IIT ASHRAM BRINGS...

SCIENCE APTITUDE TEST (2016-17)
SAMPLE PAPER

CLASS 7

Time : 3 Hours
M.M. : 300

KHOJ

A Hunt for
Young Scientists..!

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

◆ IMPORTANT INSTRUCTIONS ◆

A. General:

1. This booklet consists of 100 questions.
2. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, and electronic gadgets in any form are not allowed to be carried inside the examination hall.
3. The answer sheet, a machine–readable Objective Response Sheet (OMR), is provided separately.
4. DO NOT TAMPER WITH / MUTILATE THE OMR OR THE BOOKLET.
5. Write Name and Address in capital letters of OMR sheet.
6. **Submit the OMR Sheet back to Invigilator after examination before leaving the examination hall.**

B. Question paper format:

7. The question paper consists of **4 Sections.**
    - **(I)** **Mental Ability (20 Questions)**
    - **(II)** **Mathematics (30 Questions)**
    - **(III)** **Physics & Chemistry (34 Questions)**
    - **(IV)** **Biology (16 Questions)**

C. Marking Scheme :

8. For each question in **Section I, II, III and IV** you will be **awarded 3 marks** if you have darkened only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases where the answer marked is not correct, **minus one (–1) mark** will be awarded.

Name of the Candidate	Class	Roll Number

I have read all the instructions and shall abide by them	I have verified all the informations filled by the candidate.
.... *Signature of the Candidate*	.... *Signature of the Invigilator*

MENTAL ABILITY

1. If 4th Jan 2008 falls on Friday, which day of the week is 4th Jan 2009?

   (a) Monday   (b) Friday

   (c) Wednesday   (d) Sunday

2. Ram goes $\sqrt{12.5}$ km towards west from a certain point. Then after turning to his right he again goes same distance. In the end he goes 25 km towards South-East. How far is he now from his starting point?

   (a) 10 km   (b) 20 km

   (c) 15 km   (d) 5 km

3. If '+' means 'x', 'x' means '–', '–' means '÷' and '÷' means '+', then $18 \div 4 + 3 \times 2 - 2 = ?$

   (a) 45   (b) 48

   (c) 29   (d) 39

4. Complete the sequence 4, 2, 5, 4, 7, 6, 10, 8, 14, ?

   (a) 10   (b) 12

   (c) 18   (d) 19

5. Lamp A is less bright than Lamp B;

   Lamp B is brighter than Lamp C;

   Lamp C is as bright as Lamp D;

   Lamp B is brighter than Lamp D;

   Lamp D is brighter than Lamp A; Which lamp is the brightest?

   (a) Lamp A   (b) Lamp B

   (c) Lamp C   (d) Lamp D

6. Find the appropriate figure from the answer figures so that questions figures form a series.
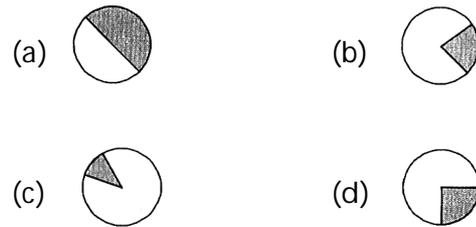

   (a)   (b)

   (c)   (d)
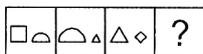
7. Find the missing figure.


   (a)   (b)

   (c)   (d)

8. In a village one half of the population works in the fields. Half of the people who do not work in fields work in factories.

   Select the appropriate diagram in which shaded region best represents people working in factories?

   (a)   (b)

   (c)   (d)

9. Complete : JK : QR :: .... : ....

   (a) ST : UV   (b) WX : ZY

   (c) CF : JL   (d) BC : IJ

10. A dice has P, Q, R, S written in a clockwise order on the adjacent faces and T & U at the top and bottom respectively. When R is at the top, what will be at the bottom?

    (a) Q   (b) P

    (c) R   (d) U

11. If A is B's brother, B is C's sister and C is D's father, then D is A's

    (a) Brother   (b) Sister

    (c) Wife   (d) None of these

12. In a certain code, "7 8 6" means "bring me apple" and "9 5 8" means " peel green apple" and "6 4 5" means "bring green fruit", which of the following is the code for 'me'?

    (a) 8   (b) 6

    (c) 7

    (d) Can't be determined

13. Four positions of a dice is given. The number oppoiste to 3 is
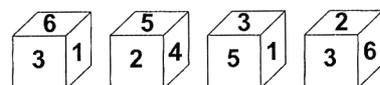
    (a) 2   (b) 3

    (c) 4   (d) 6

14. Which of the following represents the relationship between "animals, elephants and lions"?

(a) 　　　(b)

(c) 　　　(d)
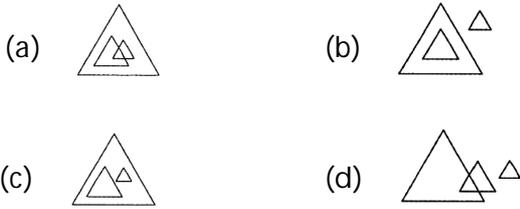
15. Which of the following numbers does not fit in the given series?

0, 1, 3, 6, 10, 15, 21, 28, 37, 45

(a) 0　　　　　　　　(b) 21

(c) 37　　　　　　　(d) 45

16. 'True' is related to 'False' as 'float' is related to____.

(a) Swing　　　　　(b) Swim

(c) Sink　　　　　　(d) Dive

17. In the sequence of numbers 5, 8, 13, X, 34, 55, 89, the value of X is____.

(a) 29　　　　　　　(b) 23

(c) 21　　　　　　　(d) 20

18. If 5 men can build a wall in 12 days. How many men can build it in 10 days?

(a) 6 men　　　　　(b) 7 men

(c) 8 men　　　　　(d) 4 men

19. Which one is the same as Basket, Pail and Pan?

(a) Knife　　　　　(b) Spoon

(c) Fork　　　　　　(d) Bowl

20. Find the odd number out.

(a) 5　　　　　　　 (b) 115

(c) 205　　　　　　(d) 14

MATHEMATICS

1. The value of $|7| + |5| - |-3|$, where $|.|$ is absolute value of an integer is____.

(a) 9　　　　　　　　(b) 1

(c) 2　　　　　　　　(d) 3

2. An insect crawls up 5 cm every second on a 60 cm vertical rod and then falls down 2cm over the next second. How many seconds will it take to climb the rod?

(a) 20 sec　　　　　(b) 39 sec

(c) 60 sec　　　　　(d) 30 sec

3. A tank contains 500 litres of water. Due to a small hole in the tank, the quantity of water is decreasing at the rate of 9 litres every hour. What will be the quantity of water in the tank after 10 hours?

(a) 410 litres　　　　(b) 491 litres

(c) 400 litres　　　　(d) 90 litres

4. The average of the two middle rational number if $\frac{4}{7}, \frac{1}{3}, \frac{2}{3}, \frac{5}{9}$ are arranged in ascending order is____.

(a) $\frac{4}{9}$　　　　　　　　(b) $\frac{71}{63}$

(c) $\frac{11}{18}$　　　　　　　(d) $\frac{71}{126}$

5. The value of $[(-4) \times (-9) \times (-25)] \div [(-2) \times (-3) \times (-5)]$ is____

(a) 10　　　　　　　(b) 20

(c) 30　　　　　　　(d) 40

6. A fraction $\frac{x}{y}$ can be expressed as a terminating decimal if y has no prime factors other than___

(a) 2, 3　　　　　　(b) 3, 5

(c) 2, 5　　　　　　(d) 2, 3, 5

7. The value of $3\frac{4}{5} + 2 + \frac{7}{10} + 4\frac{8}{15}$ is

(a) 68/15　　　　　(b) 331/30

(c) 27/10　　　　　(d) 325/30

8. In the given number line, point M represents which of the following fractional numbers?
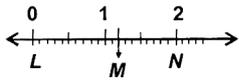
   (a) $\dfrac{2}{8}$ 　　　　(b) $\dfrac{6}{5}$

   (c) $\dfrac{2}{3}$ 　　　　(d) $\dfrac{7}{10}$

9. What fraction of the figure is shaded?
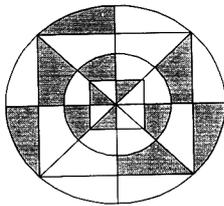
   (a) $\dfrac{1}{4}$ 　　　　(b) $\dfrac{3}{8}$

   (c) $\dfrac{5}{8}$ 　　　　(d) $\dfrac{8}{11}$

10. The value of $[2 - 3(2 - 3)^{-1}]^{-1}$ is_____

   (a) $\dfrac{-1}{5}$ 　　　　(b) $\dfrac{1}{5}$

   (c) -5 　　　　(d) 5

11. Express the value of $9\dfrac{1}{3} - 5\dfrac{3}{4}$ in its simplest form:

   (a) $5\dfrac{4}{7}$ 　　　　(b) $9\dfrac{1}{12}$

   (c) $6\dfrac{2}{5}$ 　　　　(d) $3\dfrac{7}{12}$

12. The value of $1 + \cfrac{1}{1 + \cfrac{1}{1 - \cfrac{1}{6}}}$ is_____.

   (a) $\dfrac{6}{11}$ 　　　　(b) $\dfrac{16}{11}$

   (c) $\dfrac{7}{6}$ 　　　　(d) $\dfrac{1}{6}$

13. Simplify : $4\dfrac{5}{2} - 2\dfrac{3}{8} + 3\dfrac{7}{8}$

   (a) $\dfrac{145}{24}$ 　　　　(b) $\dfrac{24}{145}$

   (c) $\dfrac{144}{25}$ 　　　　(d) 8

14. The sum of Rs. 750 is distributed among A, B, C and D in such a manner that A gets as much as B and C together, B gets Rs. 125 more than C, D gets as much as C. What is A's share?

   (a) Rs. 100 　　　　(b) Rs. 225
   (c) Rs. 275 　　　　(d) Rs. 325

15. The total cost of three prizes is Rs. 2550. If the value of second prize is $\left(\dfrac{3}{4}\right)^{\text{th}}$ of the first prize and the value of 3rd prize is $\dfrac{1}{2}$ of the second prize, then the value of the first prize is_____

   (a) Rs. 900 　　　　(b) Rs. 1500
   (c) Rs. 1200 　　　　(d) Rs. 450

16. In a family, the father took $\dfrac{1}{4}$ of the cake and he had 3 times as much as each of the other members had. The total number of family members is

   (a) 3 　　　　(b) 7
   (c) 10 　　　　(d) 12

17. The present age of A is twice to that of B, 30 years from now, age of A will be $1\dfrac{1}{2}$ times that of B. The present ages of A and B (in years) respectively, are___

   (a) 60, 30 　　　　(b) 30, 60
   (c) 40, 50 　　　　(d) 50, 40

18. Two angles are complementary and congruent, then measure of each of the angles is____.

   (a) 90° 　　　　(b) 45°
   (c) 180° 　　　　(d) 135°

19. The angle between two hands of a clock at 4 : 30 pm is____
   (a) 45°　　　　　　　(b) 90°
   (c) 180°　　　　　　(d) 60°

20. A student is constructing a triangle whose sides are 3 cm, 4 cm and 8cm, is this triangle possible?
   (a) Yes　　　　　　　(b) No
   (c) Can't say
   (d) Data given is not complete

21. The value of 36 coins of 10 p and 20 p is Rs. 6.60. The number of 20p coins is____
   (a) 16　　　　　　　(b) 20
   (c) 30　　　　　　　(d) 32

22. A man sold 10 eggs for 5 rupees and gained 20%. How many eggs did he buy for 5 rupees?
   (a) 12　　　　　　　(b) 14
   (c) 25　　　　　　　(d) 16

23. Two numbers are in the ratio of 1 : 2. If 7 be added to both, their ratio changes to 3 : 5. The greater number is____.
   (a) 28　　　　　　　(b) 32
   (c) 36　　　　　　　(d) 25

24. By how much is $a^4 + 4a^2b^2 + b^4$ more than $a^4 - 8a^2b^2 + b^4$?
   (a) $12a^2 b^2$　　　　(b) $-12a^2b^2$
   (c) $2a^4 + 2b^4$　　　(d) $10a^2 b^2$

25. If $2l - 3m = -1$ and $lm = 20$, then the value of $4l^2 + 9m^2$ is___
   (a) 239　　　　　　　(b) 240
   (c) 241　　　　　　　(d) 361

26. The value of $(2.3\ a^5b^2) \times (1.2\ a^2b^4)$, when a = 1 and b = 0.5 is____.
   (a) 0.011625　　　　(b) 0.043125
   (c) 0.031825　　　　(d) 0.041525

27. $\left\{ 6^{-1} + \left(\dfrac{3}{2} \right)^{-1} \right\}^{-1} = ?$

   (a) $\dfrac{2}{3}$　　　　　　(b) $\dfrac{5}{6}$

   (c) $\dfrac{6}{5}$　　　　　　(d) $\dfrac{3}{2}$

28. The value of x, for which $\left(\dfrac{125}{8} \right)^5 \times \left(\dfrac{125}{8} \right)^x = \left(\dfrac{5}{2} \right)^{18}$ is____
   (a) 2　　　　　　　(b) 3
   (c) 1　　　　　　　(d) 9

29. The value of $\dfrac{\left(-\dfrac{1}{2} \right)^5}{\left(-\dfrac{1}{2} \right)^4} \div \dfrac{\left(-\dfrac{1}{8} \right)}{\left(-\dfrac{1}{4} \right)}$ is___.
   (a) 2　　　　　　　(b) 0
   (c) 1　　　　　　　(d) – 1

30 Calculate the area of the shaded region of the following figure. ABCD is a rectangle having length 30 cm, breadth 20 cm. E, F and G are midpoints of AB, CD and AD respectively.
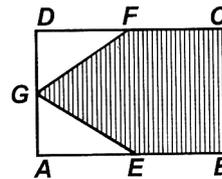
   (a) 400 cm²　　　　(b) 450 cm²
   (c) 375 cm²　　　　(d) 325 cm²

PHYSICS & CHEMISTRY

1. Convert 5 km into meters?
   (a) 500 meters　　　(b) 5000 meters
   (c) 50000 meters　　(d) 50 meters

2. ____is a push or pull.
   (a) mass　　　　　　(b) speed
   (c) force　　　　　　(d) time

3. Which of the following is NOT a conductor?
   (a) copper　　　　　(b) water
   (c) rubber　　　　　(d) aluminum

4. Electricity is the flow of ____.
   (a) load　　　　　　(b) electrons
   (c) rays　　　　　　(d) insulators

5. Which type of energy is given off by a fire?

    (a) thermal   (b) nuclear
    (c) electrical   (d) chemical

6. An electric cell uses chemical reactions to
    (a) stop the flow of power
    (b) measure the amount of power
    (c) produce an electrical current
    (d) create a short circuit

7. Thermal insulator is a material that...
    (a) moves heat easily through the material.
    (b) reduces or prevents the transfer of heat.
    (c) is flammable and can start fires.
    (d) does not exist.

8. Which of these is the best conductor of electricity?
    (a) Copper penny
    (b) Glass rod
    (c) Plastic tubing
    (d) Cotton string

9. If the bike covers 24 km in 2 hours then its average speed would be?
    (a) 24 km/hr   (b) 12 km/hr
    (c) 48 km/hr   (d) 6 km/hr

10. This is the force resulting from the pull of the earth on an object.
    (a) friction   (b) gravity
    (c) nuclear   (d) magnetic

11. If you are at sea level, at what temperature does water boil on the Kelvin scale?
    (a) 0 K   (b) 100 K
    (c) 273 K   (d) 373 K

12. Which shows the freezing point of water in Fahrenheit, Celsius, and kelvin?
    (a) 0°F,32°C,273K   (b) 32°F,0°C,273K
    (c) 273°F,0°C,32K   (d) 32°F,273°C,0K

13. Light from the sun has a range of wavelengths that include
    (a) visible spectrum.   (b) infrared light
    (c) ultraviolet light   (d) all the above

14. Light does not pass through an object at all.
    (a) opaque   (b) translucent
    (c) shiny   (d) transparent

15. An example of light scattering is
    (a) when the light travels through a lens.
    (b) when a light bounces off of a mirror.
    (c) when the sky is blue.
    (d) when the light bends as it travels through a lens.

16. People should not swim in water during a lightening storm because
    (a) water will heat up quickly and burn the person.
    (b) water is an insulator and will bounce the electricity off the water and hit the person.
    (c) water is a great conductor and allows the electricity to travel quickly through it shocking the person.
    (d) water is reflective and will blind the person.

17. Transfer of heat through a solid is called
    (a) convection   (b) conduction
    (c) radiation   (d) solar heating

18. Sunita classified different material based on their properties. Which of the following sets are correctly matched?
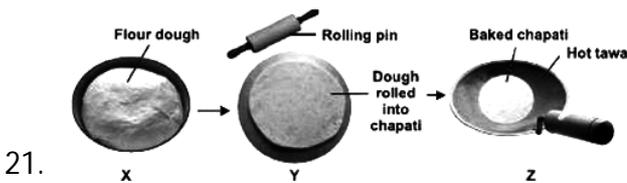
Set	Hard	Opaque	floats in water	Insoluble in water
I.	Sponge	Butter Paper	Glass Marble	Honey
II.	Steel	Wooden board	Ice	Mustard oil
III.	Lump of Sugar	Glass	Grass	Sugar candy
IV	Iron nail	Thermocol	Hair	Glass powder

    (a) II and IV   (b) I and II
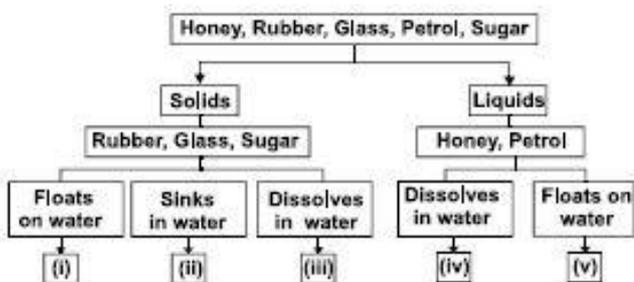   (c) III and IV   (d) All of these

19. Reem's mother has done some preparation for her 'Birthday Party'. Which of the following changes can be reversed?
    (a) Baking cake in an oven
    (b) Burning of a candle

(c) Rolling a ball of dough and baking it to make kulcha

(d) Blowing of a balloon

20. Which of the following items has definite volume and shape?

(a) Water

(b) Milk

(c) Aluminium foil

(d) oxygen

21.

Flour dough — Rolling pin — Dough rolled into chapati — Baked chapati — Hot tawa

X   Y   Z

Which statements do you think is correct regarding the given changes?

(a) From X to Y the change is reversible while Y to Z the change is irreversible.

(b) From X to Y the change is irreversible while Y to Z the change is reversible.

(c) From X to Y and Y to Z the changes are irreversible

(d) From X to Y and Y to Z the changes are reversible.

22. Diksha prepared the given flowchart for sorting the materials into different groups. Fill the blanks left by her from the given options

Honey, Rubber, Glass, Petrol, Sugar

Solids: Rubber, Glass, Sugar
Liquids: Honey, Petrol

Floats on water (i)
Sinks in water (ii)
Dissolves in water (iii)
Dissolves in water (iv)
Floats on water (v)

	(i)	(ii)	(iii)	(iv)	(v)
(a)	Glass	Sugar	Rubber	Honey	Petrol
(b)	Sugar	Rubber	Glass	Petrol	Honey
(c)	Rubber	Glass	Sugar	Honey	Petrol
(d)	Rubber	Sugar	Glass	Honey	Petrol

23. Jaya made a hole in the cap of a bottle and filled it with coloured water. She put a straw through the hole and kept the bottle in a pan of very hot water.

She observed that water starts coming out of the bottle in the form of a fountain and comes down when water cools down.

What does her experiment show?

Straw — Coloured water — Fountain — Hot water
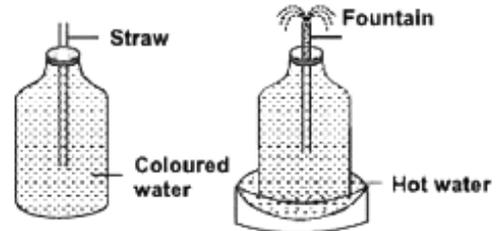
(a) Air from the bottle comes out taking water with it

(b) Liquids expand on heating and contract on cooling

(c) The water changes into vapours and comes out the bottle

(d) On heating, water vapours are converted into liquid which comes out of the bottle.

24. Resham took three beakers X, Y and Z containing cold, warm and hot water respectively as shown in the figure. She added two table spoons of sugar to each beaker and stirred the solutions. After two minutes she observed the following.

Choose the correct statement(s) that explains her observations.

Cold water Sugar (X) — Warm Water Sugar (Y) — Hot Water (Z)
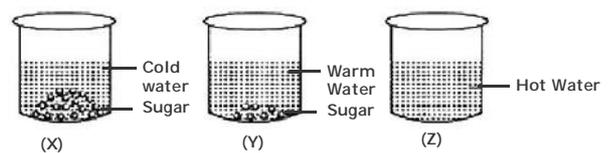
(i) The solubility of sugar decreases with increase in temperature.

(ii) The solubility of sugar increases with increase in temperature

(iii) We can add some more sugar if we heat the water.

(a) (i), (ii) and (iii)   (b) (ii) and (iii)

(c) (i) and (iii)   (d) (iii) only

25. Jyoti burnt a candle. She collected the wax and heating it again in a dish

Burning of candle
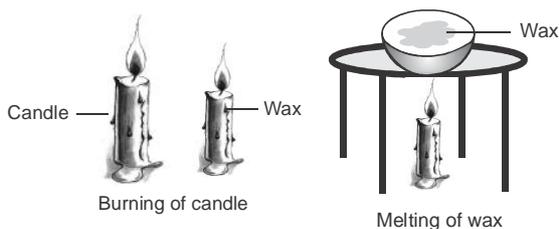
Melting of wax

Which of the following conclusions is correct?

(a) Burning of candle is a chemical change while melting of wax is a physical change.

(b) Both burning of candle and melting of wax are physical changes.

(c) Both burning of candle and melting of wax are chemical changes.

(d) Burning of candle is a physical change while melting of wax is a chemical change.

26. Changes occurring in the figure are___

Cooking of food   Ripening of fruit
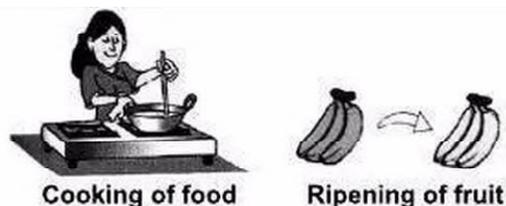
(a) Permanent, permanent

(b) Permanent, reversible

(c) Reversible, reversible

(d) Reversible, permanent

27. Arjun conducted an experiment shown in figure. What conclusion could you draw from the observation?


Fill water in tumbler   Put some ice in it   Water droplets

(a) Air contains dust particles

(b) Air contains oxygen.

(c) Air contains water vapour

(d) Air contains carbon dioxide

28. Identify an undesirable change from the following.

(a) Ripening of fruits

(b) Occurrence of earthquakes

(c) Preparing starch by photosynthesis in plants

(d) Evaporation of sea water

29. A needle and a knife belong to the same group because:

(a) they are transparent

(b) they are hard and magnetic

(c) they float on water

(d) They are poor conductors of heat

30. A flask filled partially with water is shown below.
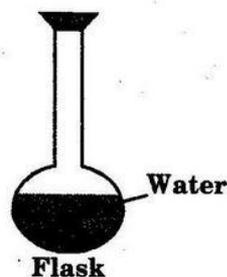
Water

Flask

Which of the following figures shows the correct water level in the flask when tilted?

(a)

(b)

(c)

(d)
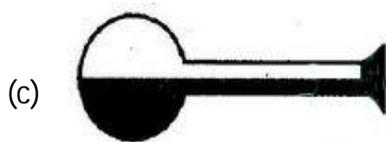
31. What kind of change is the making of a ring from pure gold?

(a) Irreversible chemical change

(b) Irreversible physical change

(c) Reversible chemical change

(d) Reversible physical change

32. Identify the chemical change from the following

(a) Heating of sugar

(b) Dissolution of sugar

(c) Crystallization of sugar

(d) Powdering of sugar

33. A mixture contains tiny particles of three different substances P, Q and R. Which of the following methods will be suitable for separation of components of the mixture
Substances Properties of the particles
P, Q and R Same size and colour
P   Heavy, insoluble and non-magnetic
Q   Light, insoluble and non-magnetic
R   Magnetic

(a) Winnowing following by magnetic separation

(b) Filtration followed by magnetic separation

(c) Sieving followed by sublimation

(d) hand picking followed by winnowing.

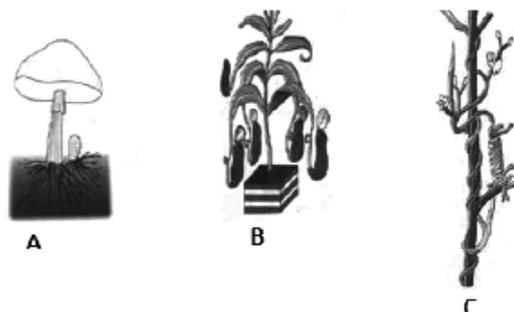34. What conclusion can you draw from the following experiment?
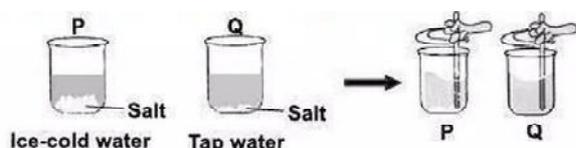
(a) Stirring decreases solubility, increase in temperature increase solubility

(b) Stirring increases solubility, increase in temperature decrease solubility

(c) Stirring increases solubility, decrease in temperature decreases solubility

(d) Stirring decreases solubility, decreases in temperature increases solubility

BIOLOGY

1. Atmosphere comprises of 78% :-

(a) oxygen gas

(b) hydrogen gas

(c) nitrogen gas

(d) carbondioxide gas

2. A food chain includes

(a) producers and herbivores

(b) producers and carnivores

(c) producers and decomposers

(d) producers, herbivores and carnivores

3. Normal range of breathing rate per minute in an adult person at rest is

(a) 9 - 12,   (b) 15 - 18,

(c) 21 - 24,   (d) 30 – 33

4. Which of the following is not required by plant for food synthesis?

(a) Water   (b) Oxygen

(c) Carbon dioxide

(d) Chlorophyll

5. The voice box is called

(a) epiglottis   (b) glottis

(c) larynx   (d) vocal cords

6. The food material used to release energy in body cells, which is considered as a biological fuel is

(a) Glucose   (b) Vitamin

(c) Water   (d) Minerals

7. Observe the diagram and choose correct match for the options A,B & C :-

(a) A-saprophytes , B-herbivores ,C-insectivorous

(b) A-saprophytes,B- insectivorous,C- herbivores

(c) A-saprophytes, B-insectivorous,C-parasitic

(d) A-producers,B-herbivores,C-insectivorous

8. To test the presence of starch by iodine, the green leaf is first boiled in alcohol to

(a) Dissolve chlorophyll

(b) Remove starch

(c) Make the leaf soft

(d) Make the leaf transparent

9. Gastric juice contain enzyme

(a) Lipase

(b) Amylase

(c) Cellulase

(d) Pepsin

10. Water from undigested food is absorbed by

(a) Small intestine   (b) Large intestine

(c) Food pipe   (d) Liver

11. Utilization of digested food to obtain energy is called

(a) Ingestion

(b) Digestion

(c) Absorption

(d) Assimilation

12. Silkworms feeds on leaves of

(a) Guava   (b) Mulberry

(c) Mango   (d) Banana

13. Pulses are a good source of

(a) Carbohydrates   (b) Fats

(c) Proteins   (d) Vitamins

14. What is scientific name of man ?

(a) Rana tigrina

(b) Canis familaris

(c) Felis domestica

(d) Homo sapiens

15. A substance which kills bacteria in stomach

(a) Water

(b) Hydrochloric acid

(c) Sulphuric acid

(d) Citric acid

16 . Which of the following carries malaria?

(a) Bats

(b) Mosquitoes

(c) Cockroaches

(d) Earthworms

ANSWER KEY

MENTAL ABILITY	MATHEMATICS		PHYSICS & CHEMISTRY		BIOLOGY
1. D	1. A	21. **C**	1. B	21. A	1. C
2. B	2. B	22. A	2. C	22. C	2. D
3. C	3. A	23. A	3. C	23. B	3. B
4. A	4. D	24. A	4. B	24. B	4. B
5. B	5. C	25. C	5. A	25. A	5. C
6. B	6. C	26. B	6. C	26. A	6. A
7. D	7. B	27. C	7. B	27. C	7. C
8. A	8. B	28. C	8. A	28. B	8. A
9. D	9. B	29. D	9. B	29. B	9. D,A
10. B	10. B	30. B	10. B	30. B	10. B
11. D	11. D		11. D	31. D	11. D
12. C	12. B		12. B	32. A	12. B
13. C	13. D		13. D	33. A	13. C
14. C	14. D		14. A	34. C	14. D
15. C	15. C		15. C		15. B
16. C	16. C		16. C		16. B
17. C	17. A		17. B		
18. A	18. B		18. A		
19. D	19. A		19. D		
20. **A**	20. B		20. C		

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