W-2

IM-Optometry

Entrance examination- 2020

Hall Ticket Number

Time: 2 hours **Total marks: 100**

Please read the following instructions carefully before answering.

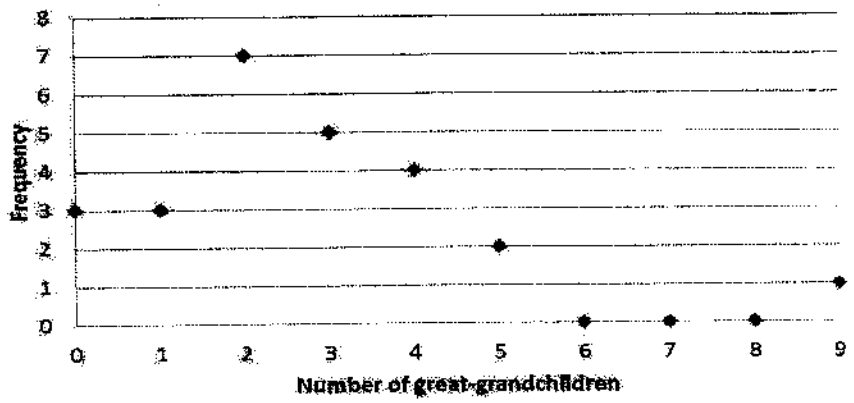
Instructions

1. **This booklet has (24) pages. Please check thoroughly for all the pages.**
2. **Enter the Hall ticket number on the first page of this booklet as well as on the OMR sheet.**
3. **There is negative marking for PART A only. For each wrong answer 0.33 marks will be deducted.**
4. **There are two PARTS in the question paper – PART A (Question nos. 1-25) and PART B (Question nos. 26 – 100). In case of a tie, marks obtained in PART A will be considered for resolving the tie.**
5. **Calculators are not permitted**

W-2

PART A

1. 25 randomly selected residents of a retirement village were asked " How many great-grandchildren do you have?" The following dot plot was constructed from the data. How you would describe the data value of 9?



A. An outlier

B. An inlier

C. Standard

D. Normality

2. Find the mean, Median, Mode and range for the data set:

10, 12, 12, 15, 15, 17, 18, 18, 18, 19

	MEAN	MEDIAN	MODE	RANGE
A	6	5	9	10
B	15.4	16	18	9
C	16.4	17	18	18
D	10.6	16	18	9

3. State the number of terms in the expression: $X^3 - 2X^2 + 5X - 1/x - 1$

A. 3

B. 4

C. 5

D. 1

W-2

4. What is the ratio of vowels to consonants in the English alphabet?
   A. 5:21
   B. 4:22
   C. 6:20
   D. 3: 23
5. Which of the following radioisotope is used as anti-cancerous?
   A. Na-24
   B. Co-60
   C. U-235
   D. C-14
6. Bonds that are absent in silicone?
   A. C-O-Si
   B. Si-O-Si
   C. O-Si-R
   D. R-Si-R
7. Which of the following is used for metal cleaning and finishing?
   A. $CHCl_3$
   B. CH_2Cl_2
   C. CCl_4
   D. CHI_3
8. Which is more soluble among the following?
   A. CaO
   B. MgO
   C. BaO
   D. BeO
9. A very important component of ceramics, glass and cement is?
   A. Si
   B. Ge
   C. C
   D. Pb

W-2

10. The sequence of steps leading to urine formation and excretion from the body is best described by the following statement:
    A. Glomerular filtration, Tubular reabsorption, Tubular secretion, Collection in the urinary bladder
    B. Glomerular filtration, Tubular secretion, Tubular reabsorption Collection in the urinary bladder
    C. Glomerular filtration, Tubular absorption, Tubular secretion, Collection in the urinary bladder
    D. Glomerular filtration, Tubular secretion, Tubular absorption Collection in the urinary bladder
11. Which of the following sequence of nucleotides is not a stop codon for RNA?
    A. UAA
    B. UAG
    C. UGA
    D. UGG
12. Hydrogenation of vegetable oils to convert them into a saturated fat utilises which of the following as a catalyst?
    A. Organic compound
    B. Phenolic compound
    C. Inorganic ion
    D. Gaseous mixture
13. A Pulmonologist is a doctor that specialises in treating?
    A. Disorders of the Liver
    B. Disorders of the Kidneys
    C. Disorders of the Lung
    D. Disorders of the Skin
14. An auto-immune disorder that leads to the destruction of the pancreatic cells leads to:
    A. Increased blood sugar
    B. Decreased blood sugar
    C. Increased blood sodium
    D. Decreased blood sodium

15. At a depth of 600meter in an ocean, what is absolute pressure ? The density of ocean water is $1.03x10^3$ Kg/m^3 and g= 10 m/s , Pa = $1.0x10^5$ Pa .

    A. $1.03x10^3$ Kg/m^3

    B. $1.03x10^5$ Kg/m^3

    C. $61.01x10^3$ Kg/m^3

    D. $61.01x10^5$ Kg/m^3

16. The density of the atmosphere at sea level is 1.29kg/m^3 and g=9.8 m/s^2. Assume that both do not change with altitude, how high the atmosphere extends?

    A. 0.0798 m

    B. 0.798 m

    C. 7.98 m

    D. 79.8 m

17. What is that temperature at which the Fahrenheit reading is double that of the Celsius reading.

    A. 160 °C

    B. 150 °C

    C. 64 °C

    D. 50 °C

18. Value of Cp for mono atomic gas is 5/2 R, What is the value of Cv.

    A. 1/2 R

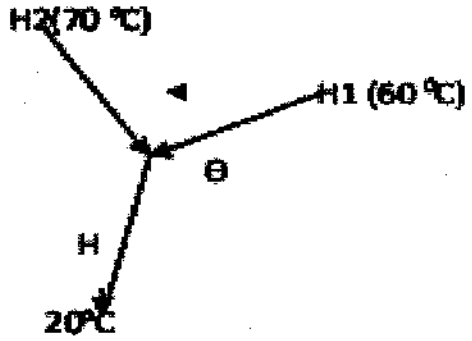
    B. 3/2 R

    C. 5/2 R

    D. R

W - 2

19. Find the temperature of junction shown in below figure for three metallic rods identical in dimensions. Consider that there is no heat lost due to radiation.



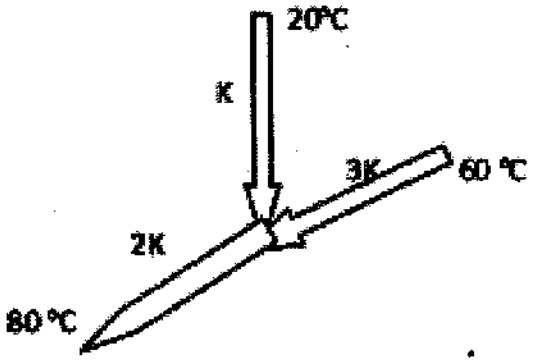
A. 30.66 °C

B. 50 °C

C. 60 °C

D. 150 °C

20. Find the temp. of junction shown in below figure for three rods, identical in dimensions.



A. 80 °C

B. 90 °C

C. 160 °C

D. 180 °C

21. A tuning fork produces 3 beats/sec. when sounded together with a fork of frequency 360 Hz Ā frequency of the first fork is ?

A. 357 Hz

B. 357.5 Hz

C. 361 Hz

D. 363 Hz

For question 22 to 25 please read the paragraph and choose the best answer to each question. Answer all questions following the paragraph on the basis of what is stated or implied in that passage.

Warm-blooded animals have elaborated physiological controls to maintain constant body temperature (in humans, 37' C). Why then during sickness should temperature rise, apparently increasing stress on the infected organism? It has long been known that the level of serum iron in animals falls during infection. Garibaldi first suggested a relationship between fever and iron. He found that microbial synthesis of siderophorts substances that bind iron in bacteria of the genus **Salmonella** declined at environmental temperatures above 37^0 C and stopped at 40.3^0 C. Thus, fever would make it more difficult for an infecting bacterium to acquire iron and thus to multiply. Cold-blooded animals were used to test this hypothesis because their body temperature can be controlled in the laboratory. Kluger reported that of iguanas infected with the potentially lethal bacterium A. ***hydrophilia***, more survived at temperatures of 420 C than at 370 C, even though healthy animals prefer the lower temperature. When animals at 420 C were injected with an iron solution, however, mortality rates increased significantly. Research to determine whether similar phenomena occur in warm-blooded animals is sorely needed.

22. The passage is primarily concerned with attempts to detetmine

A. The role of siderophores in the synthesis of serum iron

B. New treatments for infections that are caused by A. hydrophilia

C. The function of fever in warm-blooded animals

D. Iron utilization in cold-blooded animals

23. According to the passage, Garibaldi determined which of the following?

A. That serum iron is produced through microbial synthesis

B. That microbial synthesis of siderophores in warm-blooded animals is more efficient at higher temperatures

C. That bacteria of the genus Salmonella require iron as a nutrient

D. That there is a relationship between the synthesis of siderophores in bacteria of the genus Salmonella and environmental temperature

24. Which of the following can be inferred about warm blooded animals solely on the basis of information in the passage?

A. The body temperatures of warm-blooded animals cannot be easily controlled in the laboratory

B. Warm-blooded animals require more iron in periods of stress than they do at other times.

C. In warm-blooded animals, bacteria are responsible for the production of siderophores, which, in turn, make iron available to the animal.

D. In warm-blooded animals, infections that lead to fever are usually traceable to bacteria.

25. If it were to be determined that "similar phenomena occur in warm-blooded animals", which of the following, assuming each is possible, is likely to be the most effective treatment for warm-blooded animals with bacterial infections?

A. Administering a medication that lowers the animals' body temperature

B. Administering a medication that makes serum iron unavailable to bacteria

C. Providing the animals with reduced-iron diets

D. Keeping the animals in an environment with temperatures higher than 37^0 C

PART B

26. $4Y^2 - 6X + 2XY - 5 + X^2$. What is the coefficient of X?

A. -5

B. -6

C. +2

D. 12

27. Neeraj decided to go jogging each morning. As a result, he lost 6 kg. If he initially weighed w kg, how much does he weigh now?

A. 6 kg.

B. 8 kg.

W-2

C. (w - 6) kg

D. (w - 8) kg

28. If f = 2, g = 4 and h = 1, evaluate $2g^2$:

A. 32

B. 16

C. 8

D. 4

29. The area of a triangle with base length b cm and height h cm, is given the expression 1/2bh cm2. Find the area of triangle with base 6 cm and height 9 cm.

A. 27 cm^2

B. 54 cm^2

C. 6 cm^2

D. 9 cm^2

30. A mixture of water and lime cordial concentrate contains 12% cordial concentrate. How much water is required to make 6 liters this lime cordial mixture?

A. 5.28L

B. 7.20L

C. 6.28L

D. 7.72

31. 50 students were asked their favourite way of spending time with their friends. The responses are given below, where B=Going to the beach, M = Going to movies, P = Going to park, S = going to shopping, and V = Playing video games.

V V S B P M S B V S M M M B S M S M B B V P V S M
P S S M M V S V M S B B S V M B S M P P M V S M P

How many students chose shopping and find the mode of the data?

A. 13 & Movies

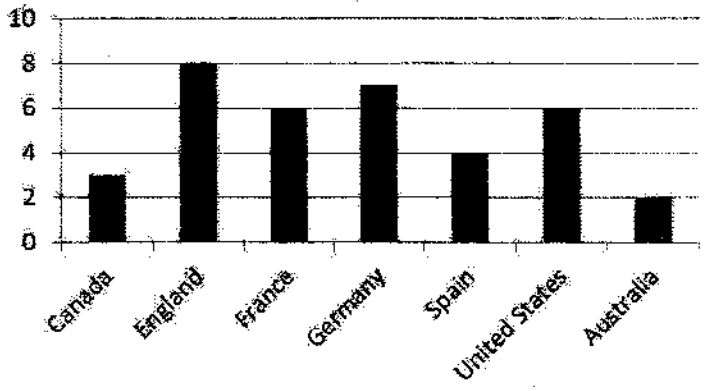
B. 14 & Shopping

C. 13 & Shopping

D. 14 & movies

W-2

32. Guests of a hotel in Delhi were asked which country they lived in. The results are shown in the bar graph. How many guests were surveyed & what percentage of guests were from Spain.



A. 35.0 & 10.1%

B. 36.0 & 11.1%

C. 37.0 & 12.1%

D. 38.0 & 13.1%

33. A member of each household in one street was asked which brand of washing machine they owned. The data collected is summarised alongside. What percentage of households own a brand E washing machine?

Brand	Frequency
A	11
B	5
C	13
D	8
E	7
F	6

A. 12

B. 13

C. 14

D. 15

W-2

34. Match the following variables.

A	The number of text messages you send in a day	I	Numerical
B	The places where you access the Internet	II	Categorical
C	The brands of breakfast cereal	III	Categorical
D	The heights of students in your class	IV	Numerical

Which of the following pairs given above are correctly matched.

	I	II	III	IV
A.	1	2	3	4
B.	2	4	1	3
C.	4	3	2	1
D.	3	2	1	4

35. For the data in this stem-and-leaf plot, find the maximum value & the number values greater than 50.

Stem	Leaf
2	5 6 9
3	1 2 7 7
4	0 3 4 6 9
5	2 5 6

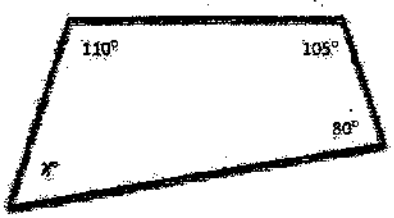
A. 56 & 3 values

B. 56 & 4 values

C. 77 & 4 values

D. 77 & 3 values

36. Find the value of X for a given polygon:



A. 95°

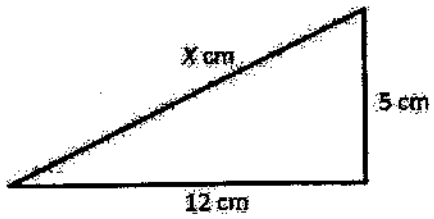
B. 85°

C. 75°

D. 65°

W-2

37. Find the length of the hypotenuse in the given right angled triangle:



A. 11 cm

B. 12 cm

C. 13 cm

D. 14 cm

38. A postage stamp is most likely to have an area of:

A. 10 mm^2

B. 10 cm^2

C. 10 m^2

D. 10 ha

39. Consider the formula $P = 2t + 7$. Find the value of P when $t = 6$.

A. 15

B. 19

C. 21

D. 23

40. As per the given number sequence, state the next 3 numbers: 13, 22, 31, 40 …

A. 59, 68, 77

B. 49, 57, 68

C. 48, 57, 66

D. 49, 58, 67

W-2

41. Find the equation of the straight line passing through the following points. What is the value of y for it corresponding x-value?

X	1	2	3	4	5
Y	4	8	12	16	20

A. X=2

B. -2X

C. 4x

D. 2X

42. A ticket is randomly selected from a box containing 3 yellow, 4 green, and 8 blue tickets. What is the probability that the yellow ticket is:

A. 1/5

B. 1/4

C. 1/3

D. ½

43. Ajay is practicing hitting cricket ball in nets. Out of 52 attempts, he hits the ball 38 times. Estimate the probability that Ajay will hit the next ball pitched at him.

A. ≈ 0.931

B. ≈ 0.731

C. ≈ 0.631

D. ≈ 0.831

44. A set of cricket wickets consists of 3 stumps and 2 bails. Each bail weighs 100 g, and the total weight of wickets is 1.7 kg. What is the weight of each stump?

A. 200 g.

B. 300 g.

C. 400 g.

D. 500 g.

W-2

45. A set of 7 data values has a mean of 9. What is the sum of the data values?

A. 63

B. 53

C. 43

D. 73

46. Which of the following ions, has polarizing power close to that of Mg+

A. Rb+

B. Li^+

C. Na^+

D. K^+

47. The lightest metal among the following is

A. Be

B. H

C. Mg

D. Li^+

48. Which of the following has highest conductivity in aqueous solution?

A. Li^+ ion

B. Na^+ ion

C. Cs^+ ion

D. K^+ ion

49. From Be to Ba electropositive or metallic character

A. Remains Same

B. Decreases

C. Increases

D. Cannot be predicted

50. Which of the following salts does not impart a colour to the flame?

A. LiCl

B. KCl

C. $CaCl_2$

D. $MgCl_2$

51. The pair of ions which give the same flame colour in flame test are

A. Li^+ and Sr^{2+}

B. Ca^{2+} and Ba^{2+}

C. Ca^{2+} and Mg^{2+}

D. Li^+ and Ca^{2+}

52. Boric acid is a polymer due to

A. Acidic nature

B. Basic nature

C. Hydrogen bonds

D. Its geometry

53. Alum is not used

A. as a mordant in dyeing

B. in tanning of leather

C. in the purification of water

D. as an insecticide

54. Man dies in an atmosphere of carbon monoxide, because it

A. Combine with the O2 present in the body to form CO2

B. Reduces of the organic matter of tissues

C. Dries up the blood

D. Combines with heamoglobin of blood, making it incapable of binding O2

55. Reason for highest catenation of carbon

A. C is more electronegative

B. C-C bond is strong

C. C has only one stable isotope

D. C has higher ionization potential value

56. Sodium ion is isoelectronic with

A. Mg2+

B. Al^{3+}

C. N3+

D. Ne

57. Rutherford's alpha ray scattering experiment showed for the first time that the atom has

A. Neutron

B. Proton

C. Electron

D. Nucleus

58. Elements of a vertical group have

A. Same number of valency electrons

B. Same electronic configuration

C. Same atomic number

D. Same number of core elements

59. Ethyl chloride is not used in

A. General anaesthesia

B. Local anaesthesia

C. Preparation of T.E.L.

D. Ethylating agent

60. Entropy of a system depends upon

A. Volume only

B. Temperature only

C. Pressure, volume and temperature

D. Pressure only

61. Hess's law is based on

A. Law of conservation of mass

B. First law of thermodynamics

C. Gibb's equation

D. Kirchoff's equation

62. Entropy is maximum for 10 grams of

A. Phosphorus

B. Water

C. Carbon

D. Methane

W-2

63. Which of the following participate in aldol condensation

A. Formaldehyde

B. Acetaldehyde

C. Methanol

D. Benzaldehyde

64. Among the following least boiling point is for

A. Methoxyethane

B. Propanone

C. Propanal

D. 1-propanol

65. Which of the following is not a fatty acid?

A. Propionic acid

B. Stearic acid

C. Valeric acid

D. Oxalic acid

66. According to the World Health Organization (WHO), which of the neighboring country of India is free of malaria:

A. Sri Lanka

B. Nepal

C. Bhutan

D. Bangladesh

67. Which of the organ listed below is not involved in the removal of metabolic end products:

A. Kidneys

B. Lungs

C. Liver

D. Pancreas

W-2

68. Insulin is a _____ that is responsible for maintaining the levels of glucose in the body:

A. Enzyme

B. Cofactor

C. Hormone

D. Vitamin

69. Sodium salts of Stearic acids are also known as:

A. Baking Soda

B. Soaps

C. Waxes

D. Prostaglandin

70. Which structure of the proteins is not affected by the denaturation process?

A. Primary Structure

B. Secondary Structure

C. Tertiary Structure

D. Quaternary Structure

71. Which of the following is not a property of Amylase?

A. Digesting starches

B. Digesting lipids

C. Performs salivary digestion

D. Indicates pancreatic disorder

72. Concentration of hormones in our body is regulated by

A. Receptor blockers of the hormones

B. Nutritional Stimulus to the Glands

C. Positive and negative feedback mechanisms

D. Indirect growth inducing agents

73. The disorder of which amongst the following organ will affect the production of the Red Blood Cells:

A. Heart

B. Liver

C. Kidney

D. Lungs

74. Humoral immunity is a form of adaptive immunity mediated by:

A. Antibodies

B. T Cytotoxic cells

C. Natural Killer cells

D. Macrophages

75. Pick the odd one out:

A. Pneumonia

B. AIDS

C. Tuberculosis

D. Cholera

76. A 2.5M Glucose solution in a volume of 100 ml will contain _____ of glucose:

A. 4500 milligrams

B. 450 milligrams

C. 45 milligrams

D. 45000 milligrams

77. Which of the following is not true for Saprophytes

A. They feed on decaying and dead materials

B. They are a form of parasite

C. Important agents to maintain ecological balance

D. Survive by mutualism

78. The order of classification, going upwards from the species is best described in :

A. Species, genus, family, class, order, phylum

B. Species, genus, family, order, class, phylum

C. Species, genus, order, family, class, phylum

D. Species, genus, class, family, order, phylum

W-2

79. Which of the following is not true for an enzymatic reaction

A. They catalyse the reaction by lowering the activation energy

B. They catalyse the reaction but remain unchanged in the reaction

C. They are unable to catalyse a reaction after being used up for a reaction

D. They are highly specific for the substrate they act upon

80. Which type of bonding is found in water

A. Electrostatic

B. Covalent

C. Hydrogen

D. Van der Waals

81. Scurvy is caused by the deficiency of

A. Ascorbic acid

B. Folic acid

C. Boric acid

D. Carbonic acid

82. Pick the odd one out

A. Down's Syndrome

B. Patau's Syndrome

C. Fragile X Syndrome

D. Edwards syndrome

83. Sound waves needs a medium to travel and are hence called

A. Electromagnetic wave

B. Electrical wave

C. Light wave

D. Mechanical wave

84. Which among the following is not a vector quantity

A. Torque

B. Force

C. Velocity

D. Density

W-2

85. The pressure of a given mass of a gas filled in a vessel of volume V at constant temperature is reduced to ½ of the initial value. The percentage change in its volume ?

A. 50

B. 75

C. 100

D. 125

86. The average kinetic energy of H2 molecule at 0 °C is ?

A. 3.76×10^{-21}J

B. 5.65×10^{-21}J

C. 1.88×10^{-21}J

D. 9.42×10^{-21}J

87. The ratio of kinetic energy of molecules of neon and oxygen gas at 50 °C is :

A. 5/3

B. 3/5

C. 5/2

D. 3/2

88. The value of the mean free path of molecules of a gas having number density 2×10^{8} and the diameter of the molecules is 10^{-5} cm ?

A. 11.25×10^{-3} cm

B. 1.125×10^{-3} cm

C. 0.1125×10^{-3} cm

D. 0.01125×10^{-3} cm

89. Two thin lens of power -5D and 3D are placed in contact coaxially, the focal length of combination is ?

A. 50 cm

B. -50 cm

C. 100 cm

D. -100cm

90. The ratio of De-broglie's wavelength associated with two electrons accelerated through 25V and 36 V ?

A. 5/6

W-2

B. 6/5

C. 25/36

D. 36/25

91. The following truth table represents the :

A	B	$\bar{A}$	$\bar{B}$	$\bar{A}+\bar{B}$
0	0	1	1	1
0	1	1	0	1
1	0	0	1	1
1	1	0	0	0

A. AND

B. NAND

C. OR

D. NOR

92. Monochromatic light of frequency 6.0×10^{14} Hz is produced by a Laser. The power emitted is 2×10^{-3} W (The value of Plank's constant h $=6.6 \times 10^{-34}$ J-sec.).Estimated numbers of photons emitted per second is?

A. 1×10^{15}

B. 2×10^{15}

C. 3×10^{15}

D. 5×10^{15}

93. Two polarizers P1 and P2 are placed with their pass axe perpendicular to each other, un-polarized light of intensity I_0 is incident on P1. A third Polaroid P3 is kept in between P1 and P2 such that its axis makes an angle of 30° with that of P1.The intensity of light transmitted through P1 and P3 are ?

A. I_o , 3/2 I_o

B. 1/2 I_o , 3/2 I_o

C. I_o , 3/8 I_o

D. 1/2 I_o , 3/8 I_o

94. A microphone converts the sound signal into electric signal is also known as :

A. Converter

B. Amplifier

C. Transducer

D. Repeater

95. A giant refracting telescope has ab objective lens of focal length 15 m. If the eye piece of focal length 1.0 cm is used .The angular magnification of the telescope is :

A. 15 m

B. 150 m

C. 1500m

D. 1550 m

96. An objective and ocular lens are to be mounted at opposite end of a 110 mm long tube to make a make a 10 magnification power astronomical telescope .The focal length are :

A. 10, 100

B. 100, 10

C. 110, 10

D. 10,110

For question 97 to 100 please read the paragraph and choose the best answer to each question. Answer all questions following the paragraph on the basis of what is stated or implied in that passage.

Tsunamis are huge, fast-moving waves that are capable of causing enormous destruction and loss of life if they broach the shoreline on a populated coast. To communities that have been devastated by such an event, the tsunami often seems to come out of nowhere, and survivors are mystified as to why such a huge wave could appear with so little warning. The terrifying suddenness of a tsunami's arrival is a consequence of where and how they are created. When submarine tectonic activity distorts the sea floor, it vertically displaces the overlying sea water. As the displaced water seeks equilibrium under the influence of gravity, waves form, and when the distortion is of sufficient magnitude, a tsunami can result. If the earthquake occurs near the shore, the tsunami may take only minutes to reach a populated coast. Tsunamis attain their enormous heights through a process of decreasing speed and increasing height. The energy flux of a tsunami is constant, which leads to an inversely proportional relationship between the wave's speed and its height. Since speed is directly proportional to water depth, as the wave approaches shallower water, its speed decreases, causing its height to increase to compensate for the loss and thus maintain the wave's energy flux. Through this process, a barely perceptible deep ocean wave formed by an earthquake far from shore can

rapidly transform into a tsunami that can exceed 30 meters at its final run up height, which it attains onshore above sea level

97. The author is primarily concerned with
    A. Arguing that a tsunami's energy flux results in its great height and destructive capacity
    B. Establishing that tsunamis are formed by submarine tectonic activity.
    C. Challenging long held beliefs about the formation of deep ocean waves
    D. Explaining why tsunamis can appear so suddenly and with so little warning.
98. It may be inferred from the passage that a tsunami that entered deeper water would experience an increase in
    A. Height
    B. Speed
    C. energy flux
    D. Destructive power
99. It may be inferred from the passage that a tsunamis attain their enormous heights through a process of.
    A. Decreasing speed and increasing height
    B. Increasing speed and increasing height
    C. Submarine tectonic activity close to the shore.
    D. Submarine tectonic activity in the middle of the ocean.
100. It may be inferred from the passage that energy flux of a tsunami
    A. Keeps increasing
    B. Keeps decreasing
    C. Is constant
    D. Is sinusoidal