SOF
SCIENCE OLYMPIAD FOUNDATION

DPS Science & Maths
TALENT EXAMINATION
2018-19

Time : 2 hrs.

Total Marks : 100

Guidelines for the Candidate

1. The paper consists of two sections –
   Science (60 Questions) : Physics (20 Questions), Chemistry (20 Questions) & Biology (20 Questions) and
   Mathematics (40 Questions)

2. All questions are compulsory and carry equal marks. There is no negative marking. Use of calculator is not permitted.

3. Write your Name, School Name and Roll No. clearly on the OMR sheet and do not forget to sign it.

4. There is only one correct answer hence mark one choice only.

5. Darken your choice with **HB Pencil** or **Blue / Black Ball Point Pen** only.
   For example :
   Q.16 : In the water cycle, condensation is the process of
       (A) Water vapour cooling down and turning into a liquid
       (B) Ice warming up and turning into a liquid
       (C) Liquid cooling down and turning into ice
       (D) Liquid warming up and turning into water vapour
       (E) None of these

   As the correct answer is option (A), the candidate should darken the circle corresponding to option (A).

   16. ● (B) (C) (D) (E)

6. Rough work should be done in the blank space provided in the booklet.

SYLLABUS

Science : Motion, Force and Laws of Motion, Gravitation, Work and Energy, Sound, Matter in Our Surroundings, Is Matter Around Us Pure, Atoms and Molecules, Structure of Atom, Cell-The Fundamental Unit of Life, Tissues, Diversity in Living Organisms, Why Do we Fall Ill, Natural Resources, Improvement in Food Resources.

Mathematics : Verbal and Non-verbal Reasoning.
Number Systems, Polynomials, Co-ordinate Geometry, Linear Equations in Two Variables, Lines and Angles, Triangles, Circles, Quadrilaterals, Areas of Parallelograms and Triangles, Statistics, Probability, Heron's Formula, Introduction to Euclid's Geometry, Constructions, Surface Areas and Volumes.

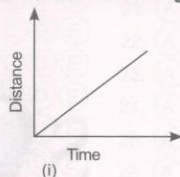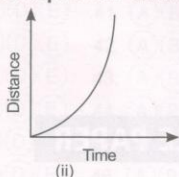**A Collaborative Project of DPS Society & Science Olympiad Foundation**

SCIENCE

PHYSICS
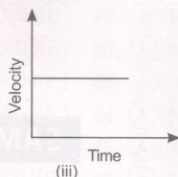
1. Which of the following graphs represent uniform motion?
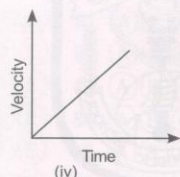

(A) (i) and (ii)   (B) (i) and (iv)   (C) (iii) and (ii)   (D) (i) and (iii)

(E) None of these

2. A stone is tied to one end of a string, and is rotated in a horizontal circle whose centre lies at the other fixed end of the string. If the stone is released during its motion by letting the fixed end free. The path described by the stone is

(A) Along a straight line towards the centre of the circle

(B) Along a straight line (radially) away from the centre of the circle

(C) Along a straight line tangential to the circular path

(D) It doesn't change its path

(E) None of these.

3. Two children P and Q of equal masses are at a swimming bath. Child P drops vertically from a diving board 5 m high. Child Q slides from the same height down a slide into the water. The children start moving at the same instant. Which one of the following statements is true? (Ignore air resistance and friction on the slide.)
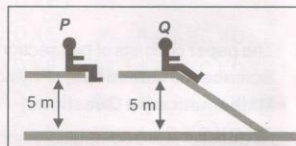
(A) The children hit the water at the same time with the same speed.

(B) The children hit the water at different times with the same speed.

(C) The children hit the water at the same time with different speeds.

(D) The children hit the water at different times with different speeds.

(E) None of these

4. A sound wave passes from a medium P to a medium Q. The velocity of sound in medium Q is greater than that in medium P. Assume that there is no absorption or reflection at the boundary. As the wave moves across the boundary, the

(A) Frequency of sound will increase   (B) Wavelength of sound will increase

(C) Wavelength of sound will decrease   (D) Intensity of sound will increase

(E) None of these.

5. A spaceship brings a rock of mass m to the earth. On the surface of the earth

(A) Mass of rock changes but not the weight   (B) Weight of rock changes but not the mass

(C) Mass and weight of the rock remain same   (D) Both mass and weight of the rock change

(E) None of these.

6. A ball thrown up vertically returns to the thrower after 6 seconds. The velocity with which it was thrown is

(A) 30 m/s   (B) $30\sqrt{2}$ m/s   (C) $-\dfrac{27}{4}$ m/s   (D) 30 × 2 m/s

(E) None of these.

7. A cricket ball weighing 100 g and moving with a speed of 20 m s^{-1} strikes a bat and remains in contact with it for 0.1 s. If the ball comes to rest after striking the bat then, the average force exerted by the ball on the bat is

(A) 100 N   (B) 40 N   (C) 20 N   (D) 1 N

(E) None of these.

8. A spherical planet, far out in space, has a mass M_0 and diameter D_0. A particle of mass m falling freely near the surface of this planet will experience acceleration due to gravity which is equal to

(A) $\dfrac{GM_0}{D_0^2}$ (B) $\dfrac{4mGM_0}{D_0^2}$ (C) $\dfrac{4GM_0}{D_0^2}$ (D) $\dfrac{Gm}{D_0^2}$

(E) None of these.

9. Match the items of Column I with the corresponding items of Column II.

Column I		Column II	
1.	Sound waves of frequency less than 20 Hz	(a)	20 Hz to 20,000 Hz
2.	Audible range of frequency	(b)	Wavelength
3.	Distance between two successive compressions	(c)	About 340 m s⁻¹
4.	Speed of sound waves in air	(d)	Infrasonic waves

(A) 1-(d); 2-(a); 3-(b); 4-(c) (B) 1-(b); 2-(c); 3-(d); 4-(a)
(C) 1-(a); 2-(b); 3-(c); 4-(d) (D) 1-(c); 2-(d); 3-(a); 4-(b)

(E) None of these

10. Which of the following statements is not true regarding uniform circular motion?
(A) The body moves with a constant speed. (B) The body moves with a variable velocity.
(C) The magnitude of acceleration is constant. (D) The kinetic energy of the body is constant.

(E) None of these

11. An iron ball and a glass ball of same size are immersed in water. Which of the following statements is correct?
(A) The weight loss in iron ball is more. (B) The weight loss in glass ball is more.
(C) The buoyant force on iron ball is more. (D) The buoyant force is same on both the balls.

(E) None of these

12. Choose the correct statement.
(A) A low pitch sound has high frequency. (B) A high pitch sound has high frequency.
(C) Soft sound has large amplitude. (D) Louder sound has small amplitude.

(E) None of these

13. In the given graph the work done by the force during the first 5 metres is
(A) 10 J
(B) 12.5 J
(C) 15 J
(D) 17.5 J
(E) None of these.
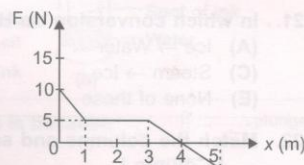
14. The velocity of a particle increases from u to v in a time t during which it covers a distance S. If the particle has a uniform acceleration a, which one of the following equation does not apply to the motion?

(A) $2S = (v + u)t$ (B) $a = \dfrac{v - u}{t}$ (C) $v^2 = u^2 - 2aS$ (D) $S = \left(u + \dfrac{1}{2}at\right)t$

(E) None of these

15. A person exerts a horizontal force of 500 N on a box, which also experiences a frictional force of 100 N.

100 N ← → 500 N

3 m
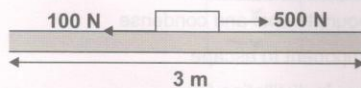
How much work is done against friction when the box moves a horizontal distance of 3 m?
(A) 300 J (B) 1200 J (C) 1500 J (D) 1800 J
(E) None of these

16. **A body thrown vertically up, at the maximum height**
    (A) The velocity is not zero but acceleration is zero   (B) The acceleration is not zero but velocity is zero
    (C) Both acceleration and velocity are zero   (D) Both acceleration and velocity are not zero
    (E) None of these.

17. **If 'X' represents the product of the masses of any two bodies and F be the force of attraction between the two bodies, then F varies with X as (Assume separation between two bodies is constant.)**

    (A)   (B)   (C)   (D)
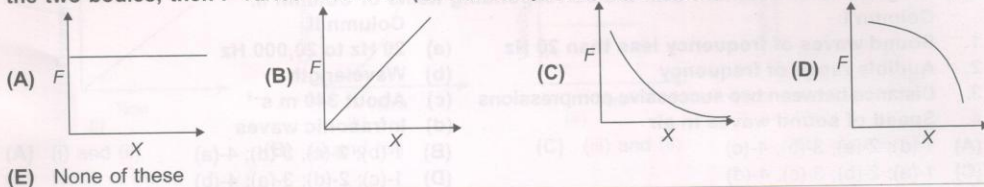
    (E) None of these

18. **Pressure at a point inside a liquid does not depend on**
    (A) The depth of the point below the surface of the liquid   (B) The nature of the liquid
    (C) The acceleration due to gravity at that point   (D) The shape of the containing vessel
    (E) None of these.

19. **Three blocks X, Y and Z of masses 10 kg, 3 kg, and 5 kg respectively are connected by light inextensible strings placed on a smooth horizontal surface. If a force of 36 N is applied to the string connected to Z. The ratio of T_2 and T_1 is**
    (A) 10 : 13   (B) 10 : 2
   (C) 13 : 10   (D) 1 : 5
    (E) None of these.
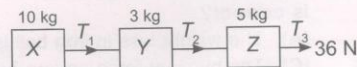
20. **A sharp knife can cut food much more easily because**
    (A) It produces a greater pressure on the food   (B) Friction between the blade and the food is reduced
    (C) It produces a greater force than a blunt knife   (D) Its mass is less as the blade is thinner
    (E) None of these.

CHEMISTRY

21. **In which conversion do H_2O molecules lose speed?**
    (A) Ice → Water   (B) Ice → Steam
    (C) Steam → Ice   (D) Water → Steam
    (E) None of these
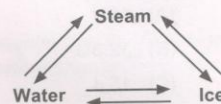
22. **Match the columns and select the correct option from the given codes.**

Column I		Column II
(a)	Mercury	(i) Acidic oxide
(b)	CO_2	(ii) Liquid metal
(c)	Gold	(iii) Basic oxide
(d)	MgO	(iv) Malleable

    (A) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)   (B) (a) - (ii), (b) - (i), (c) - (iv), (d) - (iii)
    (C) (a) - (iv), (b) - (ii), (c) - (iii), (d) - (i)   (D) (a) - (ii), (b) - (i), (c) - (iii), (d) - (iv)
    (E) None of these

23. **What is the function of X in the given apparatus?**
    (A) To provide surface for the vapours to cool and condense

    (B) To allow only lower boiling component to escape

    (C) To apply pressure to the mixture in distillation flask

    (D) Both (A) and (C)

    (E) None of these
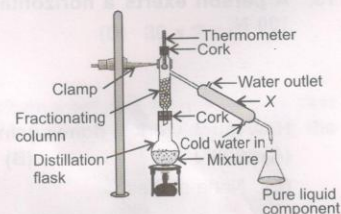
24. Favourable conditions for evaporation are _____.
   I. Increase in surface area
   II. Increase in temperature
   III. Increase in humidity
   IV. Increase in wind speed
   (A) I and II only   (B) II and III only   (C) I, II and IV only   (D) I, II, III and IV
   (E) None of these
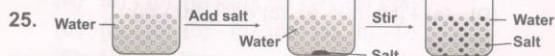
25.

   The conclusion which can be drawn from the above experiment is that _____.
   (A) Nature of matter is continuous   (B) Matter is made up of particles
   (C) Particles of salt get into the spaces between the particles of water
   (D) Both (B) and (C)
   (E) None of these

26. If 2.5 g of a solute is dissolved in 25 g of water to form a saturated solution at 298 K, the solubility of the solute is _____.
   (A) 0.1   (B) 10   (C) 100   (D) 50
   (E) None of these

27. Which of the following represents the correct comparison between a solution and a suspension?
	Solution	Suspension
(A)	Homogeneous, separated by filtration	Heterogeneous, not separated by filtration
(B)	Homogeneous, not separated by filtration	Heterogeneous, separated by filtration
(C)	Heterogeneous, separated by filtration	Homogeneous, not separated by filtration
(D)	Heterogeneous, not separated by filtration	Homogeneous, separated by filtration
(E)	None of these	

28. Neha sets up an experiment as shown in the figure.
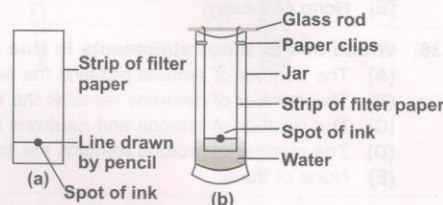   She is trying to _____.
   (A) Check the solubility of ink in water
   (B) Find out the number of components of ink
   (C) Observe the effect of gravity on the process
   (D) Observe absorption of ink on paper
   (E) None of these

29. In the diagram, air is compressed when the plunger moves from P to Q. This is because air _____.
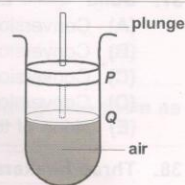   (A) Has particles which have large empty spaces between them
   (B) Has particles which are constantly moving
   (C) Has particles which have intermolecular forces
   (D) Has particles of negligible mass
   (E) None of these.

30. Two particles X and Y have the composition as shown in the table.
   The particles X and Y are _____.
   (A) Metal atoms
   (B) Non-metal atoms
   (C) Negative ions
   (D) Positive ions
   (E) None of these.

Particle	Number of electrons	Number of neutrons	Number of protons
X	10	8	8
Y	18	18	17

31. What weight of oxygen gas will contain the same number of molecules as 56 g of nitrogen gas?
   (A) 60 g   (B) 32 g   (C) 56 g   (D) 28 g
   (E) None of these

32. **Match the columns and select the correct option from the given codes.**

Column I (Fuel)

(a) LPG
(b) Bitumen
(c) Paraffin wax
(d) Petrol

Column II (Uses)

(i) Paints
(ii) Ointments
(iii) Solvent for dry cleaning
(iv) Fuel for home

(A) (a) - (i), (b) - (iii), (c) - (iv), (d) - (ii)
(B) (a) - (ii), (b) - (i), (c) - (iii), (d) - (iv)
(C) (a) - (iv), (b) - (i), (c) - (ii), (d) - (iii)
(D) (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)
(E) None of these

33. **Read the given statements and select the correct option.**

Statement I : Number of molecules of water in 18 u of water is same as the number of molecules of SO_2 in 64 u of SO_2.

Statement II : Number of molecules of water in 18 g of it is same as the number of molecules of SO_2 in 18 g of SO_2.

(A) Both statements I and II are true and statement II is the correct explanation of statement I.
(B) Both statements I and II are true but statement II is not the correct explanation of statement I.
(C) Statement I is true but statement II is false.
(D) Statement I is false but statement II is true.
(E) None of these

34. **Concentration of a solution, in mass by volume percentage, when 36 g of sodium chloride is dissolved in water to form 145 mL of solution is _____.**

(A) 24.8
(B) 32.9
(C) 0.248
(D) 0.329
(E) None of these

35. **Li occurs in nature in two isotopic forms with masses 6.015 u and 7.016 u in the ratio 7.42 : 92.58. The average atomic mass of Li atom is _____.**

(A) 6.94
(B) 6.12
(C) 7.12
(D) 7.00
(E) None of these

36. **Which one of these statements is true about an isotope of an element?**

(A) The number of protons remains the same, but the number of neutrons is different.
(B) The number of neutrons remains the same, but the number of protons is different.
(C) The number of protons and neutrons remain the same, but the number of electrons is different.
(D) The number of protons remains the same, but electrons are added to the nucleus.
(E) None of these

37. **Solid ⇌ Liquid ⇌ Gas. Which of the following statements is correct?**

(A) Conversion of gas to liquid can be done by increasing pressure and temperature.
(B) Conversion of liquid to solid can be done by increasing temperature and reducing pressure.
(C) Conversion of solid to gas can be done by decreasing temperature and increasing pressure.
(D) Conversion of liquid to gas can be done by increasing temperature and reducing pressure.
(E) None of these

38. **Three beakers containing different mixtures are given.**
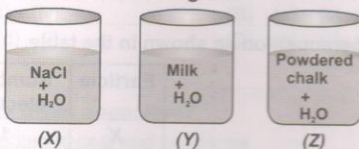
Identify the correct statement.

(A) (X) and (Z) represent suspension, (Y) represents a colloid.
(B) (X) and (Y) represent true solution, (Z) represents a suspension.
(C) (X) represents a true solution, (Y) represents a colloid and (Z) represents a suspension.
(D) (X) represents a true solution, (Y) represents a suspension and (Z) represents a colloid.
(E) None of these

39. Match Column I with Column II and select the correct option from the given codes.

Column I		Column II
(a)	Liquid	(p) Highly compressible
(b)	Gas	(q) Definite volume
(c)	Plasma	(r) Super low density
(d)	Bose-Einstein condensate	(s) Super energetic

(A) (a) - (p), (b) - (q), (c) - (r), (d) - (s)
(B) (a) - (q), (b) - (p), (c) - (r), (d) - (s)
(C) (a) - (q), (b) - (p), (c) - (s), (d) - (r)
(D) (a) - (r), (b) - (p), (c) - (q), (d) - (s)
(E) None of these

40. Which of the following statements is correct for the boiling point of solvent containing a dissolved solid substance?
(A) Boiling point of the solvent is depressed.
(B) Boiling point of the solvent is elevated.
(C) There is no effect on the boiling point of the solvent.
(D) The change in boiling point depends on the polarity of the solvent.
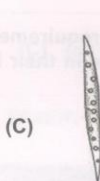(E) None of these

BIOLOGY

41. Xylem consists of tracheids, vessels, xylem parenchyma and xylem fibres. One of these components helps in sideways conduction of water, stores food and is living. Which of the following figures represents that component?
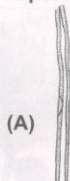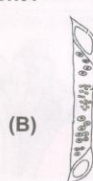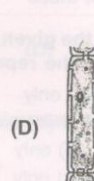
(A)　　　　　(B)　　　　　(C)　　　　　(D)

(E) None of these

42. Meristematic tissues of plants include
(A) Xylem, tips of stem and root, cork cambium
(B) Stem and root tips, vascular cambium, cork cambium
(C) Vascular cambium, cork cambium, phloem
(D) Xylem, phloem, sclerenchyma
(E) None of these.

43. Rabi and Kharif crops are the major crops of India. Given below is a list of crops. Categorize them as Rabi and Kharif crops and select the correct option.

Paddy, Wheat, Soybean, Mustard, Maize, Cotton, Barley, Sugarcane

(A) Rabi crops : Paddy, Wheat, Cotton, Sugarcane
　　 Kharif crops : Soybean, Mustard, Maize, Barley
(B) Rabi crops : Wheat, Mustard, Barley, Sugarcane
　　 Kharif crops : Paddy, Soybean, Maize, Cotton
(C) Rabi crops : Wheat, Mustard, Barley
　　 Kharif crops : Paddy, Soybean, Maize, Cotton, Sugarcane
(D) Rabi crops : Paddy, Soybean, Maize, Cotton, Sugarcane
　　 Kharif crops : Wheat, Mustard, Barley
(E) None of these

44. The diagram shows a plant cell as seen under a microscope. Match the functions of the organelles mentioned as a, b, c, d, e.

	Controls entry of substances	Keeps the cell clean	Lipid synthesis	Photo-synthesis	Rigidity and shape of cell
(A)	e	a	b	c	d
(B)	a	b	c	d	e
(C)	c	a	e	b	d
(D)	d	b	a	c	e

(E) None of these
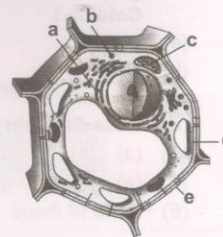
45. Match column I with column II and select the correct option from the codes given below.

Column I
(a) Squamous epithelium
(b) Columnar epithelium
(c) Cuboidal epithelium
(d) Ciliated epithelium

Column II
(i) Iris of eye
(ii) Fallopian tube
(iii) Stomach
(iv) Alveoli of the lungs
(v) Inner ear
(vi) Pancreatic duct
(vii) Gall bladder

(A) (a)-(iii, v), (b)-(ii, vi), (c)-(i), (d)-(iv, vii)
(B) (a)-(iv, v), (b)-(iii, vii), (c)-(i, vi), (d)-(ii)
(C) (a)-(iv, v), (b)-(iii, vi), (c)-(ii), (d)-(i, vii)
(D) (a)-(i, vii), (b)-(ii, v), (c)-(iii), (d)-(iv, vi)
(E) None of these

46. In which of the given plants there is requirement of water to complete the reproductive phase in their life cycle?

(A) (i) and (ii) only
(B) (i), (ii) and (iii) only
(C) (ii) and (iii) only
(D) (ii) and (iv) only
(E) None of these

47. *Crotalaria juncea*, *Sesbania aculeata* and *Cyamopsis tetragonoloba* are
(A) Green manure   (B) Farmyard manure   (C) Compost   (D) Mixed fertilizers
(E) None of these.

48. This animal is cold-blooded, has scales and breathes through lungs. It has four-chambered heart. It lays eggs with tough covering and does not need to lay its eggs in water.
Which of the following animals is referred to in the above paragraph?

(E) None of these

49. A layer of air known as the atmosphere surrounds the earth. The composition of the atmosphere changes with air pollution. Which of the following statements about air pollution are correct?
(i) It affects the weather.
(ii) It covers the leaves of plants and limits photosynthesis.
(iii) It may cause breathing difficulties and diseases of the respiratory tract.
(iv) It is mostly caused by the burning of fossil fuels.
(A) (iii) and (iv) only   (B) (i), (ii) and (iii) only   (C) (i), (iii) and (iv) only   (D) (i), (ii), (iii) and (iv)
(E) None of these

50. The given figure represents a plant cell after being placed in a strong sugar solution. The different parts have been labelled as a, b, c, d and e. Which of the following is the correct labelling ?
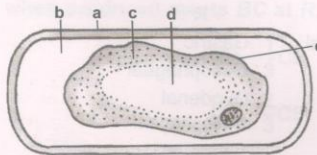
	a	b	c	d	e
(A)	Cell wall	Sugar solution	Protoplasm	Vacuole	Cell membrane
(B)	Cell membrane	Sugar solution	Protoplasm	Vacuole	Cell wall
(C)	Cell wall	Sugar solution	Vacuole	Protoplasm	Tonoplast
(D)	Cell membrane	Sugar solution	Vacuole	Protoplasm	Tonoplast
(E)	None of these				

51. X is a phylum. The organisms belonging to X are bilaterally symmetrical, triploblastic and possess pseudocoelom. Identify X.
   (A) Platyhelminthes   (B) Annelida   (C) Coelenterata   (D) Nematoda
   (E) None of these

52. Select the incorrect statement(s).
   (i) *Helicobacter pylori* is the causal agent of peptic ulcer.
   (ii) *Staphylococcus* is responsible for acne.
   (iii) *Trypanosoma* causes sleeping sickness.
   (iv) *Leishmania donovani* is a protozoan.
   (A) (i) and (ii)   (B) (ii) and (iii)   (C) (iv) only   (D) (ii) only
   (E) None of these

53. The given figure shows the carbon cycle in nature. Identify correctly the processes labelled as I, II, III and IV.
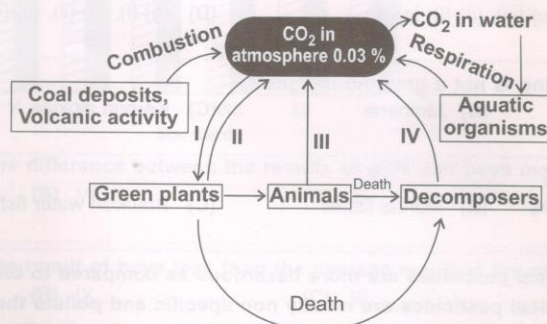
	I	II	III	IV
(A)	Photosynthesis	Respiration	Respiration	Decomposition
(B)	Respiration	Photosynthesis	Respiration	Decomposition
(C)	Combustion	Photosynthesis	Respiration	Decomposition
(D)	Photosynthesis	Combustion	Decomposition	Combustion
(E)	None of these			

54. Plants get their nitrogen
   (A) By absorbing nitrogen compounds present in the soil
   (B) By taking in nitrogen gas from the air through leaves
   (C) From dissolved nitrogen gas in the soil water
   (D) From photosynthesis
   (E) None of these.

55. The given figure shows the position of peptic ulcers. These ulcers cause acidity- related pain and bleeding. Identify the names of these ulcers from the codes given below.

	P	Q	R
(A)	Duodenal	Oesophageal	Gastric
(B)	Gastric	Duodenal	Oesophageal
(C)	Oesophageal	Gastric	Duodenal
(D)	Duodenal	Gastric	Oesophageal

(E) None of these
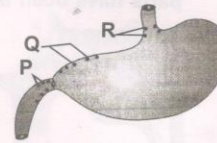
56. Statement I : UV radiation causes photodissociation of ozone into O_2 and O, thus causing damage to ozone layer.

Statement II : Ozone hole is resulting in global warming and climatic change.

(A) Both statements I and II are true and statement II is the correct explanation of statement I.

(B) Both statements I and II are true but statement II is not the correct explanation of statement I.

(C) Statement I is true but statement II is false.

(D) Statement I is false but statement II is true.

(E) None of these

57. Match column I (common name) with column II (scientific name) and select the correct option from the given codes.

Column I
(a) Feather star
(b) Climbing perch
(c) Ostrich
(d) Flying lizard
(e) Tree frog

Column II
(i) *Draco*
(ii) *Hyla*
(iii) *Hemidactylus*
(iv) *Rana tigrina*
(v) *Anabas*
(vi) *Struthio camelus*
(vii) *Antedon*

(A) (a)-(vii), (b)-(v), (c)-(vi), (d)-(iii), (e)-(iv)
(B) (a)-(i), (b)-(v), (c)-(vi), (d)-(ii), (e)-(vii)
(C) (a)-(vii), (b)-(v), (c)-(vi), (d)-(i), (e)-(ii)
(D) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv), (e)-(v)
(E) None of these

58. Which of the following is not a greenhouse gas?
(A) Sulphur dioxide (B) Methane (C) Carbon dioxide (D) Nitrous oxide
(E) None of these

59. *Labeo* and *Catla* are
(A) Fresh water fishes (B) Marine fishes (C) Brackish water fishes (D) Both (B) and (C)
(E) None of these.

60. Statement I : Chemical pesticides are more hazardous as compared to biopesticides.

Statement II : Chemical pesticides are mostly non specific and pollute the atmosphere.

(A) Both statements I and II are true and statement II is the correct explanation of statement I.

(B) Both statements I and II are true but statement II is not the correct explanation of statement I.

(C) Statement I is true but statement II is false.

(D) Statement I is false but statement II is true.

(E) None of these

MATHEMATICS

61. If P denotes '×', T denotes '−', M denotes '+' and B denotes '÷', then the value of the expression 28B7P8T6M4B2P8 will be _____.

(A) $\dfrac{23}{9}$ (B) 42 (C) 32 (D) $\dfrac{-9}{2}$

(E) None of these

SOF

Class-9

62. In the given figure, $ABCD$ is a parallelogram in which P is the midpoint of DC and Q is a point on AC such that $CQ = \frac{1}{4}AC$. Also, PQ when produced meets BC at R. Then $CR =$ _____.
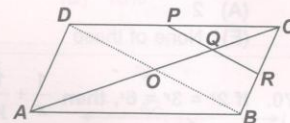
(A) RB

(B) $\frac{1}{3}CB$

(C) $\frac{1}{4}CB$

(D) $\frac{2}{3}CB$

(E) None of these

63. Evaluate $\dfrac{40}{2\sqrt{10} + \sqrt{20} + \sqrt{40} - 2\sqrt{5} - \sqrt{80}}$ when it is given that $\sqrt{5} = 2.236$ and $\sqrt{10} = 3.162$.

(A) 10.799

(B) 10.976

(C) 10.679

(D) 10.769

(E) None of these

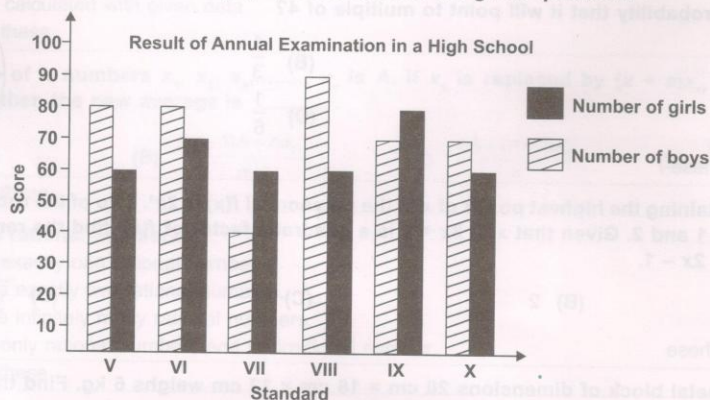64. Find the value of k, if $(x - 1)$ is a factor of $4x^3 + 3x^2 - 4x + k$.

(A) 3

(B) −5

(C) 5

(D) −3

(E) None of these

DIRECTION (65-66) : Study the following graph and answer the given questions :

Result of Annual Examination in a High School

Number of girls

Number of boys

(Y-axis: Score, 10–100; X-axis: Standard, V VI VII VIII IX X)

65. In which standard is the difference between the results of girls and boys maximum ?

(A) V

(B) VII

(C) X

(D) VIII

(E) None of these

66. In which standard is the result of boys less than the average result of the girls?

(A) VII

(B) IX

(C) VI

(D) VIII

(E) None of these

67. The taxi fare in a city is as follows : For the first kilometre, the fare is ₹ 10 and for the subsequent distance it is ₹ 7 per kilometre. Taking the distance covered as x km and total fare as ₹ y, a linear equation for this information is _____.

(A) $7x + y + 3 = 0$

(B) $7x - y + 3 = 0$

(C) $7x + y - 3 = 0$

(D) $7x - y - 3 = 0$

(E) None of these

68. Which of the following is Euclid's axiom?

(A) The things which coincide with one another are not equal to one another.

(B) If equals are subtracted from equals, the remainders are not equal.

(C) The whole is greater than the part.

(D) A terminated line can be produced indefinitely.

(E) None of these

69. Study the given number series :

7 8 9 7 6 5 3 4 2 8 9 7 2 4 5 9 2 9 7 6 4 7

How many 7's are immediately preceded by 9 and immediately followed by 6?

(A) 2   (B) 3   (C) 4   (D) 5

(E) None of these

---

70. If $2^x = 3^y = 6^z$, then $\dfrac{1}{x} + \dfrac{1}{y}$ equals _____.

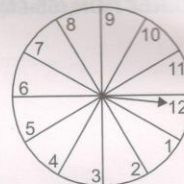(A) $\dfrac{1}{z}$ (B) $-\dfrac{1}{z}$ (C) z (D) $2z$

(E) None of these

---

71. Find the value of R, if $\dfrac{a^2 - 19a - 25}{a - 7} = a - 12 + \dfrac{R}{a - 7}$

(A) -109 (B) -88 (C) -84 (D) -64

(E) None of these

---

72. A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the number, 1, 2, 3, ..., 12 as shown in figure.
What is the probability that it will point to multiple of 4?

(A) $\dfrac{1}{2}$ (B) $\dfrac{1}{3}$

(C) $\dfrac{1}{4}$ (D) $\dfrac{1}{6}$

(E) None of these

---

73. The term containing the highest power of x in the polynomial $f(x)$ is $2x^4$. Two of the roots of the equation $f(x) = 0$ are -1 and 2. Given that $x^2 - 3x + 1$ is a quadratic factor of $f(x)$, find the remainder when $f(x)$ is divided by $2x - 1$.

(A) $1\dfrac{1}{8}$ (B) 2   (C) 0   (D) $\dfrac{-1}{3}$

(E) None of these

---

74. A cuboidal metal block of dimensions 20 cm × 16 cm × 12 cm weighs 6 kg. Find the weight of block of the same metal of size 10 cm × 8 cm × 8 cm.

(A) 3 kg   (B) 8 kg   (C) 7 kg   (D) 1 kg

(E) None of these

---

75. In the given Venn diagram, the triangle represents doctors, the circle represents players and the rectangle represents artists.
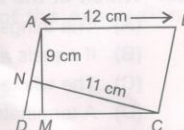Which numbered space in the diagram represents doctors who are also players and artists?

(A) 2
(B) 3
(C) 4
(D) 5
(E) None of these

---
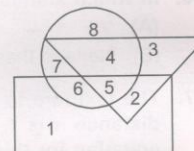
76. In parallelogram $ABCD$, $AB = 12$ cm. The altitudes corresponding to the sides DC and AD are respectively 9 cm and 11 cm. Find AD.

(A) $\dfrac{108}{11}$ cm   (B) $\dfrac{108}{10}$ cm

(C) $\dfrac{99}{10}$ cm   (D) $\dfrac{108}{17}$ cm

(E) None of these

77. A person lent out a certain sum on simple interest and the same sum on compound interest at certain rate of interest per annum. He noticed that the ratio between the difference of compound interest and simple interest of 3 years and that of 2 years is 25 : 8. The rate of interest per annum is _____.
(A) 10%   (B) 11%   (C) 12%   (D) 15%
(E) None of these

78. In the given figure, if $l \parallel m$, $m \parallel n$, $w = (3p + 5)°$ and $\theta = (2p)°$, then find $x + y + z + w + \theta$.
(A) 320°
(B) 420°
(C) 360°
(D) 180°
(E) None of these
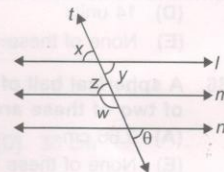
79. If 'l', 'b' and 'h' of a cuboid are increased, decreased and increased by 1%, 3% and 2% respectively, then the volume of the cuboid _____.
(A) Increases
(B) Decreases
(C) Increases or decreases depending on original dimensions
(D) Can't be calculated with given data
(E) None of these

80. The average of n numbers x_1, x_2, x_3,........, x_n is A. If x_1 is replaced by $(x + a)x_1$, x_2 is replaced by $(x + a)x_2$,...... then the new average is _____.
(A) $(x + a) A$ (B) $\dfrac{(x-1)A + nx_n}{n}$ (C) $\dfrac{nA + (n+1)x_n}{n}$ (D) $\dfrac{(n+1)A + x_n}{n}$
(E) None of these

81. Between two rational numbers
(A) There is exactly one rational number.
(B) There are exactly two rational numbers.
(C) There are infinitely many rational numbers.
(D) There is only rational numbers and no irrational number.
(E) None of these

82. In an experiment, a coin is tossed 500 times. If the head turns up 280 times, then the experimental probability of getting (i) a head (ii) a tail is _____ .

	(i)	(ii)		(i)	(ii)
(A)	$\dfrac{14}{25}$	$\dfrac{11}{25}$	(B)	$\dfrac{11}{20}$	$\dfrac{12}{20}$
(C)	$\dfrac{12}{25}$	$\dfrac{10}{25}$	(D)	$\dfrac{9}{25}$	$\dfrac{11}{25}$

(E) None of these

83. P and Q can do a piece of work in 12 days, Q and R in 15 days, R and P in 20 days. In how many days can R alone do it?
(A) 60   (B) 50   (C) 25   (D) 24
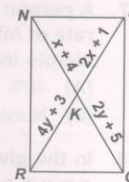(E) None of these

84. If 'a' and 'b' are rational numbers and $\dfrac{2+\sqrt{3}}{2-\sqrt{3}} = a + b\sqrt{3}$, then $b =$
(A) 4   (B) 7   (C) 6   (D) 8
(E) None of these

85. In the adjoining figure, NPQR is a rectangle. What is the length of NQ?

(A) 1 unit
(B) 3 units
(C) 7 units
(D) 14 units
(E) None of these

(Figure showing rectangle NPQR with diagonals meeting at K, labels: N, P, R, Q, with expressions x + y, 2x + 1, 4y + 3, 2y + 5)

86. A spherical ball of lead, 3 cm in diameter is melted and recast into three spherical balls. The diameter of two of these are 1.5 cm and 2 cm respectively. The diameter of the third ball is _____ .

(A) 2.66 cm   (B) 2.5 cm   (C) 3 cm   (D) 3.5 cm
(E) None of these

87. There are _____ points of intersection of the lines $x + y = 1$ and $2x + 2y = 4$.

(A) 1   (B) 2   (C) No intersection point   (D) Infinitely many points
(E) None of these

88. A swimming pool is being filled with water at a rate of $2\frac{1}{2}$ cm/minute. The owners started filling the pool at 6:00 a.m. What time was it when the water was 2 metres ?

(A) 7:10 a.m.   (B) 7:20 a.m.   (C) 7:30 a.m.   (D) 8:00 a.m.
(E) None of these

89. The altitude drawn to the base of an isosceles triangle is of length 8 cm and the perimeter is 32 cm. The area of the triangle is _____

(A) 32 cm²   (B) 40 cm²   (C) 48 cm²   (D) 56 cm²
(E) None of these

90. A sum of money becomes ₹ 6690 after three years and ₹ 10035 after six years on compound interest. The sum is _____ .

(A) ₹ 4400   (B) ₹ 4445   (C) ₹ 4460   (D) ₹ 4520
(E) None of these

91. Conical glass in figure is filled with soft drink upto the brim. The quantity of soft drink required to fill 25 such glasses is _____.

(A) 3.8 L
(B) 5.3 L
(C) 4.5 L
(D) 2.5 L
(E) None of these

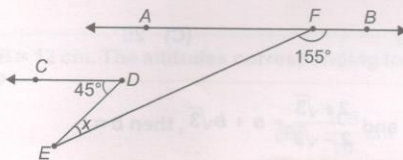(Figure of an inverted cone with 4.5 cm, 4.5 cm at top and 10cm height)
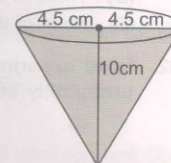
92. The mean, median and mode of the following numbers

7, 4, 3, 5, 6, 3, 3, 2, 9, 3, 4, 3, 3, 4, 4, 3, 2, 2, 8, 3, 5, 4, 3, 4, 3, 8, 3, 1, 5, 3 are _____ .

(A) 3.47, 3, 3   (B) 3, 3, 3   (C) 4, 3, 3   (D) 5, 4, 3
(E) None of these

93. In figure, AB || CD, find the value of x.

(Figure showing AB line with points A, F, B; angle 155° at F; line CD with C, D and angle 45° at D; point E with angle x)

(A) 20°   (B) 25°   (C) 30°   (D) 35°
(E) None of these

SOF   14   Class-9

94. A triangle and a trapezoid are equal in area. They also have the same altitude. If the base of the triangle is 18 inches, then mean of parallel sides of the trapezoid is _____ .

(A) 36 inches   (B) 9 inches   (C) 18 inches   (D) 20 inches
(E) Data insufficient

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95. The diagram below shows the cross section of six identical marbles touching each other on a horizontal surface. If the volume of a marble is $\dfrac{9\pi}{2}$ cm^3, calculate the length of PQ, in cm.
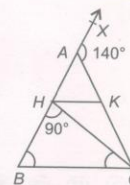

(A) 9 cm   (B) 27 cm   (C) 18 cm   (D) 36 cm
(E) None of these

---

96. The mean of the data $x_1, x_2, ..., x_n$ is 102, then mean of the data $5x_1, 5x_2, ..., 5x_n$ is
(A) 102   (B) 204   (C) 606   (D) 510
(E) None of these

---

97. If $a = \dfrac{3+\sqrt{5}}{2}$, then $a^2 + \dfrac{1}{a^2} =$
(A) 14   (B) 10   (C) 7   (D) 15
(E) None of these

---

98. Which is always a correct conclusion about the quantities in the equation $y = x + 4$?
(A) It is linear equation in two variable.
(B) When the value of x is negative, the value of y is also negative.
(C) The variable y is always less than x.
(D) As the value of x increases, the value of y decreases.
(E) None of these

---

99. Rohan ranks eighth from the top and thirty-eight from the bottom in the class. How many students are there in the class ?
(A) 46   (B) 49   (C) 45   (D) 38
(E) None of these

---

100. In the figure $AB = AC$, $CH = CB$ and $HK \parallel BC$. If the exterior angle CAX is 140°, then $\angle HCK$ equals _____ .
(A) 45°
(B) 70°
(C) 110°
(D) 30°
(E) None of these

SPACE FOR ROUGH WORK

DARKEN YOUR CHOICE WITH HB PENCIL OR BLUE/BLACK BALL POINT PEN ONLY

1. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	21. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	41. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	61. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	81. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
2. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	22. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	42. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	62. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	82. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
3. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	23. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	43. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	63. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	83. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
4. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	24. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	44. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	64. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	84. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
5. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	25. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	45. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	65. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	85. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
6. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	26. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	46. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	66. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	86. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
7. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	27. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	47. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	67. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	87. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
8. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	28. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	48. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	68. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	88. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
9. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	29. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	49. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	69. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	89. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
10. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	30. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	50. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	70. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	90. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
11. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	31. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	51. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	71. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	91. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
12. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	32. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	52. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	72. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	92. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
13. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	33. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	53. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	73. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	93. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
14. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	34. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	54. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	74. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	94. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
15. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	35. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	55. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	75. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	95. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
16. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	36. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	56. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	76. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	96. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
17. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	37. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	57. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	77. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	97. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
18. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	38. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	58. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	78. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	98. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
19. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	39. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	59. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	79. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	99. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
20. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	40. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	60. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	80. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	100. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

ANSWER KEY

1. (D)	2. (C)	3. (B)	4. (B)	5. (B)	6. (A)	7. (C)	8. (C)	9. (C)	10. (E)
11. (D)	12. (B)	13. (D)	14. (C)	15. (A)	16. (B)	17. (B)	18. (D)	19. (B)	20. (A)
21. (C)	22. (B)	23. (A)	24. (C)	25. (B)	26. (B)	27. (B)	28. (B)	29. (A)	30. (C)
31. (E)	32. (C)	33. (C)	34. (A)	35. (A)	36. (A)	37. (C)	38. (C)	39. (D)	40. (B)
41. (D)	42. (B)	43. (C)	44. (D)	45. (A)	46. (B)	47. (A)	48. (C)	49. (C)	50. (A)
51. (D)	52. (E)	53. (A)	54. (A)	55. (B)	56. (D)	57. (C)	58. (A)	59. (A)	60. (A)
61. (A)	62. (A)	63. (A)	64. (A)	65. (A)	66. (A)	67. (B)	68. (B)	69. (B)	70. (A)
71. (A)	72. (C)	73. (C)	74. (D)	75. (D)	76. (D)	77. (E)	78. (E)	79. (B)	80. (B)
81. (C)	82. (A)	83. (A)	84. (A)	85. (A)	86. (B)	87. (C)	88. (B)	89. (C)	90. (C)
91. (B)	92. (C)	93. (A)	94. (B)	95. (C)	96. (D)	97. (A)	98. (A)	99. (C)	100. (D)