Solution

11TH STD MSAT PCB

Class 11 - Admission Test

Physics

1.

(d) -15 cm

Explanation:

Given the magnification +2.0 of a concave mirror of radius of curvature 60.0 cm.

Focal length = $\frac{60}{2}$ = -30

(-ve is taken because the focus of the mirror is behind the pole.)

Magnification, m = $\frac{-v}{u}$

Putting the value of magnification in the above formula we get,

$\frac{-v}{u}$ = 2

v = -2u

v is image distance, u is object distance and f is focal length.

Since,

$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

Putting the values

$\frac{1}{u} + \frac{1}{-2u} = \frac{1}{-30}$

$\frac{1}{2u} = \frac{1}{-30}$

u = $-\frac{30}{2}$ cm

u = -15 cm

Hence, the object distance is -15 cm.

2. **(a)** i = r = 90^o

Explanation:

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

3. **(a)** 50 C

Explanation:

Given,

Current, I = 5A

Time taken, t = 10s

Charge moved, Q = ?

I = $\frac{Q}{t}$

Q = I $\times$ t

Q = 50 C

4.

(b) 5 A

Explanation:

The resistance of a material is given by:

R = $\rho\frac{l}{A}$

If l' = 2.5l and R' = 0.5 R

let A' is the area. New resistance is given by:

R' = $\rho\frac{l'}{A'}$

Solving for A'

A' = $\frac{\rho l'}{R'}$ ...(i)

Plugging all the values,

A' = $\frac{\rho l'}{R'}$ ...(ii)

Dividing (i) by (ii)

$\frac{A'}{A} = \frac{\frac{\rho(2.5)l}{(0.5R)}}{\frac{\rho l}{R}}$

$\frac{A'}{A}$ = 5

A' = 5A

5.

(b) Network (iii)

Explanation:

i. R_1 = kΩ + 200 Ω = 1000 Ω + 200 Ω = 1200 Ω

$\frac{1}{R_i} = \frac{1}{1200} + \frac{1}{1000} = \frac{11}{6000}$

$\therefore R_{\text{i}} = \frac{6000}{11} = 545.45\Omega$

ii. $\frac{1}{R_{\text{ii}}} = \frac{1}{1000} + \frac{1}{200} + \frac{1}{1000} = \frac{7}{1000}$

$\therefore R_{\text{ii}} = \frac{1000}{7} = 142.85\Omega$

iii. $\frac{1}{R_1} = \frac{1}{1000} + \frac{1}{1000} = \frac{2}{1000}$

$R_1 = \frac{1000}{2} = 500\Omega$

R_{iii} = 500 + 200 = 700 Ω

$\therefore R_{\text{iii}} > R_{\text{i}} > R_{\text{ii}}$

6.

(d) 4.8 amp

Explanation:

First case:

Given,

Current, I = 2.4amp

Voltage, V = 120V

We know that,

V = IR

120 = 2.4 × R

R = $\frac{120}{2.4}$ = 50 Ohm

Second case:

Given,

Voltage, V = 240 volt

Resistance, r = 50 Ohm

We know that,

V = IR

240 = I × 50

I = 4.8 amp

7.

(d) $\frac{I^2}{R}$

Explanation:

Power (P) is the rate at which electric energy is lost (dissipated) or consumed in an electrical device due to resistance (R).

$P = VI = I^2R$ ($\because V = I \times R$)

$P = VI = \frac{V^2}{R}$($\because I = \frac{V}{R}$)

8. **(a)** Induced current will start flowing
Explanation:
According to Lenz's law, when a closed coil is linked with a varying magnetic flux, then some current is induced in the coil. So, when a magnet is taken towards a circular coil, then a varying magnetic flux is linked with the coil so that current is induced in the coil. This phenomenon is said to be electromagnetic induction.

9. **(a)** virtual
Explanation:
virtual

10. **(a)** Pupil
Explanation:
Pupil

11. **(c)** reflection of sky in water
Explanation:
The bluish color of water in the deep sea is due to the scattering of light because blue color has the smallest wavelength than other colors and therefore, due to the scattering of water particles by Sun’s radiations, the color of the water is blue in the deep sea.

12. **(a)** 5 m
Explanation:
New distance between the man and the mirror = y + 5
∴ The distance between the man and his image
$(y + 5) \times 2 = 20$
$2y + 10 = 20$
$2y = 10$
$y = 5$ m

13. **(a)** 59.4 kWh
Explanation:
Case 1:
Power, $P_1 = 60W$
Number, $n_1 = 2$
Time for use, $T_1 = 4$ hours everyday
Energy consumed, $E_1 = n_1 \times P_1 \times T_1$
$E_1 = 2 \times 60 \times 4 = 480$ watt-hour $= 0.48$kWh
Therefore, energy consumed for 30 days $= 30 \times 0.48 = 14.4$ watt-hour
Case 2:
Power, $P_2 = 100W$
Number, $n_2 = 3$
Time for use $T_2 = 5$ hours everyday
Energy consumed, $E_2 = n_2 \times P_2 \times T_2$
$E_2 = 3 \times 100 \times 5 = 1500 = 1.5$kWh
Therefore, energy consumed for 30 days $= 30 \times 1.5 = 45$kWh
Therefore, overall energy consumed = 14.4 + 45 = 59.4kWh

14. **(d)** The band of 7 colours.
Explanation:
When a white light is passed through a prism it gets split into combination of seven colours which is known as the spectrum. The colors of the spectrum of white light are those seen in a rainbow. They are usually named in order as: red, orange, yellow, green, blue, indigo and violet.

15.

(d) Current

Explanation:

Resistors in series have same current.

Chemistry

16.

(b) Calcium hydroxide

Explanation:

Calcium hydroxide (traditionally called slaked lime) is an inorganic compound with the chemical formula $Ca(OH)_2$. It is a colourless crystal or white powder and is obtained when calcium oxide (called lime or quicklime) is mixed or slaked with water. It has many names including hydrated lime, caustic lime, builders' lime, slack lime, cal, or pickling lime. Calcium hydroxide is used in many applications, including food preparation. Limewater is the common name for a saturated solution of calcium hydroxide.

17.

(b) Decomposition of calcium carbonate to form quick lime and carbon dioxide.

Explanation:

Decomposition of calcium carbonate to form quick lime and carbon dioxide.

18.

(d) Heating copper wire in presence of air at high temperature

Explanation:

In the other given options here, there is no involvement of chemical reaction. When copper is heated in presence of air at high-temperature copper undergoes an oxidation reaction to give out copper oxide.

19. **(a)** Oxidation reaction

Explanation:

Silver articles turn black due to oxidation of silver to silver sulphide.

20.

(b) Blue litmus turns red and red litmus remains red.

Explanation:

Blue litmus turns red and red litmus remains red.

21.

(d) Wash the hand immediately with plenty of water and apply a paste of sodium hydrogencarbonate

Explanation:

Washing the hand with plenty of water will minimize the presence of acid. Further, the application of sodium hydrogen carbonate will neutralize any remaining acid.

22.

(c) A only

Explanation:

Zinc quickly combines with acid to generate hydrogen bubbles, and solution A with a pH of 2.0 is extremely acidic.

23.

(c) dry slaked lime

Explanation:

Bleaching powder is manufactured (prepared on a large scale) by passing chlorine gas over dry slaked lime:

$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

24. **(a)** Mercury and Bromine

Explanation:

Mercury is the metal which exists as a liquid at room temperature, while bromine is the non-metal which exits as a liquid at room temperature.

25.

(d) Non-metal being acceptors of electrons.

Explanation:

Non-metals are electronegative. They do not provide free electrons. Hence they do not replace hydrogen from acids.

26.

(b) Shiny globules of Pb, C and Mg

Explanation:

$$2PbO + \underset{(Y)}{C} \rightarrow \underset{\substack{(Shiny\\ globules)}}{2Pb} + CO_2$$

27.

(c) (i) and (iii) only

Explanation:

$$\text{Ethyl propanoate} : \underset{(10\ H\ atoms)}{CH_3CH_2COOCH_2CH_3}$$

$$\text{Propyl methanoate} : \underset{(8\ H\ atoms)}{HCOOCH_2CH_2CH_3}$$

$$\text{Methyl butanoate} : \underset{(10\ H\ atoms)}{CH_3CH_2CH_2COOCH_3}$$

$$\text{Ethyl butanoate} : \underset{(12\ H\ atoms)}{CH_3CH_2CH_2COOCH_2CH_3}$$

28. **(a)** H - C ≡ C - H

Explanation:

The formula of ethyne is C_2H_2

29.

(d) Both H_2C = CH - CH = CH_2 and $HC \equiv CH$

Explanation:

To add two molecules of Br_2, a hydrocarbon should have two double bonds or one triple bond.

30.

(b) $CH_3COOC_2H_5$ + NaOH $\rightarrow$ CH_3COONa + C_2H_5OH

Explanation:

When ester is treated with an alkali, the reaction gives ethanol and sodium ethanoate. This reaction is called saponification reaction.

Biology

31.

(b) small intestine

Explanation:

The small intestine is the part of the gastrointestinal tract between the stomach and the large intestine where much of the digestion of food takes place. The primary function of the small intestine is the absorption of nutrients and minerals found in food.

32. **(a)** Oxidation of carbon to carbon dioxide

Explanation:

The plants containing chlorophyll pigments can perform photosynthesis by absorption of the light energy. The carbon dioxide is fixed and reduced to form the carbohydrates. During this process, the conversion of light energy to chemical energy takes place.

33.

(c) Amino acids, (ii) glucose, (iii) fatty acids and glycerol

Explanation:

Amino acids, (ii) glucose, (iii) fatty acids and glycerol

34.

(d) Amylase

Explanation:

Amylase is secreted in the mouth and acts on the starch to convert into simpler molecules. Hence, Amylase is the first enzyme to mix with food in the digestive tract.

35.

(d) Adrenaline

Explanation:

Adrenaline is secreted at the time of emergency and stress condition such as facing an interview. Large amount of adrenaline causes increase in heart beat to supply more oxygen to muscles. The breathing rate also increases due to the contraction of the diaphragm and rib muscles. Also, basal metabolic rate, blood pressure and sugar level in blood is increased. Because of its role in emergency situations, adrenaline is also called as emergency hormone.

36.

(b) Absence of KOH

Explanation:

KOH absorbs the CO_2 gas so, in the absence of KOH, CO_2 gas turns lime water milky.

37.

(d) Water level will not rise in bent tube and CO_2 will not be absorbed

Explanation:

The rise in the level of water indicates that CO_2 is produced by germinating seeds during respiration. Actually, the germinating seeds respire and produce CO_2, which is absorbed by the KOH solution. This creates a vacuum in the conical flask. The air present in the bent glass tube moves into the conical flask. This pulls the water in the bent tube further up.

So, if a student puts germinating seeds into the conical flask and misses to put KOH solution in a hanging test tube then the water level will not rise in a bent tube and CO_2 will not be absorbed.

38.

(d) To prevent the material from drying

Explanation:

Glycerine is a good dehydrating agent. It avoids the drying of the specimen. Besides, glycerine tends to reflect light due to its refractive nature. As a result of it, the image appears clearer under the microscope. Due to these reasons, glycerine is used while preparing a temporary mount of leaf peel.

39.

(b) excretion

Explanation:

Excretion is the process by which metabolic wastes and other non-useful materials are eliminated from an organism. In Human beings, kidneys are the organs that filter waste products from the blood. Therefore, Kidneys are the part of the excretory system.

40.

(b) tongue

Explanation:

Gustatory receptor present in tongue.

41.

(d) Sensory neuron

Explanation:

Sensory neuron carries electrical impulses from receptor to brain while motor neuron carries electrical impulses from the brain to effectors.

42.

(b) Cerebellum

Explanation:

The Cerebellum is responsible for the precision of voluntary actions and maintaining the posture and balance of the body.

43.

(c) abscisic acid

Explanation:

The substance that triggers the fall of mature leaves and fruits from plants is due to Abscisic acid.
Abscisic acid forms a layer of abscission. This layer disconnects the living tissue of leaf from the other parts.

44.

(c) Budding

Explanation:

Above oragnism is hydra which reproduce by budding.

45. **(a)** C and D only

Explanation:

In Amoeba, the nucleus divides, first then cytoplasm to form daughter nuclei. This is binary fission. Budding takes place in yeast.

46.

(b) Roots in case of sweet potato and Colocasia.

Explanation:

Colocasia is vegetatively propagated from underground stem.

47.

(d) Intra-Uterine Contraceptive Device

Explanation:

An Intra-Uterine Contraceptive Device (IUCD) is a device which is inserted into the uterus (womb) to prevent pregnancy. There are many types of IUCD and they come in different shapes and sizes. Commonly used types are IUCD containing copper.

48. **(a)** Urethra

Explanation:

Chlamydia is a common sexually transmitted disease. It is caused by bacteria called Chlamydia trachomatis. It can infect both men and women. In Men, this condition often causes swelling and inflammation of the urethra, accompanied by a penile discharge.

49.

(b) Mechanical method

Explanation:

Mechanical Barrier methods include the diaphragm, cervical cap, male and female condom, spermicidal foam, sponges, and film. Unlike other methods of birth control, barrier methods are used only when you have sexual intercourse.

50.

(d) genetic material comes from two parents of the same species

Explanation:

Sexual reproduction involves two parents of the same species. Thus, both of them contribute to the genetic material of the offspring and bring about the variations.

51.

(b) Chrysemys picta

Explanation:

In Chrysemys picta, a species of turtle, high incubation temperature above $33^{o}C$ results in development of female progeny while a temperature below $28^{o}C$ produces only males. It is an example of sex determination under the effect of environmental factors.

52. **(a)** Cricket

Explanation:

- The X0 sex-determination system is a system that determines the sex of offspring among grasshoppers, crickets, cockroaches, and some other insects. In this system, there is only one sex chromosome, referred to as X. Males only have one X chromosome (X0), while females have two (XX).
- The zero (sometimes, the letter O) signifies the lack of a second X. Maternal gametes always contain an X chromosome, so the sex of the animals' offspring depends on whether a sex chromosome is present in the male gamete. Its sperm normally contain either one X chromosome or no sex chromosomes at all.

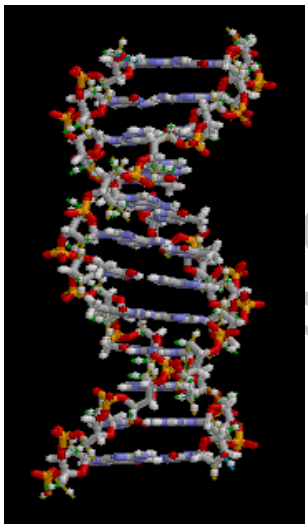
53.

(d) DNA

Explanation:

Heredity is the passing on of traits from parents to their offspring, either through asexual reproduction or sexual reproduction; the offspring cells or organisms acquire the genetic information of their parents.

Heritable traits are known to be passed from one generation to the next via DNA, a molecule that encodes genetic information.



54. **(a)** 9 : 3 : 3 : 1

Explanation:

9 : 3 : 3 : 1

55.

(b) 1 : 1

Explanation:

When purebred tall plant with the phenotype (TT) crossed with a short plant with the phenotype (tt), the possible progeny in F_2 generation: TT(1), tt(1), and Tt(2). Thus the ratio of pure tall (TT) to pure short (tt) is 1:1.

56.

(d) Biomass in a pond ecosystem

Explanation:

The pyramid shown here is an inverted pyramid. Pyramid of energy can never be inverted. Number of producers (i.e., phytoplanktons) in a pond are always more than the consumers thus, pyramid of number in a pond cannot be inverted. In a forest, biomass of producers (i.e., tree) is large, so pyramid of biomass in a forest is also upright. Pyramid of biomass for pond ecosystem is inverted as biomass of a trophic level depends on reproductive potential and longevity of its members.

57.

(d) A, C and D

Explanation:

All given ecosystems are terrestrial ecosystems. Forest, grassland and desert are natural ecosystems. An aquarium is an example of a human-made (artificial) ecosystem.

58.

(b) $R \rightarrow P \rightarrow S \rightarrow Q$

Explanation:

$R \rightarrow P \rightarrow S \rightarrow Q$

59.

(d) Trap solar radiations and increase temperature

Explanation:

Greenhouse gases (GHG) are gases in the atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. Greenhouse gases trap solar radiation and increase the temperature of the Earth.

60. **(a)** A and C

Explanation:

Excessive exposure of humans to UV (ultraviolet) rays results in damage to the immune system. Exposure to UV radiation is also a risk factor for most skin cancers.