(1) P-2 C-1

केन्द्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली
माध्यमिक स्कूल परीक्षा (कक्षा दसवीं)
परीक्षार्थी प्रवेश–पत्र के अनुसार भरें

विषय Subject : SCIENCE - THEORY

विषय कोड Subject Code : 086

परीक्षा का दिन एवं तिथि
Day & Date of the Examination : Wednesday, 22-3-'17

उत्तर देने का माध्यम
Medium of answering the paper : ENGLISH

प्रश्न पत्र के ऊपर लिखे कोड को दर्शाएं : Write code No. as written on the top of the question paper :	Code Number	Set Number
	31/1	● ② ③ ④

अतिरिक्त उत्तर–पुस्तिका (ओं) की संख्या
No . of supplementary answer -book(s) used :

विकलांग व्यक्ति : हाँ / नहीं
Person with Disabilities : Yes / No — No

किसी शारीरिक अक्षमता से प्रभावित हो तो संबंधित वर्ग में ✓ का निशान लगाएं।
If physically challenged, tick the category

B	D	H	S	C	A

B = दृष्टिहीन, D = मूक व बधिर, H = शारीरिक रूप से विकलांग, S = स्पास्टिक
C = डिस्लेक्सिक, A = ऑटिस्टिक
B = Visually Impaired, D = Hearing Impaired, H = Physically Challenged
S = Spastic, C = Dyslexic, A = Autistic

क्या लेखन – लिपिक उपलब्ध करवाया गया : हाँ / नहीं
Whether writer provided : Yes / No — No

यदि दृष्टिहीन हैं तो उपयोग में लाए गये सोफ्टवेयर का नाम :
If Visually challenged, name of software used :

*एक खाने में एक अक्षर लिखें। नाम के प्रत्येक भाग के बीच एक खाना रिक्त छोड़ दें। यदि परीक्षार्थी का नाम 24 अक्षरों से अधिक है, तो केवल नाम के प्रथम 24 अक्षर ही लिखें।
Each letter be written in one box and one box be left blank between each part of the name. In case Candidate's Name exceeds 24 letters, write first 24 letters.

कार्यालय उपयोग के लिए
Space for office use

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086/01775

3 2

Section - A

Q1: → Alkane series
2nd Member - Ethane - C_2H_6
3rd Member - Propane - C_3H_8

Q2:
→ When a cell reproduces, its DNA makes two copies, each divided cell getting one.

Ans 3: Energy available to producer → 10,000 J

Ans 4: Concave lens

$u = -30\,cm$

$f = -15\,cm$

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

$$-\frac{1}{15} = \frac{1}{v} + \frac{1}{30}$$

$$\frac{1}{v} = -\frac{1}{15} - \frac{1}{30} \Rightarrow \frac{1}{v} = \frac{-2-1}{30} \Rightarrow \frac{1}{v} = -\frac{3}{30} \Rightarrow v = -10\,cm$$

2016

Since object is placed at a finite distance from concave lens
Therefore

1) Image is virtual and erect.
2) Image is diminished.
3) It is formed on same side of the lens.
4) It is formed 10 cm in front of lens.
5) It can't be captured on a screen.

$u = -30$

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

$-\frac{1}{15} = -\frac{1}{30} - \frac{1}{v}$

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

-30

Ans 5:→ Advantages of conserving forests :-

1) More oxygen in the atmosphere.
2) Reduction in global warming.

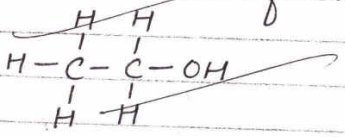
Advantages of conserving wildlife :-

1) Promotes ecological stability.
2) Maintains balance in food chain.

Ans 6:→ Advantages of water harvesting at community level :-

1) No shortage of water in dry or non-monsoon months.
2) Reduction of chances of droughts & famines.
3) Increased biomass production & more income.

Ans 7 → Structural Formula of Ethanol



When ethanol is heated with excess H_2SO_4 at 443K, dehydration reaction occurs and ethene & water are formed as by products.

$$CH_3CH_2OH \xrightarrow[\text{dehydrating agent}]{\text{conc. } H_2SO_4 + \Delta} CH_2=CH_2 + H_2O$$

(Ethene)

Here, H_2SO_4 acts as dehydrating agent to remove water from ethanol.

Ans 8) →

ESTERIFICATION REACTION	SAPONIFICATION REACTION
1) In this reaction, alcohol (like ethanol) reacts with carboxylic acid (like CH_3COOH) to form esters & H_2O in the presence of sulphuric acid	1) In this reaction, alkaline(NaOH) hydrolysis of esters gives soap (salt) & alcohol.
$CH_3COOH + C_2H_5OH \xrightarrow{\text{conc. } H_2SO_4} CH_3COOC_2H_5$ (Ethyl Ethanoate) $+ H_2O$	$CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$

Use

(i) Esters → used in perfumes or as flavouring agents.

(ii) Saponification process → used to prepare soap.

Ans 9: Modern Periodic Table has 7 periods and 18 groups.

(i) Metallic character decreases on moving from left to right in a period.

Reason: Along the period, from left to right, the effective nuclear charge increases due to increase in no. of protons due to which forces of attraction between nucleus & valence electrons increases and ability to lose electrons (i.e metallic character) decreases.

016

(ii) Metallic character increases down a group.

Reason: Because atomic size increases down a group, the force of attraction between nucleus & valence electron decrease & electrons losing tendency increases. Therefore metallic character increases.

Ans 10 :→

(a) Highest valency

	K	L	M
Na	2	8	1
Mg	2	8	2
Al	2	8	3

Clearly, highest valency is 3 i.e of Aluminium as it can lose its 3 valence electrons to become Al^{3+}

(b) largest atomic radius → Sodium (Na)

Reason → Because atomic size decreases along a period from left to right. Since Na is present at most left side, it has more atomic radius.

(C) Maximum chemical reactivity → Na (Sodium)

Reason → Since all three are metals ; chemical reactivity means ability to lose electrons. Since ability to lose electrons decreases along a period, Na would be most metallic and hence chemically most reactive.

8

Ans 11:→ Reproduction is an important characteristic of living beings because :-

1) It promotes continuity of life.

2) It promotes stability of species.

3) It includes creation of variations that are the basis of evolution.

4) It regulates population.

Ans 12→ Vegetative Propagation :→ Propagating (or growing) plants from their vegetative parts like stem, leaves, roots etc. is known as vegetative propagation.

2016

Advantages :-

1) Plants produced by vegetative propagation flowers & have fruits much earlier than plants produced by seeds.

2) It is easy, fast method and can be used for propagation of plants which don't produce seeds.

Disadvantages :-

1) Since plants are genetically very similar & almost identical, no new variations can be generated.

2) Plants can still suffer from various plant diseases.

3 10

Ans 13 → Pregnancy prevention techniques :

1) Mechanical barriers like cervical cap, condoms etc.
2) Surgical methods like Tubectomy, vasectomy.
3) Using IUCD's like loop, Copper-T.

Using IUCD's (like loop & copper-T) & also oral contraceptives are not meant for males.

Impact on health & propperity of a family :-

1) Better standard of living.
2) Better and improved resources.
3) More focus on children who have already born.
4) Prevention from STDs like HIV AIDS, syphilis etc.

2016

Ans14 → Mendel explained this through his monohybrid cross. He produced progeny from purely dwarf & purely tall plants of pea and he found that all F_1 progeny were tall. But when he used F_1 progeny to produce F_2 progeny, then 25% of plants (pea plant) were short and 3/4 were tall. From this he concluded that both tallness & dwarfness were inherited in F_1 progeny but dwarfness was suppressed under the dominance of other. Thus he concluded that it is possible that a trait is inherited but not expressed in an organism.

Ans15 → 1) classification is the reflection of evolutionary relationships between organisms.

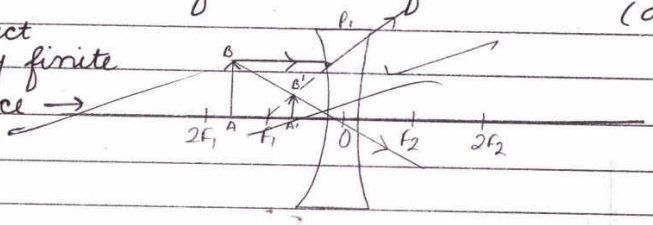
2) More the two organisms are related to each other, more characteristics they have in common.

3) More characteristics they have in common, more recently they have common ancestor like a girl & her real brother.

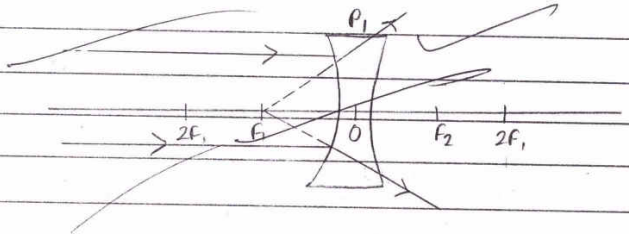
4) Similarities between organisms allow us to group (classify) them & study these groups to determine how these organisms are evolutionary related.

Ans 16 → If Image formed by a lens is always erect & diminished for all values of 'u', therefore, the lens is concave lens. (diverging)

Object At any finite distance →



Object at infinity →



2016

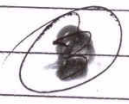
We know that power of a concave lens is negative

$\therefore P = -10D$

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

$f = \frac{1}{P} = \frac{-1}{10} = -0.1m$ or $-10cm$

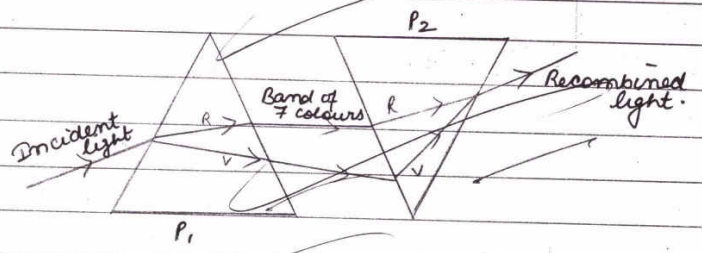
Ans 17 ↦ Cause of Dispersion of white light by a glass prism ↤



When white light ray passed through a glass prism, its constituents colours having different wavelengths & speeds, bend or deviate at different angles due to which they get separated from each other. This happens due to peculiar shape of prism that different colours go in different directions.

Newton passed a ray of white light through a glass prism. After refraction, the white light splitted into its constituent band of seven colour called spectrum. When he tried to further split it by

placing a prism, it didnt occur. But when he placed an inverted prism and passed the band of colours through it, he saw white light ray coming from other side. Thus he concluded that sunlight is made up of seven colours.



2016

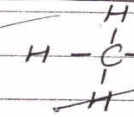
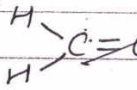
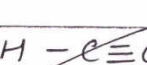
Ans 18 → (a) 1) By making them understand the need and important of water.

2) By awaring them about water saving methods like - watering plants in evening or roof top rainwater harvesting.

3) By making them aware of less water using habits.

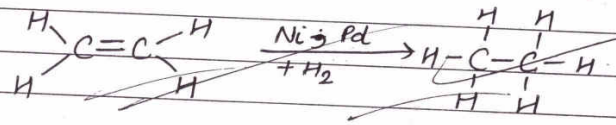
Ans(b) 1) Increasing vegetation ⟶ Increased vegetation allows percolation of water from the rain into the ground to increase water table level. We should use handpumps & wells judiciously.

Ans 19 ⟶ compounds containing carbon & hydrogen are called hydrocarbons. Oxides, carbonates, hydrogencarbonates of carbon are not called hydrocarbons as they are inorganic compounds.

	General Formula	First Member's Structure
Alkanes	C_nH_{2n+2} where $n=1,2,3...$	 Methane
Alkenes	C_nH_{2n} where $n=2,3...$	 Ethene
Alkynes	C_nH_{2n-2} where $n=2,3...$	 Ethyne

3

Addition Reaction converts alkenes to alkanes
(unsaturated) (saturated)



Reactions occurs at high temperature & in presence of catalysts such as nickel or palladium.

2016

Ans 20.) →

(i) Ovary :→
1) It produces female eggs or ova.
2) It produces hormones like progesterone or oestrogen that bring changes in girls during puberty.

(ii) Uterus :→
1) It is the site where implantation of zygote occurs.
2) It nourishes & provides nutrition to embryo.

(iii) Fallopian Tube

(i) It carries & take female ovum from ovary to womb.

(ii) It is the site of fertilisation.

(b) Structure of placenta :

1) It is a disk like structure embedded in the uterine wall.

2) It has villi on embroyal side and blood filled spaces on mother side surrounded by villi.

Functions of Placenta :

1) It provides a large surface area for absorption of glucose & oxygen from mother blood to embryo.

2) It also takes away wastes generated by embryo into mother's blood.

3

Ans 21 ↦

ACQUIRED TRAITS	INHERITED TRAITS
1) These traits are acquired by a person during his lifetime.	1) These traits are inherited by the individual from his/her parents.
2) They donot pass to next generations.	2) They pass to next generations.
3) They donot direct evolution.	3) They direct evolution.
4) eg ↦ Body weight, Knowledge.	4) eg ↦ eye colour, skin colour, height etc.

2016

The traits which are acquired by individual during his lifetime can't be passed to future generations as they donot bring any change in the DNA of germ cells. Any change in non-reproductive tissue cannot lead to change in DNA of germ cells. for eg ↦ There were red beetles living in green bushes and the

bushes were hit by plant disease. This caused reduction in the available food to red beetles and made them poorly nourished. But if the bushes will become free from any plant disease, the new generation will be healthy & of normal weight as low weight do not causes any change in the DNA of germ cells of red beetles.

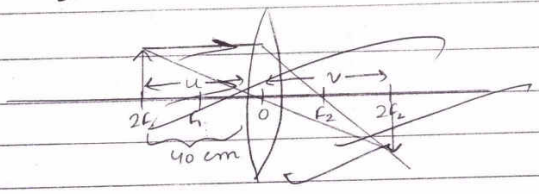
Ans 22 →

(a) Focal length of convex lens will be 20 cm.

By S.No. 3 in the table, we get $u = v$ and this is possible when object is placed at $2F_1$ and

Therefore $R = 40\text{ cm}$

$$f = R/2 = 40/2 = 20\text{ cm}$$



(b) S. No. 6 is incorrect

WKT Here, $u = -15$ cm

∴ Object is placed between focus & optical centre

∴ Image will be formed on same side of lens and it will be virtual, erect & magnified

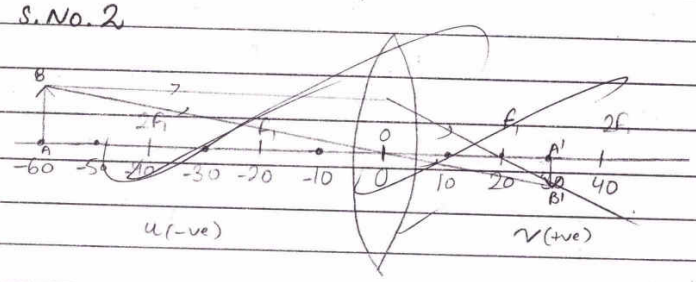
WKT, by sign conventions

For virtual image in case of any lens

v is always negative

But in S. No. 6, v is positive indicating that image is real but actually it is virtual.

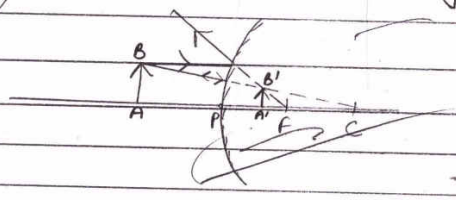
(c) For S. No. 2



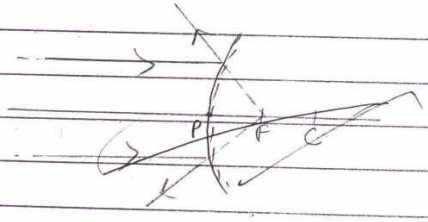
$$m = \frac{v}{u}$$

$$m = \frac{30}{-60} = -\frac{1}{2} = -0.5$$

Ans 23 → (a) If image formed by a mirror for all positions of the object is diminished, erect & virtual, then the mirror is diverging or convex mirror.



If object is placed at any finite distance from a convex mirror, image is virtual, erect & diminished



Use

Convex mirrors are used in rear view mirrors as they are bulged out & thus have wider field of view due to which much cars can be seen. Also it forms an erect image.
It is also used as shop safety mirrors ~~so~~ because of same reason to detect thieves.

(b) Radius of curvature is the radius of sphere (imaginary) of which spherical mirror is a part. It is represented by 'R'.

$R = +24\,cm$

∴ It is a convex mirror

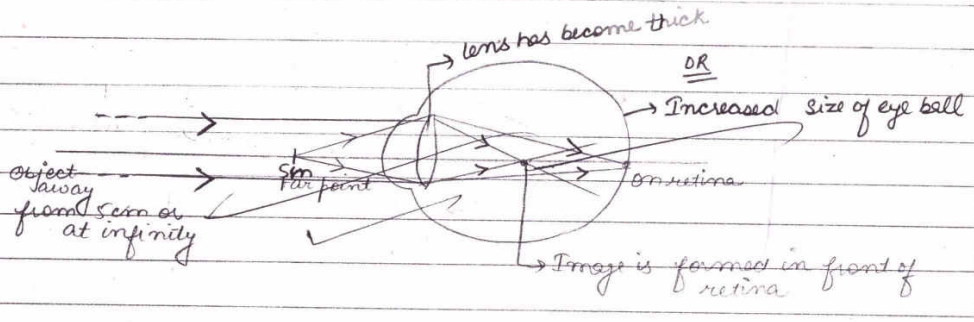
$f = R/2 = 24/2 = +12\,cm$

2016

Ans 24 ⟼ (a) Causes of myopia ⟼

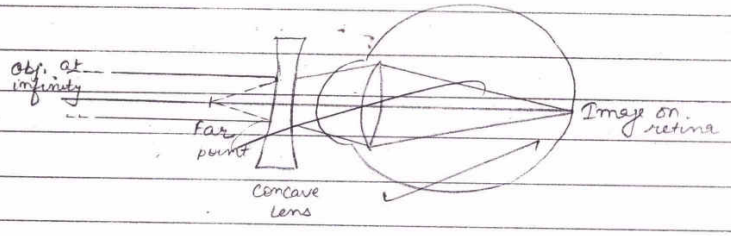
1) Excessive curvature of eye lens.
2) Elongation of eye ball.

(i)



Light rays coming from an object away from 5m like from the infinity are converged much before retina due to increased converging power.

(ii)



Concave lens is used to restore proper vision in case of myopia. Concave lens is diverging and make the image of object placed at infinity on it focus i.e its far point

and help us to see objects upto infinity.

(b) Focal length of concave lens is negative

$\therefore f = -5m$

$P = \frac{1}{f} = \frac{-1}{5} = -0.2D$

$\frac{1 \times 2}{5 \quad 10}$

-0.2

Section-B

25.) (D) Formation of bubbles of a colourless and odourless gas.

26.) (C) The outer surface of beaker has become hot.

27.) (D) Calcium sulphate, Calcium chloride

28.) (B) Gram, pea and groundnut

29.) (C) Radish and Carrot

30.) (D) Device X is a convex lens and device Y is a concave mirror, whose focal lengths are 20cm & 25cm resp.

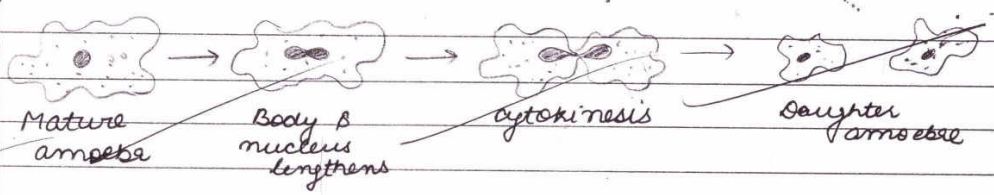
31.) (D) Either towards or away from the screen depending upon the position of object.

32.) (B) $\angle i = \angle e > \angle r$

33.) (C) P, Y, Z

34.) (1) Fat or oil (Castor oil): 20ml
(2) 20% NaOH solution 30ml
(3) Water
(4) NaCl
If we add a red litmus paper to reaction mixture, it will turn blue indicating presence of alkaline nature.

35.)



36.)

(A) He should move lens away from screen because as object distance decreases, image will go away from focus.

(B) Size of image will increase as the object is moved towards lens.

(C) As image is magnifying, ∴ intensity of flame reduces.

(D) No image will be formed on screen as it will form virtual image in that case.