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ROUGH WORK

Instructions for the Candidate

1. You are allowed additional 10 minutes to fill the required details in the RESPONSE SHEET (OMR).
2. The question paper is made as per syllabus guidelines & pattern given in the information Booklet. The Question Paper for Classes 1 to 6 contains 40 Questions each to be answered in 60 minutes. The Question paper for classes 7 to 12 contains 60 Questions each to be answered in 60 minutes. All questions are compulsory. Further instructions are given in the instruction letter to the teacher.
3. Use the response sheet to mark your responses by darkening the required circle. The response sheet has to be returned to the foundation, duly filled in. **THE STUDENT CAN RETAIN THE QUESTION PAPER.**

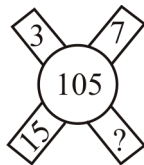
GENERAL IQ

1. Pointing to a man in the photograph a lady said, "The father of his brother is the only son of my mother."

How is that man related to that lady?

- (1) Brother (2) Son
(3) Cousin (4) Nephew

2. In the following question, Select from the answer choices an appropriate number to replace the question mark.



- (1) 41 (2) 22
(3) 25 (4) 35

Direction : (Q.3 to Q.5) : A solid cube of each side 8 cms, has been painted red, blue and black on pairs of opposite faces. It is then cut into cubical blocks of each side 2 cms.

3. How many cubes have three faces painted with different colours?

- (1) 0 (2) 4
(3) 8 (4) 12

4. How many cubes have two faces painted red and black and all other faces unpainted?

- (1) 4 (2) 8
(3) 16 (4) 32

5. How many cubes are there in all?

- (1) 64 (2) 56
(3) 40 (4) 32

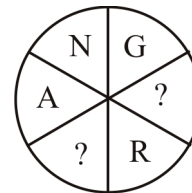
6. If $x = 28^3 - 16^3 - 12^3$, then x is equal to

- (1) 26228 (2) 46778
(3) 32168 (4) 16128

7. What was the day of the week on the 28th May 2006?

- (1) Thursday (2) Friday
(3) Sunday (4) Monday

8. Complete the letter wheel to form a meaningful word. (Read Clockwise)



- (1) EM (2) ME
(3) NA (4) AN

9. Find the odd one out?

- (1) Doctor and medicine
(2) Teacher and book
(3) Judge and court
(4) Accountant and cash

10. In a certain code language, 24685 is written as 33776. How is 35791 written in that code?

- (1) 44882 (2) 44880
(3) 46682 (4) 44682

GENERAL SCIENCE

11. A body immersed in a liquid will rise to the surface if the buoyant force acting on it is

- (1) greater than its actual weight
(2) less than its actual weight
(3) equal to its actual weight
(4) equal to zero

12. A body weighing 200 g wt. is dipped in water. Its weight in water as indicated by the spring balance is 150 g. wt. The buoyant force acting on the body is

- (1) 200 g wt. (2) 1000 g wt.
(3) 50 g wt. (4) 250 g wt.

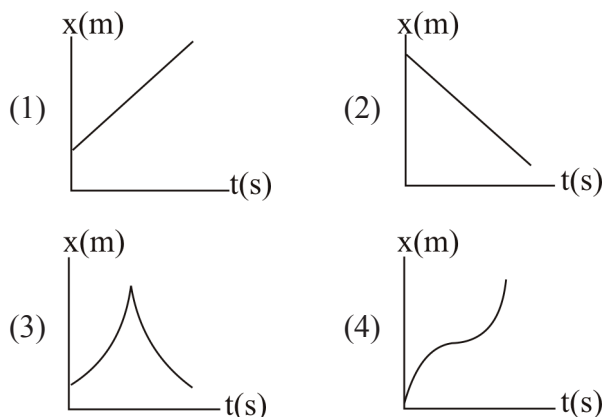
- 13.** A body is floating in upright position in water. Then force of gravity and buoyant force acting on the body are
- (1) In the same direction along the same line
 - (2) In opposite direction but along the same line
 - (3) At right angle to each other
 - (4) At left angle to each other
- 14.** A body floats in vertical position, when its centre of buoyancy is
- (1) Below C.G. of the body
 - (2) Above the C.G. of the body
 - (3) At some place where the C.G. of the body lies
 - (4) None of these
- 15.** In case of a body placed in liquid if the buoyant force is equal to its actual weight, then its apparent weight
- (1) Is equal to the weight
 - (2) Is equal to buoyant force
 - (3) Is greater than its actual weight
 - (4) Is equal to zero
- 16.** Plum-Pudding model is known as
- (1) Rutherford Model
 - (2) Thomson's model
 - (3) Bohr Model
 - (4) All the above
- 17.** Nucleons consist of
- (1) Proton and electron
 - (2) Proton and neutron
 - (3) Neutron and electron
 - (4) Only neutron
- 18.** Mass number of element is
- (1) Number of protons in its nucleus
 - (2) Number of electrons and protons in the atom
 - (3) Number of neutrons and protons in the nucleus
 - (4) Number of neutrons in the nucleus
- 19.** According to the Dalton's atomic theory
- (1) Electrons, proton and neutron are found in atom
 - (2) Atom is indivisible
 - (3) atom of various element have same properties
 - (4) Atoms are destroyed in the chemical reaction
- 20.** Neutron is a fundamental particle which have
- (1) +1 unit charge and 1 unit mass
 - (2) No charge and 1 unit mass
 - (3) Have no charge and mass
 - (4) Have -1 unit charge and 1 unit mass
- 21.** Bryophytes are amphibians because
- (1) They require a layer of water for carrying out sexual reproduction
 - (2) They occur in damp places
 - (3) They are mostly aquatic
 - (4) All the above
- 22.** Pteridophytes differ from bryophytes in possessing
- (1) Gametophyte dependent on sporophyte
 - (2) Independent gametophyte and sporophyte
 - (3) Sporophyte dependent on gametophyte
 - (4) No sporophyte
- 23.** Gymnosperms do not have
- (1) Antheridium
 - (2) Ovule
 - (3) Archegonium
 - (4) Egg
- 24.** What is true in a scientific name?
- (1) Specific name is written first
 - (2) Generic name starts with small letter
 - (3) Generic name starts with capital alphabet while specific name starts with small letter
 - (4) It is written in English
- 25.** Naked seeds are present in
- (1) Pinus
 - (2) Mango
 - (3) Mustard
 - (4) Lemon

26. An athlete runs over a certain distance before taking a long jump, because due to this
- (1) his mass gets decreased, so he can jump over a long distance
 - (2) he gains inertia of motion, so he can take a longer jump
 - (3) he gets the power of God, so he can take a longer jump
 - (4) he follows law of conservation of kinetic energy

26. The position of an object in equal time intervals is shown in figure.



Which graph below correctly represents position versus time for this object ?



27. A planet is in circular orbit around the Sun. Its distance from the Sun is four times the average distance of Earth from the Sun. The period of this planet, in Earth years, is
- (1) 4
 - (2) 8
 - (3) 16
 - (4) 64
28. As the frequency of a source decreases in a given medium, the wavelength of a periodic longitudinal wave
- (1) increases, but the speed of the wave remains constant.
 - (2) increases, and the speed of the wave increases.

- (3) decreases, but the speed of the wave remains constant.
- (4) decreases, and the speed of the wave decreases.

29. What will be the value of acceleration due to gravity at a height $2R$ from the surface of earth ?

- (1) 1.1 m/s^2
- (2) 2.2 m/s^2
- (3) 3.3 m/s^2
- (4) 4.9 m/s^2

30. The value of universal gravitational constant

- (1) Changes with change of place
- (2) Does not change from place to place
- (3) Becomes more at night
- (4) Becomes more during the day

31. Which of the following is a chemical reaction?

- (1) Evaporating rubbing alcohol
- (2) Burning lamp oil
- (3) Dissolving table salt in water
- (4) Forming frost

31. $p\%$ of the students of a class passed the exam. $g\%$ of the passed students are girls and $b\%$ of the fail students are boys. The percentage of passed boys over the failed girls is

- (1) $\left(\frac{bg}{p} \times 100\right)$
- (2) $\frac{100(100-g)p}{(100-p)(100-b)}$
- (3) $\frac{(100-g)(100-b)}{(100-p)}$
- (4) None of these

32. Diabetic person is advised to take insulin when _____ and there is _____ of insulin respectively.

- (1) His blood pressure is high and hypersecretion
- (2) His heart beat is high and hyposecretion
- (3) His blood sugar is high and hyposecretion
- (4) His blood sugar is low and hyposecretion

- 33.** Why are methanogens called as obligate anaerobes?
- (1) They live in salty environments.
 - (2) They die in the presence of oxygen.
 - (3) They give off carbon dioxide as a waste product.
 - (4) They carry out photosynthesis using chlorophyll.
- 34.** How do the daughter cells at the end of mitosis and cytokinesis compare with their parent cell when it was in G_1 of the cell cycle?
- (1) The daughter cells have half the amount of cytoplasm and half the amount of DNA
 - (2) The daughter cells have half the number of chromosomes and half the amount of DNA
 - (3) The daughter cells have the same number of chromosomes and half the amount of DNA
 - (4) The daughter cells have the same number of chromosomes and same amount of DNA
- 35.** Which of the following is an example of a weed of Rabi season that infest wheat crop?
- (1) Chenopodium
 - (2) Cock's comb
 - (3) Gram
 - (4) None of the above
- 36.** Following are a few definitions of osmosis. Read carefully and select the most appropriate definition.
- (1) Movement of solvent molecules from a region of higher concentration to a region of lower concentration through a semipermeable membrane .
 - (2) Movement of solute molecules from its higher concentration to lower concentration.
 - (3) Movement of solvent molecules from higher concentration to lower concentration through a permeable membrane.
 - (4) Movement of solute molecules from lower concentration to higher concentration through a semipermeable membrane.
- 37.** Vaccination
- (1) can control every disease.
 - (2) develops resistance against the attack of a disease.
 - (3) kills all the disease causing organisms in the area by using antibodies.
 - (4) all of these
- 38.** The process of cross breeding between two different varieties of crop plants each having a desired characteristic is known as
- (1) Selection
 - (2) Hybridisation
 - (3) Emasculation
 - (4) Introduction
- 39.** What can a grower do to produce plants that are attractive and full of side branches?
- (1) Pinch off the apical meristem to decrease the amount of auxin.
 - (2) Pinch off the apical meristem to increase the amount of auxin.

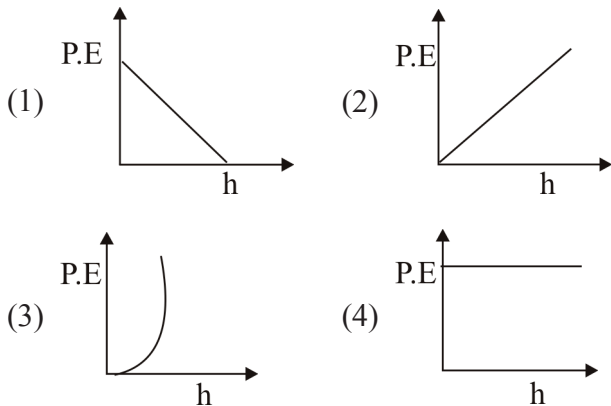
(3) Pinch off the intercalary meristems to increase the amount of auxin.

(4) Pinch off the intercalary meristems to decrease the amount of auxin.

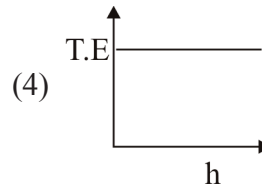
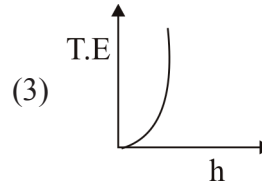
40. Crossing over that results in genetic recombination in higher organisms occurs between

- (1) Non sister chromatids of a bivalent
- (2) Two daughter nuclei
- (3) Two different bivalent
- (4) Sister chromatids of a bivalent

41. If a graph between P.E. of the body in relation to the height through which it falls freely is plotted, it may be noted that the total energy remains the same. Which of the following graphs shows this relation correctly?



42. A graph of the total energy, (P.E + K.E.) of a freely falling body from a height is plotted. Which of the following is the best approximation?



43. A person A does 500 J work in 10 minutes and another person B does 600 J of work in 20 minutes the power delivered by A and B be P_1 and P_2 respectively, then

- (1) $P_1 = P_2$
- (2) $P_1 > P_2$
- (3) $P_1 < P_2$
- (4) P_1 and P_2 are undefined

44. A piece of ice having a stone frozen in it floats in a glass vessel filled with water. How will the level of water in the vessel change when the ice melts

- (1) the level will rise
- (2) the level will not change
- (3) the level will drop
- (4) some water will flow out

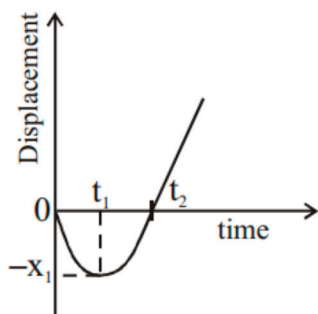
45. A ball of density r is released from deep inside of a liquid of density $2r$. Ignore viscous force. The ball will move up

- (1) with an increasing acceleration
- (2) with a decreasing acceleration
- (3) with a constant acceleration
- (4) with zero acceleration

46. Two solids A and B float in water. A floats with half its volume immersed and B floats with $\frac{2}{3}$ rd of its volume immersed. The densities of A and B are in the ratio
- (1) 2 : 3
 - (2) 4 : 3
 - (3) 3 : 4
 - (4) 3 : 2
47. A person applies for a patent on an engine that is 100% efficient. This application would be rejected because the engine would violate the:
- (1) Law of conservation of momentum
 - (2) Law of friction
 - (3) Law of gravity
 - (4) Laws of thermodynamics
48. Fossils are most often found in what type of rock?
- (1) Igneous
 - (2) Metamorphic
 - (3) Sedimentary
 - (4) Granitic
49. Which of the following elements is NOT a noble gas?
- (1) Xenon
 - (2) Radon
 - (3) Krypton
 - (4) Bromine
50. What type of energy production does NOT require a turbine with a shaft to spin a generator in order to create electricity?
- (1) Geothermal power
 - (2) Hydropower
 - (3) Hydrogen fuel cells
 - (4) Nuclear (fission) reactors
51. Which of the following statement is always correct?
- (1) An atom has equal number of electrons and protons.
 - (2) An atom has equal number of electrons and neutrons.
 - (3) An atom has equal number of protons and neutrons.
 - (4) An atom has equal number of electrons, protons and neutrons.
52. For an environment where a long-lasting toxin has been introduced, in which organism of a food chain will you expect to find the least accumulation of the toxin?
- (1) Producer
 - (2) Herbivore
 - (3) Primary predator
 - (4) Secondary predator
53. The infectious agents responsible for which disease can be spread when the patient coughs?
- (1) AIDS, TB and hepatitis
 - (2) TB, influenza and cholera
 - (3) TB and influenza
 - (4) TB and hepatitis
54. Elephantiasis is a disease that result in:-
- (1) long-term effects on health
 - (2) short-term effects on health
 - (3) no effect on health
 - (4) occasional bad effects on health

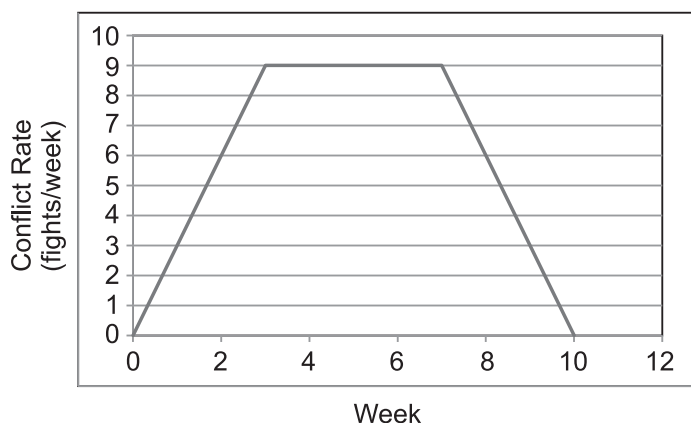
LHS SECTION

57. Mark the incorrect statement



- (1) From time $t = 0$ to $t = t_1$, speed of the particle is decreasing
 - (2) From $t = t_1$ to $t = t_2$, speed of the particle is increasing
 - (3) Initial velocity of the particle is negative
 - (4) At $t = t_1$, velocity of the particle is maximum
58. The graph shows the conflict rate of primates, measured throughout the day and night over 10 weeks of a study period.

How many fights occurred in total?



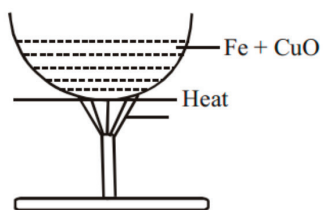
- (1) 9
 - (2) 59
 - (3) 12
 - (4) 63
59. Take a mixture of powdered iron and copper oxide. Heat the mixture. The mixture starts glowing with a shining brown colour and it glows even after the burner is removed. Iron oxide and copper are formed during the reaction. It is observed that iron takes away oxygen from copper and acts as a reducing agent. What general observation can be made from the above experiment ?

RHS SECTION

What can be concluded from these data?

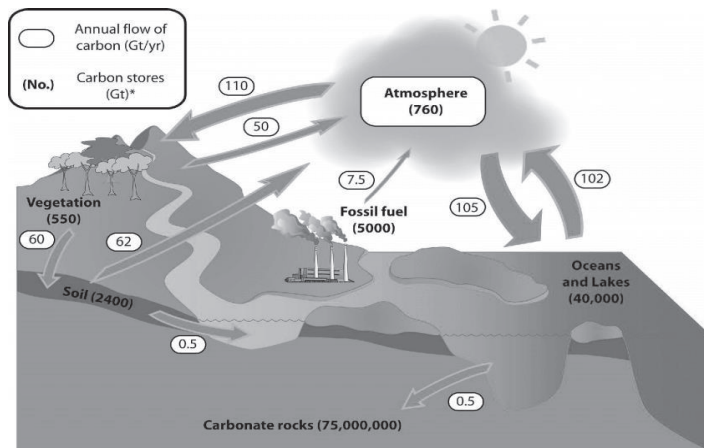
- (A) You cannot catch the flu in summer.
 - (B) Medical treatment works in individual patients after about two months.
 - (C) Influenza infection always peaks in February.
 - (D) Virus epidemics follow predictable patterns.
 - (E) Respiratory syncytial virus kills more people than the flu each year.
- (1) A only
 - (2) D only
 - (3) Both B & C
 - (4) B only
56. A suspension of microscopic green algae was divided into two equal samples. Each was given the SAME total amount of light energy. Sample I was exposed to continuous light. Sample II was exposed to bursts of light for 5 - 10 seconds duration, followed by dark periods. Photosynthesis took place in both samples, but more occurred in sample I. From this evidence we may conclude that
- (A) More photosynthesis occurs in the dark than in the light.
 - (B) Some part of the photosynthetic process can occur in darkness.
 - (C) Photosynthesis requires darkness as well as light.
 - (D) Photosynthesis is a very rapid process.
 - (E) Photosynthesis involves enzymes as well as light.
- (1) A only
 - (2) A, C & D
 - (3) B only
 - (4) D, C & E
57. Many laboratory procedures involve the use of dilutions. If a solution has a $1/10$ dilution the number represents 1 part of the sample added to 9 parts of diluent. The dilution factor equals the final volume divided by the sample volume. A serial dilution is any dilution in which the concentration decreases

LHS SECTION



- (1) When a metal is heated with the oxide of a more reactive metal it will act as a reducing agent
- (2) A more reactive metal can displace the less reactive metal from its oxide on heating
- (3) The reaction of more reactive metal with an oxide of less reactive metal is endothermic
- (4) No general statement can be given

60. The global carbon cycle is represented in the diagram at right. Human activities that affect the distribution of carbon include the burning of fossil fuels and cultivation practices such as land clearance. The greatest annual flow of carbon is by:



* 1 Gt = 1 Gigatonne = 1 billion metric tonnes

- (1) Dissolving of atmospheric carbon dioxide in water bodies.
- (2) Erosion of calcium carbonate in soils and rocks by water.
- (3) Release of carbon dioxide during respiration.
- (4) Fixation of atmospheric carbon dioxide by plants.

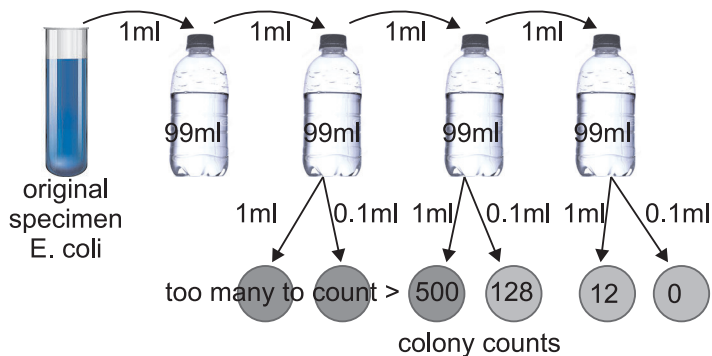


END OF THE EXAM

RHS SECTION

by the same quantity in each successive step. Serial dilutions are multiplicative.

Bacterial counts in a stream water sample can be determined by placing a known volume of the stream water into a liquefied agar medium that is then poured into a petri dish. The agar solidifies and bacterial colonies grow within the agar. These colonies can then be accurately counted as the bacteria are equally distributed through the agar. In practice the number of bacteria is usually so great that a serial dilution must be made first so that the number of colonies can be counted. Note that the amount put on the plate is also a dilution as colonies are normally reported as per ml. Plates with 30-300 colonies are used for the calculation as plates with greater than 300 and less than 30 have a high degree of error. Air contaminants can contribute significantly to a really low count and a high count can be confounded by error in counting too many small colonies.

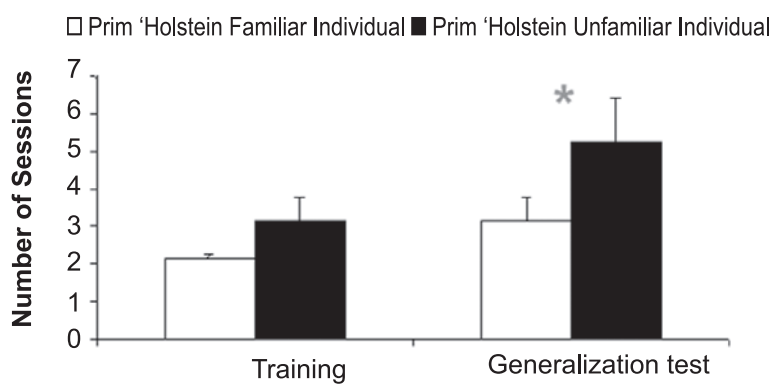


Calculate the number of bacterial cells (*E. coli*) per ml in the original water sample.

- (A) 1.28×10^7
- (B) 1.28×10^8
- (C) 1.28×10^9
- (D) 1.20×10^8
- (E) 1.20×10^9

- (1) A only
- (2) A & B
- (3) D & E
- (4) C only

58. Facial recognition has been shown in the behaviour of many species. Cows (*Bos taurus*) of the breed Prim Holstein were studied to measure this trait. Cows were shown two pictures, one of a member of their own social group and one of an unfamiliar cow of the same breed. They were rewarded with food when they walked towards the unfamiliar cow's picture. The cows were first trained, using the same pictures of a familiar cow and an unfamiliar cow. Then, in 'generalisation' tests, experimental subjects were shown different angles of familiar cows' faces and unfamiliar cows' faces (examples are shown below). The number of sessions required for cows to reliably choose the correct picture was recorded. The * sign indicates a statistically significant difference.



What conclusion can be drawn from the data?

- (A) Cows only have a short term memory.
- (B) Cows show recognition of familiar individuals.
- (C) Cows cannot recognise familiar individuals.
- (D) Cows are colour-blind.
- (E) Cows will only ever walk towards food.

- (1) A, B & C
- (2) B & C
- (3) C & D
- (4) B only

59. The table below summarises the complications by age for measles cases in the United States from 1987-2000.

| Complication | Overall (67,032 cases with age information) | No. (%) of persons with complication, by age group | | | | |
|-----------------|---|--|--------------------|------------------------|----------------------|--------------------|
| | | <5 years (n = 28,730) | 5-9 years (n=6492) | 10-19 years (n=18,580) | 20-29 years (n=9161) | >30 years (n=4069) |
| Any | 19,480 (29.1) | 11,883 (41.4) | 1173 (18.1) | 2369 (12.8) | 2656 (29.0) | 1399 (34.4) |
| Death | 177 (0.3) | 97 (0.3) | 9 (0.1) | 18 (0.1) | 26 (0.3) | 27 (0.7) |
| Diarrhea | 5482 (8.2) | 3294 (11.5) | 408 (6.3) | 627 (3.4) | 767 (8.4) | 386 (9.5) |
| Encephalitis | 97 (0.1) | 43 (0.2) | 9 (0.1) | 13 (0.1) | 21 (0.2) | 11 (0.3) |
| Hospitalization | 12,876 (19.2) | 7470 (26.0) | 612 (9.4) | 1612 (8.7) | 2075 (22.7) | 1107 (27.2) |
| Otitis media | 4879 (7.3) | 4009 (14.0) | 305 (4.7) | 338 (1.8) | 157 (1.7) | 70 (1.7) |
| Pneumonia | 3959 (5.9) | 2480 (8.6) | 183 (2.8) | 363 (2.0) | 554 (6.1) | 379 (9.3) |

Based on the data, which statement is correct?

- (A) Measles is relatively more deadly in young people compared with older people
 - (B) Catching measles will give you pneumonia
 - (C) Most of the measles cases with complications reported were young people, below 19 years of age
 - (D) Hospitalization is rare with measles
 - (E) Encephalitis is a deadly complication of measles
- (1) B only
 - (2) C only
 - (3) Both A and D
 - (4) A, D and E

Direction for Q. 60

Understanding the foraging ecology of a species is crucial when conservation management involves translocation of the species. Work by Kearvell et al. (2002) had described the foods consumed by orange-fronted parakeets in the South Island and noted that for most of the year the species fed almost exclusively on *Nothofagus* spp (beech trees) and that invertebrates made up nearly 70% of the food items consumed in spring.

Luis' research group recorded data on the diet of translocated orange-fronted parakeets on Maud Island, in the Marlborough Sounds, South Island. They recorded the foraging of the parakeets on each research visit to Maud Island from March 2007 to January 2009, visiting approximately every two months (17 visits in total).

132 feeding bouts were recorded with a total of 124 observations (81%) consisting of dietary items and 29 (19%) of non-dietary items such as bark, sticks and grit. Orange-fronted parakeets were observed to consume fruits 94 times, leaves 19 times, flowers six times and invertebrates five times.

The table below gives the plant species and food types ingested by translocated orange-fronted parakeets on Maud Island

| Species | Type | Proportion of diet (feeding bouts in brackets) |
|--|-------------------------|--|
| Sycamore (<i>Acer pseudoplatanus</i> *) | Fruits | 3.36 (4) |
| Titoki (<i>Alectryon excelsus</i>) | Fruits | 1.68 (2) |
| Makomako (<i>Aristotelia serrata</i>) | Fruits, leaves | 13.44 (16) |
| Putaputaweta (<i>Carpodacus serratus</i>) | Fruits, leaves | 5.88 (7) |
| Karamu (<i>Coprosma robusta</i>) | Fruits | 8.40 (10) |
| Tree lucerne (<i>Cytisus palmensis</i> *) | Flowers, leaves | 5.04 (6) |
| Akeake (<i>Dodonea viscosa</i>) | Leaves | 0.84 (1) |
| Kohekohe (<i>Dysoxylum spectabile</i>) | Flowers | 0.84 (1) |
| Koromiko (<i>Hebe stricta</i>) | Flowers | 1.68 (2) |
| Manuka (<i>Leptosperum scoparium</i>) | Fruits | 7.56 (9) |
| Mahoe (<i>Melycitus ramiflorus</i>) | Fruits, leaves, flowers | 43.70 (52) |
| Whauwhaupaku (<i>Pseudopanax arboreus</i>) | Fruits | 5.04 (6) |
| Pine (<i>Pinus radiata</i>) | Leaves | 1.68 (2) |
| Karo (<i>Pittosporum</i> sp.) | Fruits | 0.84 (1) |

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60. Considering all the data above, the best conclusion about the diet of the orange-fronted parakeet is?

- (A) They have very specific dietary preferences.
 - (B) They rely primarily on fruit for energy.
 - (C) Invertebrates are an important food source in spring.
 - (D) They exhibit dietary flexibility.
 - (E) They feed on the most abundant plant species in an area.
- (1) A, B & C
 (2) B, C & D
 (3) C, D & E
 (4) E only



END OF THE EXAM