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ROUGH WORK

GENERAL IQ

1. If a man reduces the price of a fan from 400 to 380 rupees, his loss increases by 2 percent. The cost price of the fan is.

(1) 480 (2) 500

(3) 600 (4) 1000

2. Today is Thursday. The day after next 66 days will be.

(1) Sunday (2) Monday

(3) Tuesday (4) Wednesday

3. If a square and a rhombus stand on the same base, then the ratio of the areas of the square and the rhombus is

(1) Greater than 1 (2) equal to 1 / 2

(3) equal to 1 (4) equal to 1 / 4

4. In what ratio must water be mixed with milk costing Rs.12 per litre to obtain a mixture worth of Rs.8 per litre?

(1) 1 : 2 (2) 2 : 1

(3) 4 : 3 (4) 5 : 3

5. The average of 20 numbers is zero. Of them, at the most, how many may be greater than zero?

(1) 0 (2) 1

(3) 10 (4) 19

6. The value of $(4.7\times13.26 + 4.7\times9.43+4.7\times77.31)$ is

(1) 0.47 (2) 47

(3) 470 (4) 4700

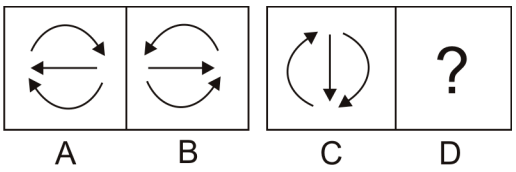
7. Find the missing number.

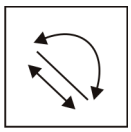
0 1 5 14 ? 55

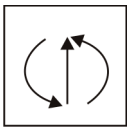
(1) 28 (2) 30

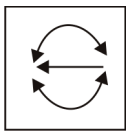
(3) 25 (4) 20

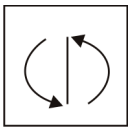
8. Find out the right option for the missing figure



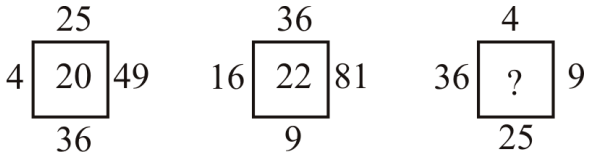
(1) 

(2) 

(3) 

(4) 

9. Find the missing number



(1) 16 (2) 22

(3) 20 (4) 17

10. In a certain language, 2 7 8 means APPLES ARE SWEET, 357 means JAMOON TASTES SWEET and 982 means APPLES ARE RED. Which digit means RED in this language?

(1) 2 (2) 5

(3) 3 (4) 9

GENERAL SCIENCE

11. The potential at a point is 20V. The work done in bringing a charge of 0.5C from infinity to this point will be

(1) 20 J (2) 10 J

(3) 5 J (4) 40 J

12. A negative charge released from a point A moves along the line AB. The potential at A is 15V, and it varies uniformly along AB. The potential at B

(1) may be 10 V (2) may be 15 V

(3) may be 20 V (4) must be 15 V

13. Charge is taken from a point A to a point B. The work done per unit charge in the process is called

(1) the potential at A (2) the potential at B

(3) The potential difference between B and A

(4) the current from A to B

14. Joule/coulomb is the same as

(1) watt (2) volt

(3) ampere (4) ohm

15. On which of the following no 'plus' or 'minus' sign is marked?

(1) a cell (2) an ammeter

(3) a voltmeter (4) a resistor

16. An ammeter is always connected in _____ and a voltmeter in_____. The suitable words, in order, for the blanks are

(1) series;series (2) parallel;parallel

(3) parallel;series (4) series;parallel

17. In a metal,

(1) all the electrons are free to move

(2) all the electrons are bound to their parent atoms

(3) there are no electrons

(4) some electrons are free to move

18. The magnetic field lines due to a straight wire carrying a current are

(1) straight (2) circular

(3) parabolic (4) elliptical

19. The magnetic field lines inside a long current-carrying solenoid are nearly

(1) straight (2) circular

(3) parabolic (4) elliptical

20. The front face of a circular loop of wire is found North-pole. The direction of current in this face of the loop will be:

(1) clockwise (2) anticlockwise

(3) towards North (4) towards South

21. Which of the following is not a strong acid?

(1) H_2SO_4 (2) CH_3COOH

(3) HNO_3 (4) HCl

22. Which of the following is an basic salt?

(1) $SnCl_2$ (2) NaCl

(3) NH_4Cl (4) CH_3COONa

23. Which one of the following types of medicines is used for the treatment of indigestion-

(1) Antibiotic (2) Analgestic

(3) Antacid (4) Antiseptic

24. Which of the following gives the correct increasing order of acid strength ?

(1) Water< Acetic acid< Hydrochloric acid

(2) Water< Hydrochloric acid< Acetic acid

(3) Acetic acid< Water< Hydrochloric acid

(4) Hydrochloric acid< Water< Acetic aicd

25. Which among the following is not a base?

(1) NaOH (2) KOH

(3) NH_4OH (4) C_2H_5OH

26. Which of the following is used for dissolution of gold?

(1) Hydrochloric acid (2) Sulphuric acid

(3) Nitric acid (4) Aqua regia

27. A solution reacts with crushed egg-shells to give a gas that turns lime water milky. The solution contains.

(1) NaCl (2) HCl

(3) LiCl

(4) KCl

28. Milk of magnesia is an-

(1) Acid (2) Antacid

(3) Alkali (4) Rock salt

29. $NaHCO_3$ represent the formula of which one of the following?

(1) Sodium carbonate (2) Baking soda

(3) Sodium acetate (4) Washing soda

30. The pH of the gastric juices released during digestion is

(1) less than 7 (2) more than 7

(3) equal to 7 (4) equal to 0

31. Respiration is the process in which

(1) energy is stored in the form of ADP

(2) energy is released and stored in the form of ATP

(3) energy is not released at all

(4) energy is used up

32. The form of energy used in respiration is -

(1) Chemical energy

(2) Electrical energy

(3) Mechanical energy

(4) Radiant energy

33. In anaerobic respiration -

(1) O_2 is given out (2) CO_2 is given out

(3) CO_2 is taken in (4) O_2 is taken in

34. During inspiration muscles of diaphragm -

(1) Contracts (2) Expands

(3) No effect (4) Coiled like string

35. The structure which prevent the entry of food into respiratory tract is -

(1) Pharynx

(2) Laryns

(3) glottis

(4) Epiglottis

36. In fever breathing rate -

(1) Increase (2) Decrease

(3) Stop (4) None

37. Rate of respiration is directly affected by-

(1) CO_2 concentration

(2) O_2 in trachea

(3) Concentration of O_2

(4) Diaphragm expansion

38. Respiration and photosynthesis are just the :

(1) Opposite process (2) Similar process

(3) burning process (4) None of these

39. In which part of the plant, respiration rate is higher:

(1) Root and stem tip

(2) Buds

(3) Germinating seeds

(4) All of these

40. Plant cell can do :

(1) Breathing and Respiration

(2) Respiration and photosynthesis

(3) Breathing and photosynthesis

(4) All of these

41. Chemical formula of Gypsum is

(1) $CaSO_4 \cdot 2H_2O$

(2) $CaSO_4 \cdot H_2O$

(3) $CaSO_4 \cdot \frac{1}{2} H_2O$

(4) $CaSO_4 \cdot \frac{3}{2} H_2O$

42. In respiration, air passes through -

(1) Pharynx, Nasal cavity, Larynx, Trachea, Bronchi, Bronchiole, Lungs

(2) Nasal cavity, Pharynx, Larynx, Trachea, Bronchi, Bronchiole, Lungs

(3) Larynx, Nasal Cavity, Pharynx, Trachea, Lungs

(4) Larynx, Pharynx, Trachea, Lungs.

43. What happens when a solution of an acid is mixed with a solution of a base in a test tube ?

(i) The temperature of the solution increases

(ii) The temperature of the solution decreases

(iii) The temperature of the solution remains the same

(iv) Salt formation takes place

(1) (i) only (2) (i) and (iii)

(3) (ii) and (iii) (4) (i) and (iv)

44. Which of the following statement is true for acids?

(1) Bitter and change red litmus to blue

(2) Sour and change red litmus to blue

(3) Sour and change blue litmus to red

(4) Bitter and change blue litmus to red

45. Which of the following statement is correct about an aqueous solution of an acid and of a base?

(i) Higher the pH, stronger the acid

(ii) Higher the pH, weaker the acid

(iii) Lower the pH, stronger the base

(iv) Lower the pH, weaker the base

(1) (i) and (iii) (2) (ii) and (iii)

(3) (i) and (iv) (4) (ii) and (iv)

46. A student observed that the colour of pH paper changed to green when she dipped it in water. She added a few drops of concentrated hydrochloric acid to the water. The colour of pH paper would turn to

(1) light red (2) apple green

(3) dark blue (4) lemon yellow

47. An electric current passes through a straight wire. Magnetic compasses are placed at the points A and B.

(1) Their needles will not deflect.

(2) Only one of the needles will deflect.

(3) Both the needles will deflect in the same direction

(4) The needles will deflect in the opposite directions.

48. The direction of the force on a current-carrying wire placed in a magnetic field depends on

(1) the direction of the current but not on the direction of the field

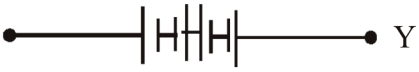
(2) the direction of the field but not on the direction of the current

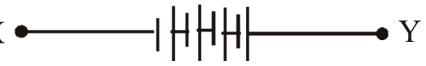
(3) the direction of the current as well as the direction of the field

(4) neither the direction of the current nor the direction of the field

49. Four identical cells, of emf 1.5 V each, were connected in four different ways as shown. The potential difference, between the points X and Y, would equal 6.0 V, in case /cases

(A) 

(B) 

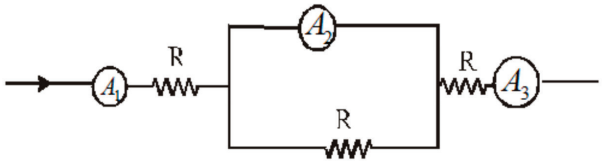
(C) 

(D) 

(1) A and B (2) A and C

(3) A and D (4) A only

50. The statement that is most correct about the following circuit is



(1) $A_1 < A_2$

(2) $A_3 < A_2$

(3) $A_1 = A_2 = A_3$

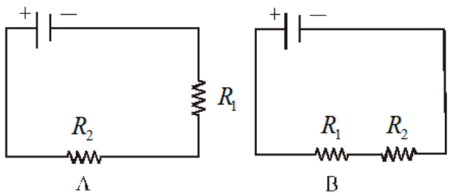
(4) $A_1 = A_3$

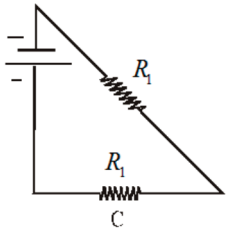
51. An ammeter has 20 divisions between marks 0 and mark 2 on its scale. The least count of the ammeter is

(1) 0.02 A (2) 0.01A

(3) 0.2 A (4) 0.1 A

52. Two resistances R_1 and R_2 are to be connected in series combination. Out of the following the correct combination is shown in:





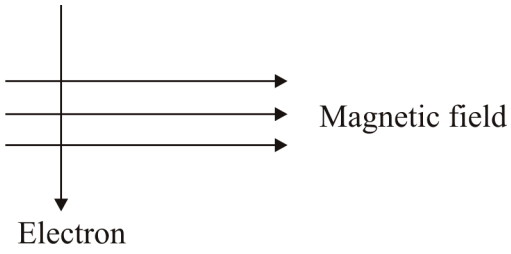
(1) only A

(2) only B

(3) only C

(4) all of them, A, B and C

53. An electron enters a magnetic field at right angles to it, as shown in Figure. The direction of force acting on the electron will be



(1) to the right

(2) to the left

(3) out of the page

(4) into the page

INTERACTIVE SECTION

Student have to solve either left hand side (LHS) questions OR right hand side (RHS) questions. RHS section is for Google Science Fair (GSF) enthusiasts. EHF will be conducting science camp (LEVEL-3) to help students prepare for online GSF participation. The online camp will be conducted by retired IIT-Delhi Professors. Equal preference will be given to students solving either of these sections. More details of online GSF is available on EHF Website www.eduhealfoundation.org

LHS SECTION

54. A soft iron bar is introduced inside a current-carrying solenoid. The magnetic field inside a solenoid:

(1) will decrease

(2) will increase

(3) will become zero

(4) will remain uneffected

55. Four students studied reactions of zinc and sodium carbonate with dilute hydrochloric acid and dilute sodium hydroxide solutions and presented their results as follows. The ' ✔ ' represents evolution of gas whereas '×' represents absence of any reaction

RHS SECTION

Google SCIENCE FAIR

54. An investigator developed a scoring system that enabled her to predict an individual's body mass index (BMI) based on information about what they ate and how much. Information is collected from a small sample of subjects in order to compute their "diet score," and the weight and height of each subject is measured in order to compute their BMI. The graph below shows the relationship between the new "diet score" and BMI, and it suggests that the "diet score" is not a very good predictor of BMI,

	Zn	Na_2CO_3
HCl	✓	✓
NaOH	✓	×

A

	Zn	Na_2CO_3
HCl	✓	×
NaOH	✓	✓

B

	Zn	Na_2CO_3
HCl	×	×
NaOH	✓	✓

C

	Zn	Na_2CO_3
HCl	✓	✓
NaOH	×	×

D

The right set of observations is that of student

(1) A

(2) B

(3) C

(4) D

56. Which of the following in(are) true when HCl (g) is passed through water?

(i) It does not ionise in the solution as it is a covalent compound.

(ii) It ionises in the solution.

(iii) It gives both hydrogen and hydroxyl ions in the solution

(iv) It forms hydronium ion in the solution due to the combination of hydrogen ion with water molecule.

(1) (i) only

(2) (iii) only

(3) (ii) and (iv) only

(4) (iii) and (iv) only

57. According Bronsted theory of acids, acid is a

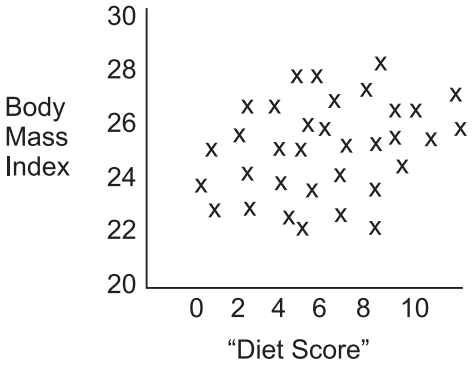
(1) Proton acceptor

(2) proton donor

(3) Proton have no action here.

(4) All above option are incorrect.

58. Meena and Rajesh observed an animal in their balcony. Rajesh called it an insect, while Meena said it is an earthworm. Choose the character from (i.e. there is little if any association between the two). She then identified the age and gender of the subjects and these data are presented in the graph below the 1st graph.



Considering these data what is the best conclusion about the relationship between "diet score" and BMI?

(A) There is no clear association between the two variables.

(B) Age is confounding the association between diet score and BMI.

(C) Gender is confounding the association between diet score and BMI.

(D) Both age and gender have an effect on BMI.

(E) Diet, age, and gender each have an independent effect on BMI.

(1) A, B & C

(2) E only

(3) C, D & E

(4) A only

the following which confirms that it is an insect.

(1) Bilateral symmetry

(2) Little segmentation in the body

(3) Cylindrical body

(4) Jointed legs

59. Exchange of gases in lung alveoli occurs through -

(1) Active transport

(2) Osmosis

(3) Simple diffusion

(4) Passive transport

60. Carbon monoxide has greater affinity for haemoglobin as compared to oxygen by

(1) 1000 times

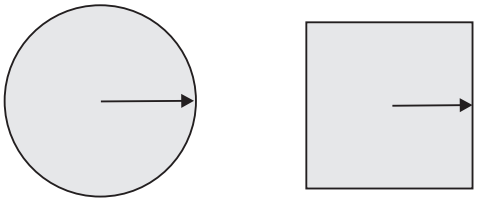
(2) 200 times

(3) 20 times

(4) 2 times

END OF THE EXAM

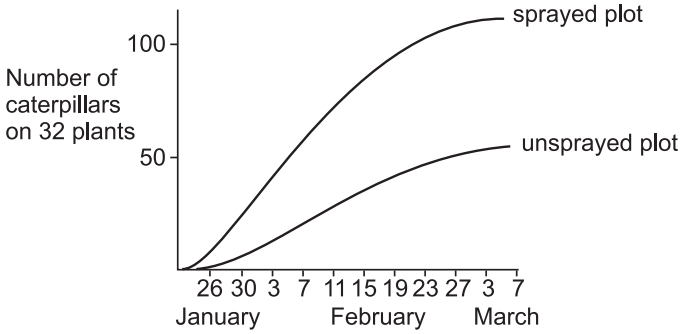
55. "Square trees" are being investigated to make forestry more sustainable. The underlying concept involves modifying the genome of trees so that the trunks grow in a 3D 'cuboid' shape instead of a cylinder. If the arrows on the cross sections of the trees shown are the same size, and the trunks are the same height, what is the percentage wood gained in tree on the right when compared with tree on the left? (Cuboid volume = base × height × width), (Cylinder volume = $\pi r^2 \times$ height).



(A) 21%
(B) 10%
(C) 34%
(D) 5%
(E) 31.4%

(1) A only
(2) B only
(3) Either C or D
(4) None of these

56. Two similar plots of cabbage plants were used in an investigation to determine the effectiveness of an insecticide. One plot was sprayed with the insecticide on 26th December. The second plot was left unsprayed as a control. The graph shows the number of caterpillars that were found on the plots during the following January, February and March.



Which one of the following statements is the best explanation of these data?

(A) The caterpillars on the cabbage sprayed with insecticide were resistant to the insecticide.

(B) In the sprayed plot the insecticide killed many of the natural predators of the caterpillars.

(C) The effect of the insecticide had worn off by the time the caterpillars had hatched from their eggs.

(D) The insecticide was applied too late in the life cycle and had the effect of delaying pupation.

(E) The insecticide had no effect on the caterpillars.

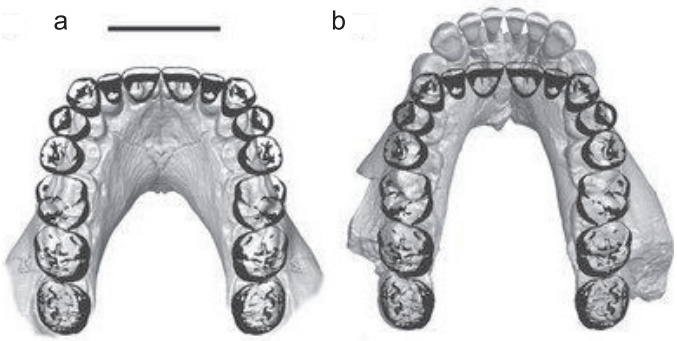
(1) Both A and C

(2) Either A or C

(3) B only

(4) All of the above

57. Dental arcades are a feature that is used to differentiate between Homo sapiens and their recent ancestors. Dental arcades of recently discovered Homo species have been compared with data on previously discovered species. The reconstructed upper arcade of KNM-ER 62000 (outlined in black; discovered 2012) is occluded with (a) the reconstructed lower arcades of KNM-ER 60000 (shown in grey; also discovered 2012) and (b) KNM-ER 1802 (shown in grey; discovered 1973). What is a logical conclusion that can be made from these data?



(A) Early Homo species were scavengers.

(B) There was morphological variation in early Homo species.

(C) Modern Homo sapiens have taken large evolutionary leaps from early Homo species.

(D) Early Homo species had an 'overbite' in their jaws.

(E) Fossils that are discovered at the same time, are the same shape.

(1) A only

(2) B only

(3) Either C or D

(4) Either D or E

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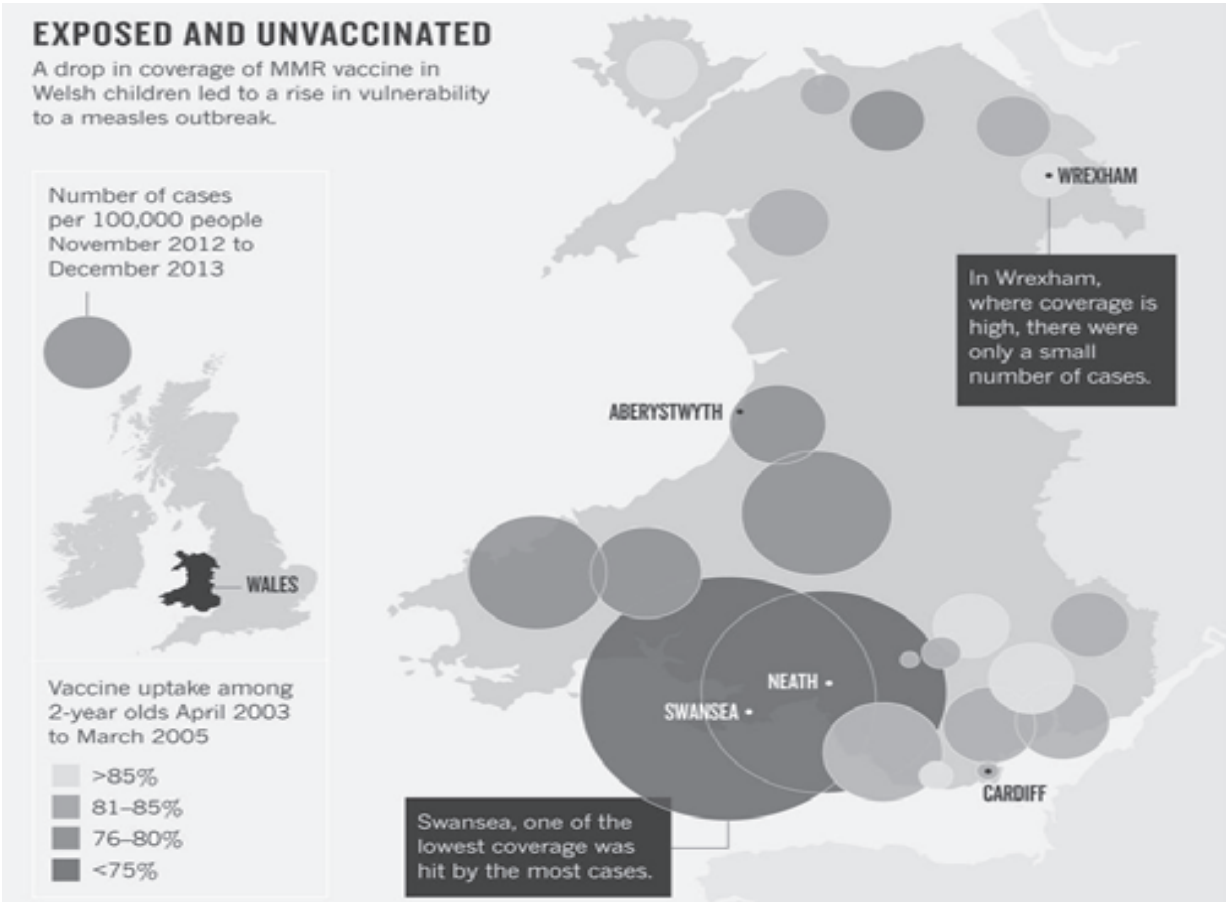
58. What is the best conclusion(s) that can be made from the diagram given below of measles cases and immunisation rates in Wales?



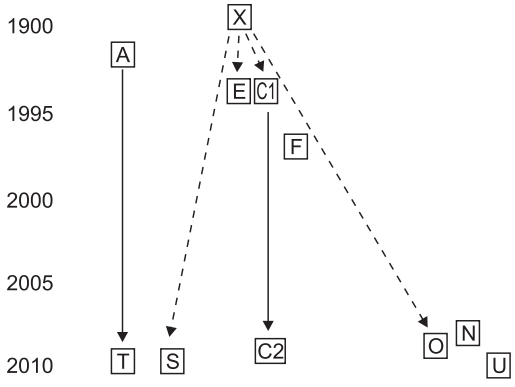
(1) A vaccination programme does not always stop outbreaks of disease.

(2) Higher infection rates are linked with lower vaccination rates.

(3) Outbreaks can occur in geographical clusters.

(4) 1, 2 and 3 are valid conclusions.

59. Tuberculosis (TB) kills more than two million people annually and is a disease studied by scientists around the world.



The diagram on the left shows the chronology of a TB outbreak in a given country. "Each square represent a subject at the time of the TB diagnosis. Broken lines represent known close direct contact with the initial index case "X" during X's period of infectiousness. Solid lines show assumed connections between a case of presumed reactivation (C1 to C2) and a case of potential child-parent transmission (A to T)".

What is the best conclusion to be made from these data?

(1) Tuberculosis is widespread in a given country.
(2) Tuberculosis outbreaks occur in geographical patterns.
(3) Tuberculosis can stay dormant in a human before symptoms are shown.
(4) Patient X and Patient A are responsible for all of the tuberculosis infections in this study.

Direction for Q.60:

KĀKĀRIKI – CONSERVATION OF NEW ZEALANDS PARAKEETS

There are five main species of kākāriki: yellow-crowned parakeet, orange-fronted parakeet, red-crowned parakeet, Forbes' parakeet and Antipodes Island parakeet. All are bright green in colour but with distinguishing coloured areas on the head. The yellow-crowned parakeet is rare but is found throughout forested areas of the North, South and Stewart Islands as well as the sub-Antarctic Auckland Islands. The orange-fronted parakeet is critically endangered with around 300 birds found in just three alpine beech forest valleys in Canterbury. The red-crowned parakeet was widespread throughout the mainland last century but today is very rare on the mainland and only common on islands free of mammalian predators. Forbes' parakeet is restricted to the Chatham Island and also critically endangered. The Antipodes Island parakeet is restricted to the Antipodes Islands.

Deforestation, disease, introduced predators, and shooting by farmers have all contributed to the present restricted distribution of these species. An important conservation tool for the restoration of endangered birds is the translocation of species to habitats that have been restored and introduced predators eradicated.

Luis Ortiz-Catedral at the Ecology and Conservation Lab, Institute of Natural & Mathematical Sciences, Massey University, has been studying kākāriki on Raoul Island, a remote volcanic island approximately 995 km north of New Zealand. There had not been a confirmed record of resident parakeets on Raoul Island since 1836 following the introduction of goats, cats and rats. Goats were

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removed from the island in 1986. Then, in the world's largest multispecies eradication project to date, the New Zealand Department of Conservation (DOC) successfully removed domestic cats, and Norway and Pacific rats (kiore) from Raoul Island using aerial drops of poisoned bait for rats between 2002 and 2004, and follow-up ground-based control for cats.

Prior to the removal of these invasive species on Raoul, the last strongholds for Kermadec red-crowned parakeets were the Herald Islets (ca. 50 breeding pairs) and Macauley (c.a. 10,000 breeding pairs) 2-4 km east and 108 km south respectively off the coast of Raoul Island. Since 2000 (i.e. two years prior to initiation of the predator removal programme), staff from DOC have carried out bird surveys roughly once a year on Raoul to assess the effect of the removal of predators. No parakeets were detected prior to eradication of cats and rats. After the cat and rat eradication there were infrequent sightings of one to three parakeets. In 2008 during the parakeet survey, 100 parakeets were caught during a 13-day mist-netting period. Of these, 59 were female and 41 were male, of which 56 were adults and 44 sub-adults hatched in 2008. One full pre-mating display followed by copulation was also observed and two nests were located in fallen logs of Kermadec pohutukawa.

Considering the data given above what conclusion can be drawn about the presence of red-crowned parakeets on Raoul Island?

(1) Red-crowned parakeets are now frequent visitors to Raoul Island from their breeding sites on the Herald Islets.

(2) Red-crowned parakeets have successfully recolonised Raoul Island after eradication of invasive predators.

(3) Red-crowned parakeets have been successfully translocated to Raoul Island.

(4) Eradication of invasive predators on Raoul Island has allowed remnant populations of red-crowned parakeets to increase.

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