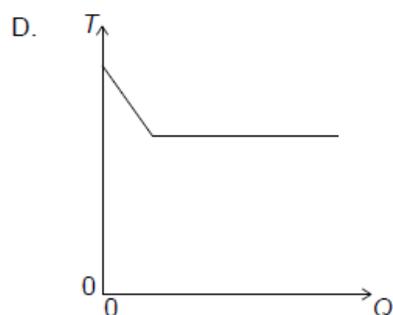
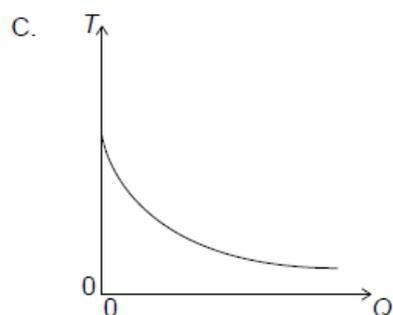
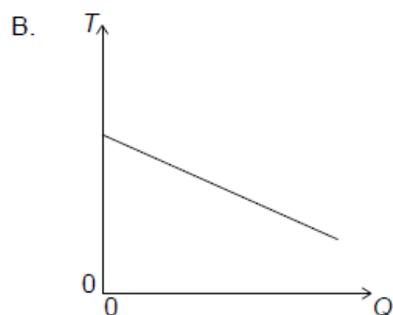
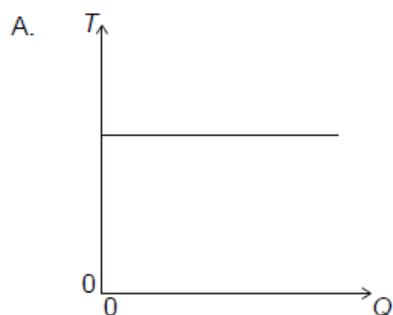
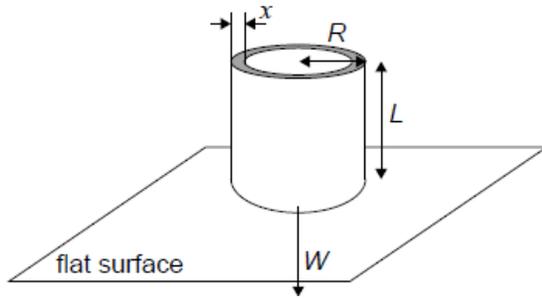


Thermal-practice-2-MC [78 marks]

1. A liquid is initially at its freezing point. Energy is removed at a uniform rate from the liquid until it freezes completely. Which graph shows how the temperature T of the liquid varies with the energy Q removed from the liquid? [1 mark]



2. A thin-walled cylinder of weight W , open at both ends, rests on a flat surface. The cylinder has a height L , an average radius R and a thickness x where R is much greater than x . [1 mark]



What is the pressure exerted by the cylinder walls on the flat surface?

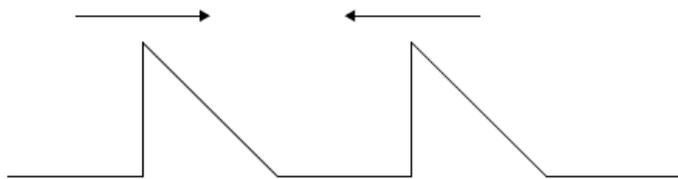
- A. $\frac{W}{2\pi Rx}$
- B. $\frac{W}{\pi R^2 x}$
- C. $\frac{W}{\pi R^2}$
- D. $\frac{W}{\pi R^2 L}$
3. A fixed mass of an ideal gas in a closed container with a movable piston initially occupies a volume V . The position of the piston is changed, so that the mean kinetic energy of the particles in the gas is doubled and the pressure remains constant. [1 mark]

What is the new volume of the gas?

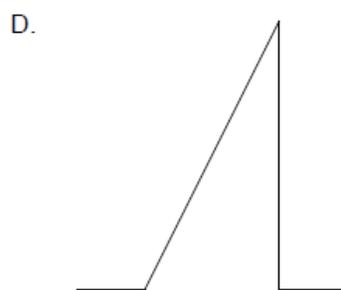
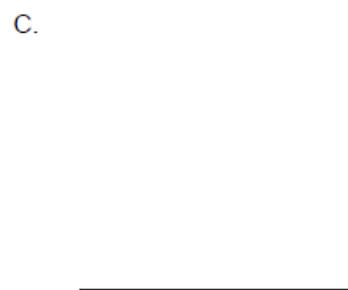
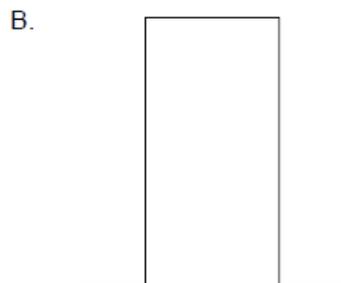
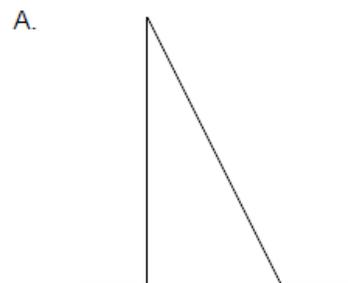
- A. $\frac{V}{4}$
- B. $\frac{V}{2}$
- C. $2V$
- D. $4V$

4. Two pulses are travelling towards each other.

[1 mark]



What is a possible pulse shape when the pulses overlap?



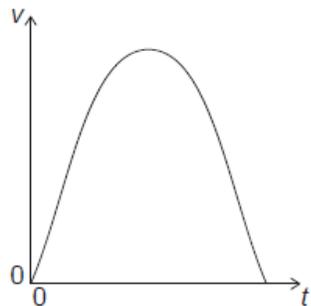
5. An object is released from rest in the gravitational field of the Earth. Air resistance is negligible. How far does the object move during the fourth second of its motion?

[1 mark]

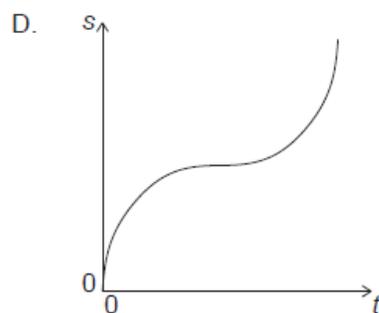
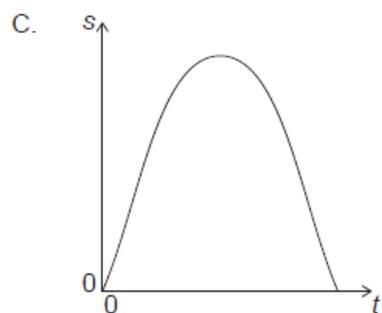
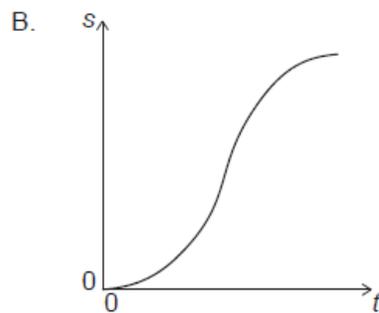
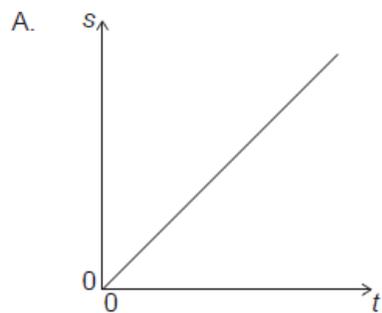
- A. 15 m
- B. 25 m
- C. 35 m
- D. 45 m

6. The graph shows the variation of speed v of an object with time t .

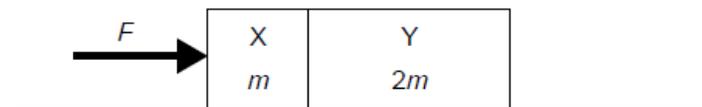
[1 mark]



Which graph shows how the distance s travelled by the object varies with t ?



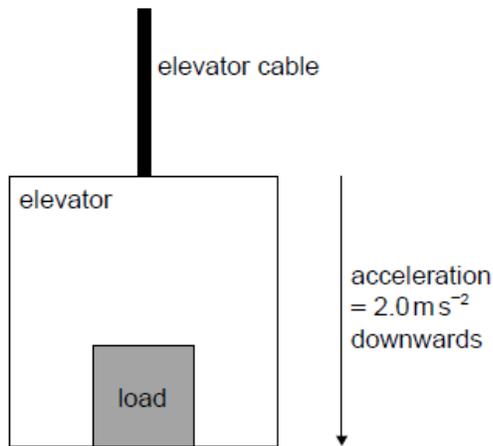
7. Two boxes in contact are pushed along a floor with a force F . The boxes move at a constant speed. Box X has a mass m and box Y has a mass $2m$. [1 mark]



What is the resultant force acting on Y?

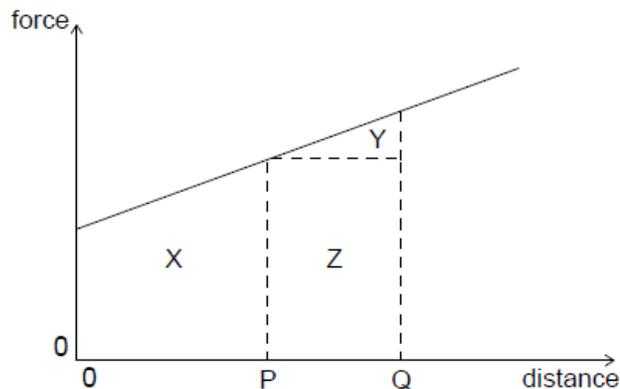
- A. 0
- B. $\frac{F}{2}$
- C. F
- D. $2F$

8. An elevator (lift) and its load have a total mass of 750 kg and accelerate vertically downwards at 2.0 m s^{-2} . [1 mark]



What is the tension in the elevator cable?

- A. 1.5 kN
B. 6.0 kN
C. 7.5 kN
D. 9.0 kN
9. A graph shows the variation of force acting on an object moving in a straight line with distance moved by the object. Which area represents the work done on the object during its motion from P to Q? [1 mark]



- A. X
B. Y
C. Y + Z
D. X + Y + Z
10. A car travelling at a constant velocity covers a distance of 100 m in 5.0 s. [1 mark]
The thrust of the engine is 1.5 kN. What is the power of the car?

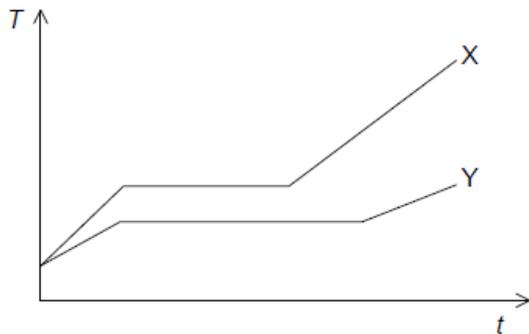
- A. 0.75 kW
B. 3.0 kW
C. 7.5 kW
D. 30 kW

11. An inelastic collision occurs between two bodies in the absence of external forces. [1 mark]

What must be true about the total momentum of the two bodies and the total kinetic energy of the two bodies during this interaction?

- A. Only momentum is conserved.
- B. Only kinetic energy is conserved.
- C. Both momentum and kinetic energy are conserved.
- D. Neither momentum nor kinetic energy are conserved.

12. The graph shows the variation with time t of the temperature T of two samples, X and Y. X and Y have the same mass and are initially in the solid phase. Thermal energy is being provided to X and Y at the same constant rate. [1 mark]



What is the correct comparison of the specific latent heats L_X and L_Y and specific heat capacities in the liquid phase c_X and c_Y of X and Y?

A.	$L_X > L_Y$	$c_X > c_Y$
B.	$L_X > L_Y$	$c_X < c_Y$
C.	$L_X < L_Y$	$c_X > c_Y$
D.	$L_X < L_Y$	$c_X < c_Y$

13. A mass m of ice at a temperature of $-5\text{ }^\circ\text{C}$ is changed into water at a temperature of $50\text{ }^\circ\text{C}$. [1 mark]

Specific heat capacity of ice = c_i

Specific heat capacity of water = c_w

Specific latent heat of fusion of ice = L

Which expression gives the energy needed for this change to occur?

- A. $55 m c_w + m L$
- B. $55 m c_i + 5 m L$
- C. $5 m c_i + 50 m c_w + m L$
- D. $5 m c_i + 50 m c_w + 5 m L$

14. A sealed container contains a mixture of oxygen and nitrogen gas. [1 mark]

The ratio $\frac{\text{mass of an oxygen molecule}}{\text{mass of a nitrogen molecule}}$ is $\frac{8}{7}$.

The ratio $\frac{\text{average kinetic energy of oxygen molecules}}{\text{average kinetic energy of nitrogen molecules}}$ is

- A. 1.
- B. $\frac{7}{8}$.
- C. $\frac{8}{7}$.
- D. dependent on the concentration of each gas.

15. A ball is tossed vertically upwards with a speed of 5.0 m s^{-1} . After how many seconds will the ball return to its initial position? [1 mark]

- A. 0.50 s
- B. 1.0 s
- C. 1.5 s
- D. 2.0 s

16. A projectile is fired horizontally from the top of a cliff. The projectile hits the ground 4 s later at a distance of 2 km from the base of the cliff. What is the height of the cliff? [1 mark]

- A. 40 m
- B. 80 m
- C. 120 m
- D. 160 m

17. A tennis ball is released from rest at a height h above the ground. At each bounce 50 % of its kinetic energy is lost to its surroundings. What is the height reached by the ball after its second bounce? [1 mark]

- A. $\frac{h}{8}$
- B. $\frac{h}{4}$
- C. $\frac{h}{2}$
- D. zero

18. The initial kinetic energy of a block moving on a horizontal floor is 48 J. A constant frictional force acts on the block bringing it to rest over a distance of 2 m. What is the frictional force on the block? [1 mark]

- A. 24 N
- B. 48 N
- C. 96 N
- D. 192 N

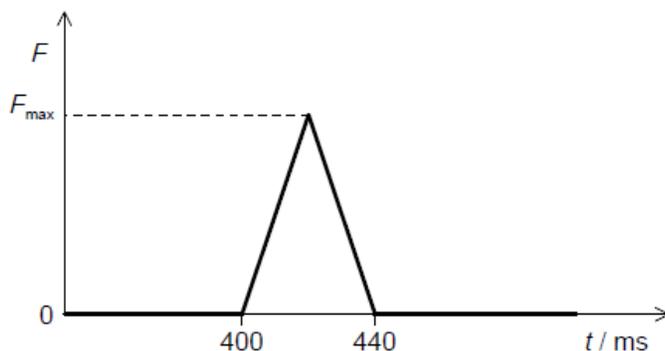
19. The efficiency of an electric motor is 20 %. When lifting a body 500 J of energy are wasted. What is the useful work done by the motor? [1 mark]

- A. 100 J
- B. 125 J
- C. 250 J
- D. 400 J

20. A net force acts on a body. Which characteristic of the body will definitely change? [1 mark]

- A. Speed
- B. Momentum
- C. Kinetic energy
- D. Direction of motion

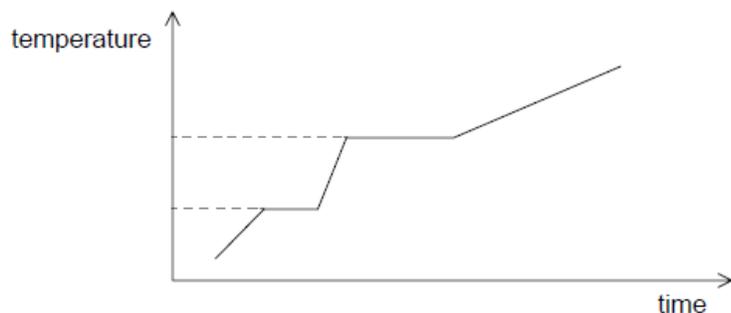
21. A ball of mass 0.2 kg strikes a force sensor and sticks to it. Just before impact the ball is travelling horizontally at a speed of 4.0 m s^{-1} . The graph shows the variation with time t of the force F recorded by the sensor. [1 mark]



What is F_{max} ?

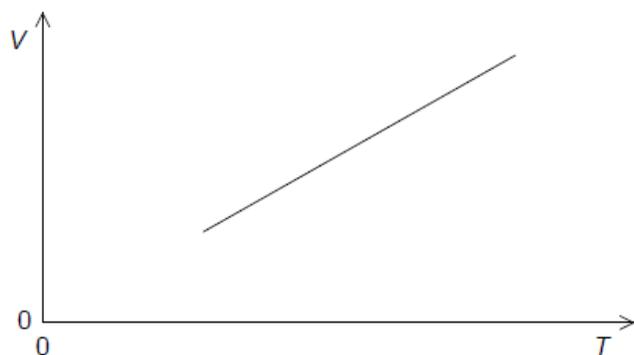
- A. 2 N
- B. 4 N
- C. 20 N
- D. 40 N

22. Energy is supplied at a constant rate to a fixed mass of a material. The material begins as a solid. The graph shows the variation of the temperature of the material with time. [1 mark]



The specific heat capacities of the solid, liquid and gaseous forms of the material are c_s , c_l and c_g respectively. What can be deduced about the values of c_s , c_l and c_g ?

- A. $c_s > c_g > c_l$
B. $c_l > c_s > c_g$
C. $c_l > c_g > c_s$
D. $c_g > c_s > c_l$
23. An ideal gas of N molecules is maintained at a constant pressure p . The graph shows how the volume V of the gas varies with absolute temperature T . [1 mark]



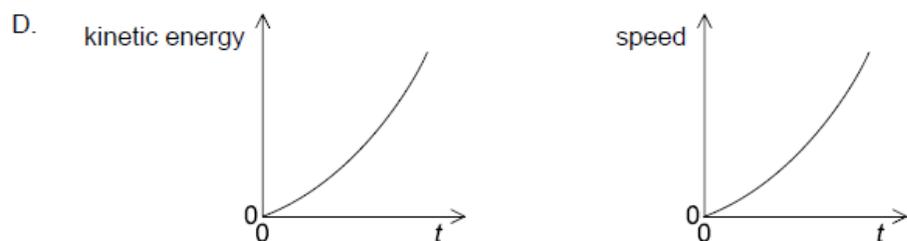
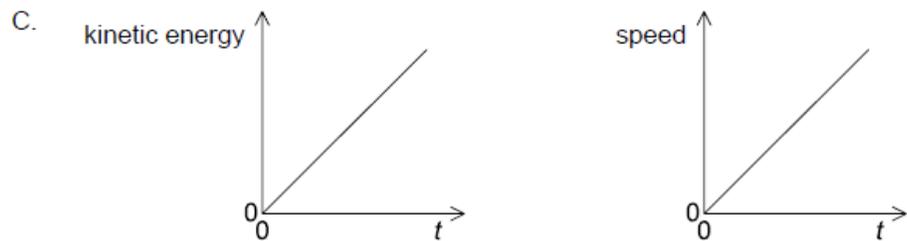
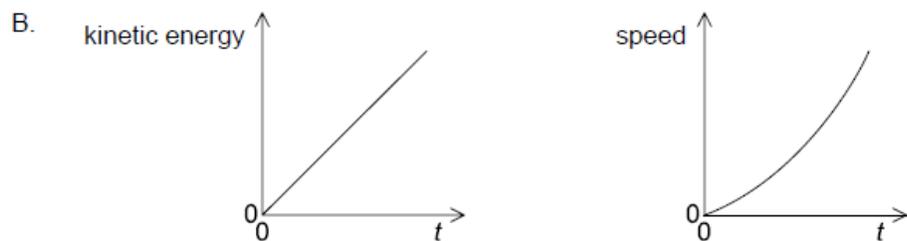
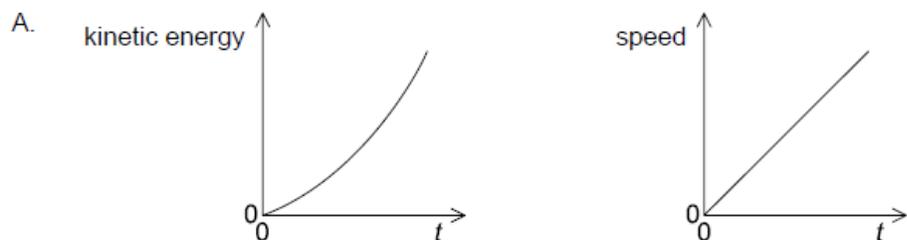
What is the gradient of the graph?

- A. $\frac{N}{p}$
B. $\frac{NR}{p}$
C. $\frac{Nk_B}{p}$
D. $\frac{N}{Rp}$

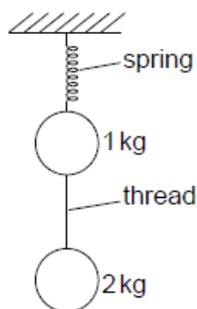
24. The pressure of a fixed mass of an ideal gas in a container is decreased at [1 mark] constant temperature. For the molecules of the gas there will be a decrease in
- A. the mean square speed.
 - B. the number striking the container walls every second.
 - C. the force between them.
 - D. their diameter.

25. An object of weight W is falling vertically at a constant speed in a fluid. [1 mark] What is the magnitude of the drag force acting on the object?
- A. 0
 - B. $\frac{W}{2}$
 - C. W
 - D. $2W$

26. An object, initially at rest, is accelerated by a constant force. Which [1 mark] graphs show the variation with time t of the kinetic energy and the variation with time t of the speed of the object?



27. Two stationary objects of mass 1kg and 2kg are connected by a thread and suspended from a spring [1 mark] and suspended from a spring.



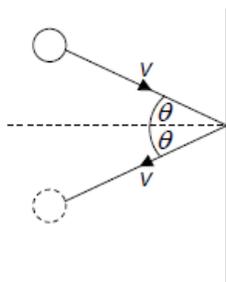
The thread is cut. Immediately after the cut, what are the magnitudes of the accelerations of the objects in terms of the acceleration due to gravity g ?

	Acceleration of 1 kg object	Acceleration of 2 kg object
A.	$3g$	$2g$
B.	$2g$	$2g$
C.	$3g$	$1g$
D.	$2g$	$1g$

28. A student of weight 600N climbs a vertical ladder 6.0m tall in a time of 8.0s. What is the power developed by the student against gravity? [1 mark]

- A. 22W
- B. 45W
- C. 220W
- D. 450W

29. A ball of mass m strikes a vertical wall with a speed v at an angle of θ to the wall. The ball rebounds at the same speed and angle. What is the change in the magnitude of the momentum of the ball? [1 mark]



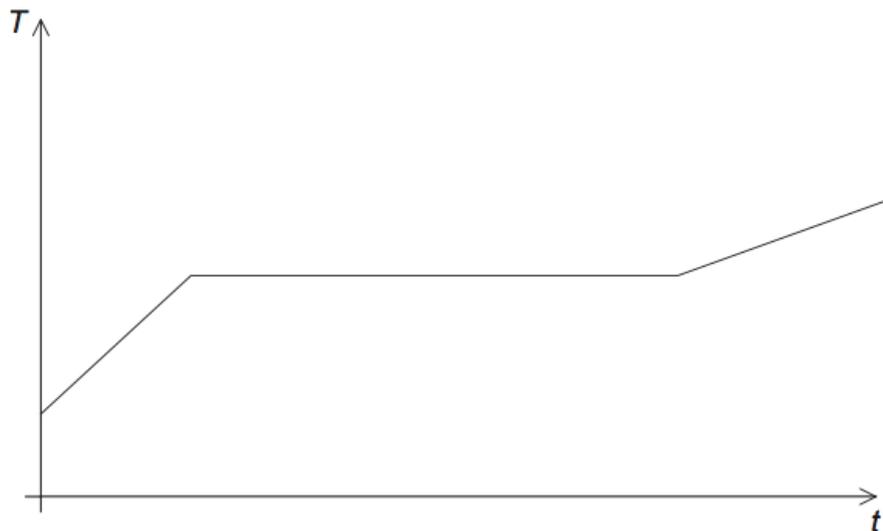
- A. $2 mv \sin \theta$
- B. $2 mv \cos \theta$
- C. $2 mv$
- D. zero

30. Two objects m_1 and m_2 approach each other along a straight line with speeds v_1 and v_2 as shown. The objects collide and stick together. [1 mark]



What is the total change of linear momentum of the objects as a result of the collision?

- A. $m_1 v_1 + m_2 v_2$
B. $m_1 v_1 - m_2 v_2$
C. $m_2 v_2 - m_1 v_1$
D. zero
31. A substance is heated at constant power. The graph shows how the temperature T of the substance varies with time t as the state of the substance changes from liquid to gas. [1 mark]



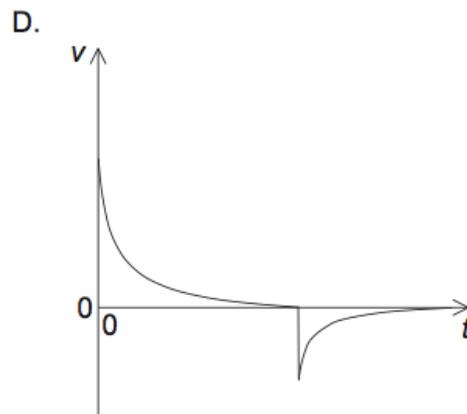
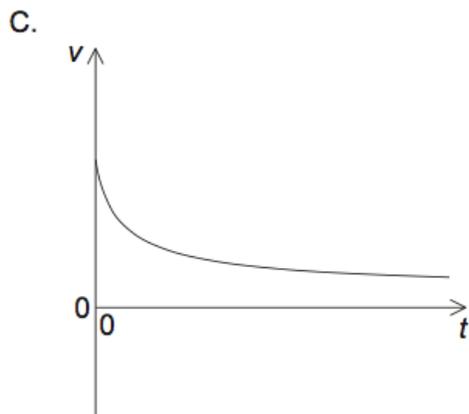
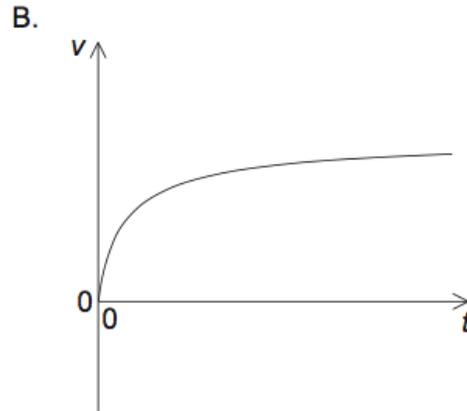
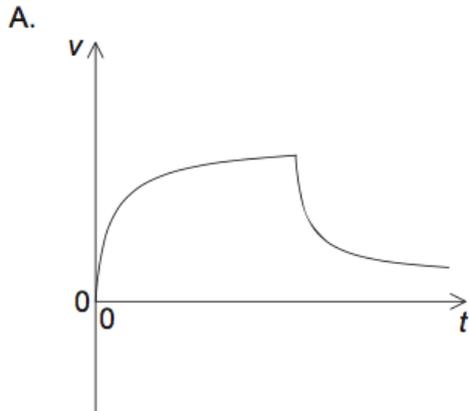
What can be determined from the graph?

- A. The specific heat capacity of the gas is smaller than the specific heat capacity of the liquid.
B. The specific heat capacity of the gas is larger than the specific heat capacity of the liquid.
C. The specific latent heat of fusion of the substance is less than its specific latent heat of vaporization.
D. The specific latent heat of fusion of the substance is larger than its specific latent heat of vaporization.

32. Which of the following is **not** an assumption of the kinetic model of ideal gases? *[1 mark]*
- A. All particles in the gas have the same mass.
 - B. All particles in the gas have the same speed.
 - C. The duration of collisions between particles is very short.
 - D. Collisions with the walls of the container are elastic.
-

33. Under what conditions of density and pressure is a real gas best described by the equation of state for an ideal gas? *[1 mark]*
- A. Low density and low pressure
 - B. Low density and high pressure
 - C. High density and low pressure
 - D. High density and high pressure
-

34. An aircraft is moving horizontally. A parachutist leaves the aircraft and a [1 mark] few seconds later opens her parachute. Which graph shows the variation of the vertical speed v with time t for the parachutist from the time she leaves the aircraft until just before landing?



35. An object of mass m rests on a horizontal plane. The angle θ that the plane makes with the horizontal is slowly increased from zero. When $\theta = \theta_0$, the object begins to slide. What are the coefficient of static friction μ_s and the normal reaction force N of the plane at $\theta = \theta_0$? [1 mark]

	μ_s	N
A.	$\sin \theta_0$	$mg \cos \theta_0$
B.	$\tan \theta_0$	$mg \sin \theta_0$
C.	$\sin \theta_0$	$mg \sin \theta_0$
D.	$\tan \theta_0$	$mg \cos \theta_0$

36. A stone is falling at a constant velocity vertically down a tube filled with oil. Which of the following statements about the energy changes of the stone during its motion are correct? [1 mark]

- I. The gain in kinetic energy is less than the loss in gravitational potential energy.
- II. The sum of kinetic and gravitational potential energy of the stone is constant.
- III. The work done by the force of gravity has the same magnitude as the work done by friction.

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

37. A spring of negligible mass and length l_0 hangs from a fixed point. When a mass m is attached to the free end of the spring, the length of the spring increases to l . The tension in the spring is equal to $k\Delta x$, where k is a constant and Δx is the extension of the spring. What is k ? [1 mark]

A. $\frac{mg}{l_0}$

B. $\frac{mg}{l}$

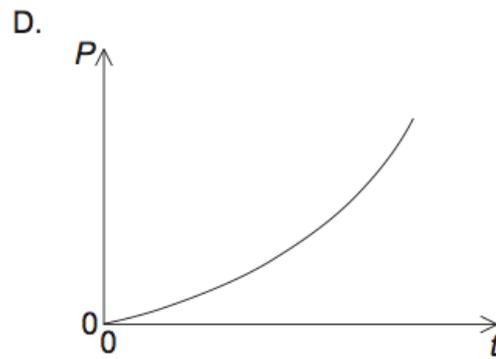
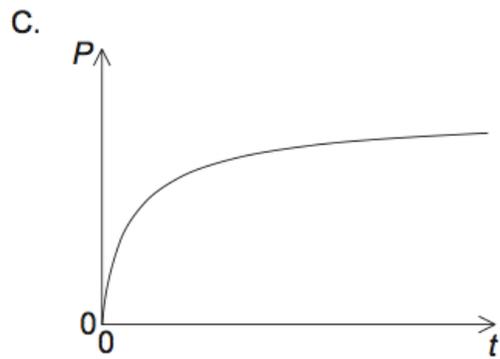
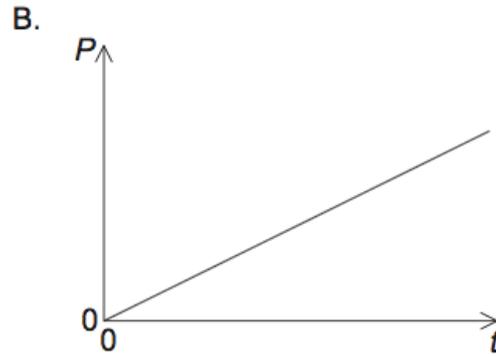
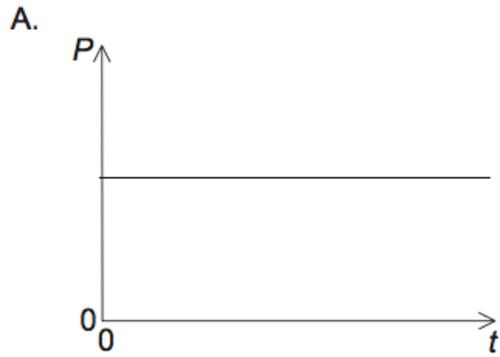
C. $\frac{mg}{l-l_0}$

D. $\frac{mg}{l_0-l}$

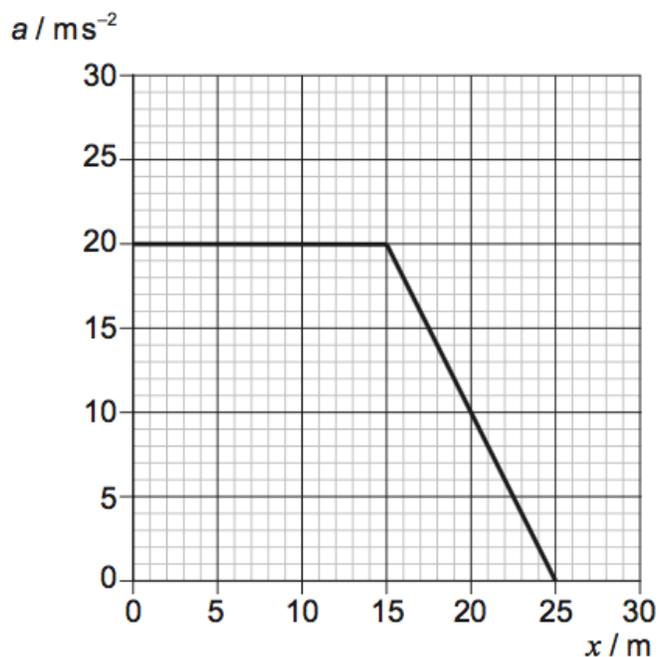
38. A ball with mass m moves horizontally with speed u . The ball hits a vertical wall and rebounds in the opposite direction with speed $v < u$. The duration of the collision is T . What are the magnitude of the average force exerted by the wall on the ball and the loss of kinetic energy of the ball? [1 mark]

	Average force	Loss of kinetic energy
A.	$\frac{m(u+v)}{T}$	$\frac{m(u^2 - v^2)}{2}$
B.	$\frac{m(u+v)}{T}$	$\frac{m(u-v)^2}{2}$
C.	$\frac{m(u-v)}{T}$	$\frac{m(u^2 - v^2)}{2}$
D.	$\frac{m(u-v)}{T}$	$\frac{m(u-v)^2}{2}$

39. A train on a straight horizontal track moves from rest at constant acceleration. The horizontal forces on the train are the engine force and a resistive force which increases with speed. Which graph represents the variation with time t of the power P developed by the engine? [1 mark]



40. The graph shows how the acceleration a of an object varies with distance x travelled x . [1 mark]

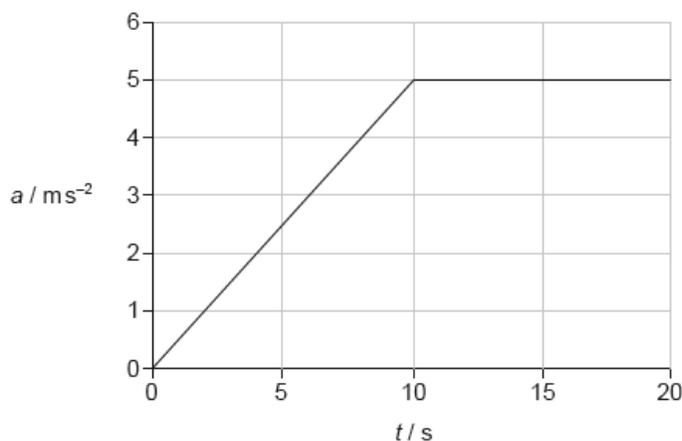


The mass of the object is 3.0 kg. What is the total work done on the object?

1. 300 J
 2. 400 J
 3. 1200 J
 4. 1500 J
-
41. When 1800 J of energy is supplied to a mass m of liquid in a container, [1 mark] the temperature of the liquid and the container changes by 10 K. When the mass of the liquid is doubled to $2m$, 3000 J of energy is required to change the temperature of the liquid and container by 10 K. What is the specific heat capacity of the liquid in $\text{J kg}^{-1}\text{K}^{-1}$?
- A. $\frac{60}{m}$
 - B. $\frac{120}{m}$
 - C. $\frac{180}{m}$
 - D. $\frac{240}{m}$

42. Two objects are in thermal contact and are at different temperatures. [1 mark]
What is/are determined by the temperatures of the two objects?
- I. The direction of thermal energy transfer between the objects
 - II. The quantity of internal energy stored by each object
 - III. The process by which energy is transferred between the objects
- A. I only
 - B. II only
 - C. I and II only
 - D. I, II and III

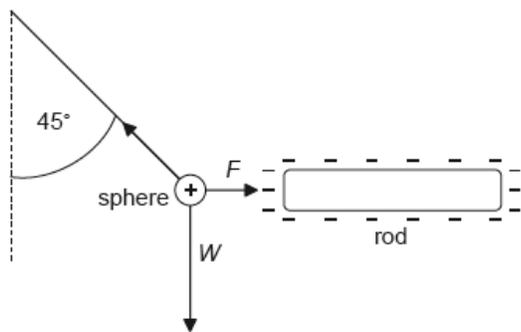
43. An object is at rest at time $t = 0$. The variation with t of the acceleration a of the object is shown from $t = 0$ to $t = 20$ s. [1 mark]



What is the speed of the object when $t = 15$ s?

- A. 25 m s^{-1}
 - B. 50 m s^{-1}
 - C. 75 m s^{-1}
 - D. 100 m s^{-1}
44. Which of the following is proportional to the net external force acting on a [1 mark] body?
- A. Speed
 - B. Velocity
 - C. Rate of change of speed
 - D. Rate of change of velocity

45. A small positively charged sphere is suspended from a thread and placed [1 mark] close to a negatively charged rod. When the thread is at 45° to the vertical the system is in equilibrium. The weight of the sphere is W and the magnitude of the electrostatic force between the rod and the sphere is F .



(not to scale)

What is the magnitude of W compared with the magnitude of F ?

- A. $W = \sqrt{2}F$
- B. $F < W < \sqrt{2}F$
- C. $W = F$
- D. $W > F$
-
46. An object of mass m is initially at rest. When an impulse I acts on the [1 mark] object its final kinetic energy is E_K . What is the final kinetic energy when an impulse of $2I$ acts on an object of mass $2m$ initially at rest?
- A. $\frac{E_K}{2}$
- B. E_K
- C. $2E_K$
- D. $4E_K$
-
47. A heat engine does 300 J of work during one cycle. In this cycle 900 J of [1 mark] energy is wasted. What is the efficiency of the engine?
- A. 0.25
- B. 0.33
- C. 0.50
- D. 0.75

48. A container holds 40 g of argon-40 (${}^{40}_{18}\text{Ar}$) and 8 g of helium-4 (${}^4_2\text{He}$). [1 mark]

What is the $\frac{\text{number of atoms of argon}}{\text{number of atoms of helium}}$ in the container?

- A. $\frac{1}{2}$
- B. $\frac{2}{9}$
- C. $\frac{2}{1}$
- D. $\frac{9}{2}$

49. Molecules leave a boiling liquid to form a vapour. The vapour and the liquid have the same temperature. [1 mark]

What is the change of the average potential energy and the change of the average random kinetic energy of these molecules when they move from the liquid to the vapour?

	Average potential energy	Average random kinetic energy
A.	increases	increases
B.	increases	no change
C.	no change	increases
D.	no change	no change

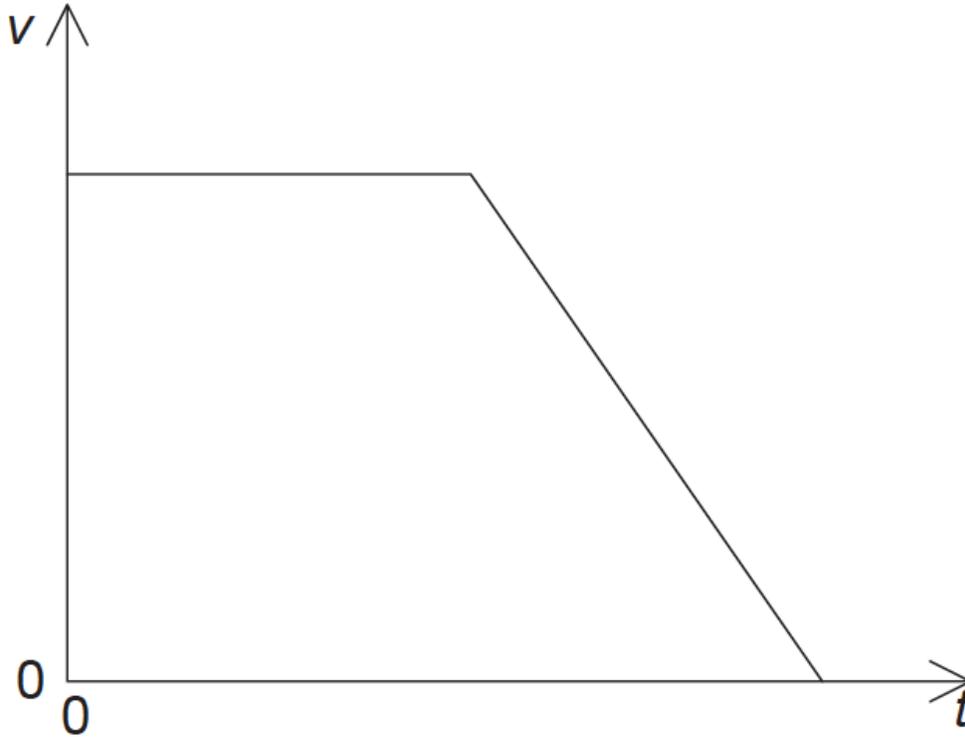
50. In the kinetic model of an ideal gas, which of the following is **not** assumed? [1 mark]

- A. The molecules collide elastically.
- B. The kinetic energy of a given molecule is constant.
- C. The time taken for a molecular collision is much less than the time between collisions.
- D. The intermolecular potential energy of the molecules is zero.

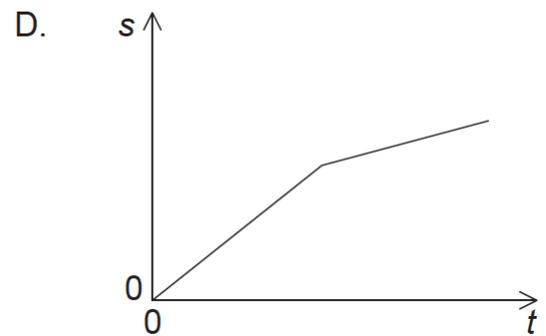
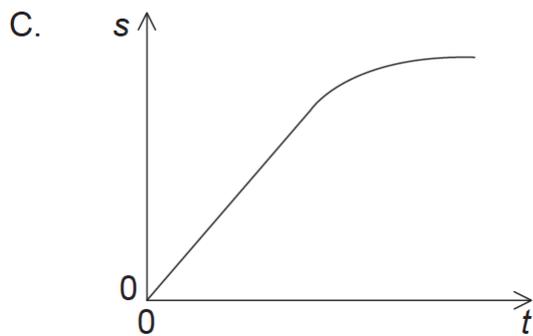
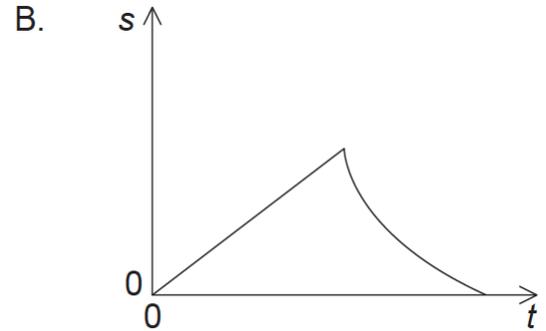
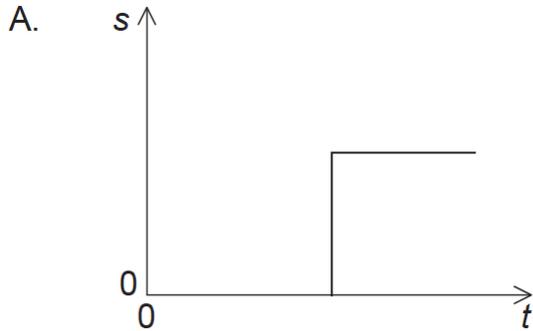
51. A tennis ball is released from rest and falls vertically through a small distance in air. What is the change in the speed of the ball and the change in the acceleration of the ball as it falls? [1 mark]

	Speed of the ball	Acceleration of the ball
A.	increases	decreases
B.	decreases	increases
C.	increases	increases
D.	decreases	decreases

52. The graph below shows the variation with time t of the velocity v of a car [1 mark] travelling in a straight line.



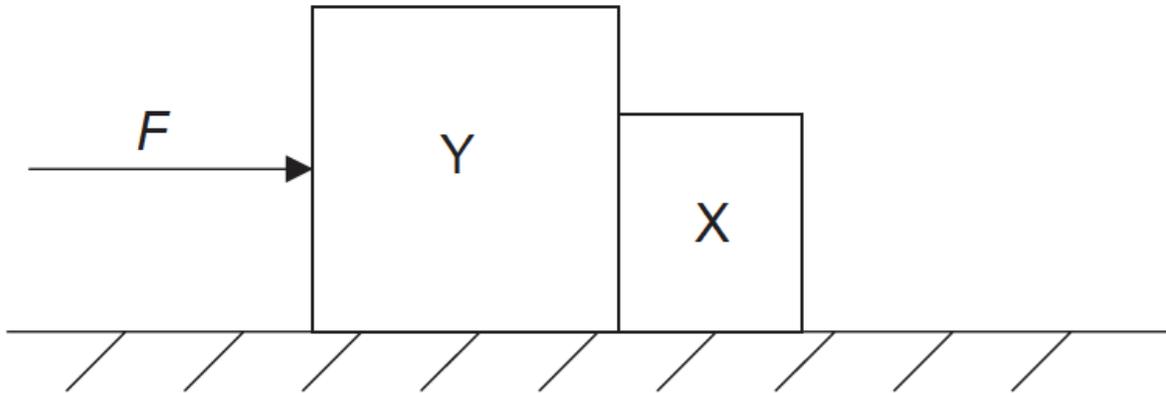
Which graph shows the variation with t of the displacement s of the car?



53. Which statement applies to an object in translational equilibrium? [1 mark]

- A. The object must be stationary.
- B. The object must be moving with constant acceleration.
- C. The resultant force acting on the object must be zero.
- D. There must be no external forces acting on the object.

54. A constant horizontal force F is applied to a block Y. Block Y is in contact with a separate block X. [1 mark]



The blocks remain in contact as they accelerate along a horizontal frictionless surface. Y has a greater mass than X. Air resistance is negligible.

Which statement is correct?

- A. The force F is equal to the product of the mass of Y and the acceleration of Y.
- B. The force that Y exerts on X is less than F .
- C. The force that Y exerts on X is less than the force that X exerts on Y.
- D. The force that Y exerts on X is equal to F .

55. Two identical spheres, each of mass m and speed v , travel towards each other on a frictionless surface in a vacuum. [1 mark]



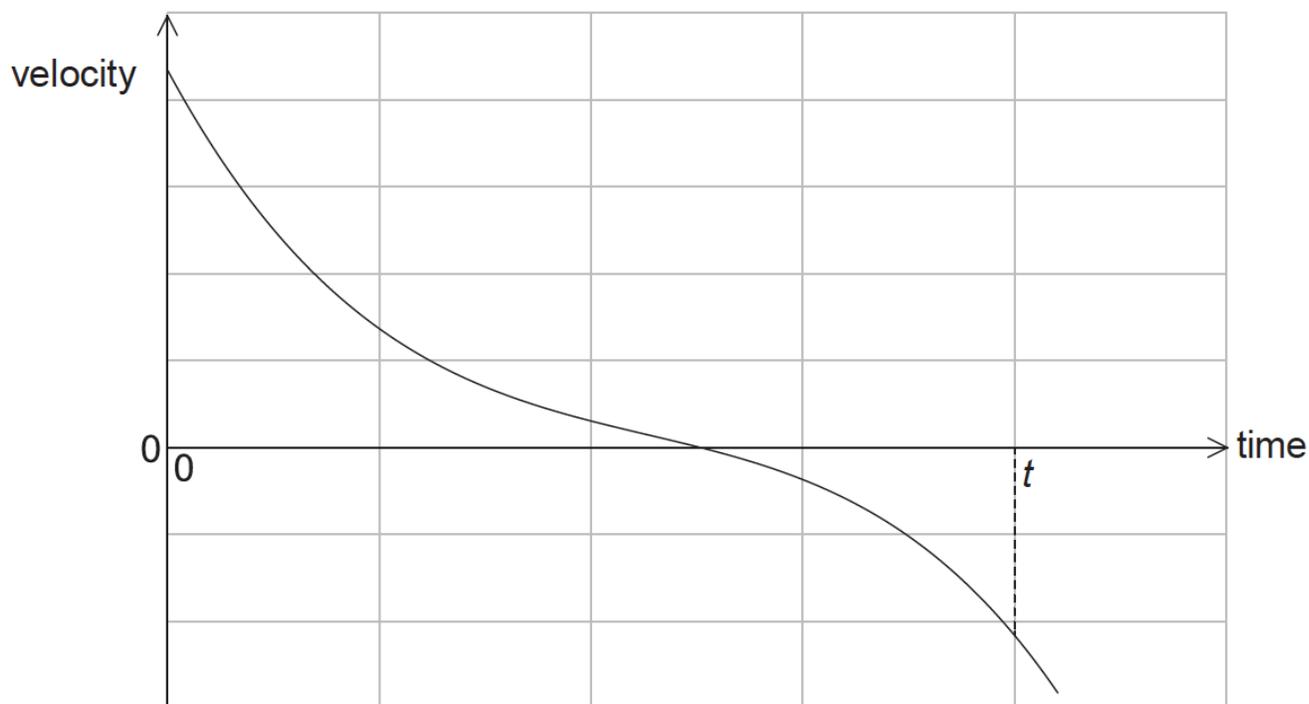
The spheres undergo a head-on elastic collision.

Which statement correctly describes the spheres after the collision?

- A. The total momentum of the spheres is $2mv$.
- B. Each sphere has zero momentum.
- C. The total kinetic energy of the spheres is mv^2 .
- D. Each sphere has zero kinetic energy.
-
56. What is the definition of the *mole*? [1 mark]
- A. The amount of substance that has the same mass as 6.02×10^{23} atoms of carbon-12.
- B. The amount of substance that contains as many nuclei as the number of nuclei in 12 g of carbon-12.
- C. The amount of substance that has the same mass as one atom of carbon-12.
- D. The amount of substance that contains as many elementary entities as the number of atoms in 12 g of carbon-12.
-
57. Equal masses of water at 80°C and paraffin at 20°C are mixed in a container of negligible thermal capacity. The specific heat capacity of water is twice that of paraffin. What is the final temperature of the mixture? [1 mark]
- A. 30°C
- B. 40°C
- C. 50°C
- D. 60°C
-
58. Which of the following is an assumption of the kinetic model of an ideal gas? [1 mark]
- A. The gas is at high pressure.
- B. There are weak forces of attraction between the particles in the gas.
- C. The collisions between the particles are elastic.
- D. The energy of the particles is proportional to the absolute temperature.

59. A body moves in a straight line. In order for the equations for uniformly accelerated motion to be applied, which condition **must** be true? [1 mark]
- A. A constant net force acts on the body of fixed mass.
 - B. A constant net force acts on the body.
 - C. The body falls towards the surface of a planet.
 - D. The body has an initial velocity of zero.

60. The graph shows the variation with time of the velocity of a truck of fixed mass. [1 mark]



What can be deduced from the graph?

- A. The truck is always accelerating.
 - B. The truck is always moving.
 - C. The truck is always moving in one direction.
 - D. The displacement of the truck after time t is zero.
61. A pure solid is heated at its melting point. While it is melting the [1 mark]
- A. mean kinetic energy of the molecules of the solid increases.
 - B. mean potential energy of the molecules of the solid increases.
 - C. temperature of the solid increases.
 - D. temperature of the solid decreases.

62. Which of the following is equivalent to a temperature of 350 K? [1 mark]

- A. -623°C
- B. -77°C
- C. $+77^{\circ}\text{C}$
- D. $+623^{\circ}\text{C}$

63. A liquid-in-glass thermometer is in thermal equilibrium with some hot water. The thermometer is left in the water. The water cools to the temperature of the surroundings. Which of the following is **unlikely to be true** for the thermometer? [1 mark]

- A. It is in thermal equilibrium with the water.
- B. It is in thermal equilibrium with the surroundings.
- C. It is at the same temperature as the water.
- D. It has the same thermal capacity as the water.

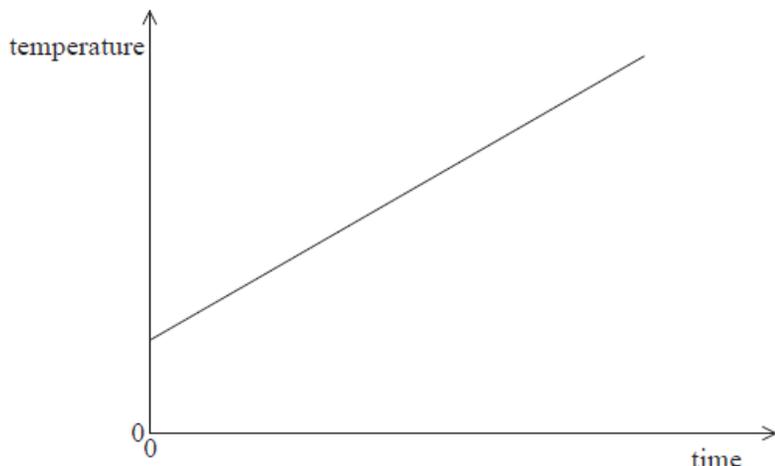
64. A solid piece of tungsten melts into liquid without a change in temperature. Which of the following is correct for the molecules in the liquid phase compared with the molecules in the solid phase? [1 mark]

	Kinetic energy	Potential energy
A.	same	greater
B.	same	same
C.	greater	greater
D.	greater	same

65. What is the mass of carbon-12 that contains the same number of atoms as 14 g of silicon-28? [1 mark]

- A. 6 g
- B. 12 g
- C. 14 g
- D. 24 g

66. A heater of constant power heats a liquid of mass m and specific heat capacity c . The graph below shows how the temperature of the liquid varies with time. [1 mark]



The gradient of the graph is k and no energy is lost to the surroundings. What is the power of the heater?

- A. kmc
- B. $\frac{k}{mc}$
- C. $\frac{mc}{k}$
- D. $\frac{1}{kmc}$
-
67. Oil with volume V has specific heat capacity c at temperature T . The density of oil is ρ . Which of the following is the thermal capacity of the oil? [1 mark]
- A. ρcV
- B. $\frac{cV}{\rho}$
- C. ρcVT
- D. $\frac{cV}{\rho T}$

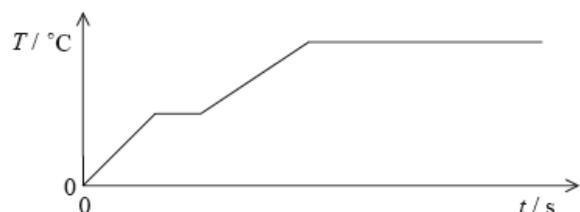
68. The volume of an ideal gas in a container is increased at constant temperature. Which of the following statements is/are correct about the molecules of the gas? [1 mark]
- I. Their average speed remains constant.
- II. The frequency of collisions of molecules with unit area of the container wall decreases.
- III. The force between them decreases.
- A. I only
- B. I and II only
- C. I and III only
- D. II and III only

69. The energy of the molecules of an ideal gas is

[1 mark]

1. thermal only.
2. thermal and potential.
3. potential and kinetic.
4. kinetic only.

70. Thermal energy is added at a constant rate to a substance which is solid [1 mark] at time $t = 0$. The graph shows the variation with t of the temperature T .



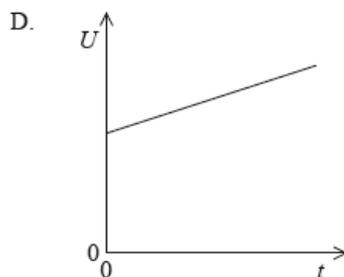
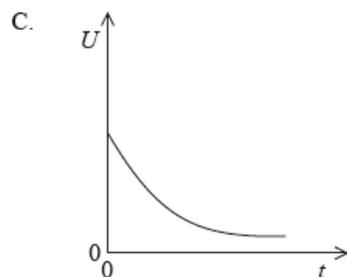
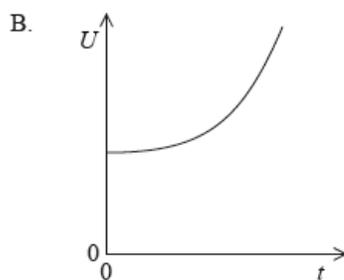
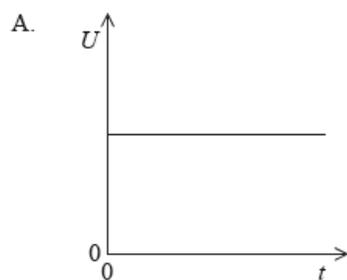
Which of the statements are correct?

- I. The specific latent heat of fusion is greater than the specific latent heat of vaporization.
 - II. The specific heat capacity of the solid is less than the specific heat capacity of the liquid.
- A. I only
B. I and II
C. II only
D. Neither I nor II

71. Which of the following is an assumption made in the kinetic model of ideal gases? [1 mark]

- A. Molecules have zero mass.
- B. Forces between molecules are attractive.
- C. Collisions between molecules are elastic.
- D. Molecules move at high speed.

72. A system consists of an ice cube placed in a cup of water. The system is [1 mark] thermally insulated from its surroundings. The water is originally at 20 °C. Which graph best shows the variation of total internal energy U of the system with time t ?



73. The mole is defined as

[1 mark]

- A. $\frac{1}{12}$ the mass of an atom of the isotope carbon-12.
- B. the amount of a substance that contains as many elementary entities as the number of atoms in 12 g of the isotope carbon-12.
- C. the mass of one atom of the isotope carbon-12.
- D. the amount of a substance that contains as many nuclei as the number of nuclei in 12 g of the isotope carbon-12.

74. Carbon has a relative atomic mass of 12 and oxygen has a relative atomic mass of 16. A sample of 6 g of carbon has twice as many atoms as [1 mark]

- A. 32 g of oxygen.
- B. 8 g of oxygen.
- C. 4 g of oxygen.
- D. 3 g of oxygen.

75. Tanya heats 100 g of a liquid with an electric heater which has a constant [1 mark] power output of 60 W. After 100 s the rise in temperature is 40 K. The specific heat capacity of the liquid in $\text{J kg}^{-1}\text{K}^{-1}$ is calculated from which of the following?

- A. $\frac{60 \times 100}{0.1 \times 40}$
B. $\frac{60 \times 0.1}{40}$
C. $\frac{0.1 \times 40}{60}$
D. $\frac{60}{40}$

76. In the table below, which row shows the correct conversion between the [1 mark] Kelvin and Celsius temperature scales?

	Kelvin temperature / K	Celsius temperature / °C
A.	0	373
B.	100	-173
C.	173	100
D.	373	-100

77. In the kinetic model of an ideal gas, it is assumed that [1 mark]

- A. the forces between the molecules of the gas and the container are always zero.
B. the intermolecular potential energy of the molecules of the gas is constant.
C. the kinetic energy of a given molecule of the gas is constant.
D. the momentum of a given molecule of the gas is constant.

78. A temperature of 23 K is equivalent to a temperature of [1 mark]

- A. -300 °C.
B. -250 °C.
C. +250 °C.
D. +300 °C.