$$



Sum of clockwise = Anticlockwise moment

$$6 \times 24 = 18 \times x_c$$

$$144 = 18x_c$$

$$x_c = \frac{1440}{18}$$

$$x_c = 80g$$

B → The limit of stress within which free Schmidin in the material completely disappears when the stress is removed.

$$\frac{10g}{15g} = \frac{5cm}{x_c}$$

$$10x_c = 75cm$$

$$x_c = 7.5cm$$

133.) C → III only

134.) D → None

135.) C → Electric charges can be produced by conductor.

136.) D → The motion of Earth around the sun

137.) B → Time taken to make one complete oscillation

$$m_1 v_1 + m_2 v_2 = [m_1 + m_2] V$$

$$m_1 = 200 \text{ m/s}, v_1 =$$

$$\text{Total time taken} = \frac{2\pi \sin \theta}{g}$$

$$v = 200 \text{ m/s}$$

$$g = 10 \text{ m/s}^2$$

$$\theta = 60^\circ$$

$$\frac{2 \times 200 \times \sin 60}{10}$$

$$= 40 \times 0.8660$$

$$= 34.64s$$

$$m_1 v_1 - m_2 v_2 = [m_1 + m_2] V$$

$$m_1 = 20g, v_1 = 200 \text{ m/s}$$

$$m_2 = 380g, v_2 = 0$$

$$20 \times 200 - 380 \times 0 = [20 + 380] V$$

$$4000 = 400V$$

$$V = \frac{4000}{400}$$

$$V = 10 \text{ m/s.}$$

140.) A → The ratio of the distance moved by effort to the distance moved by load.

$$\text{Efficiency} = \frac{m \cdot A}{V \cdot R} \times 100$$

$$\text{Efficiency} = 80\%, V \cdot R = 6, m \cdot A = \frac{\text{Load}}{\text{Effort}} = \frac{300}{x_c}$$

$$\frac{80}{160} = \frac{300}{x_c} \times \frac{1}{6} \cancel{\times 100}$$

$$0.8 = \frac{300}{x_c}$$

$$4.8x_c = 300$$

$$x_c = 62.5N.$$

$$142.) \text{Open pipe} = \frac{\lambda}{2L}$$

$$f = ?$$

$$\lambda = 340 \text{ m/s}$$

$$L = 6 \text{ m.}$$

$$\therefore f = \frac{340}{2 \times 6}$$

$$= 28.33 \text{ Hz}$$

$$143.) f = \frac{1}{2L} \sqrt{\frac{T}{m}}$$

$$m = 0.01 \text{ kg}$$

$$L = 0.5 \text{ m}$$

$$T = 800 \text{ N} \quad m = \frac{0.01}{0.5}$$

$$f = ?$$

$$m = \frac{0.01}{0.02}$$

$$f = \frac{1}{2 \times 0.5} \sqrt{\frac{800}{0.02}}$$

$$f = \frac{1}{1} \sqrt{40,000}$$

$$f = 200 \text{ Hz}$$

$$144.) C \rightarrow \frac{1}{\sin \theta}$$

145.) B → If correct.

146.)

147.) Torque = work done

$$\text{work done} = f \times d$$

$$m \text{ (T}^{-2}\text{) } \times L$$

$$= m L^2 T^{-2}$$

$$148.) \text{Power} = \frac{\text{work done}}{\text{time}}$$

$$\text{work done} = mgh$$

$$m = 80 \text{ kg}, g = 10 \text{ m/s}, h = 600 \text{ cm} = 6 \text{ m} \quad \text{time} = 20 \text{ s}$$

$$\text{work done} = 80 \times 6 \times 10$$

$$= 4800$$

$$\text{Power} = \frac{4800}{20}$$

$$= 240 \text{ W}$$

149.) C → Impulse is the product of force and time

150.) Mechanical advantage = $\frac{\text{load}}{\text{effort}}$

$$\text{load} = 2 \text{ tonnes} = 2 \times 1000$$

$$= 2000 \text{ kg} = 20,000 \text{ N}$$

$$\text{effort} = 10 \text{ N}$$

$$M.A = \frac{20,000}{10}$$

$$= 2000$$

151.) K.E = P.E

$$\frac{1}{2}mv^2 = mgh$$

$$P.E = mgh, m = 4000, g = 10, h = [60 - 50]$$

$$m = 10 \text{ kg}$$

$$= 4 \times 10 \times 1 \times 10$$

$$= 40 \text{ J}$$

$$h = 10 \text{ cm}$$

$$= 0.1 \text{ m}$$

K.E = P.E

$$K.E = 40 \text{ J}$$

$$145.) f = BIL \sin \theta$$

$$B = 0.25 \text{ T}, I = 15 \text{ A}, L = 5 \text{ m} \quad \theta = 60^\circ$$

$$f = 0.25 \times 15 \times 5 \times \sin 60$$

$$= 18.24 \text{ N}$$

$$m_1 v_1 - m_2 v_2 = [m_1 + m_2] V$$

$$m_1 = 200g = 0.2 \text{ kg}$$

$$v_1 = 100 \text{ m/s}$$

$$v_2 = 0 \text{ m/s}, V = ?$$

$$20 \times 100 - 2 \times 0 = [2 + 0.2] V$$

$$20 - 0 = [2.2] V$$

$$20 = 2.2 V$$

$$V = 9.09 \text{ m/s}.$$

$$v^2 = u^2 + 2as$$

$$v = 72 \text{ km/h} = 72 \times \frac{1000}{3600} = 20$$

$$u = 48 \text{ km/h} = \frac{48 \times 1000}{3600} = 20$$

$$a = 10.8 \text{ m/s}^2 = \frac{72 \times 1000}{3600} = 20$$

$$20^2 = 13.33^2 + 2 \times 1.85$$

$$400 = 177.77 + 3.65$$

$$400 - 177.77 = 3.65$$

$$222.23 = 3.65$$

$$S = \frac{222.23}{3.6}$$

$$= 61.73 \text{ m.}$$

155.)

$$v^2 = u^2 + 2as$$

$$v = 72 \text{ km/h} = 72 \times \frac{1000}{3600} = 20$$

$$u = 48 \text{ km/h} = \frac{48 \times 1000}{3600} = 20$$

$$a = 10.8 \text{ m/s}^2 = \frac{72 \times 1000}{3600} = 20$$

$$20^2 = 13.33^2 + 2 \times 1.85$$

$$400 = 177.77 + 3.65$$

$$400 - 177.77 = 3.65$$

$$222.23 = 3.65$$

$$S = \frac{222.23}{3.6}$$

$$= 61.73 \text{ m.}$$

156.)

$\frac{1}{3}$ of the object is above the liquid

$\therefore 1 - \frac{1}{3}$ is immersed in the liquid

$\frac{2}{3}$ is immersed in the liquid

Density of the object = 7100 kg/m^3

Density of the liquid = $\frac{2}{3} \times 7100 = 4733 \text{ kg/m}^3$

$$\rho_c = \frac{7100 \times 3}{2}$$

$$x = 10650 \text{ kg/m}^3$$

157.)

$$\rho = \frac{\text{mass}}{\text{volume}}$$

$$\rho = \frac{2125}{250}$$

$$= 8.5 \text{ g/cm}^3$$

$$= 8500 \text{ kg/m}^3$$

.. i.e. this is fixed 120.2 m. \rightarrow the limit of stress within which the

$$158.) S = ut + \frac{1}{2} a t^2$$

$$u = 0, t = 100s, a = 1.5 \text{ m/s}^2$$

$$S = 0 + \frac{1}{2} \times 1.5 \times 10000$$

$$= 7500 \text{ m}$$

$$S = ut + \frac{1}{2} a t^2$$

$$u = 0, t = 98s, a = 1.5 \text{ m/s}^2$$

$$S = 0 + \frac{1}{2} \times 1.5 \times 9604$$

$$S_2 = 7203 \text{ m}$$

$$\therefore S = S_1 - S_2$$

$$S = 7500 - 7203$$

$$= 297 \text{ m}$$

159.) K.E \Rightarrow P.E

~~$$\frac{1}{2} m v^2 = mgh$$~~

$$m = 125$$

$$v = ? \quad h = 80 \text{ m}$$

$$g = 10$$

$$\frac{1}{2} \times 125 \times v^2 = 125 \times 10 \times 80$$

$$\frac{v^2}{2} = 800$$

$$v^2 = 1600$$

$$v = 40$$

$$\text{momentum} = mv$$

$$= 125 \times 40$$

$$= 5000 \text{ kg.m/s}$$

$$160.) m_1 v_1 - m_2 v_2 = [m_1 + m_2] V$$

$$m_1 = 1500 \text{ kg}$$

$$m_2 = 50 \text{ kg} \quad v_2 = 360 \text{ m/s}$$

$$v_1 = 0 \quad v = ?$$

$$1500 \times 0 - 50 \times 360 = [50 + 1500] v$$

$$18000 = [1550] v$$

$$v = \frac{18000}{1550}$$

$$v = 11.61$$

$$= 12 \text{ m/s}$$

$$(61) V = u + at$$

$$V = 45 \text{ m/s}, u = 0, a = ? t = 10s$$

$$V = \frac{45 \times 1000}{3600} \\ = 12.5 \text{ m/s}$$

$$12.5 = 0 + a \times 10$$

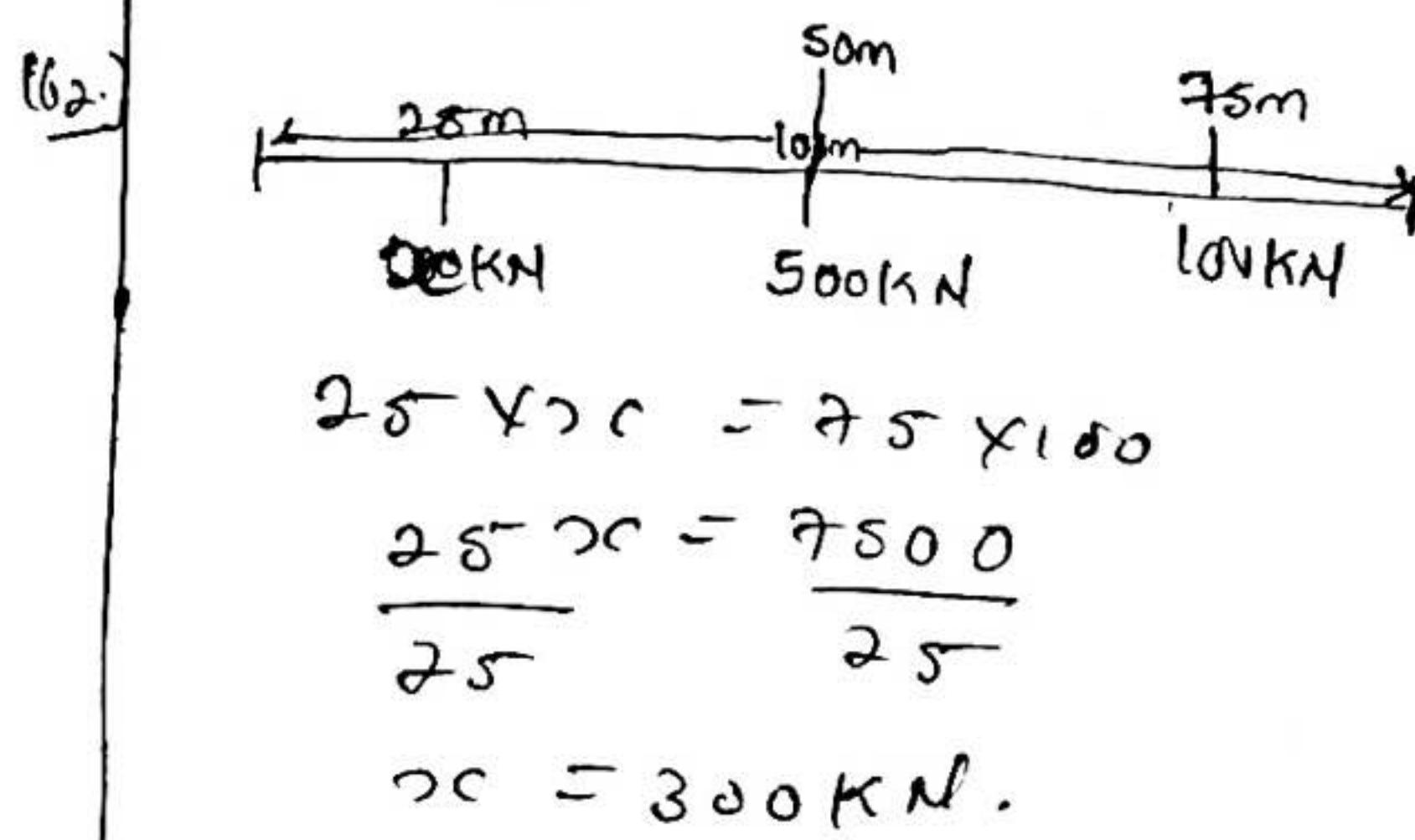
$$12.5 = 10a$$

$$a = \frac{12.5}{10} = 1.25 \text{ m/s}^2$$

$$f = ma$$

$$f = ? m = 1000 \text{ kg}, a = 1.25$$

$$f = 1000 \times 1.25 \\ = 1250 \text{ N}$$



$$25 \times 25 = 75 \times 100$$

$$\frac{25 \times 25}{25} = \frac{7500}{25}$$

$$25 = 300 \text{ kN.}$$

(63) $V = u + at$

$$V = ? u = 0, a = 10 \text{ m/s}^2, t = 5s$$

$$V = 0 + 10 \times 5$$

$$V = 50 \text{ m/s}$$

$$\text{Kinetic energy } = \frac{1}{2}mv^2$$

$$m = 220 \text{ g} = 0.22 \text{ kg} \quad V = 50$$

$$K.E. = \frac{1}{2} \times 0.22 \times 50^2$$

$$= 275 \text{ J}$$

(64) B → The specific heat of iron is lower than that of water.

(65) refractive index $\mu = \frac{\text{Speed in Air}}{\text{Speed in glass}}$

$$\mu - 1 = 1.65, \text{ Speed in Air} = 3.0 \times 10^8 \text{ m/s}$$

$$1.65 = \frac{3.0 \times 10^8}{\text{Speed in glass}}$$

$$\text{Speed in glass} = \frac{3.0 \times 10^8}{1.65}$$

$$x = 1.82 \times 10^8 \text{ m/s.}$$

(66)

$$\text{Young modulus} = \frac{\text{Stress}}{\text{Strain}}$$

$$\text{Stress} = f/A$$

$$\text{Strain} = \epsilon/l$$

$$\therefore \text{if } f = 100 \text{ N, } A = 1.5 \times 10^{-6}$$

$$\epsilon = ? \quad \text{Young modulus} = 2 \times 10^{11} \text{ N/m}^2$$

$$l = 3 \text{ m}$$

(68)

$$\text{Young modulus} = \frac{\text{Stress}}{\text{Strain}}$$

$$\text{Stress} = f/A, \text{ Strain} = \epsilon/l$$

$$\therefore f = 50 \text{ N}, A = 2.4 \text{ mm}^2 = \pi r^2, \epsilon = 0.25 \text{ mm}$$

$$d = 2r, d = 2.4 \text{ mm} \quad l = 4 \text{ m} \quad = 2.5 \times 10^{-4} \text{ m}$$

$$r = \frac{d}{2} = \frac{2.4}{2} = 1.2 \text{ mm}$$

$$\text{but } 1.2 \times 1000 = 1.2 \times 10^{-3} \text{ m}$$

$$\text{Area} = \pi r^2 = 3.142 \times (1.2 \times 10^{-3})^2 \\ = 3.142 \times 1.44 \times 10^{-6} \\ A = 4.524 \times 10^{-6}$$

$$\therefore \text{Young modulus} = \frac{50}{4.524 \times 10^{-6}} \times \frac{4}{2.5 \times 10^{-4}} \\ = 11061946.9 \times 16000 \\ = 1.769 \times 10^{11} \\ = 1.8 \times 10^{11} \text{ N/m}^2$$

→ The higher the ratio of gravity of a body the more stable the body is

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{Speed} = 45 \text{ km/h} = \frac{45 \times 1000}{3600} = 12.5 \text{ m/s}$$

$$\text{distance} = ? \quad \text{time} = 10s$$

$$12.5 = \frac{d}{10}$$

$$d = 12.5 \times 10$$

$$d = 125 \text{ m}$$

(71) $\alpha/g_h = \frac{1}{2} \alpha v^2$

$$g_h = \frac{1}{2} v^2$$

$$g = 9.78 \text{ m/s}^2, h = ? \quad v = 9.78 \text{ m/s}$$

$$9.78 \times h = \frac{1}{2} \times 9.78^2$$

$$9.78 h = \frac{1}{2} \times 95.64$$

$$9.78 h = 47.82$$

$$h = \frac{47.82}{9.78}$$

$$h = 4.89 \text{ m}$$

(72) D → When friction takes place, the friction force is less than the limiting value

(73) Upthrust = weight - tension.

$$\text{Weight} = 1 \text{ kg} = 1 \times 9.78 = 9.78 \text{ N}$$

$$\text{Tension} = 5 \text{ N}$$

$$\text{Upthrust} = 9.78 - 5 \\ = 4.78 \text{ N}$$

(74) $P = \frac{RA}{L}$

$$P = 4.0 \times 10^{-7}, \text{ Resistance} = ? \quad \text{Length} = 20 \text{ m}$$

$$\text{Cross-sectional Area} = 8.0 \times 10^{-6} \text{ m}^2$$

$$4.0 \times 10^{-7} = R \times 8.0 \times 10^{-6}$$

$$8 \times 10^{-6} = R \cancel{8.0 \times 10^{-6} R}$$

$$R = \frac{8.0 \times 10^{-6}}{8.0 \times 10^{-6}}$$

$$R = 1 \Omega$$

(75)

(76) frictional force = force applied - force dragging the body.

$$\text{force applied} = 20 \text{ N}$$

$$\text{force dragging the body} = 10 \times 1.5 = 15 \text{ N}$$

$$\text{frictional force} = 20 - 15 \\ = 5 \text{ N}$$

(77) $m_1 v_1 - m_2 v_2 = [m_1 + m_2] v$

$$m_1 = 2 \text{ kg}, m_2 = 0.5 \text{ kg}, v_1 = 5 \text{ m/s}, v_2 = 0 \quad v = ?$$

$$[2 \times 5] - [0.5 \times 0] = [2 + 0.5] v$$

$$10 - 0 = 2.5 v$$

$$10 = 2.5 v$$

$$v = 4 \text{ m/s}$$

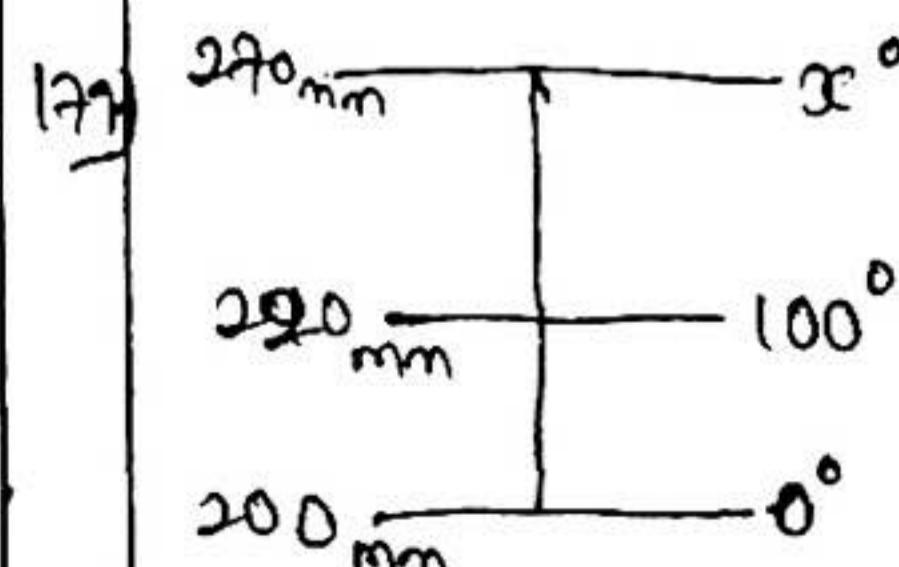
$$v = 4 \text{ m/s}^2$$

(78) $Q = mc\theta$

$$Q = ?, m = 200 \text{ g}, c = 0.4 \text{ J/kg.K} \quad \theta = \theta_2 - \theta_1$$

$$\theta = 37 - 31 \\ = 6^\circ \text{C}$$

$$Q = 200 \times 0.4 \times 6 \\ = 480 \text{ J}$$



$$\frac{100-0}{x-0} = \frac{270-200}{270-200}$$

$$\frac{100}{x} = \frac{20}{70}$$

$$7000 = 20x$$

$$x = \frac{7000}{20}$$

$$x = 350^\circ\text{C}$$

(180) Cubic expansivity = $\frac{V_2 - V_1}{V_1 [\theta_2 - \theta_1]}$

but 3 linear expansivity = cubic expansivity
 $3L = 3 \times 1.2 \times 10^{-4}$, $V_2 = ?$ $V_1 = 8.0 \times 10^3$
 $\theta_2 = 80^\circ\text{C}$, $\theta_1 = 30^\circ\text{C}$

$$3 \times 1.2 \times 10^{-4} = \frac{V_2 - 8000}{8000 [80 - 30]}$$

$$3 \times 1.2 \times 10^{-4} \times 8000 [50] = V_2 - 8000$$

$$144 = V_2 - 8000$$

$$V_2 = 144 + 8000$$

$$V_2 = 8144 \text{ cm}^3$$

$$\text{Change in temperature} = 8144 - 8000$$

$$= 144 \text{ cm}^3$$

(181) $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$$V_1 = V_1$$

$$T_1 = 0 + 273 = 273 \text{ K}$$

$$V_2 = 8V_1$$

$$T_2 = ?$$

$$\frac{V_1}{273} = \frac{3V_1}{T_2}$$

$$\frac{V_1}{V_1} = \frac{273 \times 3V_1}{T_2}$$

$$T_2 = 273 \times 3$$

$$T_2 = 819 \text{ K}$$

(182) Cubic expansivity = $\frac{V_2 - V_1}{V_1 [\theta_2 - \theta_1]}$

but 3 linear expansivity = cubic expansivity

$$\text{Linear expansivity} = 12 \times 10^{-5}$$

$$V_1 = 10^{-6} \text{ cm}^3, V_2 = ? \quad \theta_1 = 273 \text{ K}$$

$$\theta_2 = 573 \text{ K}$$

$$3 \times 12 \times 10^{-5} = \frac{V_2 - 10^{-6}}{10^{-6} [573 - 273]}$$

$$3 \times 12 \times 10^{-5} \times 10^{-6} [300] = V_2 - 10^{-6}$$

$$1.08 \times 10^{-7} = V_2 - 10^{-6}$$

$$1.08 \times 10^{-7} + 10^{-6} = V_2$$

$$V_2 = 1.108 \times 10^{-6}$$

(183) Ratio of the volume and per centage =

$$= \frac{1.08 \times 10^{-7}}{10^{-6}} \times 100$$

$$= 10.8\%$$

(183) $P_t = mc\theta$

$$P = TQ$$

$$I = 3.0 \text{ A}, V = 240 \text{ V}, t = ? \quad m = 0.0 \text{ kg} \leftarrow$$

$$C = 4.2 \times 10^3 \text{ J/kg}, \theta = \theta_2 - \theta_1 = 100 - 30$$

$$14t = mc\theta \quad = 70^\circ\text{C}$$

$$3 \times 240 \times t = 2 \times 4.2 \times 10^3 \times 70$$

$$720t = 568000$$

$$t = \frac{568000}{720}$$

$$t = 816.66 \text{ s}$$

$$t = \frac{816.66}{60} = 13.6 \text{ min.}$$

(184) B → Specific heat capacity

(185) $Q = mc\theta + mc$

$$m = 50 \text{ g}, c = 4.2 \text{ J/g.K}, L = 2260 \text{ J/g}$$

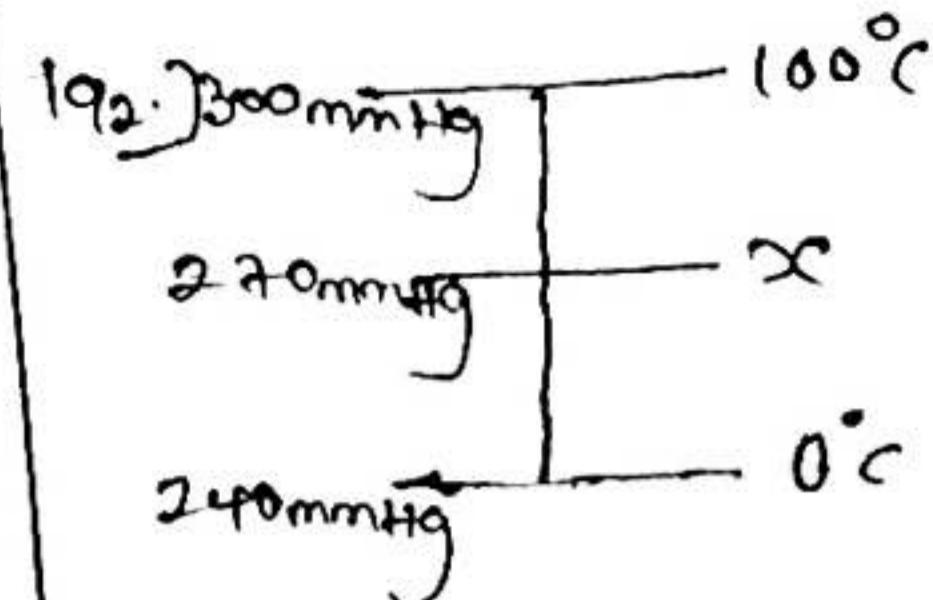
$$\theta = 80^\circ\text{C}$$

$$Q = [50 \times 4.2 \times 80] + [50 \times 2260]$$

$$Q = 16800 + 113000$$

$$= 129800 \text{ J.}$$

191.) A \rightarrow [i, ii, iii]



$$\frac{270 - 240}{300 - 240} = \frac{x - 0}{100 - 0}$$

$$\frac{30}{60} = \frac{x}{100}$$

$$30 \times 100 = x \times 60$$

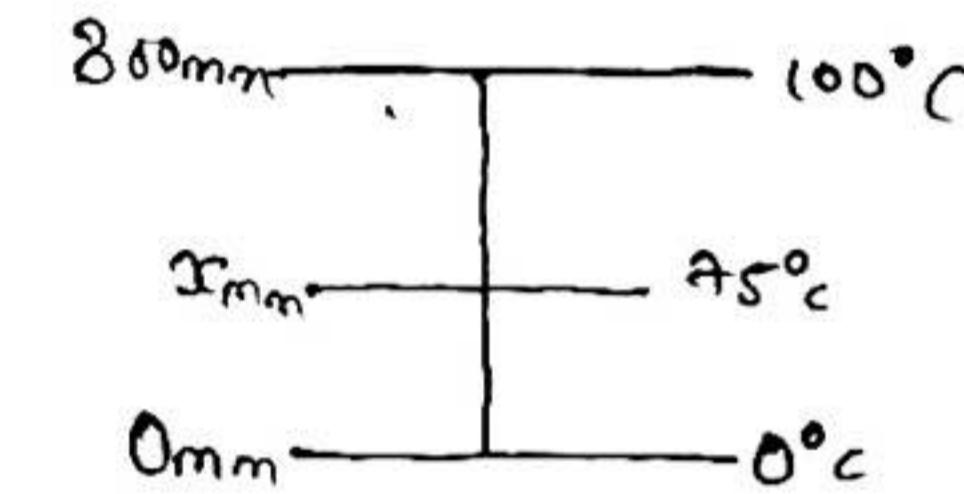
$$3000 = 60x$$

$$x = 50^\circ\text{C}$$

187)

C \rightarrow the duration of collision is negligible compared with the time between collisions.

188.)



$$\frac{25 - 0}{300 - 0} = \frac{75 - 0}{100 - 0}$$

$$\frac{25}{300} = \frac{75}{100}$$

$$100x = 22500$$

$$x = 225 \text{ mm}$$

189.) Heat energy $= mc\theta$

$$m = 0.55 \text{ kg}, c = 380 \text{ J/kg.K}, \theta = \theta_2 - \theta_1 = 100 - 52$$

$$Q = mc\theta = 0.55 \times 380 \times 48$$

$$= 8987$$

$$= 8.987 \times 10^3 \text{ J}$$

190)

$$m.c.\theta = mc\theta$$

$$m_1 = ? \quad c_1 = 3 \times c_2 \quad \theta_1 = 20 - 15, m_2 = ? \quad c_2 = c_1 \quad \theta = 20 - 15$$

$$m_1 \times 3 \times c_1 \times [20 - 15] = m_2 \times c_1 \times [20 - 15]$$

$$3 = 1$$

$$\therefore 3 : 1$$

193.) A \rightarrow the balance of a watch

$$P_t = mc\theta$$

$$P = 880 \text{ W}, t = ?, m = 21 \text{ kg}$$

$$c = 4200 \text{ J/kg.K} \quad \theta = \theta_2 - \theta_1 = 60 - 20 = 40^\circ\text{C}$$

$$880 \times t = 2 \times 4200 \times 40$$

$$880t = 336000$$

$$t = \frac{336000}{880}$$

$$t = 382 \text{ s}$$

195.) B \rightarrow Radiation.

FUTA POST-UTME

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① Empirical formula is the unit structure of a molecular formula and related with the formula:

$$(E.F) \times n = MM$$

Where E.F = Empirical formula
M.M = Molar mass.

$$\therefore (CH_2O) \times n = 180$$

$$C=12, O=16, H=1$$

$$(12+(1\times 2)+16) n = 180$$

$$(30)n = 180$$

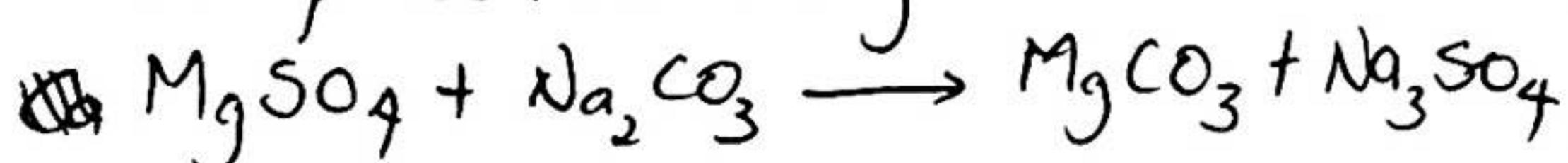
$$n = \frac{180}{30}$$

$$n = 6$$

∴ Molecular formula = $C_6H_{12}O_6$ — [A]

② [B] (sewage compound) is a solid-liquid compound which can degrade or broken to simpler forms through biological means).

③ Presence of (Ca, Mg or Fe) compounds of chloride, sulphate, and Nitrates ~~not~~ in water makes such a permanent hardness in water. Which can only be separated by ion exchange resin method of sodium. e.g



[A]

④ No of moles = Concentration \times Volume
 $= 0.01 \times \frac{500}{1000}$
 $= 0.005$ mole — [A]

⑤ A strong acid is an acid that can ionize completely in a solution i.e can donate all hydrogen ion in a solution when reacted with other compounds like a base. — [C]

⑥ $T_1 = 273K$.

$$T_2 = ?$$

$$V_1 = V,$$

$$V_2 = V_1 \times 2$$

$$P_1 = P_1$$

$$P_2 = P_1 \times 2$$

$$T_2 = \frac{P_2 V_2 T_1}{P_1 V_1}$$

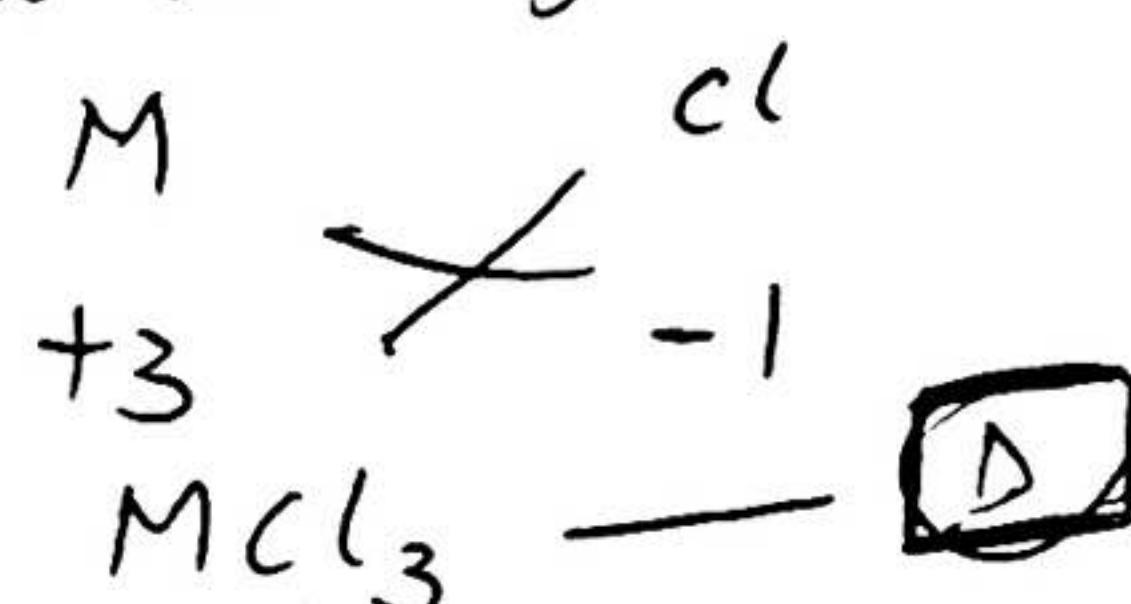
$$T_2 = \frac{P_1 \times 2 \times V_1 \times 2 \times 273}{P_1 \times V_1}$$

$$T_2 = \frac{2 \times 2 \times 273}{1092K} —$$

[D]

⑦ The charge on an element corresponds to the one faraday and to the deposition of 1 mole of such element (usually metals, (in electron as well)).

3 moles of electron of metal M means the charge on M is +3

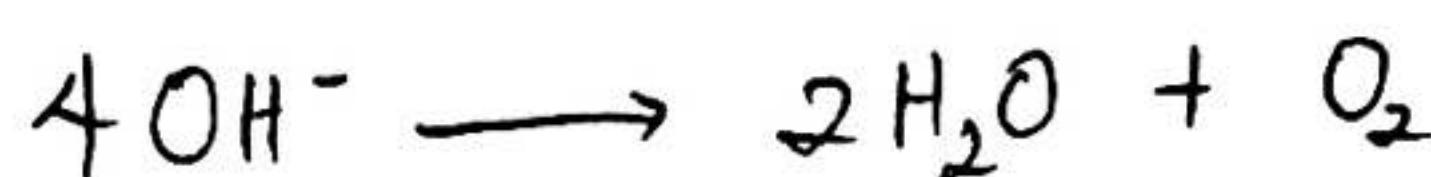


⑧ — [A]

⑨ — [D]

⑩ At the cathode, the possible cations to be deposited is Na^+ & H^+ while at the anode the possible anions to be deposited are OH^- and Cl^- .

But due to the electrochemical series, the lower ions are deposited in each electrodes i.e H^+ and OH^-



This reaction is due to the fact that hydroxyl ion cannot be deposited because it is a compound.

∴ H_2O produced remains in the solution with Oxygen gas evolved

Meaning Oxygen and Hydrogen will be deposited. — A

11 D

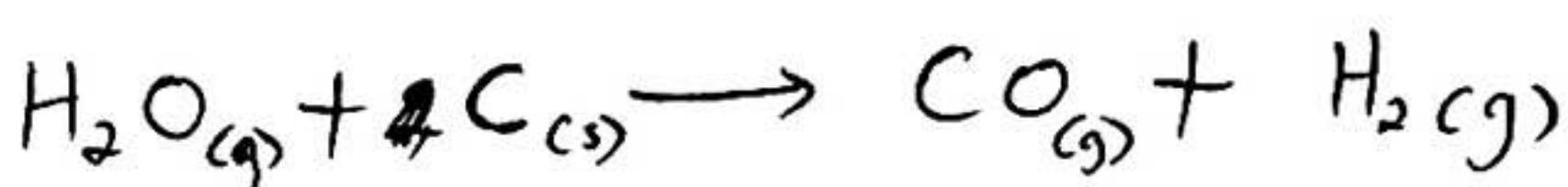
12 A

13 Any reaction involving Oxygen as one of its reactant is termed Combustion reaction. — B

14 D

15 D

17 Hot coke means Carbon. Therefore, the reaction with steam is :



However, this $CO_{(g)}$ formed reacts furtherly with either Ozone or Oxygen in the air to form $CO_2{_{(g)}}$ — B

18 C

19 B

20 A

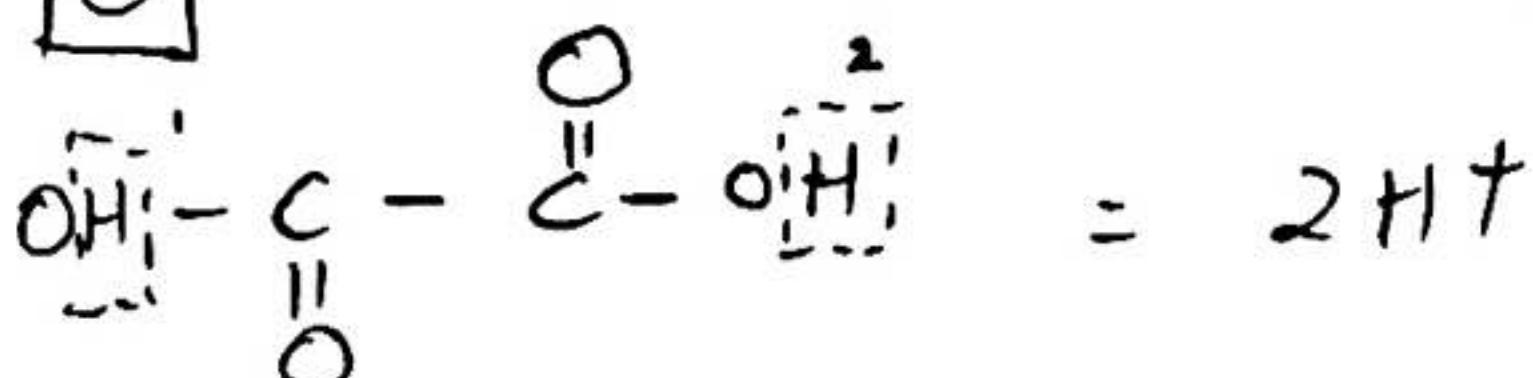
Addition of MnO_2 fasting the reaction because it acts as a catalyst. And Heating the compound (H_2O_2) will agitate the liquid compound to forming water and Oxygen gas.

Concentration increment causes or affect the reaction positively —

21 C

All other options involves chemical reactions.

22 C

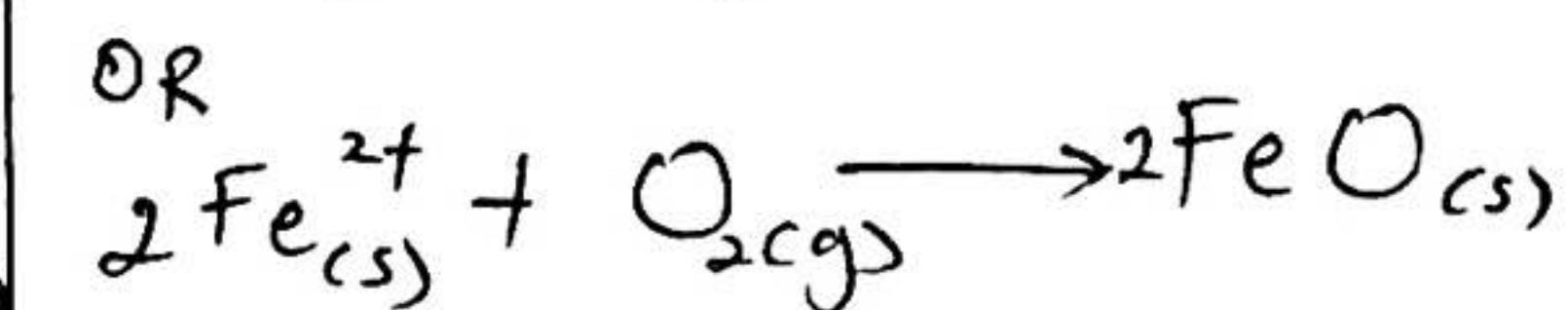
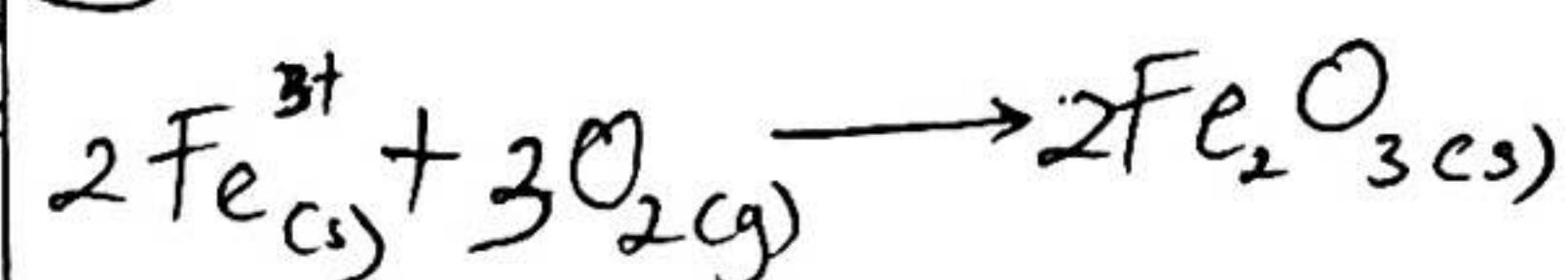


23 D

24 A

A reducing agent either removes oxygen from its conjugate or adds Hydrogen to its conjugate.

25 C



26 D

27 D

Fehling's solution is used to test for reducing sugar. Sucrose a carbohydrate is not a reducing sugar ∵ will test negative by not reacting with the reagent unlike Glucose which will ~~test~~ test positive by a brick-red precipitate colouration.

28 C

Ionic radius of metals are less than their atomic radius because atomic radius increases down the group with no changes in the ionic radius.

29 B

Ethane is gotten from plastics by hydrogenation. Plastics is however also known as Polyethene which makes it a derivative of alkenes.

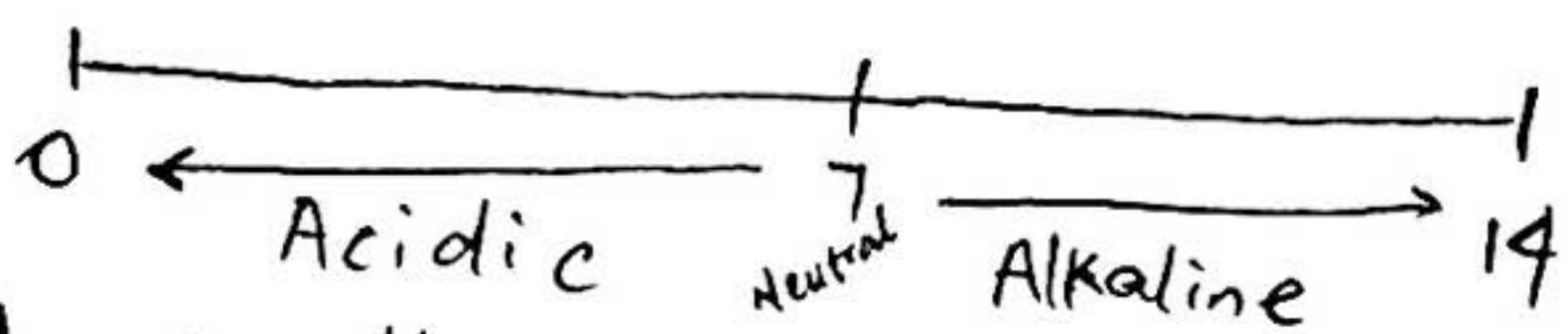
30 B

33) A

Exothermic reaction is a reaction in which the system releases heat to the environment. Such that, the environment becomes hotter than the system itself.

34) D

pH scale



As the pH scale tends towards 14, it becomes more alkaline or basic.

35) A

Bauxite - Is an ore of aluminium
Potash alum - Is a compound of Potassium
Kaolin - Is a white clay used for making ceramics.

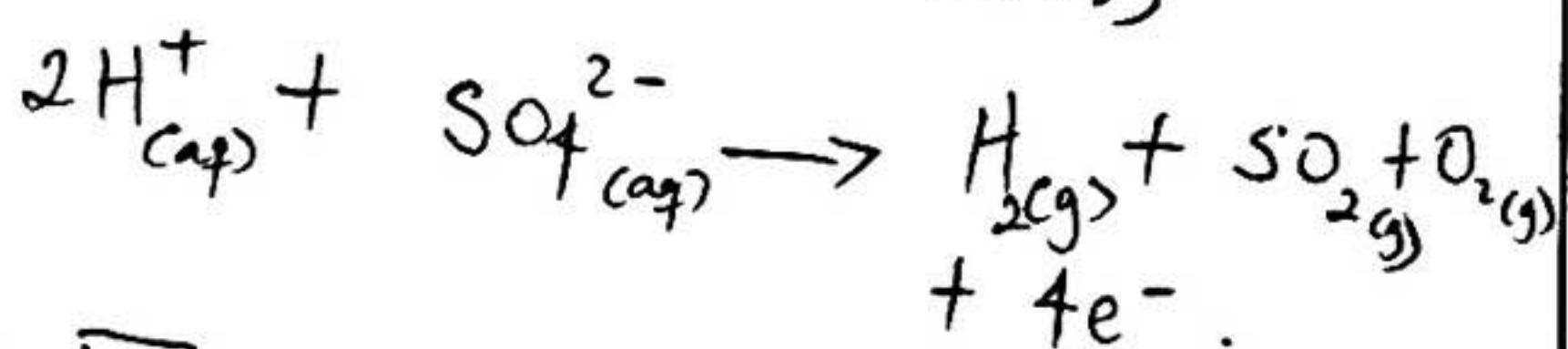
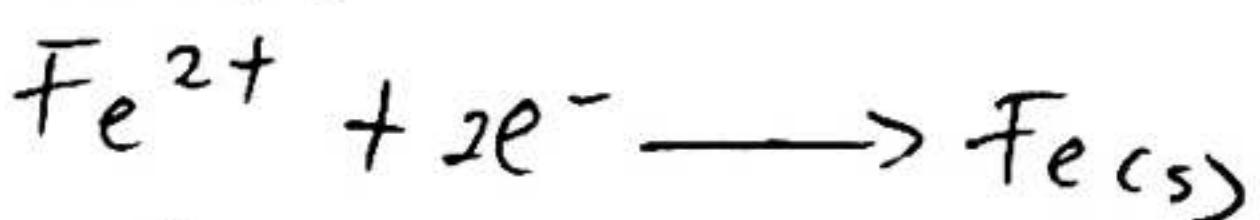
Cryolite - Is a mineral consisting of a fluoride of sodium & aluminium.

36) A

Reaction of alkanoic acid and alkanol gives alkylalkanoate (esters)

37) C

Metals contains free mobile electrons that helps to conduct electricity. While ion does that in an aqueous salts solution.



38) A

Starch are series of glucose units joined together by glycosidic bond in a specific orientation of carbon to carbon. Breakage of these bonds means that by water means the resultant is several of Glucose.

39) D

Diamond and Graphite are allotropes of carbon. But Diamonds are crystal structures that are closely-packed. While Graphite are made up of layers of hexagonal structure that are loosely packed.

40) C

41) D

42) C

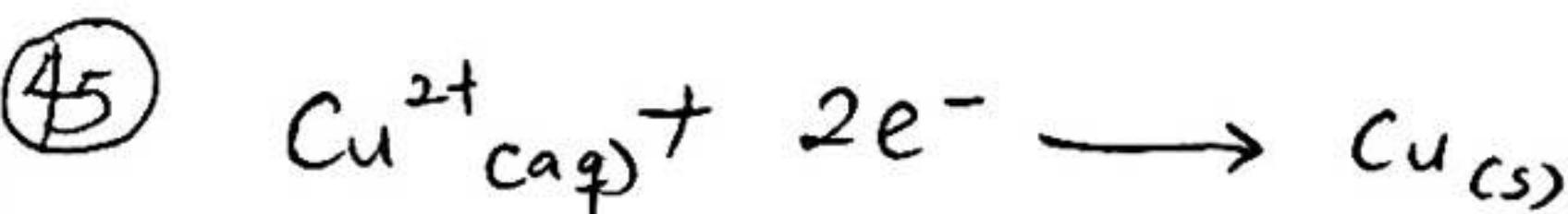
See Question 13.

Complete combustion of carbon compounds or organic compounds gives $\text{CO}_{2(\text{g})}$ and $\text{H}_2\text{O}_{(\text{l})}$. While an incomplete combustion will result to a deposition of carbon.

43) A

All oxides of non-metals gives acid when reacted with water and are therefore termed acidic oxides.

44) A



$2F$ will deposite 1 mole of Cu.

$$Q = I t \rightarrow 1F = 96,500 \text{ coulombs.}$$

$$Q = I t$$

$$= 10 \times 965$$

$$= 9,650 \text{ coulombs}$$

$$2F = 2 \times 96,500$$

$$= 193,000 \text{ coulombs}$$

$$1 \text{ mole} = 193,000 \text{ coulombs}$$

$$x \text{ mole} = 9,650 \text{ coulombs}$$

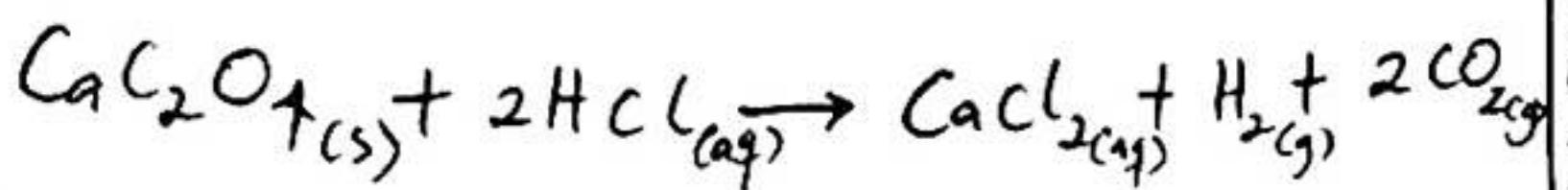
$$x \text{ moles} = \frac{9,650}{193,000}$$

$$= 0.05 \text{ mole of Cu.} -$$

C

47 D

Addition of Conc. HCl will dissolve CaC_2O_4 in the reaction



78 Concentration of $\text{H}_2\text{SO}_4 = 2.0 \text{ mol/dm}^3$

$$\text{Volume of } \text{H}_2\text{SO}_4 = \frac{400 \text{ cm}^3}{1000}$$

$$\begin{aligned}\text{No. of mole} &= CV \\ &= 2 \times 0.4 \\ &= 0.8 \text{ mol. of } \text{H}_2\text{SO}_4\end{aligned}$$

On dilution with water

$$\text{Concentration} = 0.2 \text{ mol/dm}^3$$

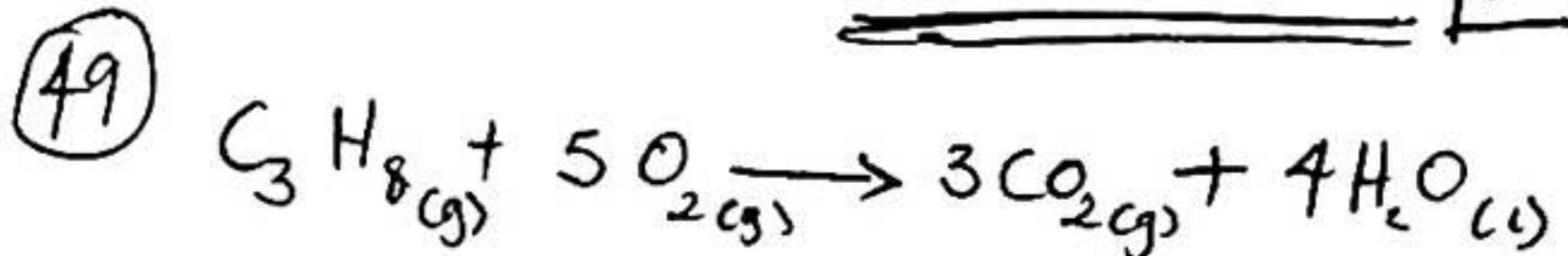
$$\text{No. of moles} = CV$$

$$\begin{aligned}\text{Volume} &= \frac{n}{C} \\ &= \frac{0.8}{0.2} \\ &= 4 \text{ dm}^3\end{aligned}$$

$$\therefore \text{Volume} = 4000 \text{ cm}^3 \text{ of } \text{H}_2\text{SO}_4(aq)$$

$$\text{Volume of water} = \text{Volume of aqueous } \text{H}_2\text{SO}_4 - \text{Volume of conc. } \text{H}_2\text{SO}_4.$$

$$\begin{aligned}\text{Volume of water} &= 4000 - 400 \\ &= 3600 \text{ cm}^3 \quad \boxed{D}\end{aligned}$$



$$1 \text{ mol} : 5 \text{ mol}$$

$$1 \text{ L} : 5 \text{ L}$$

from Gay Lussac's law:

$$\therefore \text{If } 20 \text{ cm}^3 \quad 20 \text{ cm}^3$$

$$\text{Reacted gases } 4 \text{ cm}^3 \quad 20 \text{ cm}^3$$

$$\text{Residual gas} = 16 \text{ cm}^3 \text{ of Propane gas}$$

J A

50 B

Alkaline pyrogallol solution removes Oxygen gas from its mixture.

51 D

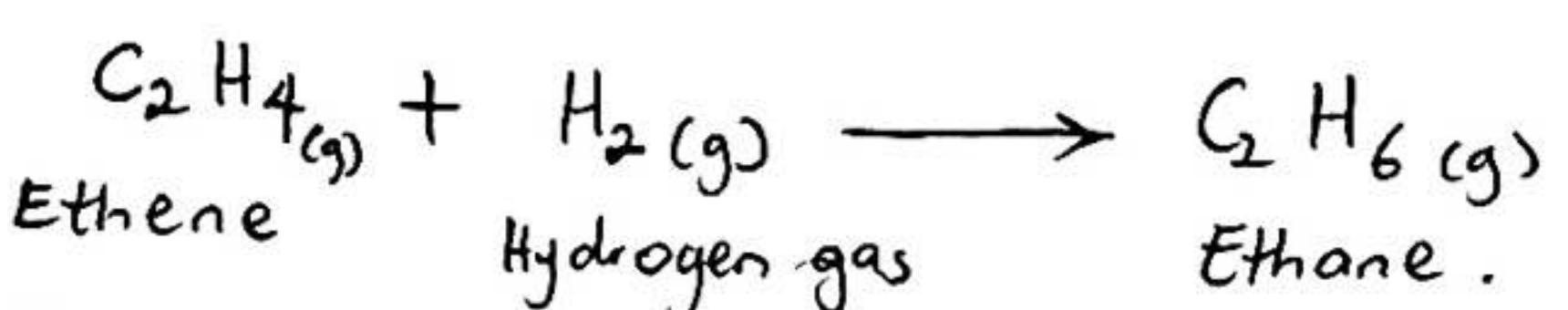
See question 24.

52 C

Deliquescent compounds are those compounds that absorb moisture from the atmosphere and form the solution of the compounds. e.g. FeCl_3

53 D

Hydrogenation means addition of hydrogen where corresponding alkanes and alkenes all differ with the differences of one hydrogen molecule. i.e.



54 C

The oxidation of alkanol gives it corresponding alkanic acid.

55 A

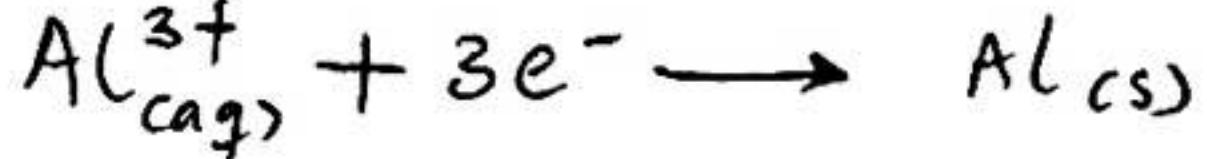
56 D

Check the electrochemical series for confirmation.

57 B

58 B

59 C



3F liberates 1 mole of Al.

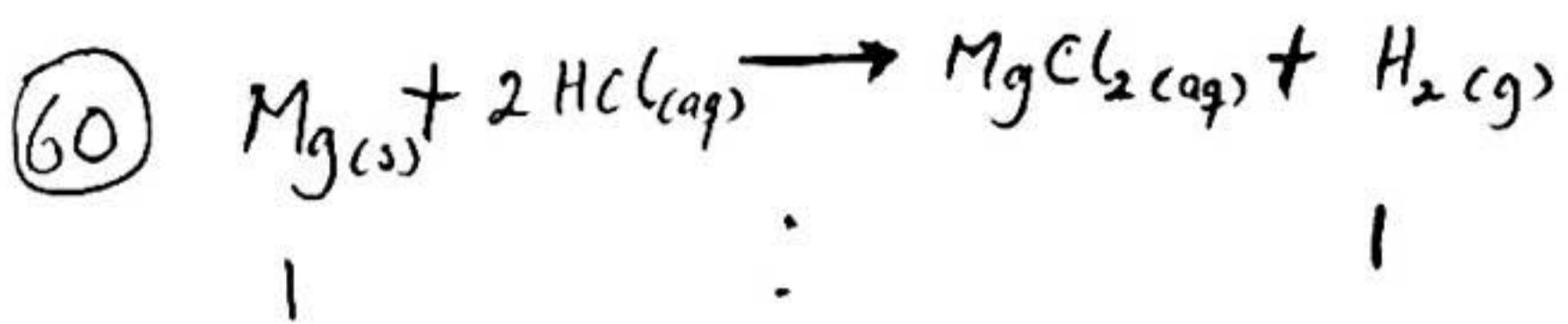
$$n = \frac{m}{M}$$

$$= \frac{9}{27} = 0.33 \text{ mole}$$

∴ xF will liberate 0.33 mole of Al

$$x = \frac{3F \times 0.33 \text{ mole}}{1 \text{ mole}}$$

$$x = 0.99 \approx 1.0F - \boxed{C}$$



$$\text{no. of moles} = \frac{\text{mass}}{\text{Molar mass}}$$

$$\text{mass of Mg}_{(s)} = 12.0 \text{ g}$$

$$\text{Molar mass of Mg} = 24 \text{ g/mol}$$

$$\text{Mass of H}_2{}_{(g)} = ?$$

$$\text{Molar mass of H} = 1 \text{ g/mol.}$$

$$n = \frac{12}{24}$$

$$n = 0.5 \text{ mol}$$

∴ If 0.5 mol of Mg_(s) reacted, then 0.5 mol of H_{2(g)} will be produced.

$$\therefore n = \frac{m}{M}$$

$$0.5 = \frac{m}{2}$$

$$m = 0.5 \times 2 = 1.0 \text{ g} - \boxed{A}$$

NOTE: The equation was based on Hydrogen gas and not Hydrogen alone.

62)

An exception occurs when an \star

63)

This is a reaction btwn a group IIIA element and a group VIA element.

$$\begin{array}{c} * \\ +3 \end{array} \quad \begin{array}{c} 2 \\ -2 \end{array}$$

$$X_2 Z_3$$

64)

CH₄ shows a tetrahedral orientation

H₂O shows a bent-shaped orientation

H₂S also shows a bent-shape or V-shape.

65) Cu₂O (copper(II) oxide)

$$\text{Cu}_2\text{O} = (2 \times 64) + 16$$

$$= 128 + 16$$

$$= 144 \text{ g/mol}$$

Percentage of Cu.

$$2\text{Cu} = 2 \times 64$$

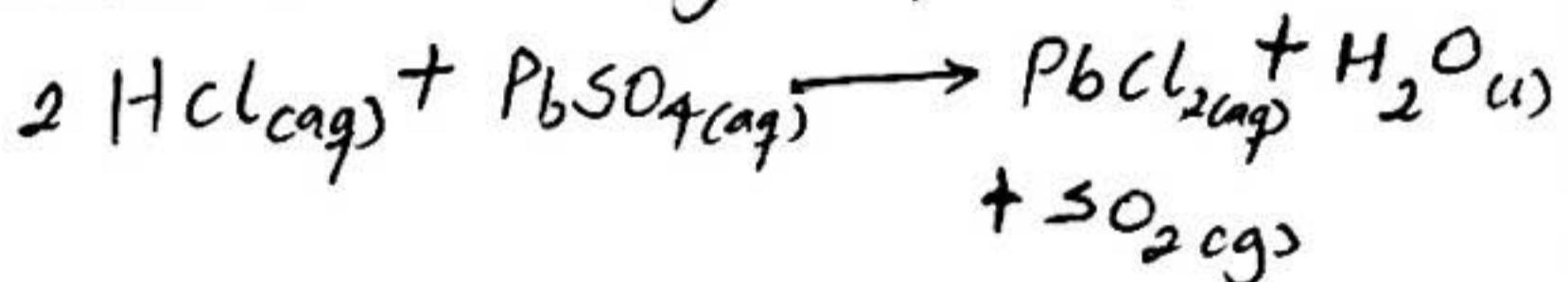
$$= 128$$

$$\% = \frac{128}{144} \times \frac{100}{1}$$

$$= \underline{\underline{88.9\%}} - \boxed{A}$$

66)

The reaction of dil. HCl_(aq) with PbSO₄ causes an exchange of compounds.



67)

68)

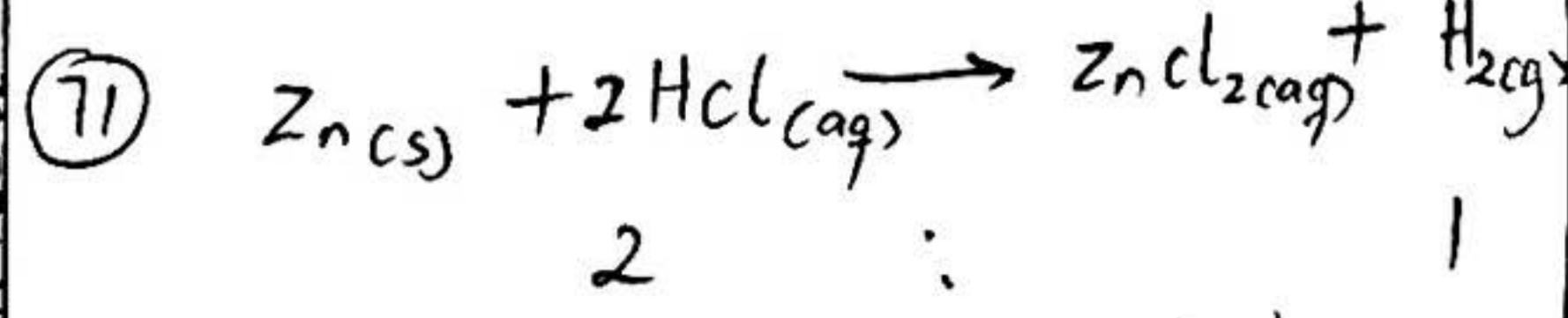
Alums are usually double salts that consists of mixture of two simple salts having two different cations but a single anion. e.g. (Ba₂(SO₄)₂ · 2H₂O · Al₂SO₄). i.e Na₂SO₄ · K₂SO₄ · 24H₂O.

69)

As H₃O⁺ denotes acid which is termed Hydroxonium ion and OH⁻ connotes the base meaning Hydroxyl ion. Reaction btwn the two compounds result into salt and Water.

70)

See question 38.



If 2 moles of HCl are needed to produce 1 mole of Hydrogen gas,

0.6 mole of HCl will produce
x mole of H_2

$$\begin{array}{rcl} 2 & = & 1 \\ 0.6 & = & x \end{array}$$

$$2x = 0.6$$

$$x = \frac{0.6}{2}$$

$$= 0.3 \text{ mole of } H_2 \quad \boxed{C}$$

72 A

73 D

Decrease in the pressure of the reactant agitates the gas molecules as they collide with the wall of their containers.

74 B

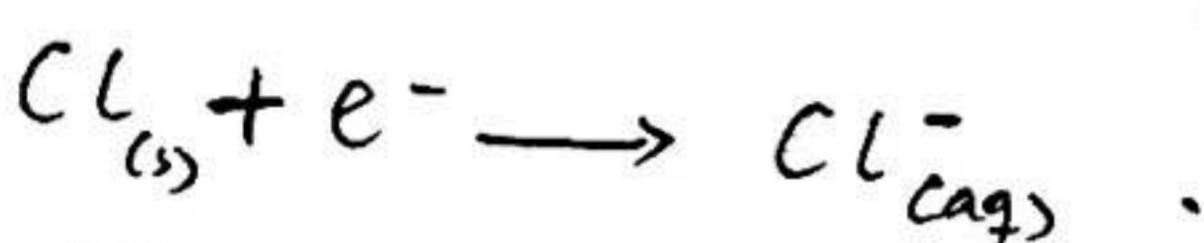
75 A

77 D

78 B

An alpha particle is represented by ~~as~~ Helium element.

79 B



80 A

81 D

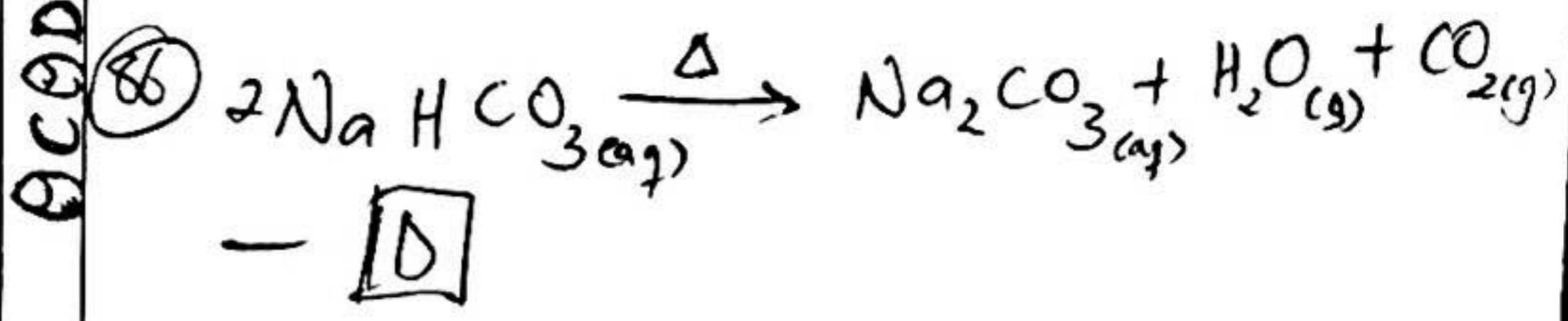
82 A

83 $Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{(aq)} + H_2$
If zinc powder is used instead of granules it fastens the rate of reaction
— B

Ozone

84 A

85 B



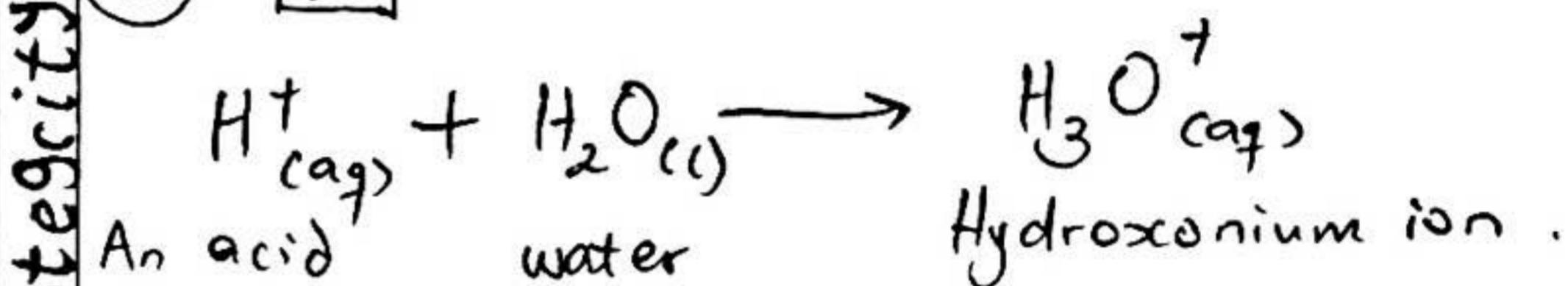
87 D

88 C

89 C

This is due to closeness in the bonds of such a gas as it turns liquid.

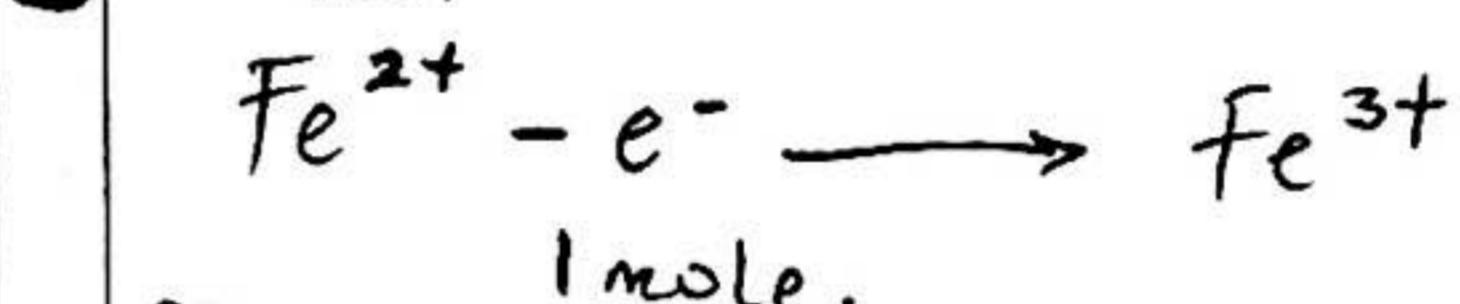
90 D



92 A

Cathodes are negatively charged and will only accept positively charged elements or ion (cation).

93 D



94 B

95 C

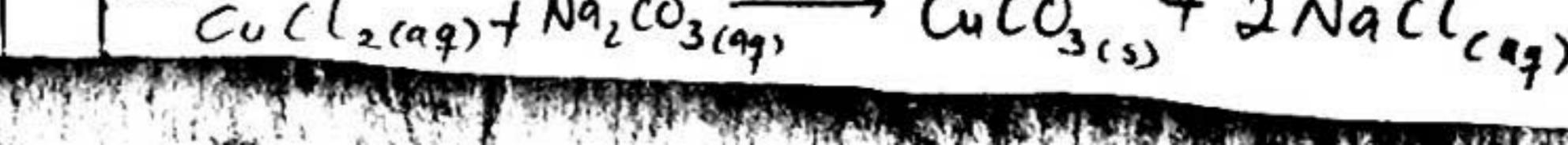
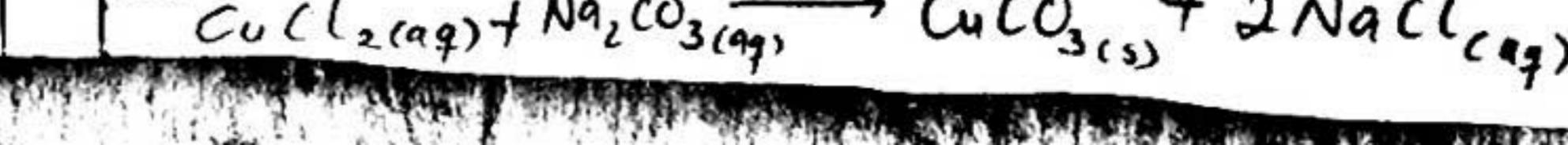
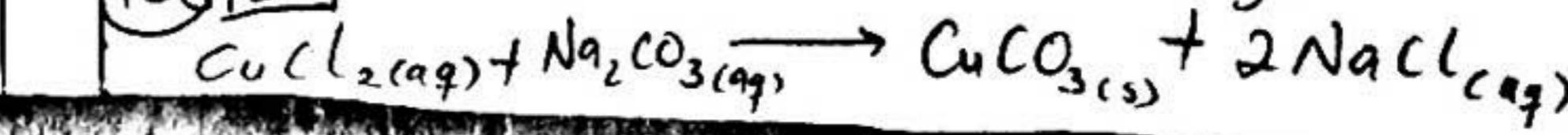
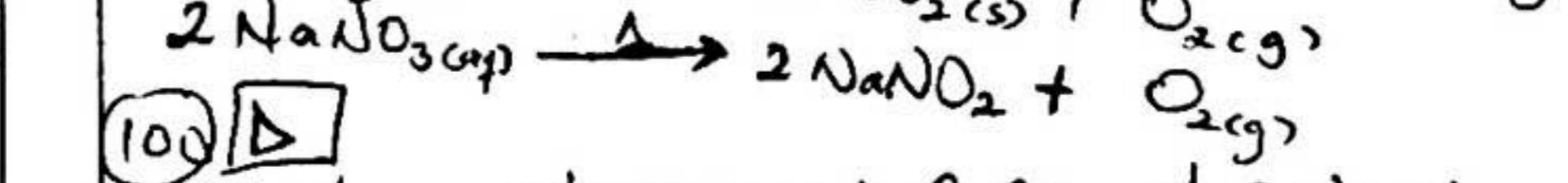
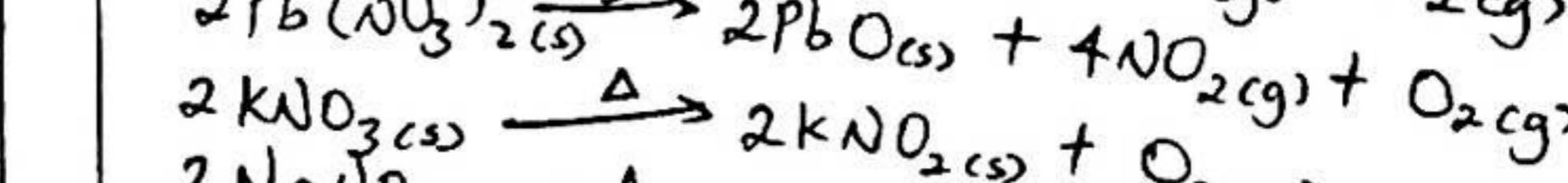
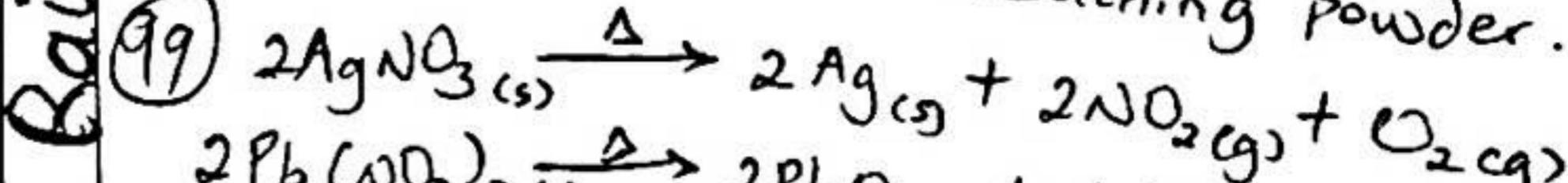
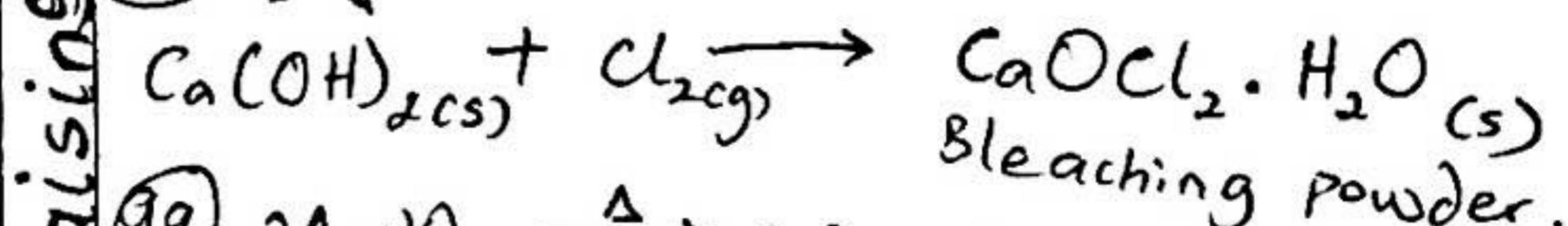
see question 53

96 D

See question 36
while the process is term esterification.

97 A

98 A



Potentials

Raising

Lattice

Integrit

Blessed

Ozone