1. A body of mass m is moving in a circle of radius r with a constant speed v. The force on the body is $\frac{mv^2}{r}$ and is directed towards the centre. What is the work done by this force in moving the body over half the circumference of the circle
   (a) $\frac{mv^2}{\pi r}$ (b) Zero
   (c) $\frac{mv^2}{r^2}$ (d) $\frac{\pi r^2}{mv^2}$
2. If the unit of force and length each be increased by four times, then the unit of energy is increased by
   (a) 16 times (b) 8 times (c) 2 times
   (d) 4 times
3. A man pushes a wall and fails to displace it. He does
   (a) Negative work
   (b) Positive but not maximum work
   (c) No work at all
   (d) Maximum work
4. The same retarding force is applied to stop a train. The train stops after 80 m. If the speed is doubled, then the distance will be
   (a) The same (b) Doubled
   (c) Halved (d) Four times
5. A body moves a distance of 10 m along a straight line under the action of a force of 5 N. If the work done is 25 joules, the angle which the force makes with the direction of motion of the body is
   (a) 0° (b) 30° (c) 60°
   (d) 90°
6. You lift a heavy book from the floor of the room and keep it in the book-shelf having a height 2 m. In this process you take 5 seconds. The work done by you will depend upon
   (a) Mass of the book and time taken
   (b) Weight of the book and height of the book-shelf
   (c) Height of the book-shelf and time taken
   (d) Mass of the book, height of the book-shelf and time taken
7. A body of mass m kg is lifted by a man to a height of one metre in 30 sec. Another man lifts the same mass to the same height in 60 sec. The work done by them are in the ratio
   (a) 1 : 2 (b) 1 : 1 (c) 2 : 1 (d) 4 : 1
8. A force **F**=$(5\hat{\imath} + 3\hat{\jmath})$ newton is applied over a particle which displaces it from its origin to the point r =$(2\hat{\imath} - \hat{\jmath})$ metres. The work done on the particle is
   (a) – 7 joules (b) + 13 joules
   (c) + 7 joules (d) + 11 joules
9. A force acts on a 30gm particle in such a way that the position of the particle as a function of time is given by $x = 3t - 4t^2 + t^3$, where x is in metres and t is in seconds. The work done during the first 4 seconds is
   (a) 5.28 J (b) 450 mJ (c) 490 mJ
   (d) 530 mJ
10. A body of mass 10 kg is dropped to the ground from a height of 10 metres. The work done by the gravitational force is (g=9.8 m/ sec^2)
   (a) – 490 Joules (b) + 490 Joules
   (c) – 980 Joules (d) + 980 Joules
11. Which of the following is a scalar quantity?
   (a) Displacement (b) Electric field
   (c) Acceleration (d) Work
12. The work done in pulling up a block of wood weighing 2 kN for a length of 10m on a smooth plane inclined at an angle of 15° with the horizontal is
   (a) 4.36 kJ (b) 5.17 kJ (c) 8.91 kJ (d) 9.82 kJ
13. A force $\vec{F}$=$(5\hat{\imath} + 6\hat{\jmath} - 4\hat{k})$ acting on a body, produces a displacement $\vec{s}$=$(6\hat{\imath} + 5\hat{k})$ Work done by the force is
   (a) 18 units (b) 15 units (c) 12 units
   (d) 10 units
14. A force of 5 N acts on a 15 kg body initially at rest. The work done by the force during the first second of motion of the body is
   (a) 5 J (b) $\frac{5}{6}$ J (c) 6 J (d) 75 J
15. A force of 5 N, making an angle θ with the horizontal, acting on an object displaces it by 0.4m along the horizontal direction. If the object gains kinetic energy of 1J, the horizontal component of the force is
   (a) 1.5 N (b) 2.5 N (c) 3.5 N
   (d) 4.5 N
16. The work done against gravity in taking 10 kg mass at 1m height in 1sec will be
   (a) 49 J (b) 98 J (c) 196 J (d) None of these
17. The energy which an e^- acquires when accelerated through a potential difference of 1 volt is called
   (a) 1 Joule (b) 1 Electron volt (c) 1 Erg (d) 1 Watt.
18. A body of mass 6kg is under a force which causes displacement in it given by S =$\frac{t^2}{4}$ metres where t is time. The work done by the force in 2 seconds is
   (a) 12 J (b) 9 J (c) 6 J (d) 3 J
19. A body of mass 10kg at rest is acted upon simultaneously by two forces 4 N and 3N at right angles to each other. The kinetic energy of the body at the end of 10 sec is
   (a) 100 J (b) 300 J (c) 50 J (d) 125 J
20. A cylinder of mass 10kg is sliding on a plane with an initial velocity of 10m/s. If coefficient of friction between surface and cylinder is 0.5, then before stopping it will describe

(a) 12.5 m (b) 5 m (c) 7.5 m (d) 10 m

21. A force of $(3\hat{\imath} + 4\hat{\jmath})$Newton acts on a body and displaces it by $(3\hat{\imath} + 4\hat{\jmath})$m The work done by the force is
(a) 10 J (b) 12 J (c) 16 J (d) 25 J
22. A 50kg man with 20kg load on his head climbs up 20 steps of 0.25m height each. The work done in climbing is
(a) 5 J (b) 350 J (c) 100 J
(d) 3430 J
23. A force $\vec{F}=(6\hat{\imath} + 2\hat{\jmath} - 3\hat{k})$ acts on a particle and produces a displacement of $\vec{s}=(2\hat{\imath} - 3\hat{\jmath} + x\hat{k})$ If the work done is zero, the value of x is
(a) – 2 (b) 1/2 (c) 6 (d) 2
24. A particle moves from position $\overrightarrow{r_1}=(3\hat{\imath} + 2\hat{\jmath} - 6\hat{k})$ to position $\overrightarrow{r_2}=(14\hat{\imath} + 13\hat{\jmath} - 9\hat{k})$ under the action of force. $4\hat{\imath} + \hat{\jmath} + 3\hat{k}$ N The work done will be
(a) 100 J (b) 50 J (c) 200 J (d) 75 J
25. A force $\vec{F}=(3\hat{\imath} + c\hat{\jmath} - 2\hat{k})$ acting on a particle causes a displacement: $\vec{s}=(-4\hat{\imath} + 2\hat{\jmath} + 3\hat{k})$ in its own direction. If the work done is 6 J, then the value of 'c' is
(a) 0 (b) 1 (c) 6
(d) 12
26. In an explosion a body breaks up into two pieces of unequal masses. In this
(a) Both parts will have numerically equal momentum
(b) Lighter part will have more momentum
(c) Heavier part will have more momentum
(d) Both parts will have equal kinetic energy
27. Which of the following is a unit of energy?
(a) Unit (b) Watt (c) Horse Power (d) None
28. If force and displacement of particle in direction of force are doubled. Work would be
(a) Double (b) 4 times (c) Half (d) 4 1 times
29. A body of mass 5 kg is placed at the origin, and can move only on the x-axis. A force of 10 N is acting on it in a direction making an angle of 60^0 with the x-axis and displaces it along the x-axis by 4 metres. The work done by the force is
(a) 2.5 J (b) 7.25 J (c) 40 J (d) 20 J
30. A force $\vec{F}=(5\hat{\imath} + 4\hat{\jmath})$ N acts on a body and produces a displacement $\vec{S}=(6\hat{\imath} - 5\hat{\jmath} + 3\hat{k})$ m. The work done will be
(a) 10 J (b) 20 J (c) 30 J (d) 40 J
31. A uniform chain of length 2m is kept on a table such that a length of 60cm hangs freely from the edge of the table. The total mass of the chain is 4kg. What is the work done in pulling the entire chain on the table
(a) 7.2 J (b) 3.6 J (c) 120 J (d) 1200 J
32. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle, the motion of the particle takes place in a plane. It follows that
(a) Its velocity is constant
(b) Its acceleration is constant
(c) Its kinetic energy is constant
(d) It moves in a straight line
33. A ball of mass m moves with speed v and strikes a wall having infinite mass and it returns with same speed then the work done by the ball on the wall is
(a) Zero (b) mv J (c) m/v.J (d) v/m J
34. A force $\vec{F}=(5\hat{\imath} + 3\hat{\jmath} + 2\hat{k})$is applied over a particle which displaces it from its origin to the $\vec{r}=(2\hat{\imath} - \hat{\jmath})$ m. The work done on the particle in joules is
(a) – 7 (b) +7 (c) +10 (d) +13
35. The kinetic energy acquired by a body of mass m is travelling some distance s, starting from rest under the actions of a constant force, is directly proportional to
(a) 0 m (b) m
(c) 2 m (d) m
36. If a force $\vec{F}=(4\hat{\imath} + 5\hat{\jmath})$ causes a displacement $\vec{s}=(3\hat{\imath} + 6\hat{k})$, work done is
(a) 4 × 6 unit (b) 6 × 3 unit
(c) 5 × 6 unit (d) 4 × 3 unit
37. A man starts walking from a point on the surface of earth (assumed smooth) and reaches diagonally opposite point. What is the work done by him
(a) Zero (b) Positive
(c) Negative (d) Nothing can be said
38. It is easier to draw up a wooden block along an inclined plane than to haul it vertically, principally because
(a) The friction is reduced
(b) The mass becomes smaller
(c) Only a part of the weight has to be overcome
(d) 'g' becomes smaller
39. Two bodies of masses 1 kg and 5 kg are dropped gently from the top of a tower. At a point 20 cm from the ground, both the bodies will have the same
(a) Momentum (b) Kinetic energy
(c) Velocity (d) Total energy
40. Due to a force of $6\hat{\imath} + 2\hat{\jmath}$N the displacement of a body is $3\hat{\imath} - \hat{\jmath}$ m. Then the work done is
(a) 16 J (b) 12 J
(c) 8 J (d) Zero
41. A ball is released from the top of a tower. The ratio of work done by force of gravity in first, second and third second of the motion of the ball is
(a) 1 : 2 : 3 (b) 1 : 4 : 9
(c) 1 : 3 : 5 (d) 1 : 5 : 3
42. A particle moves under the effect of a force F = Cx from x = 0 to x = x_1 . The work done in the process is
(a) Cx_1^2 (b) $\frac{1}{2}Cx_1^2$

(c) Cx_1 (d) Zero

43. A cord is used to lower vertically a block of mass M by a distance d with constant downward acceleration $\frac{g}{4}$. Work done by the cord on the block is

(a) Mg $\frac{d}{4}$ (b) 3Mg $\frac{d}{4}$

(c) -3Mg $\frac{d}{4}$ (d) Mgd

44. Two springs have their force constant as k_1 and k_2 ($k_1 > k_2$) When they are stretched by the same force
(a) No work is done in case of both the springs
(b) Equal work is done in case of both the springs
(c) More work is done in case of second spring
(d) More work is done in case of first spring

45. A spring of force constant 10 N/m has an initial stretch 0.20 m. In changing the stretch to 0.25 m, the increase in potential energy is about
(a) 0.1 joule (b) 0.2 joule
(c) 0.3 joule (d) 0.5 joule

46. The potential energy of a certain spring when stretched through a distance 'S' is 10 joules. The amount of work (in joule) that must be done on this spring to stretch it through an additional distance 'S' will be
(a) 30 (b) 40
(c) 10 (d) 20

47. Two springs of spring constants 1500 N/m and 3000 N/m respectively are stretched with the same force. They will have potential energy in the ratio
(a) 4 : 1 (b) 1 : 4
(c) 2 : 1 (d) 1 : 2

48. A spring 40 mm long is stretched by the application of a force. If 10 N force required to stretch the spring through 1 mm, then work done in stretching the spring through 40 mm is
(a) 84 J (b) 68 J
(c) 23 J (d) 8 J

49. A position dependent $F = 7-2x+3x^2$ newton acts on a small body of mass 2 kg and displaces it from x = 0 to x = 5 m. The work done in joules is
(a) 70 (b) 270
(c) 35 (d) 135

50. A body of mass 3 kg is under a force, which causes a displacement in it is given by $S = \frac{t^3}{3}$ (in m). Find the work done by the force in first 2 seconds
(a) 2 J (b) 3.8 J
(c) 5.2 J (d) 24 J

51. The force constant of a wire is k and that of another wire is 2k. When both the wires are stretched through same distance, then the work done
(a) $W_2 = 2W_1^2$ (b) $W_2 = 2\ W_1$
(c) $W_2 = W_1$ (d) $W_2 = 0.5\ W_1$

52. A body of mass 0.1 kg moving with a velocity of 10 m/s hits a spring (fixed at the other end) of force constant 1000 N/m and comes to rest after compressing the spring. The compression of the spring is
(a) 0.01m (b) 0.1m (c) 0.2m (d) 0.5 m

53. When a 1.0kg mass hangs attached to a spring of length 50 cm, the spring stretches by 2 cm. The mass is pulled down until the length of the spring becomes 60 cm. What is the amount of elastic energy stored in the spring in this condition, if $g = 10\ m/s^2$
(a) 1.5 Joule (b) 2.0 Joule
(c) 2.5 Joule (d) 3.0 Joule

54. A spring of force constant 800 N/m has an extension of 5cm. The work done in extending it from 5cm to 15 cm is
(a) 16 J (b) 8 J
(c) 32 J (d) 24 J

55. When a spring is stretched by 2 cm, it stores 100 J of energy. If it is stretched further by 2 cm, the stored energy will be increased by
(a) 100 J (b) 200 J
(c) 300 J (d) 400 J

56. A spring when stretched by 2 mm its potential energy becomes 4 J. If it is stretched by 10 mm, its potential energy is equal to
(a) 4 J (b) 54 J
(c) 415 J (d) None

57. A spring of spring constant 5×10^3 N/m is stretched initially by 5cm from the unstretched position. Then the work required to stretch it further by another 5cm is
(a) 6.25 N-m (b) 12.50 N-m
(c) 18.75 N-m (d) 25.00 N-m

58. A mass of 0.5kg moving with a speed of 1.5 m/s on a horizontal smooth surface, collides with a nearly weightless spring of force constant k = 50 N / m. The maximum compression of the spring would be
(a) 0.15 m (b) 0.12 m
(c) 1.5 m (d) 0.5 m

59. A particle moves in a straight line with retardation proportional to its displacement. Its loss of kinetic energy for any displacement x is proportional to
(a) x^2 (b) e^x (c) x
(d) $\log_e x$

60. A spring with spring constant k when stretched through 1 cm, the potential energy is U. If it is stretched by 4 cm. The potential energy will be
(a) 4U (b) 8U
(c) 16 U (d) 2U

61. A spring with spring constant k is extended from x = 0 to 1 x = x_1. The work done will be
(a) kx_1^2 (b) $\frac{1}{2}kx_1^2$
(c) kx_1^2 (d) $2kx_1$

62. If a long spring is stretched by 0.02 m, its potential energy is U. If the spring is stretched by 0.1 m, then its potential energy will be
(a) $\frac{U}{5}$ (b) U (c) 5U
(d) 25U

63. Natural length of a spring is 60 cm, and its spring constant is 4000 N/m. A mass of 20 kg is hung from it. The extension produced in the spring is, (Take g = 9.8 m / s^2)
(a) 4.9cm (b) 0.49cm (c) 9.4cm (d) 0.94cm

64. The spring extends by x on loading, then energy stored by the spring is:
(If T is the tension in spring and k is spring constant)
(a) $\frac{T^2}{2k}$ (b) $\frac{T^2}{2k^2}$ (c) $\frac{2k}{2T^2}$ (d) $\frac{2T^2}{k}$

65. The potential energy of a body is given by, $U = A - Bx^2$ (Where x is the displacement). The magnitude of force acting on the particle is
(a) Constant
(b) Proportional to x
(c) Proportional to 2 x
(d) Inversely proportional to x

66. The potential energy between two atoms in a molecule is given by $U(x) = \frac{a}{x^{12}} - \frac{b}{x^6}$; where a and b are positive constants and x is the distance between the atoms. The atom is in stable equilibrium when (a) $x = \sqrt[6]{\frac{11a}{5b}}$ (b) $x = \sqrt[6]{\frac{a}{2b}}$ (c) x = 0 (d) $x = \sqrt[6]{\frac{2a}{b}}$

67. Which one of the following is not a conservative force
(a) Gravitational force
(b) Electrostatic force between two charges
(c) Magnetic force between two magnetic dipoles
(d) Frictional force Conservation of Energy and Momentum

68. Two bodies of masses m_1 and m_2 have equal kinetic energies. If p_1 and p_2 are their respective momentum, then ratio p_1: p_2 is equal to
(a) m_1: m_2 (b) m_2: m_1
(c) $\sqrt{m_1}$: $\sqrt{m_2}$ (d) $m_1^2 : m_2^2$

69. Work done in raising a box depends on
(a) How fast it is raised
(b) The strength of the man
(c) The height by which it is raised
(d) None of the above

70. A light and a heavy body have equal momenta. Which one has greater K.E
(a) The light body (b) The heavy body
(c) The K.E. are equal (d) Data is incomplete

71. A body at rest may have
(a) Energy (b) Momentum (c) Speed (d) Velocity

72. The kinetic energy possessed by a body of mass m moving with a velocity v is equal to $\frac{1}{2}mv^2$, provided (a) The body moves with velocities comparable to that of light
(b) The body moves with velocities negligible compared to the speed of light
(c) The body moves with velocities greater than that of light
(d) None of the above statement is correct

73. If the momentum of a body is increased n times, its kinetic energy increases
(a) n times (b) 2n times (c) $\sqrt{n}$ times (d) n^2 times

74. When work is done on a body by an external force, its
(a) Only kinetic energy increases
(b) Only potential energy increases
(c) Both kinetic and potential energies may increase (d) Sum of kinetic and potential energies remains constant

75. The bob of a simple pendulum (mass m and length l) dropped from a horizontal position strikes a block of the same mass elastically placed on a horizontal frictionless table. The K.E. of the block will be
(a) 2mgl (b) mgl/2 (c) mgl
(d) 0

76. From a stationary tank of mass 125000 pound a small shell of mass 25 pound is fired with a muzzle velocity of 1000 ft/sec. The tank recoils with a velocity of
(a) 0.1 ft/sec (b) 0.2 ft/sec
(c) 0.4 ft/sec (d) 0.8 ft/sec

77. A bomb of 12 kg explodes into two pieces of masses 4 kg and 8 kg. The velocity of 8kg mass is 6 m/sec. The kinetic energy of the other mass is
(a) 48 J (b) 32 J (c) 24 J (d) 288 J 1

78. A rifle bullet loses 1/20th of its velocity in passing through a plank. The least number of such planks required just to stop the bullet is
(a) 5 (b) 10 (c) 11
(d) 20

79. A body of mass 2 kg is thrown up vertically with K.E. of 490 joules. If the acceleration due to gravity is 9.8 m/s^2, then the height at which the K.E. of the body becomes half its original value is given by

(a) 50 m (b) 12.5 m (c) 25 m (d) 10 m

80. Two masses of 1 gm and 4 gm are moving with equal kinetic energies. The ratio of the magnitudes of their linear momenta is
(a) 4 : 1 (b) 2 : 1 (c) 1 : 2 (d) 1 : 16

81. If the K.E. of a body is increased by 300%, its momentum will increase by
(a) 100% (b) 150% (c) 300% (d) 175%

82. A light and a heavy body have equal kinetic energy. Which one has a greater momentum?
(a) The light body
(b) The heavy body
(c) Both have equal momentum
(d) It is not possible to say anything without additional information

83. If the linear momentum is increased by 50%, the kinetic energy will increase by
(a) 50% (b) 100% (c) 125% (d) 25%

84. A free body of mass 8 kg is travelling at 2 meter per second in a straight line. At a certain instant, the body splits into two equal parts due to internal explosion which releases 16 joules of energy. Neither part leaves the original line of motion finally
(a) Both parts continue to move in the same direction as that of the original body
(b) One part comes to rest and the other moves in the same direction as that of the original body
(c) One part comes to rest and the other moves in the direction opposite to that of the original body
(d) One part moves in the same direction and the other in the direction opposite to that of the original body

85. If the K.E. of a particle is doubled, then its momentum will
(a) Remain unchanged (b) Be doubled
(c) Be quadrupled (d) Increase $\sqrt{2}$ times

86. If the stone is thrown up vertically and return to ground, its potential energy is maximum
(a) During the upward journey
(b) At the maximum height
(c) During the return journey
(d) At the bottom

87. A body of mass 2 kg is projected vertically upwards with a velocity of 2 m sec^{-1}. The K.E. of the body just before striking the ground is
(a) 2 J (b) 1 J (c) 4 J (d) 8 J

88. The energy stored in wound watch spring is
(a) K.E. (b) P.E.
(c) Heat energy (d) Chemical energy

89. Two bodies of different masses m_1 and m_2 have equal momenta. Their kinetic energies E_1 and E_2 are in the ratio
(a) $\sqrt{m_1}$: $\sqrt{m_2}$ (b) $m_1 : m_2$ (c) $m_2 : m_1$ (d) $m_1^2 : m_2^2$

90. A car travelling at a speed of 30 km/hour is brought to a halt in 8 m by applying brakes. If the same car is travelling at 60 km/hour, it can be brought to a halt with the same braking force in
(a) 8 m (b) 16 m (c) 24 m (d) 32 m

91. Tripling the speed of the motor car multiplies the distance needed for stopping it by
a) 3 (b) 6 (c) 9 (d) Some other number

92. If the kinetic energy of a body increases by 0.1%, the percent increase of its momentum will be
(a) 0.05% (b) 0.1% (c) 1.0% (d) 10%

93. If velocity of a body is twice of previous velocity, then kinetic energy will become
(a) 2 times (b) $\frac{1}{2}$ times (c) 4 times (d) 1 times

94. Two bodies A and B having masses in the ratio of 3: 1 possess the same kinetic energy. The ratio of their linear momenta is then
(a) 3 : 1 (b) 9 : 1 (c) 1 : 1 (d) $\sqrt{3}$: 1

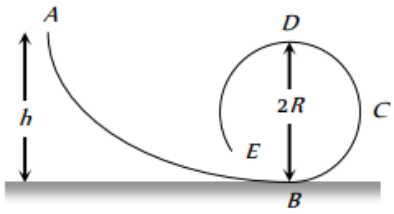
95. In which case does the potential energy decrease
(a) On compressing a spring
(b) On stretching a spring
(c) On moving a body against gravitational force
(d) On the rising of an air bubble in water

96. A sphere of mass m, moving with velocity V, enters a hanging bag of sand and stops. If the mass of the bag is M and it is raised by height h, then the velocity of the sphere was
(a) $\frac{M+m}{m}\sqrt{2gh}$ (b) $\frac{M}{m}\sqrt{2gh}$
(c) $\frac{m}{M+m}\sqrt{2gh}$ (d) $\frac{m}{M}\sqrt{2gh}$

97. Two bodies of masses m and 2m have same momentum. Their respective kinetic energies E_1 and E_2 are in the ratio
(a) 1 : 2 (b) 2 : 1 (c) 1 : 2 (d) 1 : 4

98. If a lighter body (mass M_1 and velocity V_1) and a heavier body (mass M_2 and velocity V_2) have the same kinetic energy, then
(a) $M_2V_2 < M_1V_1$ (b) $M_2V_2 = M_1V_1$
(c) $M_2V_1 = M_1V_2$ (d) $M_2V_2 > M_1V_1$

99. A frictionless track ABCDE ends in a circular loop of radius R. A body slides down the track from point A which is at a height h = 5 cm. Maximum value of R for the body to successfully complete the loop is



(a) 5 cm (b) $\frac{15}{4}$ cm (c) $\frac{10}{3}$ cm (d) 2 cm

100. The force constant of a weightless spring is 16 N/m. A body of mass 1.0 kg suspended from it is pulled down through 5 cm and then released. The maximum kinetic energy of the system will be
(a) 2×10^{-2} J (b) 4×10^{-2} J
(c) 8×10^{-2} J (d) 16×10^{-2} J

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