

BAHAN KECEMERLANGAN
SPM 2015

BK 1

FIZIK
KERTAS 1

Nama:.....

Kelas:.....

**DIBIAYAI OLEH
KERAJAAN NEGERI TERENGGANU**

MAKLUMAT UNTUK CALON

1. *Kertas soalan ini mengandungi 50 soalan.*
2. *Jawab semua soalan.*
3. *Jawab dengan menghitamkan ruangan yang betul pada kertas jawapan.*
4. *Bagi setiap soalan hitamkan satu ruangan sahaja.*
5. *Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat.
Kemudian hitamkan jawapan yang baru.*
6. *Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.*
7. *Senarai rumus disediakan di halaman 3.*
8. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.*

INFORMATION FOR CANDIDATES

1. *This question paper consists of 50 questions.*
2. *Answer all questions.*
3. *Answer each question by blackening the correct space on the answer sheet.*
4. *Blacken only one space for each question.*
5. *If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.*
6. *The diagrams in the question provided are not drawn to scale unless stated.*
7. *You may use a non-programmable scientific calculator.*
8. *A list of formula is provided on page 3.*

Maklumat berikut mungkin berfaedah. Simbol-simbol mempunyai makna yang biasa.

$$1. \quad a = \frac{v - u}{t}$$

$$2. \quad \text{Momentum} = mv$$

$$3. \quad F = ma$$

$$4. \quad \text{Gravitational potential energy} = mgh$$

$$5. \quad \rho = \frac{m}{v}$$

$$6. \quad \text{Pressure, } p = \frac{F}{A}$$

$$7. \quad \text{Pressure, } p = h\rho g$$

$$8. \quad \text{Heat, } Q = mc\theta$$

$$9. \quad \frac{pV}{T} = \text{constant}$$

$$10. \quad E = mc^2$$

$$11. \quad v = f\lambda$$

$$12. \quad \lambda = \frac{ax}{d}$$

$$13. \quad \frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$14. \quad n = \frac{\sin i}{\sin r}$$

$$15. \quad V = IR$$

$$16. \quad n = \frac{H}{h}$$

$$17. \quad v^2 = u^2 + 2as$$

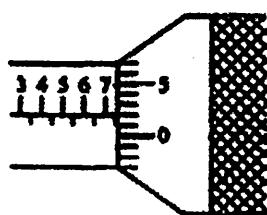
$$18. \quad s = ut + \frac{1}{2}at^2$$

$$19. \quad \text{Power, } P = \frac{\text{energy}}{\text{time}}$$

$$20. \quad g = 10 \text{ m s}^{-2}$$

- 1 Which of the following physical quantities is not a base quantity?
Antara kuantiti fizik berikut, yang manakah bukan kuantiti asas?
- A Weight
Berat
- B Time
Masa
- C Temperature
Suhu
- D Elektric current
Arus elektrik
- 2 A radio station is transmitting waves at a frequency of 102.3 MHz.
The frequency, in Hz is.....
*Sebuah stesen radio memancarkan gelombang pada frekuensi 102.3 MHz.
Frekuensi ini dalam Hz adalah....*
- A 1.023×10^2
- B 1.023×10^5
- C 1.023×10^8
- D 1.023×10^9
- 3 Which of the following quantities is a vector quantity?
Antara kuantiti berikut, yang manakah kuantiti vektor?
- A Energy
Tenaga
- B Power
Kuasa
- C Force
Daya
- D Pressure
Tekanan

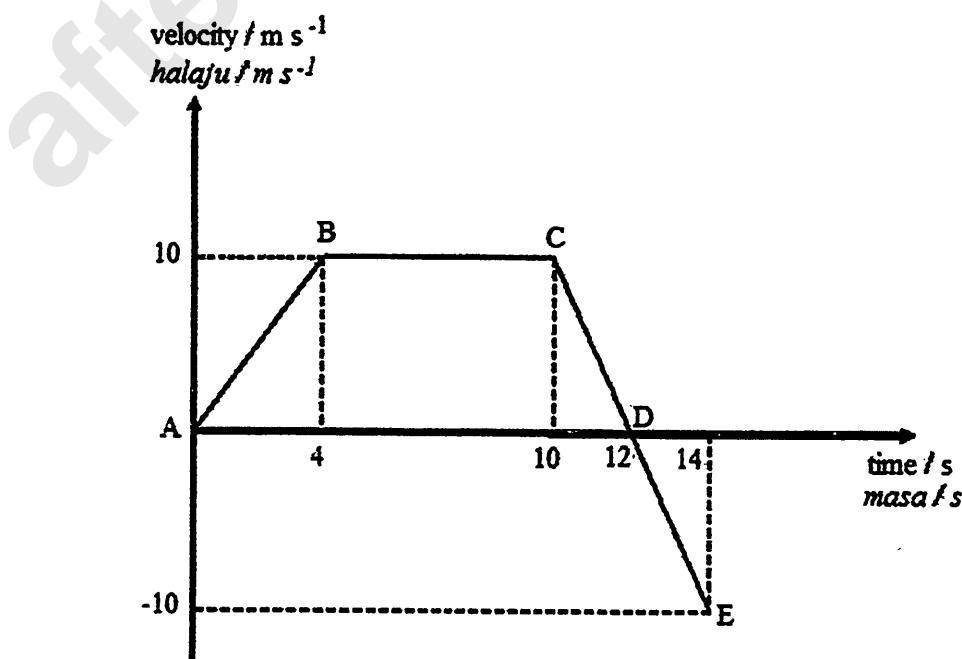
- 4 The diagram shows the scale of a micrometer screw gauge.
Gambar rajah menunjukkan skala pada tolok skru mikrometer.



What is the reading of the micrometer?
Berapakah bacaan tolok skru mikrometer itu?

Answer: 7.52 mm

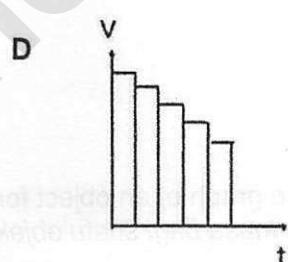
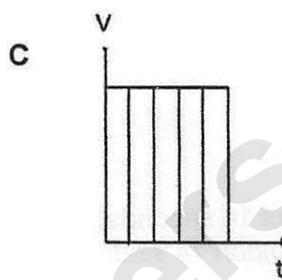
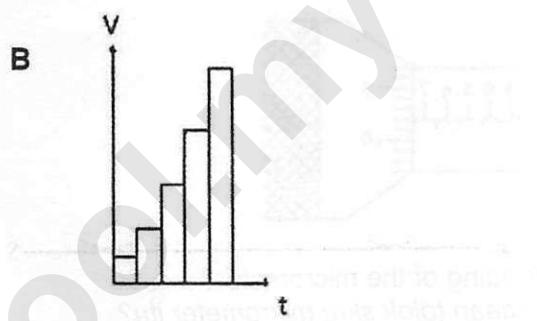
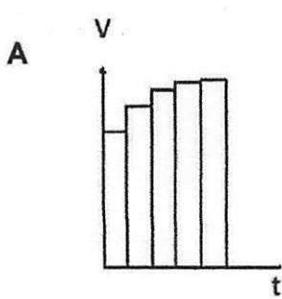
- A 7.02 mm
 B 7.03 mm
 C 7.52 mm
 D 7.58 mm
- 5 Diagram shows the velocity-time graph of an object for a period of 14 seconds.
Rajah menunjukkan graf halaju-masa bagi suatu objek dalam tempoh 14 saat.



What is the displacement of the object?
Berapakah sesaran objek itu?

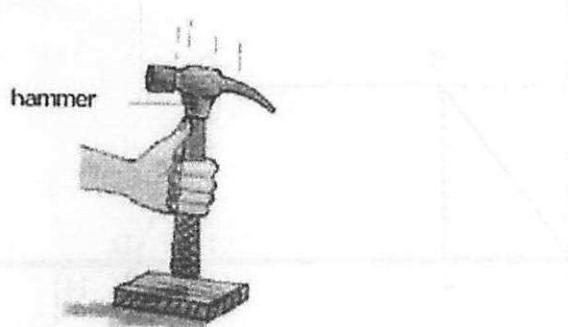
- A 20 m
 B 80 m
 C 100 m
 D 140 m

- 6 Which of the tape chart with decreasing acceleration?
Carta pita detik yang manakah menunjukkan gerakan dengan pecutan berkurang?



- 7 Diagram shows a technique to tighten a hammer head by knocking the end of its handle to the floor.

Rajah menunjukkan satu teknik mengetatkan kepala tukul dengan menghentakkan hujung pemegangnya ke lantai.

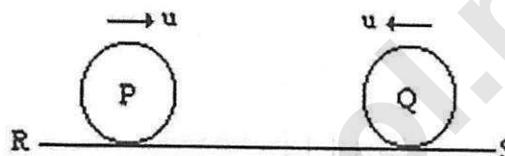


The hammer head can be tighten to its handle due to
Kepala tukul dapat diketatkan kepada pemegangnya disebabkan oleh

- A inertia
inerzia
- B impulse
impuls
- C momentum
momentum
- D linear motion
Gerakan linear

- 8 Diagram shows two identical balls moving towards each other with velocities u and collide with an elastic collision.

Rajah menunjukkan dua bola bergerak mendekati satu sama lain dengan halaju u dan berlanggar secara perlanggaran kenyal.



Which of the following is true after collision?

Yang manakah antara berikut adalah benar selepas perlanggaran?

**Velocity of P
Halaju P**

A Zero
Sifar

B Less than u in direction of R
Kurang daripada u pada arah R

C More than u in direction of R
Lebih daripada u pada arah R

D Equals to u in direction of R
Sama u pada arah R

**Velocity of Q
Halaju Q**

Zero
Sifar

Less than u in direction of S
Kurang daripada u pada arah S

More than u in direction of S
Lebih daripada u pada arah S

Equals to u in direction of S
Sama u pada arah S

- 9 Diagram shows a car is moving on the road. The frictional force, R between the car and the road is 1 000 N.

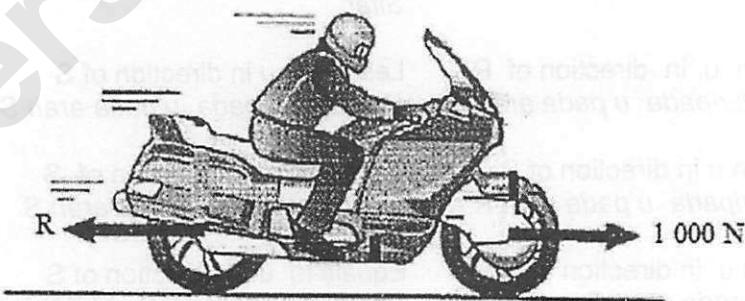
Rajah menunjukkan sebuah kereta yang sedang bergerak di atas jalanraya. Daya geseran, R yang bertindak di antara kereta dan jalanraya adalah 1 000 N.



What happen to the car when the engine thrust is decreased to 800 N?

Apakah yang berlaku kepada kereta apabila daya tujah enjin dikurangkan menjadi 800 N?

- A accelerates
memecut
- B decelerates
menyahpecut
- C move backward
bergerak ke belakang
- D moves with constant velocity
bergerak dengan halaju seragam
- 10 Diagram shows a motorcycle with a mass of 300 kg moving with an acceleration of 2 m s^{-2} . The engine thrust exerted by the motorcycle is 1000 N.
Rajah menunjukkan sebuah motorsikal berjism 300 kg yang sedang bergerak dengan pecutan 2 m s^{-2} . Daya tujah enjin yang dikenakan oleh motorsikal adalah 1000 N.



What is the frictional force acting on the motorcycle?

Berapakah daya geseran yang bertindak ke atas motorsikal?

- A 400 N
- B 700 N
- C 1300 N
- D 1600 N
- 11 Diagram (a) and Diagram (b) show two identical watermelons fall off two identical table and drop onto wooden block and a sponge respectively.
Rajah menunjukkan dua buah tembikai yang serupa terjatuh dari dua buah meja serupa ke atas blok kayu dan span masing-masing.

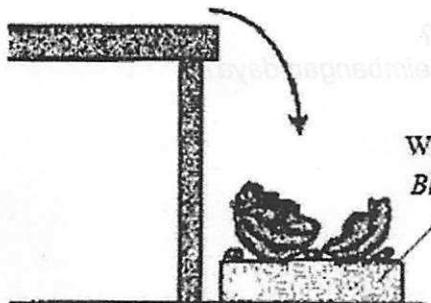


Diagram (a)

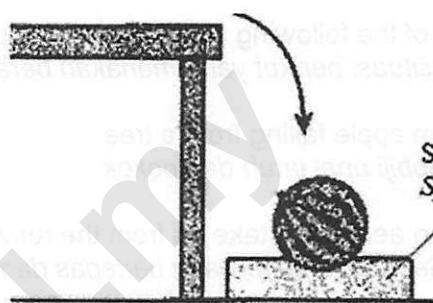


Diagram (b)

Which of the following statement is true?

Antara pernyataan berikut, yang manakah benar?

- A The velocity of the watermelon in Diagram (a) is greater than that of the watermelon in Diagram (b)

Halaju tembikai dalam Rajah (a) lebih besar daripada halaju tembikai dalam Rajah (b)

- B The change of momentum of the watermelon in Diagram (a) is equal to the watermelon in Diagram (b)

Perubahan momentum tembikai dalam Rajah (a) adalah sama dengan tembikai dalam Rajah (b)

- C The time of impact of the watermelon in Diagram (a) is greater than the watermelon in Diagram (b)

Masa hentaman tembikai dalam Rajah (a) adalah lebih besar daripada tembikai dalam Rajah (b)

- D The impulsive force exerted on the watermelon in Diagram (a) is smaller than that on the watermelon in Diagram (b)

Daya impuls ke atas tembikai dalam Rajah (a) adalah lebih kecil daripada tembikai dalam Rajah (b)

- 12 Unit for impulse is same with unit for
Unit impuls adalah sama dengan unit

- A Force
Daya

- B Power
Kuasa

- C Energy
Tenaga

- D Momentum
Momentum

- 13 Which of the following situations is in equilibrium force?

Antara situasi berikut yang manakah berada dalam keseimbangan daya?

- A An apple falling from a tree
Sebiji epal jatuh dari pokok
- B An aeroplane take off from the runway
Sebuah kapal terbang berlepas dari landasan
- C A baseball being hit with a bat
Sebiji bola besbal yang dipukul oleh batang pemukul
- D A car moving with uniform velocity
Sebuah kereta yang bergerak dengan halaju seragam

- 14 Diagram shows a stone is thrown vertically upwards at a velocity of 8 ms^{-1} . The maximum height achieved by the stone is 2 m.

Rajah menunjukkan sebuah batu dilontar tegak ke atas dengan halaju 8 ms^{-1} . Tinggi maksimum yang dicapai oleh batu adalah 2 m.

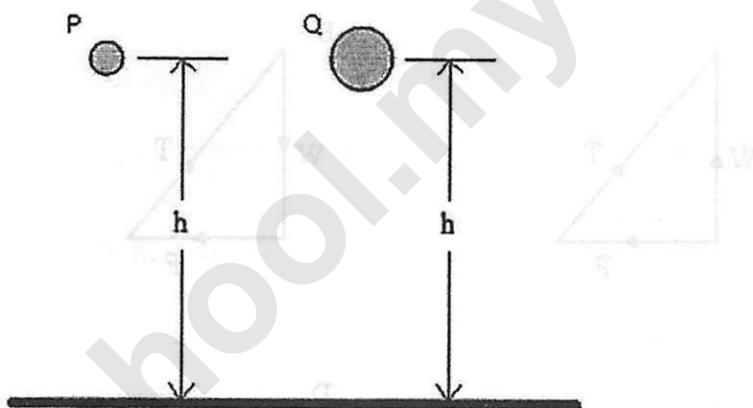


What is the time taken by the stone to achieve maximum height?

Berapakah masa yang diambil oleh batu untuk mencapai tinggi maksimum?

- A 0.2 s
- B 0.4 s
- C 0.5 s
- D 2.0 s

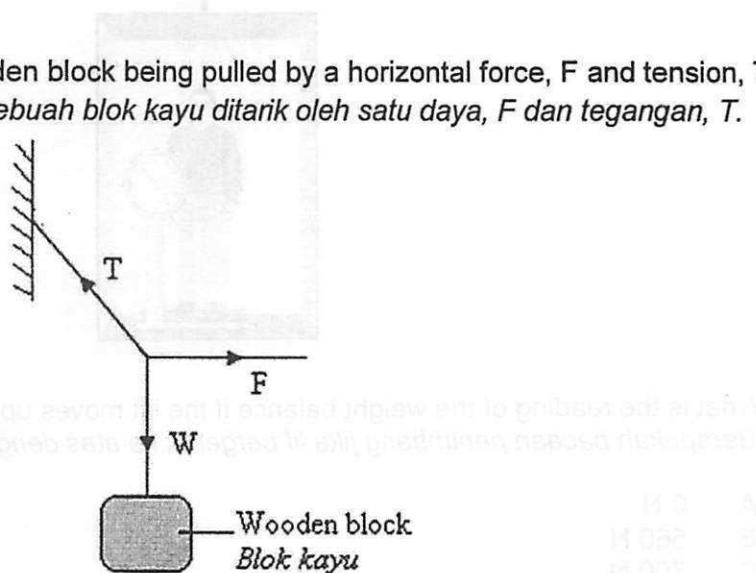
- 15** Diagram shows two iron ball, P and Q, being dropped at the same height.
Rajah menunjukkan dua bebola besi, P dan Q, dijatuhkan pada ketinggian yang sama.



Which of the physical quantity are same for both iron ball P and Q?
Antara fizikal kuantiti berikut berikut, yang manakah adalah sama bagi kedua-dua biji bebola P dan Q?

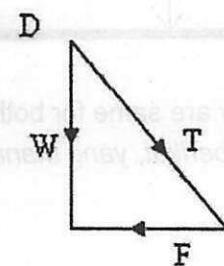
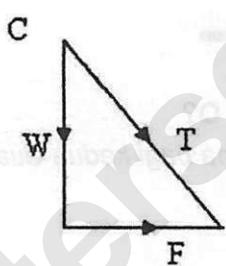
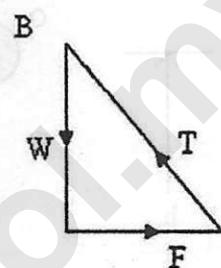
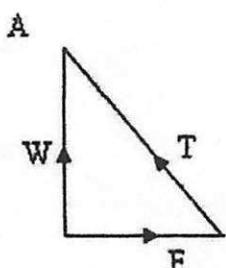
- A** Momentum
Momentum
- B** Acceleration
Pecutan
- C** Kinetic energy
Tenaga kinetik
- D** Gravitational force
Daya graviti

- 16** Diagram shows a wooden block being pulled by a horizontal force, F and tension, T.
Rajah menunjukkan sebuah blok kayu ditarik oleh satu daya, F dan tegangan, T.



Which diagram represents the forces F, T and W?

Antara rajah berikut, yang manakah mewakili daya-daya F, T dan W?



- 17 Diagram shows a man with mass of 70 kg, stands on a weighing scale in a lift.
Rajah menunjukkan seorang lelaki dengan jisim 70 kg, sedang berdiri di atas sebuah penimbang di dalam sebuah lif.

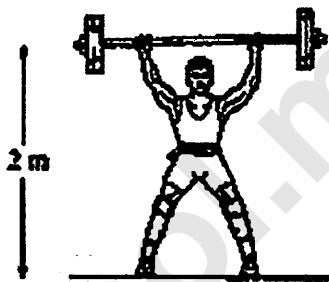


What is the reading of the weight balance if the lift moves up with acceleration of 2.0 m s^{-1} ?
Berapakah bacaan penimbang jika lif bergerak ke atas dengan pecutan 2.0 m s^{-1} ?

- A 0 N
- B 560 N
- C 700 N
- D 840 N

- 18 Diagram shows a weightlifter successfully lifting a load of 60 kg.

Rajah menunjukkan seorang ahli angkat berat berjaya mengangkat beban 60 kg.



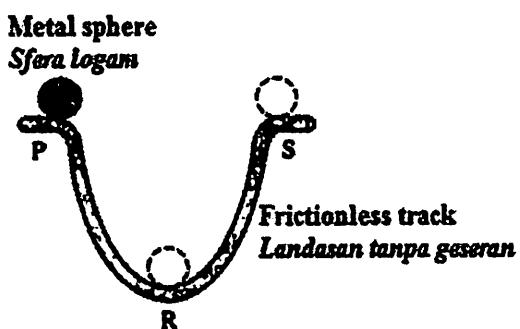
Calculate the work done in lifting the load.

Hitung kerja yang telah dilakukan untuk mengangkat beban tersebut.

- A 30 J
- B 120 J
- C 600 J
- D 1200 J

- 19 Diagram shows a metal sphere oscillating on a frictionless track.

Rajah menunjukkan satu sfera logam sedang berayun di atas landasan tanpa geseran.

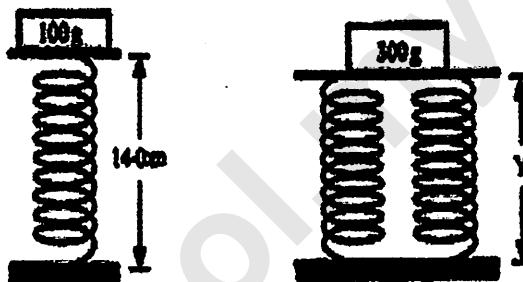


Which of the following statements is true?

Antara pernyataan berikut, yang manakah benar?

- A The kinetic energy of the metal sphere is minimum at R
Tenaga kinetik sfera logam minimum di R
- B The potential energy of the metal sphere is maximum at P
Tenaga keupayaan sfera logam maksimum di P
- C The principle of conservation of energy is not obeyed
Prinsip keabadian tenaga tidak dipatuhi
- D The total energy of the metal sphere at S is higher than that at R
Jumlah tenaga sfera logam di S lebih tinggi daripada di R

- 20 Diagram shows three identical springs with the original length of 16.0 cm.
Rajah 6 menunjukkan tiga spring yang serupa dengan panjang asal 16.0 cm.



What is the length of Y?
Berapakah panjang Y?

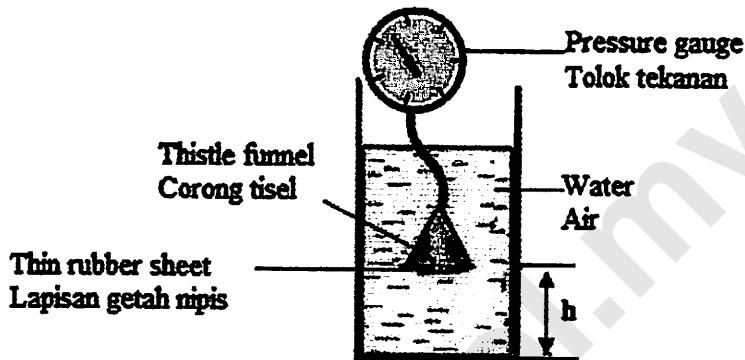
- A 2.0 cm
- B 6.0 cm
- C 10.0 cm
- D 13.0 cm

- 21 What is the meaning of pressure?
Apakah maksud tekanan?

- A The normal force acting on an object
Daya normal yang bertindak ke atas suatu objek
- B The normal force acting on a unit area
Daya normal yang bertindak pada seunit luas
- C The sum of normal forces acting on an area
Jumlah daya normal yang bertindak secara seragam ke atas satu luas permukaan
- D The product of normal force and the area it acts on
Hasil darab daya normal dan luas permukaan di mana daya itu bertindak

- 22 Diagram shows a simple pressure gauge connected to a thistle funnel. The thistle funnel is immersed in a vessel containing water at height, h from the bottom of the vessel.

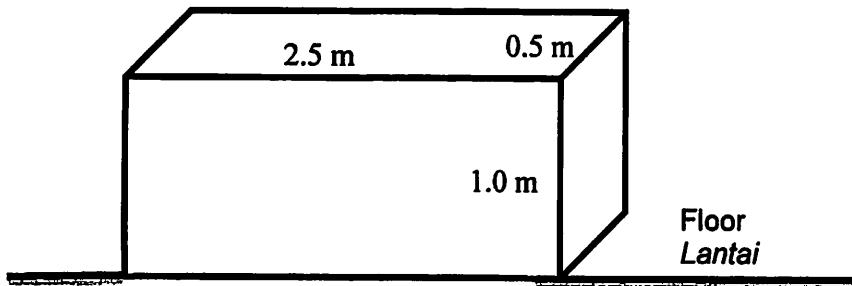
Rajah menunjukkan satu pengukur tekanan ringkas yang disambungkan ke satu corong tisel. Corong tisel tersebut direndam di dalam bekas yang mengandungi air pada ketinggian, h dari dasar bekas.



What happens to the reading of the pressure gauge if the funnel is lowered into the water?
Apakah yang berlaku kepada bacaan pengukur tekanan jika corong tersebut dimasukkan lebih rendah ke dalam air?

- A Increases
Bertambah
- B Decreases
Berkurang
- C Remain constant
tidak berubah

- 23 Diagram shows a block with dimensions of $0.5\text{ m} \times 1\text{ m} \times 2.5\text{ m}$ placed on a floor. The weight of the block is 500 N.
Rajah menunjukkan satu bongkah berdimensi $0.5\text{ m} \times 1\text{ m} \times 2.5\text{ m}$ diletakkan di atas lantai. Berat bongkah itu ialah 500 N.

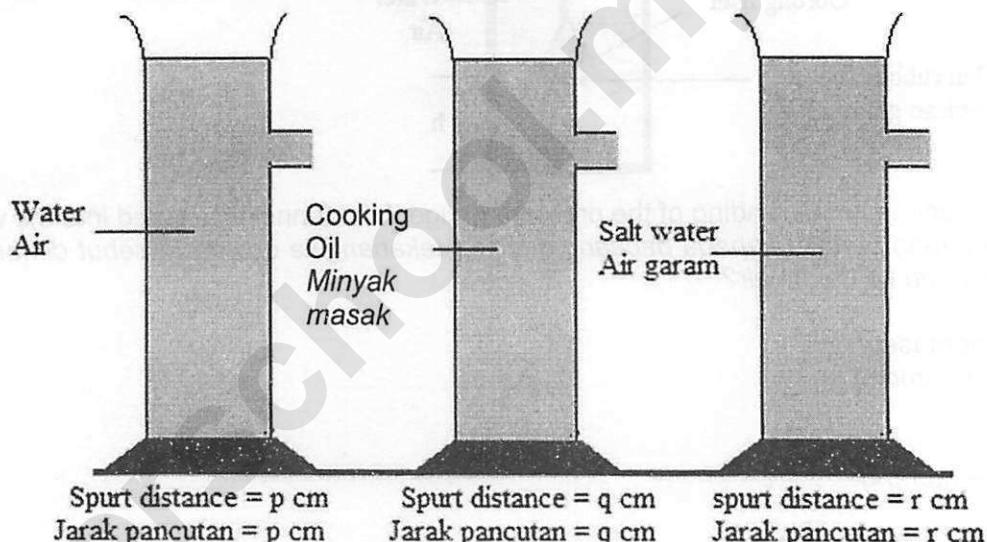


What is the minimum pressure that can be exerted by the block on the floor?
Berapakah tekanan minimum yang boleh dikenakan oleh bongkah itu pada lantai?

- A 200 Pa
- B 400 Pa
- C 500 Pa
- D 1000 Pa

- 24 Diagram shows different liquids spouts out of their containers. Spurt distance for each liquid is p , q and r cm.

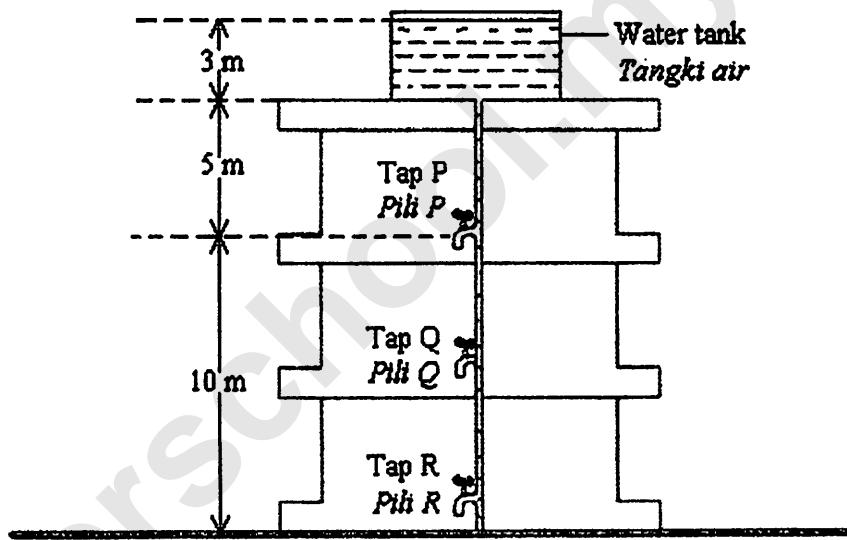
Rajah menunjukkan cecair berlainan terpancut dari bekasnya. Jarak pancutan untuk setiap cecair adalah p , q dan r cm.



Which arrangement is correct?
Susunan manakah adalah betul?

- A $p < q < r$
- B $p = q = r$
- C $r > p > q$
- D $r < q < p$

- 25 Diagram shows a water tank that supplies water to a three storey building.
Rajah menunjukkan sebuah tangki air yang membekalkan air ke sebuah bangunan tiga tingkat.



What is the total pressure at tap P?

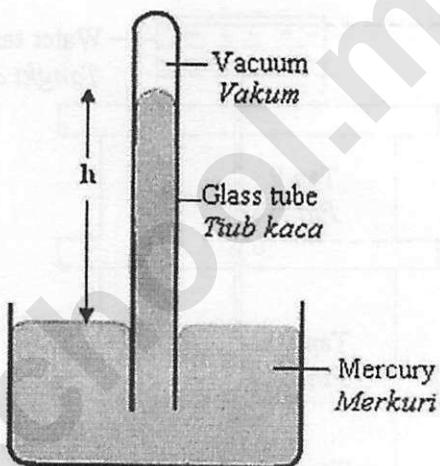
(Density of water = 1000 kg m^{-3} , atmospheric pressure = $1.0 \times 10^5 \text{ Pa}$)

Berapakah jumlah tekanan pada pili P?

(Ketumpatan air = 1000 kg m^{-3} , tekanan atmosfera = $1.0 \times 10^5 \text{ Pa}$)

- A $1.5 \times 10^5 \text{ Pa}$
- B $1.8 \times 10^5 \text{ Pa}$
- C $2.0 \times 10^5 \text{ Pa}$
- D $2.8 \times 10^5 \text{ Pa}$

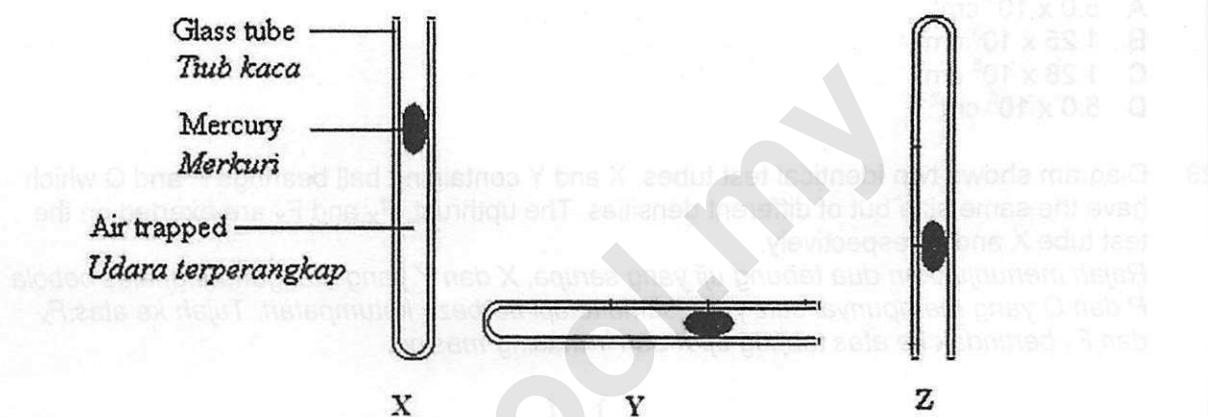
- 26 Diagram shows a simple mercury barometer. The barometer reading is h cm of mercury.
Rajah menunjukkan sebuah barometer merkuri yang ringkas. Bacaan barometer ialah h cm merkuri.



What is the physical quantity measured by h ?
Apakah kuantiti fizikal yang diukur oleh h ?

- A Gas pressure
Tekanan gas
- B Liquid pressure
Tekanan cecair
- C Atmospheric pressure
Tekanan atmosfera

- 27 Diagram shows a column of air is trapped in a capillary tube by a thread of mercury and the capillary tube is placed in three different positions as X, Y and Z.
Rajah menunjukkan satu turus udara terperangkap di dalam tiub kapilari oleh bebenang merkuri dan tiub kapilari itu diletakkan dalam tiga keadaan berbeza iaitu X, Y dan Z.



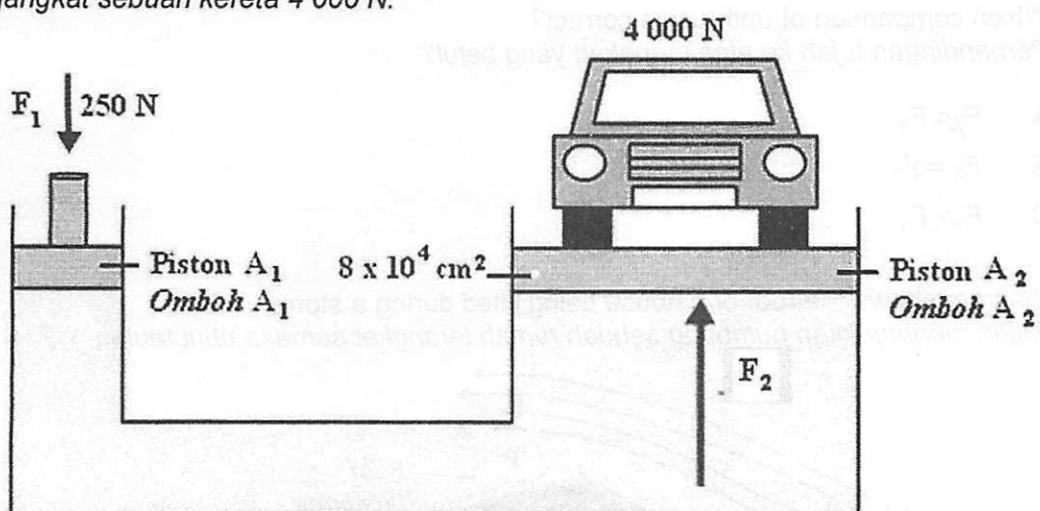
If the air pressure in each position is P_X , P_Y and P_Z , which comparison is true?

Jika tekanan udara dalam setiap kedudukan ialah P_X , P_Y and P_Z , perbandingan manakah adalah benar?

- A $P_X = P_Y = P_Z$
- B $P_X > P_Y > P_Z$
- C $P_X < P_Y < P_Z$
- D $P_X < P_Y > P_Z$

- 28 Diagram shows a hydraulic lift system being used to lift a car of 4 000 N.

Rajah menunjukkan satu sistem pengangkat hidraulik sedang digunakan untuk mengangkat sebuah kereta 4 000 N.



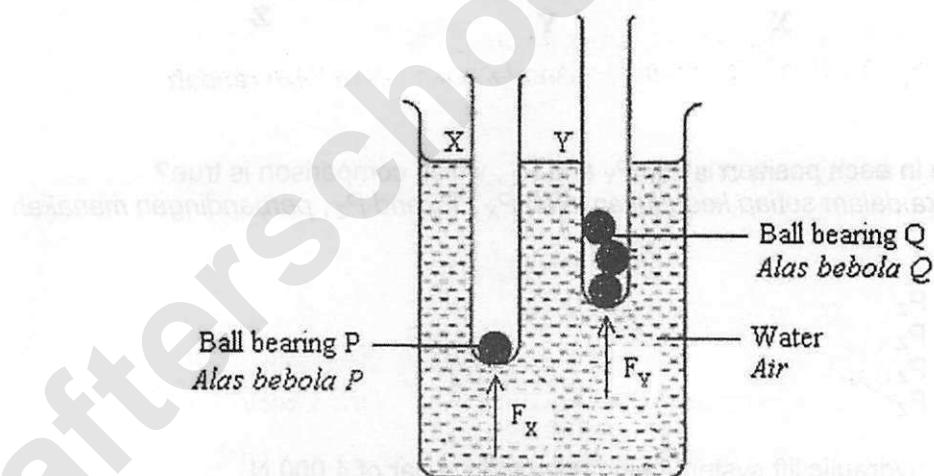
If a cross sectional area for piston A_2 is $8 \times 10^4 \text{ cm}^2$. What is the cross sectional area for piston A_1 ?

Jika luas keratan rentas bagi omboh A_2 ialah $8 \times 10^4 \text{ cm}^2$. Berapakah luas keratan rentas bagi omboh A_1 ?

- A $5.0 \times 10^3 \text{ cm}^2$
 B $1.25 \times 10^3 \text{ cm}^2$
 C $1.28 \times 10^5 \text{ cm}^2$
 D $5.0 \times 10^5 \text{ cm}^2$

- 29 Diagram shows two identical test tubes, X and Y containing ball bearings P and Q which have the same size but of different densities. The upthrust, F_X and F_Y are exerted on the test tube X and Y respectively.

Rajah menunjukkan dua tabung uji yang serupa, X dan Y yang mengandungi alas bebola P dan Q yang mempunyai saiz yang sama tetapi berbeza ketumpatan. Tujah ke atas, F_X dan F_Y bertindak ke atas tabung uji X dan Y masing-masing.



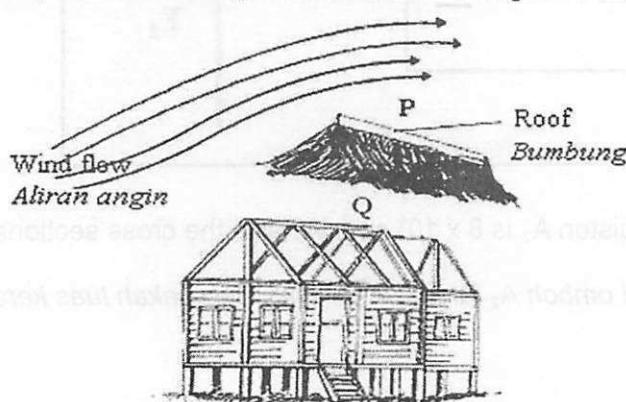
Which comparison of upthrust is correct?

Perbandingan tujah ke atas manakah yang betul?

- A $F_X < F_Y$
 B $F_X = F_Y$
 C $F_X > F_Y$

- 30 Diagram shows the roof of a house being lifted during a storm.

Rajah menunjukkan bumbung sebuah rumah terangkat semasa ribut taufan.

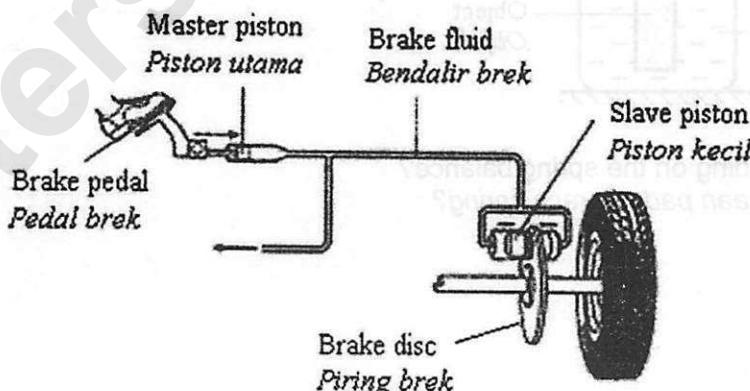


Which statement is correct to explain the phenomenon?
Pernyataan manakah yang betul untuk menerangkan fenomena itu?

- A Speed of air at Q is lower, causing lower air pressure
Laju udara di Q lebih rendah, menyebabkan tekanan udara lebih rendah
- B Speed of air at Q is higher, causing higher air pressure
Laju udara di Q lebih tinggi, menyebabkan tekanan udara lebih tinggi
- C Speed of air at P is higher, causing lower air pressure
Laju udara di P lebih tinggi, menyebabkan tekanan udara lebih rendah
- D Speed of air at P is lower, causing lower air pressure
Laju udara di P lebih rendah, menyebabkan tekanan udara lebih rendah

31 Diagram shows a brake system of a car.

Rajah menunjukkan sistem brek sebuah kereta.



Which principle is used in this system?

Prinsip yang manakah digunakan dalam sistem ini?

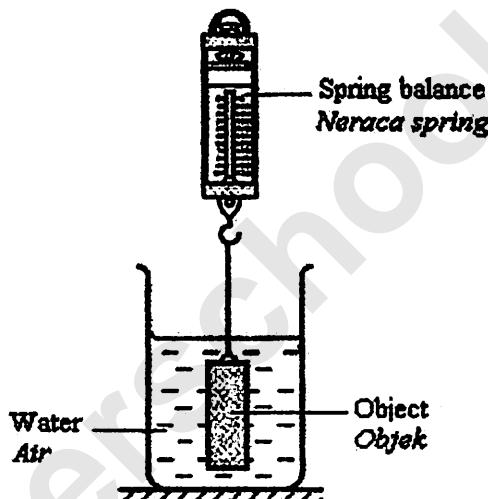
- A Pascal's Principle
Prinsip Pascal
- B Bernoulli's Principle
Prinsip Bernoulli
- C Archimedes' Principle
Prinsip Archimedes
- D Principle of conservation of momentum
Prinsip keabadian momentum

- 32 Diagram shows a spring balance holding an object of mass 20 kg, immersed in water. The volume of the object is $8.0 \times 10^{-3} \text{ m}^3$.

[Density of water = 1000 kgm^{-3}]

Rajah menunjukkan satu neraca spring menyokong objek berjisim 20 kg yang terendam di dalam air. Isipadu objek ialah $8.0 \times 10^{-3} \text{ m}^3$.

[Ketumpatan air = 1000 kgm^{-3}]



What is the reading on the spring balance?
Berapakah bacaan pada neraca spring?

- A 0 N
- B 80 N
- C 120 N
- D 200 N

- 33 A cake is placed in a hot oven. The temperature of the cake is the same as that of the oven after several minutes.

Which concept explains the situation?

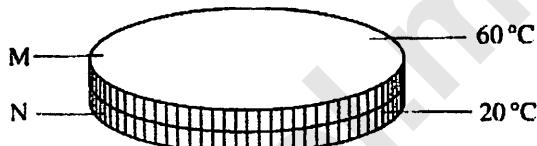
Sebiji kek diletakkan di dalam sebuah ketuhar panas. Suhu kek itu adalah sama dengan suhu ketuhar selepas beberapa minit.

Konsep manakah yang menerangkan situasi itu?

- A Specific latent heat of vaporisation
Haba pendam tentu pengewapan
- B Specific latent heat of fusion
Haba pendam tentu pelakuran
- C Specific heat capacity
Muatan haba tentu
- D Thermal equilibrium
Keseimbangan termal

- 34 Diagram shows two identical metal disc, M and N which are in contact. The initial temperatures of M and N are 60°C and 20°C respectively.

Rajah menunjukkan dua keping cakera logam yang serupa, M dan N yang bersentuhan. Suhu awal M dan N adalah 60°C dan 20°C masing-masing.



Which statement is correct about M and N when the thermal equilibrium is reached?
Pernyataan manakah yang betul mengenai M dan N apabila keseimbangan termal tercapai?

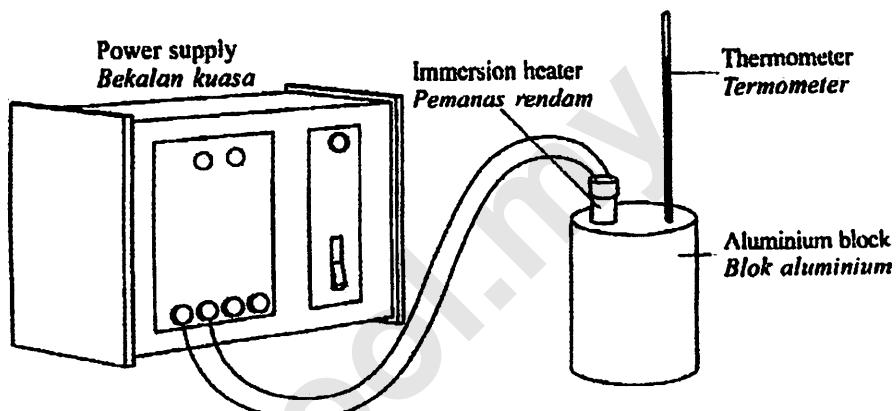
- A Temperature of M is higher than N
Suhu M adalah lebih tinggi daripada N
- B Temperature of N is higher than M
Suhu N adalah lebih tinggi daripada M
- C Net rate of heat flow between M and N is not zero
Pengaliran haba bersih antara M dan N bukan sifar
- D Net rate of heat flow between M and N is zero
Pengaliran haba bersih antara M dan N adalah sifar

- 35 Water is suitable to be used as a cooling agent because of its
Air sesuai digunakan sebagai agen penyejuk kerana mempunyai

- A high density
ketumpatan tinggi
- B high heat capacity
muatan haba tinggi
- C high latent heat
haba pendam tinggi
- D high adhesive force between the molecules
daya lekatan antara molekul tinggi

- 36 Diagram shows an apparatus set-up to determine the specific heat capacity, c , of an aluminium block.

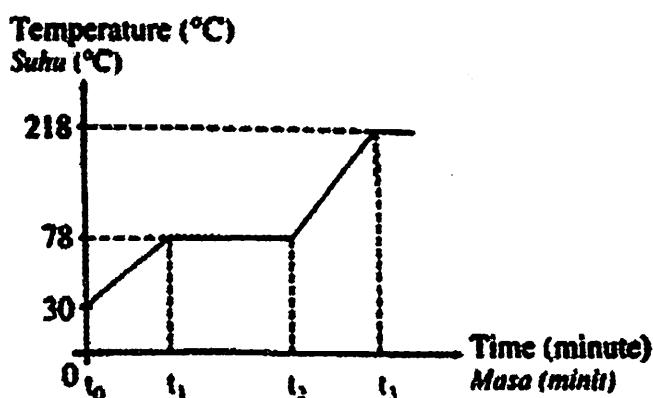
Rajah menunjukkan satu susunan radas untuk menentukan muatan haba tentu, c , bagi satu blok aluminium.



Which step cannot increase the accuracy of c?
Langkah manakah yang tidak boleh meningkatkan kejituhan c?

- A Wrap the aluminium block with cotton
Balut blok aluminium dengan kapas
- B Put the aluminium block on a polystyrene sheet
Letak blok aluminium di atas kepitingan polisterina
- C Cover the top of the aluminium block with aluminium foil
Tutup bahagian atas blok aluminium dengan kerang aluminium
- D Pour some lubricating oil into the hole where the thermometer is inserted
Tuang sedikit minyakpelincir ke dalam lubang di mana termometer dimasukkan

- 37 Diagram shows the heating curve of a sample of naphthalene.
Rajah menunjukkan lengkung pemanasan bagi satu sampel naftalena.



Naphthalene completely melt at the time
Naftalena melebur sepenuhnya pada masa

- A t_0
 B t_1
 C t_2
 D t_3

- 38 How much heat is needed to be supplied to change 400g of ice block at 0°C to water at 0°C ? [Specific latent heat of fusion = $3.36 \times 10^5 \text{ J kg}^{-1}$]

Berapa banyak haba yang perlu dibekalkan untuk mengubah 400 g blok ais pada 0°C kepada air pada 0°C ?

[Haba pendam tentu pelakuran = $3.36 \times 10^5 \text{ J kg}^{-1}$]

- A $8.40 \times 10^2 \text{ J}$
 B $1.34 \times 10^5 \text{ J}$
 C $8.40 \times 10^5 \text{ J}$
 D $1.34 \times 10^8 \text{ J}$

- 39 The air pressure in a car tyre is 200 kPa at a temperature of 25°C .

What is the air pressure in the tyre at a temperature of 37°C ?

[Assume the volume of the air in the tyre is constant]

Tekanan udara dalam tayar kereta ialah 200 kPa pada suhu 25°C .

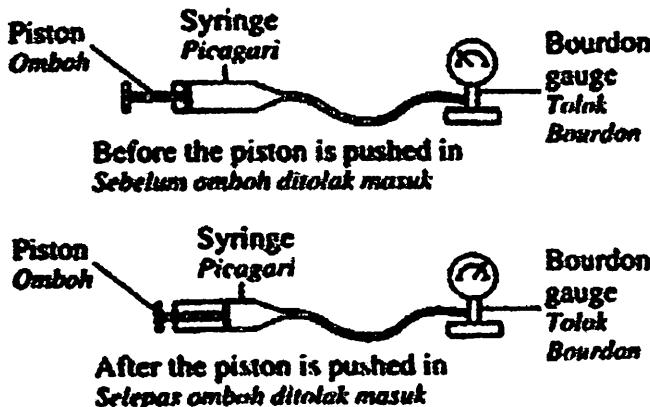
Berapakah tekanan dalam tayar tersebut pada suhu 37°C ?

[Anggap isipadu udara dalam tayar adalah tetap]

- A 135 kPa
 B 190 kPa
 C 192 kPa
 D 208 kPa

- 40 Diagram shows a syringe connected to a Bourdon gauge. The readings on the Bourdon gauge before and after the piston is pushed in are shown below.

Rajah menunjukkan sebuah picagari disambung ke tolok Bourdon. Bacaan pada tolok Bourdon itu sebelum dan selepas omboh ditolak masuk ditunjukkan di bawah.

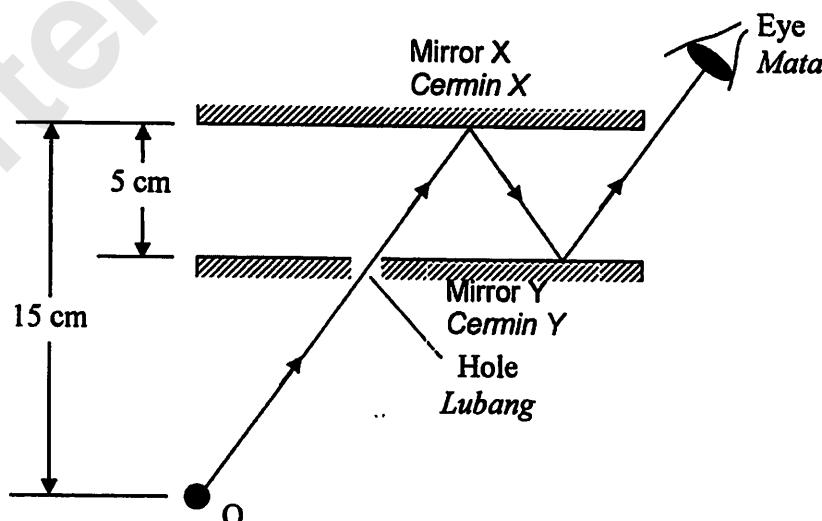


Which of the following explains this situation?
 Antara berikut, yang manakah menerangkan situasi ini?

- A Boyle's law
Hukum Boyle
- B Charle's law
Hukum Charles
- C Pascal's principle
Prinsip Pascal
- D Bernoulli's principle
Prinsip Bernoulli

- 41 Diagram shows a light ray from an object, O, entering the eye of an observer after being reflected by mirror X and mirror Y.

Rajah menunjukkan satu sinar cahaya dari satu objek, O, memasuki mata seorang pemerhati selepas dipantulkan oleh cermin X dan cermin Y.



What is the distance between image of mirror X and image of mirror Y?
Berapakah jarak antara imej cermin X dan imej cermin Y?

- A 5 cm
- B 10 cm
- C 20 cm
- D 25 cm

- 42 An object is placed in front of a convex lens of focal length 15 cm. The image formed is virtual, upright and enlarged.

Which of the following statements about the object distance, u , is correct?

Satu objek diletakkan di hadapan sebuah kanta cembung yang panjang fokusnya 15 cm. Imej yang dibentukkan adalah maya, tegak dan dibesarkan.

Antara pernyataan berikut, yang manakah betul tentang jarak objek, u ?

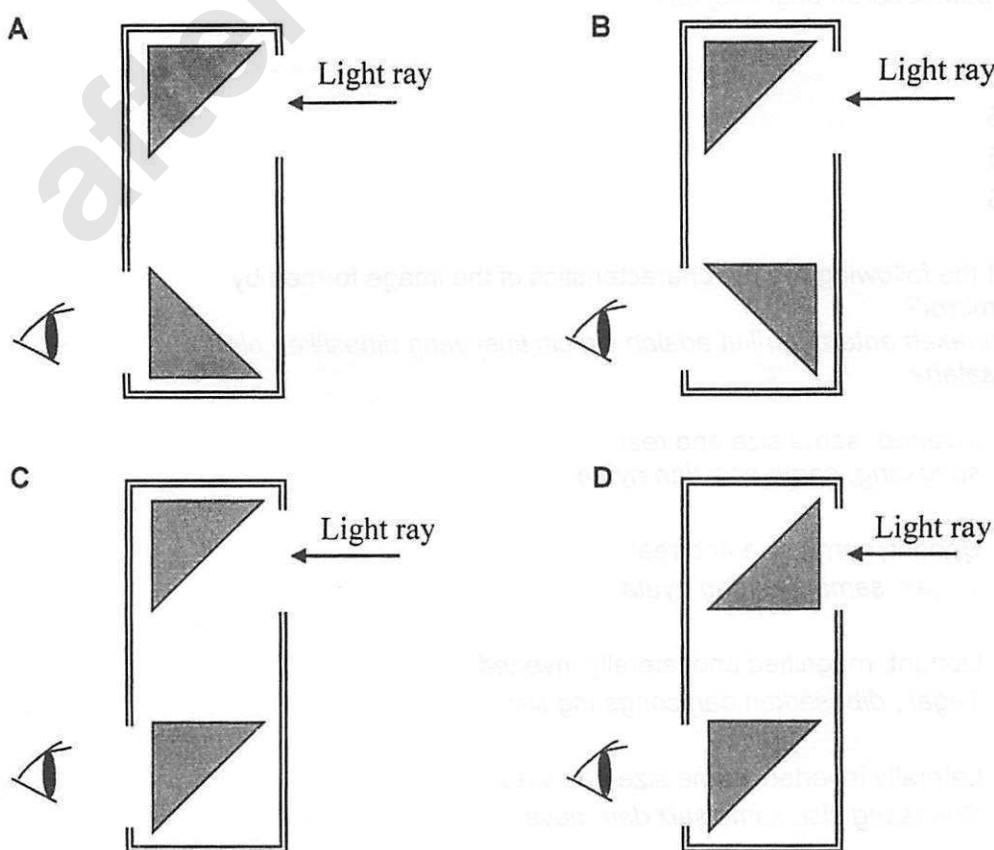
- A $u < 15 \text{ cm}$
- B $u = 15 \text{ cm}$
- C $15 \text{ cm} < u < 30 \text{ cm}$
- D $u = 30 \text{ cm}$

- 43 A periscope is made from two $45^\circ - 90^\circ - 45^\circ$ prisms.

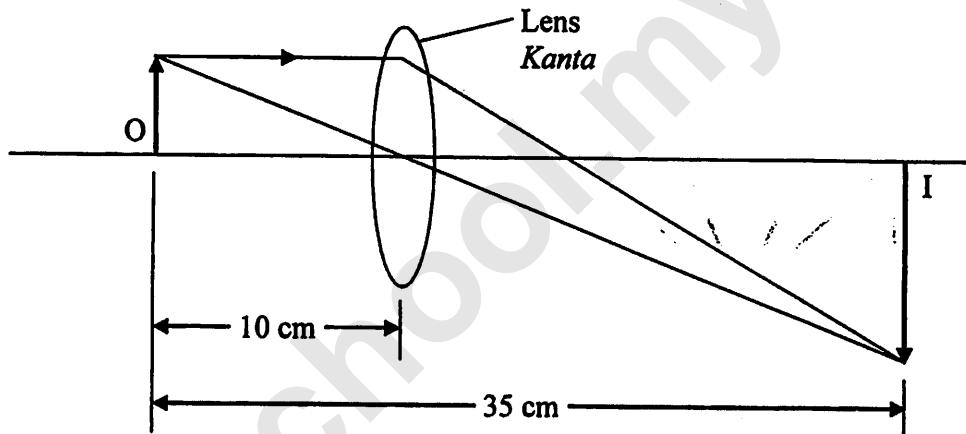
Which of the following diagrams is correct for the structure of the periscope?

Satu periskop diperbuat daripada dua prisma $45^\circ - 90^\circ - 45^\circ$.

Antara rajah berikut yang manakah betul bagi struktur periskop itu?



- 44 Diagram shows a ray diagram for the image I of an object O that is formed by a lens.
Rajah menunjukkan satu gambarajah sinar pembentukan imej I bagi satu objek O oleh suatu kanta.



What is the magnification of the image?

Apakah pembesaran bagi imej itu?

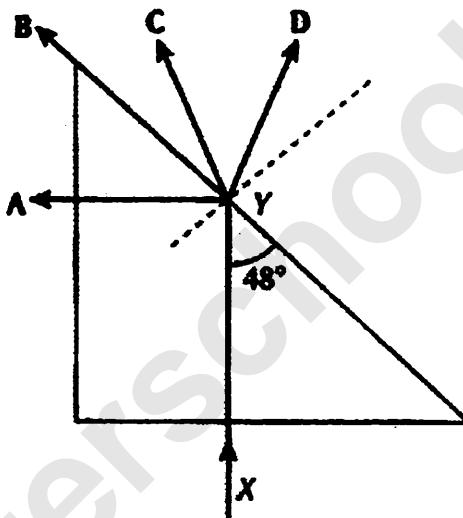
- A 1.0
- B 1.5
- C 2.5
- D 3.5

- 45 Which of the following are the characteristics of the image formed by a plane mirror?

Yang manakah antara berikut adalah ciri-ciri imej yang dihasilkan oleh cermin satah?

- A Inverted, same size and real
songsang, sama saiz dan nyata
- B Upright, same size and real
Tegak, sama saiz dan nyata
- C Upright, magnified and laterally inverted
Tegak, dibesarkan dan songsang sisi
- D Laterally inverted, same size and virtual
Songsang sisi, sama saiz dan maya

- 46 Diagram shows a ray, X, is directed into a glass block. The critical angle of the glass is 42° . Which direction does the light travel from point Y?
Rajah menunjukkan sinar X ditujukan ke dalam blok kaca. Sudut genting kaca ialah 42° . Ke manakah arah sinar merambat dari titik Y?



- 47 If u is object distance, v is image distance and f is focal length of a lens, which of the following equations is true?

Jika u ialah jarak objek, v ialah jarak imej dan f ialah panjang fokus bagi suatu kanta, manakah antara persamaan berikut adalah benar?

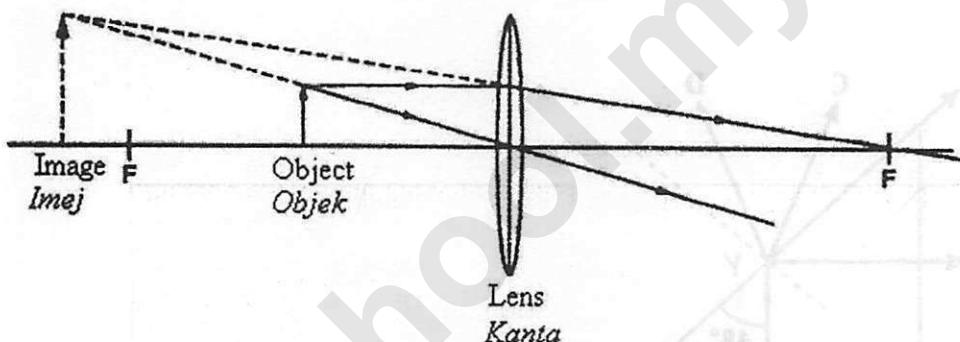
A $f = \frac{uv}{u+v}$

B $f = \frac{1}{u+v}$

C $\frac{1}{f} = \frac{uv}{u+v}$

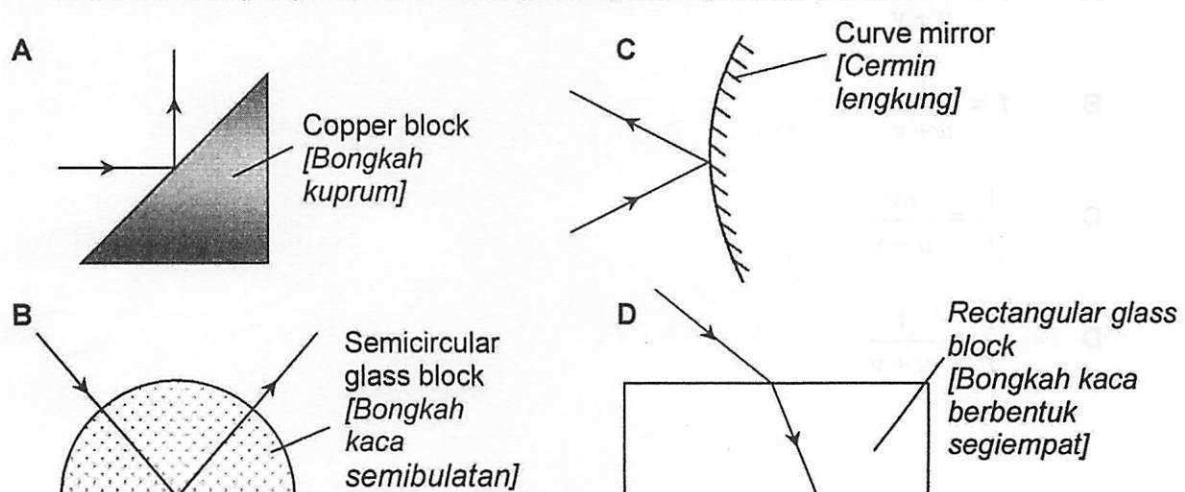
D $\frac{1}{f} = \frac{1}{u+v}$

- 48 Diagram shows a converging lens producing an upright and virtual image.
Rajah menunjukkan satu kanta penumpu yang menghasilkan imej tegak dan maya.



Which optical instrument uses this arrangement?
Manakah alat optik yang menggunakan susunan rajah ini?

- A Camera
Kamera
 - B Slide Projector
Projektor Slaid
 - C Telescope
Teleskop
 - D Magnifying Glass
Kanta pembesar
- 49 Which of the following shows total internal reflection?
Antara berikut yang manakah menunjukkan pantulan dalam penuh?



- 50 Diagram (a) shows a ray of light propagates from medium Q to medium P.
Diagram (b) shows a ray of light propagates from medium R to medium P.
Rajah (a) menunjukkan sinar cahaya merambat dari medium Q ke medium P.
Rajah (b) menunjukkan sinar cahaya merambat dari medium R ke medium P.

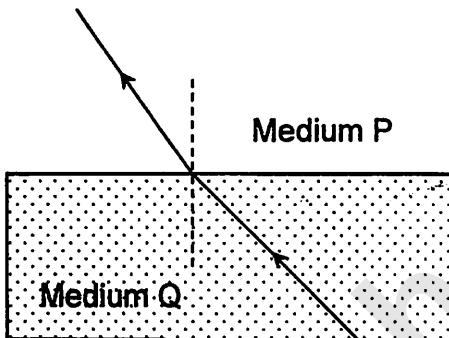


Diagram (a)
Rajah (a)

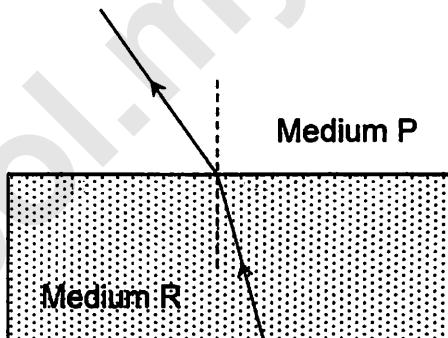


Diagram (b)
Rajah (b)

Arrange the optical density of the mediums, in ascending order.
Susunkan ketumpatan optik bagi medium-medium, mengikut tertib menaik.

- A P, Q, R
- B Q, R, P
- C Q, P, R
- D R, P, Q

**END OF QUESTION PAPER
KERTAS SOALAN TAMAT**

BAHAN KECEMERLANGAN
SPM 2015

**Skema
BK 1**

FIZIK

DIBIAYAI OLEH
KERAJAAN NEGERI TERENGGANU

SKEMA KERTAS 1 FIZIK BK 1 (TOV) 2015

1	A	26	C
2	D	27	B
3	C	28	A
4	A	29	C
5	B	30	C
6	A	31	A
7	A	32	C
8	D	33	D
9	B	34	D
10	A	35	B
11	B	36	D
12	D	37	C
13	D	38	B
14	C	39	D
15	B	40	A
16	B	41	D
17	D	42	A
18	D	43	D
19	B	44	C
20	D	45	D
21	B	46	B
22	A	47	A
23	A	48	D
24	C	49	B
25	B	50	C

BAHAN KECEMERLANGAN
SPM 2015

BK 1

FIZIK
KERTAS 2

- >Nama:.....
- Kelas:.....

DIBIAYAI OLEH
KERAJAAN NEGERI TERENGGANU

*The following information may be useful. The symbols have their usual meaning.
Maklumat berikut mungkin berfaedah. Simbol-simbol mempunyai makna yang biasa.*

$$1. \quad a = \frac{v - u}{t}$$

$$2. \quad s = ut + \frac{1}{2}at^2$$

$$3. \quad v^2 = u^2 + 2as$$

$$4. \quad \text{Momentum} = mv$$

$$5. \quad F = ma$$

$$6. \quad F = kx$$

$$7. \quad \text{Gravitational potential energy} = mgh$$

$$8. \quad \text{Kinetic energy} = \frac{1}{2}mv^2$$

$$9. \quad \text{Elastic potential energy} \quad \frac{1}{2}Fx = \frac{1}{2}kx^2$$

$$10. \quad g = 10 \text{ m s}^{-2}$$

$$11. \quad \rho = \frac{m}{v}$$

$$12. \quad \text{Pressure, } P = \frac{F}{A}$$

$$13. \quad \text{Heat, } Q = mc\theta$$

$$14. \quad \frac{pV}{T} = \text{constant}$$

$$15. \quad E = mc^2$$

$$16. \quad v = f\lambda$$

$$17. \quad \text{Power, } P = \frac{\text{energy}}{\text{time}}$$

$$18. \quad \frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$19. \quad \lambda = \frac{ax}{D}$$

$$20. \quad n = \frac{\sin i}{\sin r}, \quad n = \frac{1}{\sin c}$$

$$21. \quad n = \frac{\text{real depth}}{\text{apparent depth}}$$

$$22. \quad Q = It$$

$$23. \quad V = IR$$

$$24. \quad \text{Power / Kuasa, } P = IV$$

$$\text{Power / Kuasa, } P = \frac{V^2}{R}$$

$$25. \quad \frac{N_s}{N_p} = \frac{V_s}{V_p}$$

$$26. \quad \begin{aligned} &\text{Efficiency / Kecekapan} \\ &= \frac{I_s V_s}{I_p V_p} \times 100\% \end{aligned}$$

$$27. \quad c = 3.0 \times 10^8 \text{ m s}^{-1}$$

$$28. \quad g = 10 \text{ m s}^{-2}$$

Section A
Bahagian A

Answer all questions in this section.
Jawab semua soalan dalam bahagian ini.

- 1 Diagram 1.1 shows a vernier calipers.
Rajah 1.1 menunjukkan sebuah angkup vernier.

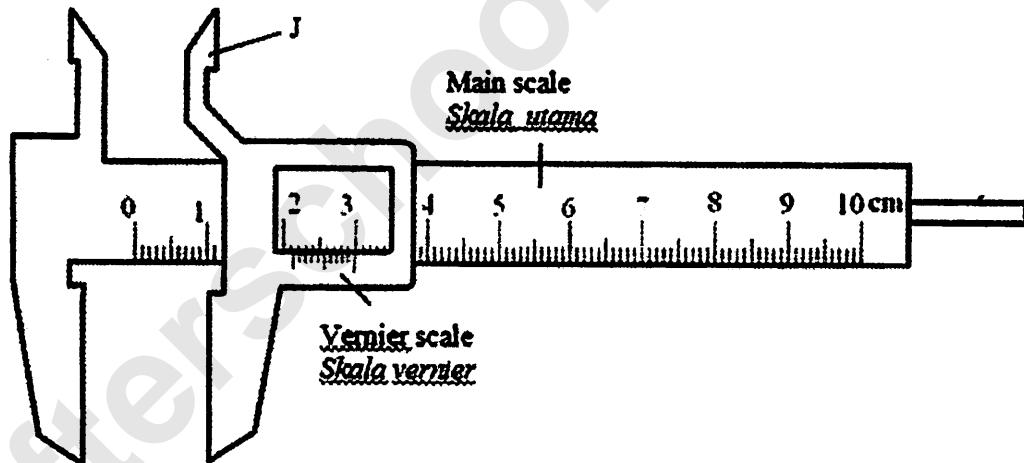


Diagram 1.1
Rajah 1.1

- (a) Name the part labeled J.
Namakan bahagian berlabel J.

[1 mark]

- (b) State the function of J.
Nyatakan fungsi J.

[1 mark]

- (c) Diagram 1.2 shows the reading of the vernier calipers when the jaws is closed.
Rajah 1.2 menunjukkan bacaan pada angkup vernier bila rahang ditutup.

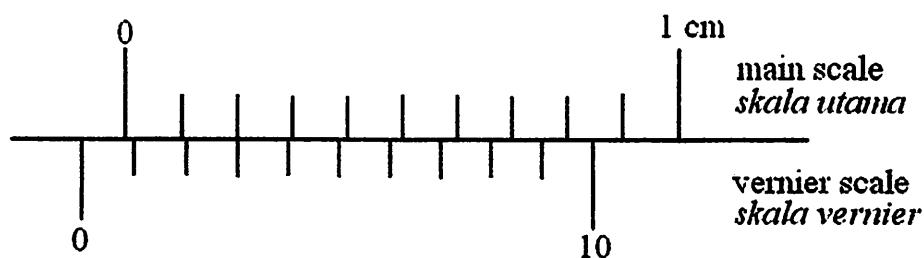


Diagram 1.2
Rajah 1.2

Based on Diagram 1.2 :
Berdasarkan Rajah 1.2 :

- (i) name the type of error occur.
namakan jenis ralat yang terjadi.

..... [1 mark]

- (ii) state the value of the error
nyatakan nilai ralat tersebut.

..... [1 mark]

- 2 Diagram 2 shows an instrument which is used to measure the pressure of a gas X.
Rajah 2 menunjukkan satu alat yang digunakan untuk mengukur tekanan suatu gas X.

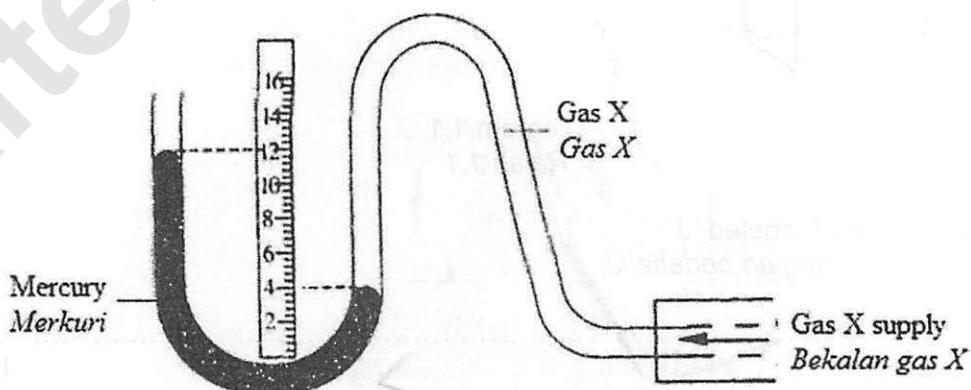


Diagram 2
Rajah 2

- (a) Based on Diagram 2,
Berdasarkan Rajah 2,

- (i) Name the instrument which is used to measure the pressure of the gas X.
Namakan alat yang digunakan untuk mengukur tekanan gas X itu.

..... [1 mark]

- (ii) State one reason why mercury is used in the instrument.
Nyatakan satu sebab mengapa merkuri digunakan dalam alat tersebut.

..... [1 mark]

- (b) Based on Diagram 2,
Berdasarkan Rajah 2,

(i) what is the pressure of the gas X in unit of cm Hg.

[Atmospheric pressure = 76 cm Hg]

Berapakah tekanan gas X dalam unit cm Hg.

[Tekanan atmosfera = 76 cm Hg]

[1 mark]

(ii) calculate the pressure of the gas X in the unit of Pascal.

[Density of mercury = $1.36 \times 10^4 \text{ kg m}^{-3}$]

hitung tekanan gas X dalam unit Pascal.

$$[Ketumpatan merkuri] = 1.36 \times 10^4 \text{ kg m}^{-3}$$

[2 marks]

- 3** Diagram 3 shows the speed limit written on heavy vehicles.
Rajah 3 menunjukkan had laju yang ditulis pada kenderaan berat.

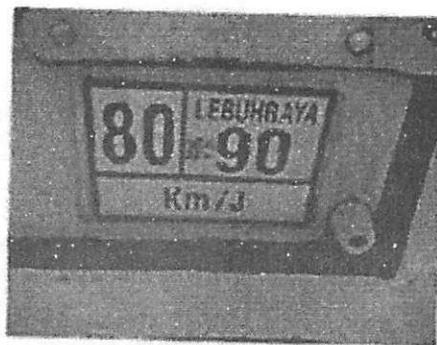


Diagram 3
Rajah 3

- (a) What is the meaning of speed?
Apakah yang dimaksudkan dengan laju?

[1 mark]

- (b) Using the concept of momentum, explain why the speed limit must be imposed on heavy vehicles.

Dengan menggunakan konsep momentum, terangkan mengapa had laju mesti dikenakan ke atas kenderaan berat.

[2 marks]

- (c) The heavy vehicle moves at the maximum speed of 90 km/h with load of 3000 kg.
Kenderaan berat itu ia bergerak dengan kelajuan 90 km/j dengan muatan 3000 kg

Caculate

Hitung

- (i) the speed of the heavy vehicle in the unit of ms^{-1}
laju kenderaan berat itu dalam unit ms^{-1}

[1 mark]

- (ii) momentum of the heavy vehicle in the unit of kg ms^{-1}
momentum kenderaan berat itu dalam unit kg ms^{-1}

[2 marks]

- 4 Diagram 4.1 shows the reading of the Bourdon Gauge is 1.1 kPa before the piston of the bicycle pump is pushed inwards and the volume of air trapped inside the pump is 0.4 m^3 .

Rajah 4.1 menunjukkan bacaan Tolok Bourdon ialah 1.1 kPa sebelum omboh pam basikal ditolak ke dalam dan isipadu udara terperangkap di dalam pam itu ialah 0.4 m^3 .

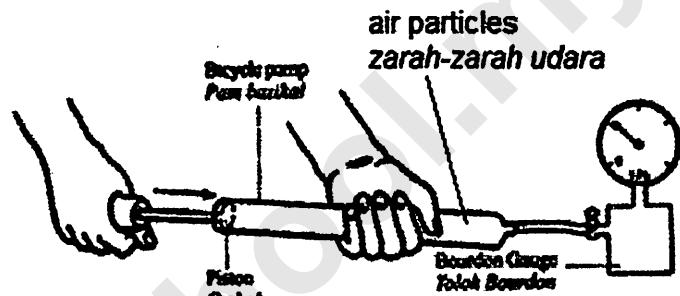


Diagram 4.1
Rajah 4.1

Diagram 4.2 shows the reading of the Bourdon Gauge is 2.2 kPa when the piston of the bicycle pump is pushed inwards.

Rajah 4.2 menunjukkan bacaan Tolok Bourdon ialah 2.2 kPa apabila omboh pam basikal ditolak ke dalam.

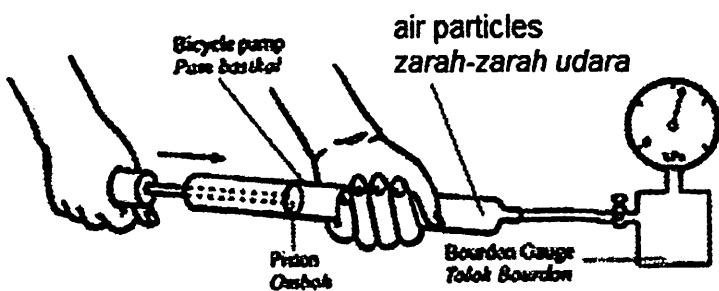


Diagram 4.2
Rajah 4.2

- (a) Based on Diagram 4.1, tick (✓) the correct answer in the provided box.
Berdasarkan Rajah 4.1, tanda (✓) pada jawapan yang betul dalam kotak yang disediakan.

Bourdon Gauge can measure
Tolok Bourdon boleh mengukur

gas temperature
 suhu gas

gas pressure
tekanan gas

[1 mark]

- (b) Based on Diagram 4.1 and Diagram 4.2,

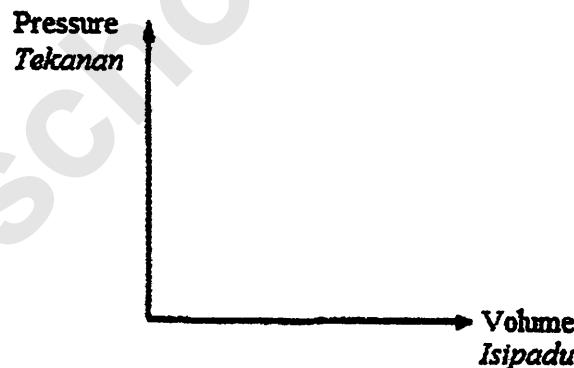
Berdasarkan Rajah 4.1 dan Rajah 4.2,

- (i) compare the number of air particles inside the bicycle pump.
bandingkan bilangan zarah-zarah udara dalam pam basikal.

.....
[1 mark]

- (ii) Sketch a pressure-volume graph of the situations in Diagram 4.1 and Diagram 4.2.

Lakarkan satu graf tekanan-isipadu bagi situasi-situasi dalam Rajah 4.1 dan Rajah 4.2 itu.



[1 mark]

- (c) Calculate the volume of air trapped in the bicycle pump in Diagram 4.2.

Hitungkan isipadu udara terperangkap di dalam pam basikal dalam Rajah 4.2.

.....
[2 marks]

- (d) (i) Based on the answer in 4(b), what happens to the kinetic energy of the air particles when the air is compressed.

Berdasarkan jawapan di 4(b), apakah yang berlaku kepada tenaga kinetik zarah-zarah udara apabila udara dimampatkan.

.....
[1 mark]

- (ii) Give one reason for the answer in 4(d)(i)

Beri satu sebab untuk jawapan di 4(d)(i).

.....
[1 mark]

- 5 Diagram 5.1 and Diagram 5.2 shows a ticker tape obtained from a movement of toy cars.
Rajah 5.1 dan Rajah 5.2 menunjukkan satu pita detik diperolehi daripada gerakan kereta mainan.

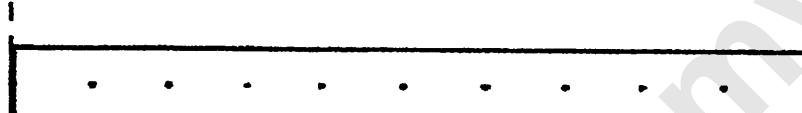


Diagram 5.1
Rajah 5.1



Diagram 5.2
Rajah 5.2

- (a) Based on Diagram 5.1 and Diagram 5.2, tick (✓) the correct answer in the box.
Berdasarkan Rajah 5.1 dan Rajah 5.2, tanda (✓) pada jawapan yang betul dalam kotak yang disediakan.

The time taken for the movement of the toy car is based on the
Masa yang diambil untuk gerakan kereta mainan adalah berdasarkan kepada

number of ticks.
bilangan detik

distance of tick
jarak detik.

[1 mark]

- (b) Observe Diagram 5.1 and Diagram 5.2,
Perhatikan Rajah 5.1 dan Rajah 5.2,

Compare

Bandingkan

- (i) the number of ticks on the ticker tape.
bilangan detik pada pita detik.

.....
[1 mark]

- (ii) the time taken for both ticker tape.
masa yang diambil oleh kedua-dua pita detik

.....
[1 mark]

- (iii) the length of the ticker tape.
panjang pita detik.

.....
[1 mark]

- (iv) the velocity of the toy car.
halaju kereta mainan.

.....
[1 mark]

- (c) Based on the answer in 5(b),
Berdasarkan jawapan di 5(b),

State the relationship between the velocity and the length of the ticker tape.
Nyatakan hubungan antara halaju dan panjang pita detik.

.....
[1 mark]

- (d) What is the type of motion recorded on the ticker tape in Diagram 5.2
Apakah jenis gerakan yang dicatatkan pada pita detik dalam Rajah 5.2

.....
[1 mark]

- (e) On Diagram 5.3 plot another 10 dots to show a deceleration motion.
Pada Rajah 5.3 plot 10 titik lagi bagi menunjukkan gerakan nyahpecutan.

Direction of motion

Arah gerakan

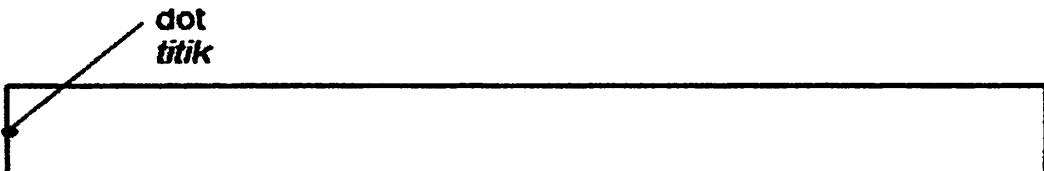


Diagram 5.3
Rajah 5.3

[1 mark]

- 6 Diagram 6.1 and Diagram 6.2 shows the bending of light when propagating into a glass block and diamond block respectively.

Rajah 6.1 dan Rajah 6.2 menunjukkan pembengkokan lintasan cahaya apabila merambat dalam kaca dan intan masing-masing.

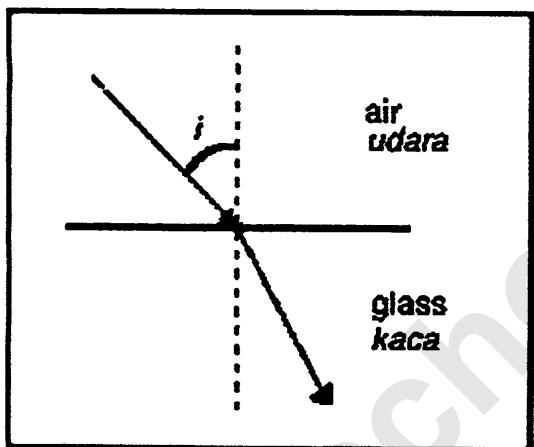


Diagram 6.1

Rajah 6.1

Refractive index, $n = 1.55$

Indek biasan, $n = 1.55$

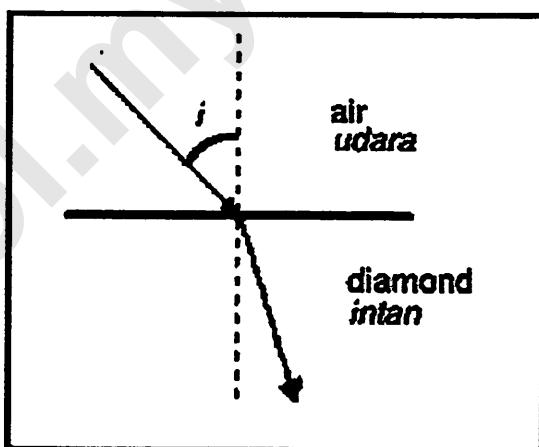


Diagram 6.2

Rajah 6.2

Refractive index, $n = 2.49$

Indek biasan, $n = 2.49$

- (a) What is the meaning of refraction?

Apakah yang dimaksudkan dengan pembiasaan?

[1 mark]

- (b) Based on Diagram 6.1 and Diagram 6.2.

Berdasarkan Rajah 6.1 dan Rajah 6.2.

- (i) Compare the bending of light ray.

Bandingkan pembengkokan lintasan cahaya.

[1 mark]

- (ii) Compare the refractive angle in glass and diamond.

Bandingkan sudut biasan dalam kaca dan intan.

[1 mark]

- (iii) Relate the refractive index to refractive angle.

Hubungkait indek biasan dengan sudut biasan.

[1 mark]

- (c) Calculate the light speed when it propagates into the diamond.
 (speed of light in air, $c = 3.0 \times 10^8 \text{ m s}^{-1}$)
Kirakan laju cahaya apabila ia merambat dalam intan.
(laju cahaya dalam udara, $c = 3.0 \times 10^8 \text{ m s}^{-1}$)

[2 marks]

- (d) Diagram 6.3 and Diagram 6.4 shows images observed by observer. Both liquid A and liquid B has different refractive index, n .
Rajah 6.3 dan Rajah 6.4 menunjukkan imej yang diperhatikan oleh pemerhati.
Kedua-dua cecair A dan cecair B mempunyai indek biasan, n yang berlainan.

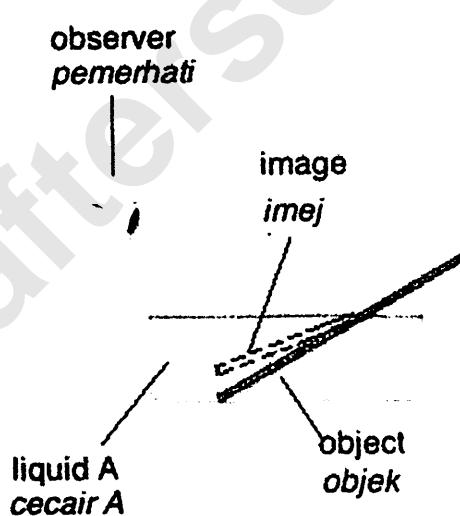


Diagram 6.3
Rajah 6.3

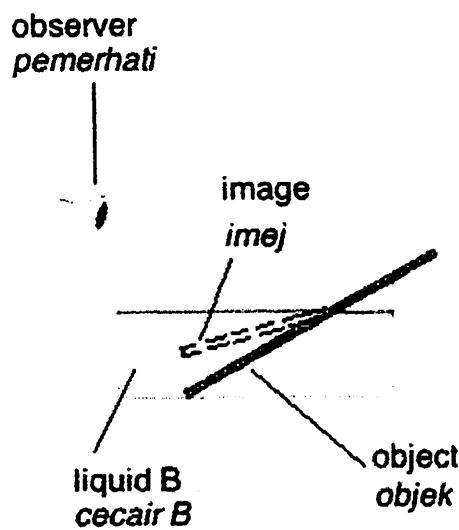


Diagram 6.4
Rajah 6.4

- (i) Liquid A and B maybe 'olive oil', 'salt solution' or 'water'. Choose one from the example given as liquid A and liquid B.
Cecair A dan cecair B mungkin 'minyak zaitun', 'larutan garam', atau 'air'.
Pilih satu daripada contoh yang diberikan sebagai cecair A dan cecair B.

Liquid A
Cecair A :

Liquid B
Cecair B :

[1 mark]

- (ii) Give your reason for the answer in (d)(i)
Berikan alasan anda bagi jawapan di (d)(i)

.....

[1 mark]

- 7 (a) Diagram 7.1 shows a 0.2 kg ball experiences "free fall" to the ground.

Diagram 7.2 shows a velocity-time graph for the motion of the ball.

Rajah 7.1 menunjukkan sebiji bola 0.2 kg mengalami "jatuh bebas" ke tanah.

Rajah 7.2 menunjukkan graf halaju-masa bagi gerakan bola tersebut.

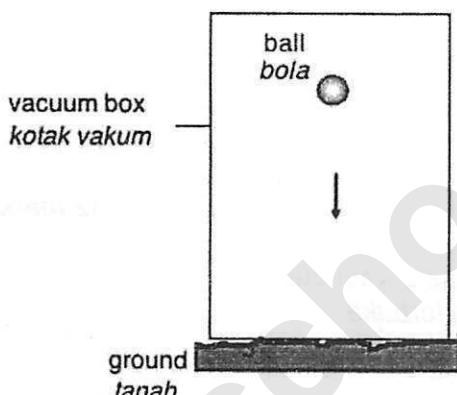


Diagram 7.1
Rajah 7.1

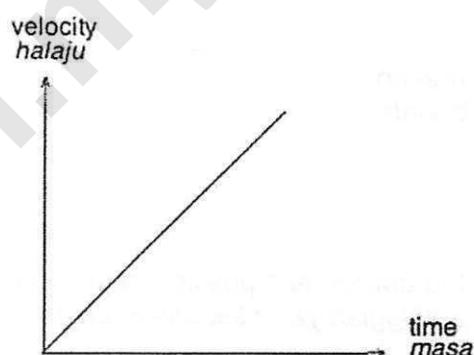


Diagram 7.2
Rajah 7.2

- (i) What is the meaning of free fall.
Apakah maksud jatuh bebas?

[1 mark]

- (ii) Name the type of motion shown in the graph.
Namakan jenis gerakan yang ditunjukkan pada graf.

[1 mark]

- (b) Diagram 7.3 shows a rocket with parachute used in a school rocket competition. The pressure used in the launcher pump is kept constant. The rocket with longest time floating in air will be the winner.

Rajah 7.3 menunjukkan roket dengan payung terjun yang digunakan dalam satu pertandingan di sekolah. Tekanan yang digunakan pada pam pelancar adalah tetap. Roket yang terapung paling lama di udara akan dikira sebagai pemenang.



Diagram 7.3
Rajah 7.3

Suggest modifications that can be made to increase the time in air.

Cadangkan pengubahaian yang boleh dibuat untuk menambahkan masa berada di udara.

- (i) area of parachute
luas payung terjun

reason
sebab

[2 marks]

- (ii) the appropriate position for the opening of the parachute
ketinggian yang sesuai untuk payung terjun terbuka

reason
sebab

[2 marks]

- (c) The ball in Diagram 7.1 dropped from a height of 2 m.
Bola pada Rajah 7.1 dijatuhkan pada suatu ketinggian 2 m.

- (i) Calculate the time to reach the ground.
Kirakan masa yang diambil untuk sampai ke tanah.

[2 marks]

- (ii) Compare the time taken to reach the ground if a ball with bigger mass used.
Bandingkan masa yang diambil jika bola yang lebih besar jisimnya digunakan.

Reason
Sebab

[2 marks]

- 8 Diagram 8.1 shows a trampoline used in a gymnastic practice. When a trainee jumps on the mate, the springs extend and the trainee will bounce up when the springs return to their initial length.

Rajah 8.1 menunjukkan satu trampolin digunakan dalam latihan jimmastik. Apabila pelatih melompat ke atas pemidang, spring meregang dan pelatih akan melambung ke atas apabila spring kembali ke panjang asal.

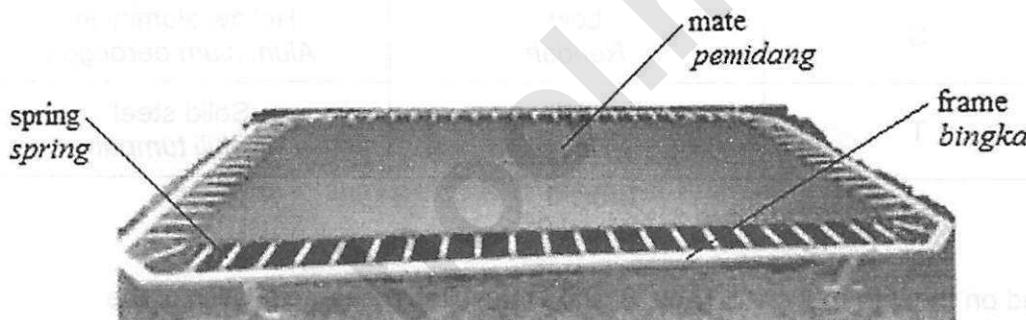


Diagram 8.1

Rajah 8.1

- (a) State the type of energy stored in the springs during extension.

Nyatakan jenis tenaga yang tersimpan dalam spring semasa meregang.

[1 mark]

- (b) What is the energy transformation during the trampolin extend until the trainee bounce.

Apakah perubahan tenaga yang berlaku semasa trampolin meregang sehingga pelatih melambung.

[1 mark]

- (c) The extension of each spring used in the trampoline is 5 cm when a force of 40 N is applied.

Pemanjangan setiap spring yang digunakan dalam trampolin adalah 5 cm apabila daya 40 N dikenakan.

Calculate

Hitungkan

- (i) the spring constant.
pemalar spring.

[2 marks]

- (ii) the energy stored in the spring.

Tenaga yang tersimpan dalam spring.

[2 marks]

- (d) Table 8 show the characteristics of spring and frame used to build a trampoline.
Jadual 8 menunjukkan ciri-ciri spring dan bingkai digunakan bagi membina trampolin.

Trampoline <i>Trampolin</i>	Spring tension <i>Tegangan spring</i>	Frame's material <i>Bahan bingkai</i>
S	Low <i>Rendah</i>	Hollow aluminium <i>Aluminium berongga</i>
T	High <i>Tinggi</i>	Solid steel <i>Keluli tumpat</i>

Table 8
Jadual 8

Based on the information in Table 8, state the suitable characteristics of the trampoline.

Give reason for the suitability of the characteristics.

Berdasarkan maklumat dalam Jadual 8, nyatakan ciri-ciri trampolin yang sesuai.

Beri sebab bagi kesesuaian ciri-ciri tersebut.

- (i) Spring constant
Pemalar spring

.....
Reason
Sebab

[2 marks]

- (ii) Frame's material
Bahan bingkai

.....
Reason
Sebab

[2 marks]

- (iii) Determine the most suitable trampoline.
Tentukan trampolin yang paling sesuai.

.....
[1 mark]

- (e) Suggest another additional characteristic to the trampoline so that it is safe for the childrens.

Cadangkan ciri tambahan yang lain pada trampolin itu supaya ia selamat digunakan oleh kanak-kanak.

.....
[1 mark]

Section B
Bahagian B

Answer any one question from this section.

Jawab mana-mana satu soalan daripada bahagian ini.

- 9 Diagram 9.1 and Diagram 9.2 show the reading of the thermometers when an amount of water is heated for 5 minutes. Both immersion heaters have the same specification.
Rajah 9.1 dan Rajah 9.2 menunjukkan bacaan termometer apabila sejumlah air dipanaskan selama 5 minit. Kedua-dua pemanas rendam mempunyai spesifikasi yang sama.

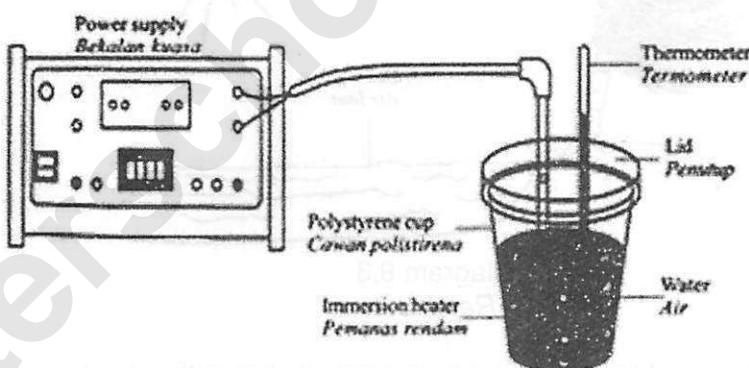


Diagram 9.1
Rajah 9.1

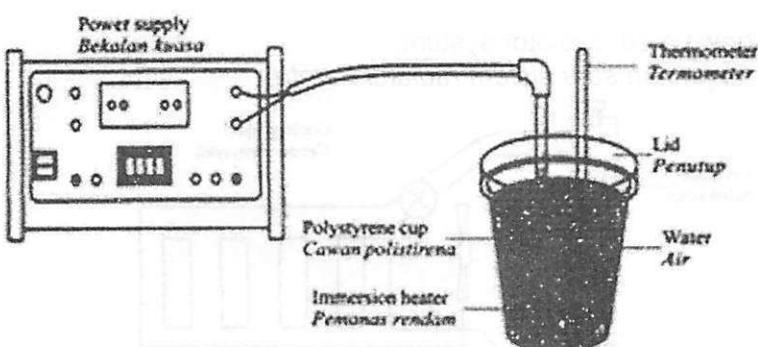


Diagram 9.2
Rajah 9.2

- (a) (i) What is the meaning of heat?
Apakah yang dimaksudkan dengan haba?

[1 mark]

- (ii) Using Diagram 9.1 and Diagram 9.2, compare the readings of both thermometers, the volume of water in the polystyrene cup and the time of heating the water.
 Relate the reading of thermometer with volume of water to make a deduction regarding the relationship between the increase in temperature and the mass of water in the polystyrene cup.

Dengan menggunakan Rajah 9.1 dan Rajah 9.2, bandingkan bacaan kedua-dua termometer, isipadu air dalam cawan polistirena dan masa pemanasan air. Hubungkaitkan bacaan termometer dengan isipadu air untuk membuat satu deduksi yang menghubungkaitkan hubungan antara kenaikan suhu dengan jisim air dalam cawan polistirena.

[5 marks]

- (b) Diagram 9.3 shows the sea breeze phenomenon.
Rajah 9.3 menunjukkan fenomena bayu laut.

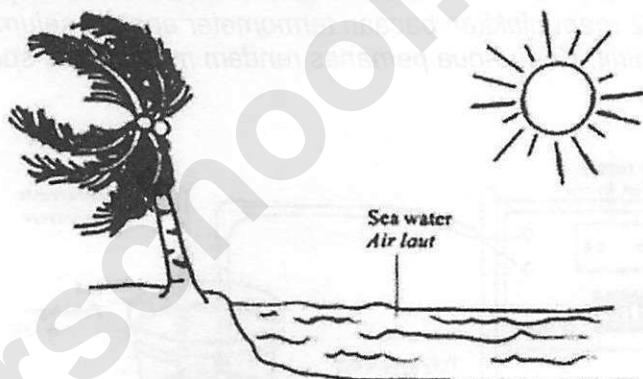


Diagram 9.3
Rajah 9.3

Explain how the sea breeze phenomenon occurs during the day time.
Terangkan bagaimana fenomena bayu laut berlaku pada hari siang.

[4 marks]

- (c) Diagram 9.4 shows a car radiator system.
Rajah 9.4 menunjukkan satu sistem radiator kereta.

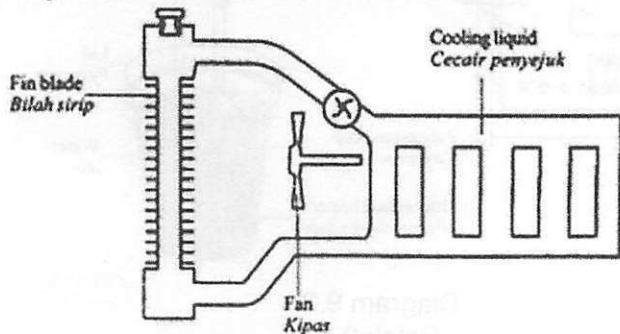


Diagram 9.4
Rajah 9.4

You are required to modify the car radiator system so that it can cool the engine more effectively.

Anda dikehendaki mengubahsuai sistem radiator kereta itu supaya ia dapat menyejukkan enjin dengan lebih berkesan.

State and explain the modifications based on the following aspects;

Nyata dan terangkan pengubahsuai berdasarkan aspek-aspek berikut;

- size of the fan used.
saiz kipas yang digunakan.
- number of the fin blade.
bilangan bilah sirip.

- (iii) material of the fin blade.
bahan untuk bilah sirip.
- (iv) specific heat capacity of the cooling liquid used.
muatan haba tentu untuk cecair penyejuk yang digunakan.
- (v) boiling point of the cooling liquid used.
takat didih untuk cecair penyejuk yang digunakan.

[10 marks]

- 10 Diagram 10.1 and Diagram 10.2 shows the real image form of convex lenses, P and Q from two identical objects. Both the lenses are made from same material.

Rajah 10.1 dan Rajah 10.2 menunjukkan imej nyata yang dibentukkan oleh kanta cembung P dan Q dari dua objek yang serupa. Kedua-dua kanta diperbuat dari bahan yang sama

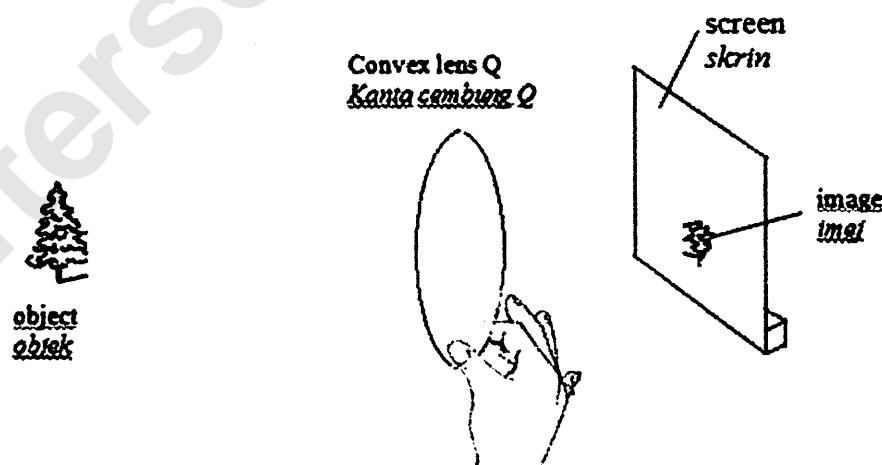


Diagram 10.1
Rajah 10.1

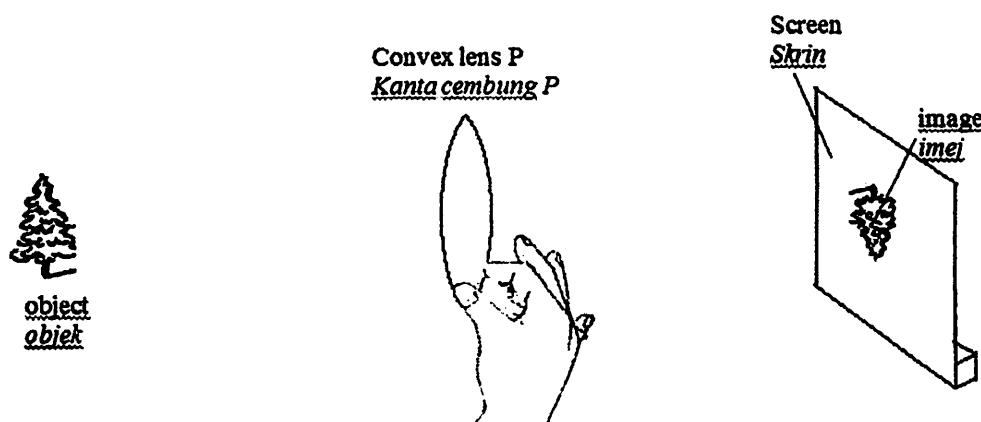


Diagram 10.2
Rajah 10.2

- (a) (i) What is meant by real image?
Apakah maksud imej nyata?

[1 mark]

- (ii) With reference to Diagram 10.1 and Diagram 10.2, compare the thickness of the lenses, object distance, image distance, and the size of image produced by the lenses.
Relate the size of the image with the thickness of the lens.

Merujuk kepada Rajah 10.1 dan 10.2, bandingkan ketebalan kanta P dan Q, jarak objek, jarak imej dan saiz imej yang dihasilkan oleh kanta-kanta tersebut. Hubungkaitkan saiz imej dengan ketebalan kanta.

[5 marks]

- (b) Diagram 10.3 shows the light ray pass through a convex lens.
Rajah 10.3 menunjukkan sinar cahaya melalui satu kanta cembung.

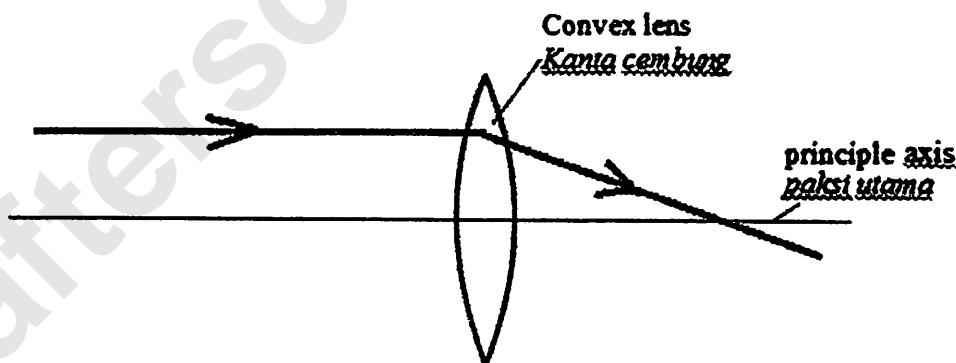


Diagram 10.3
Rajah 10.3

Explain why the light ray bend to the principle axis after pass through the lens.
Terangkan mengapa cahaya dibengkokkan ke paksi utama selepas melalui kanta itu

[4 marks]

- (b) Diagram 10.4 shows cross section of a simple camera
Rajah 10.4 menunjukkan keratan rentas sebuah kamera ringkas

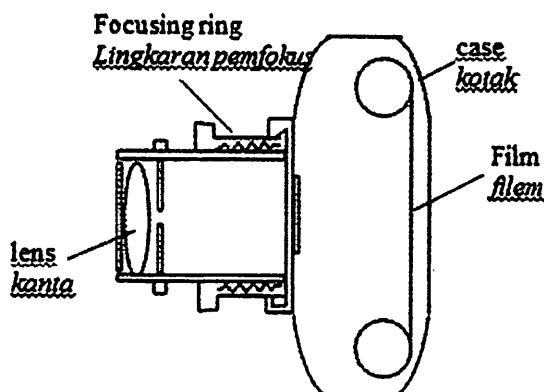


Diagram 10.4
Rajah 10.4

Based on physics concept, suggest and explain how to improve the material and structure of the camera to produced high quality image.

Your suggestion should be based on the following aspect;

Berdasarkan konsep fizik, cadangkan dan terangkan bagaimana bahan dan struktur kamera itu diperbaiki bagi menghasilkan imej yang bermutu tinggi.

Cadangan anda seharusnya berdasarkan aspek-aspek berikut;

- (i) The type of lens
Jenis kanta
- (ii) The diameter of lens
Diameter kanta
- (iii) length of focusing ring
panjang lingkaran pemfokus
- (iv) thickness of lens
ketebalan kanta
- (v) Type of image detector
Jenis pengesan imej

[10 marks]

Section C
Bahagian C

Answer any **one** question from this section.
Jawab mana-mana **satu** soalan daripada bahagian ini.

- 11 Diagram 11.1 shows a pile driver used to drive a steel pile to the ground. The force involved in driving the steel pile is impulsive force.

Rajah 11.1 menunjukkan satu pelantak cerucuk yang digunakan untuk menanam cerucuk besi ke dalam tanah. Daya yang terlibat dalam menanam cerucuk besi ini adalah daya impuls.

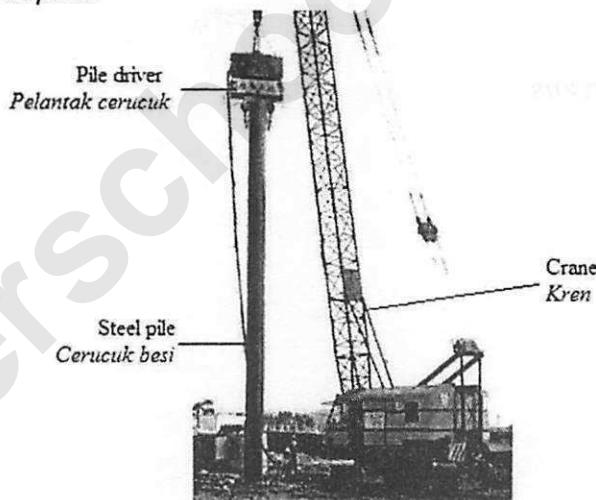


Diagram 11.1

Rajah 11.1

- (a) (i) What is the meaning of impulsive force?
Apakah yang dimaksudkan dengan daya impuls?

[1 mark]

- (ii) Explain how the steel pile is driven to the ground.
Terangkan bagaimana cerucuk besi ditanam ke dalam tanah.

[4 marks]

- (b) Diagram 11.2 shows a tennis player hitting a tennis ball with his racket.
Rajah 11.2 menunjukkan seorang pemain tenis memukul bola tenis dengan menggunakan raketnya.



Diagram 11.2

Rajah 11.2

You are required to investigate the techniques done by the player and the characteristics of the racket's string as shown in Table 11.

Anda dikehendaki menyiasat teknik yang dibuat oleh pemain itu dan ciri-ciri tali raket seperti ditunjukkan dalam Jadual 11.

Techniques and characteristics of string <i>Teknik dan ciri-ciri tali</i>	Action after hitting the ball <i>Tindakan selepas memukul bola</i>	Time of contact between the ball and racket <i>Masa tindakan antara bola dengan raket</i>	String tension <i>Tegangan tali</i>	Material of the string <i>Bahan tali</i>
P	Continue to swing the racket after hitting the ball <i>Meneruskan ayunan raket selepas memukul bola</i>	Long <i>Panjang</i>	High <i>Tinggi</i>	Steel <i>Besi</i>
Q	Continue to swing the racket after hitting the ball <i>Meneruskan ayunan raket selepas memukul bola</i>	Short <i>Singkat</i>	Low <i>Rendah</i>	Nylon <i>Nilon</i>
R	Stops the racket immediately after hitting the ball <i>Menghentikan raket sebaik sahaja memukul bola</i>	Short <i>Singkat</i>	High <i>Tinggi</i>	Steel <i>Besi</i>
S	Stops the racket immediately after hitting the ball <i>Menghentikan raket sebaik sahaja memukul bola</i>	Long <i>Panjang</i>	Low <i>Rendah</i>	Nylon <i>Nilon</i>

Table 11
Jadual 11

Explain the suitability of the techniques done by the tennis player and characteristics of the racket's string.

Determine the most effective technique done by the tennis player and the most suitable characteristics of the racket's string to produce high speed motion of the tennis ball after being hit.

Give reasons for the choice.

Terangkan kesesuaian teknik yang dibuat oleh pemain tenis itu dan ciri-ciri bagi tali raket.

Tentukan teknik yang paling efektif yang dibuat oleh pemain tenis itu dan ciri-ciri yang paling sesuai bagi tali raket untuk menghasilkan gerakan bola tenis yang berhalaju tinggi selepas dipukul.

Beri sebab bagi pilihan itu.

[10 marks]

- (c) A tennis ball of mass 100 g is moving at a velocity of 40 m s^{-1} . A player hits the ball and moves in the opposite direction with a velocity of 50 m s^{-1} .

The time of collision is 20 ms .

Sebiji bola tenis berjisim 100 g sedang bergerak pada halaju 40 m s^{-1} . Seorang pemain memukul bola itu dan bergerak dalam arah berlawanan dengan halaju 50 m s^{-1} . Masa perlanggaran adalah 20 ms .

Calculate:

Hitungkan:

- (i) The mass of ball in unit kg.
Jisim bola dalam unit kg.

- (ii) The time of collision in unit second.
Masa hentaman dalam unit saat.

- (iii) Impulsive force acted on the tennis ball.
Daya impuls yang bertindak ke atas bola tenis itu.

[5 marks]

- 12 Diagram 12.1 shows the motion a ball in a curved path when a player kicks by spinning the ball with a high velocity.

Diagram 12.2 shows the direction of the ball spins, the direction air flow and the direction of the ball moves.

Rajah 12.1 menunjukkan gerakan sebuah bola dalam bentuk melengkung apabila seorang pemain menendang sambil berputar bola itu pada halaju yang tinggi.

Rajah 12.2 menunjukkan arah putaran bola, arah gerakan udara dan arah gerakan bola.

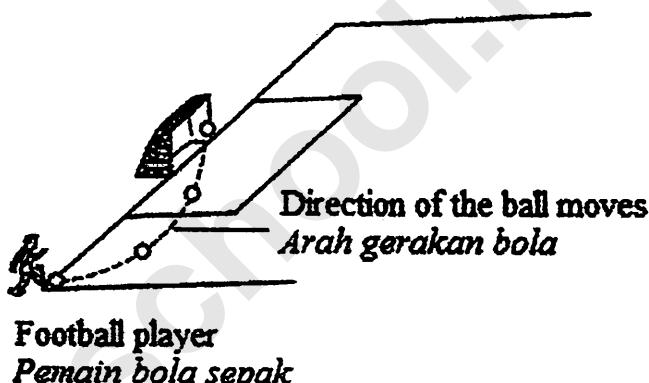


Diagram 12.1
Rajah 12.1

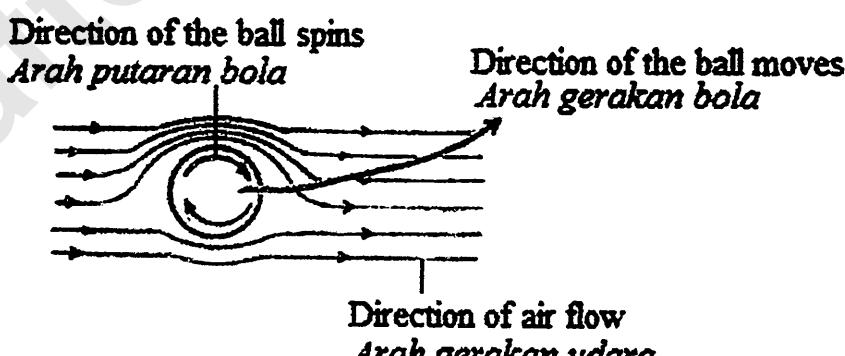


Diagram 12.2
Rajah 12.2

- (a) (i) What is the meaning of velocity?

Apakah yang dimaksudkan dengan halaju?

[1 mark]

- (ii) Using Diagram 12.2 explain how does motion of the ball in a curved path?

Dengan menggunakan Rajah 12.2, terangkan bagaimanakah gerakan bola itu adalah dalam bentuk melengkung?

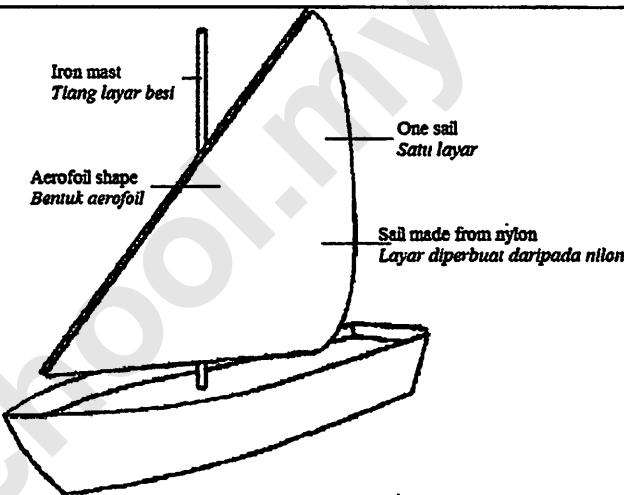
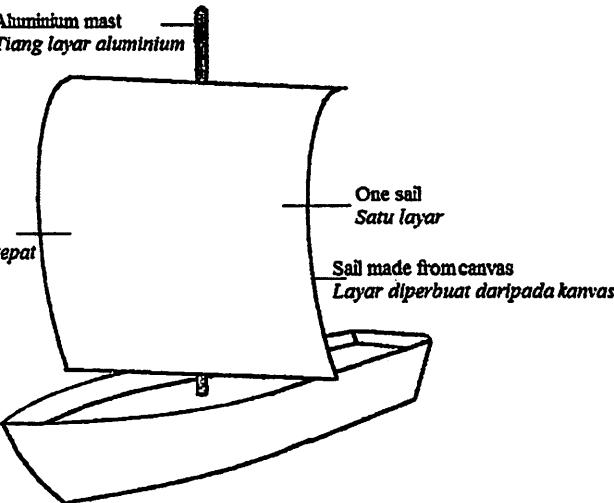
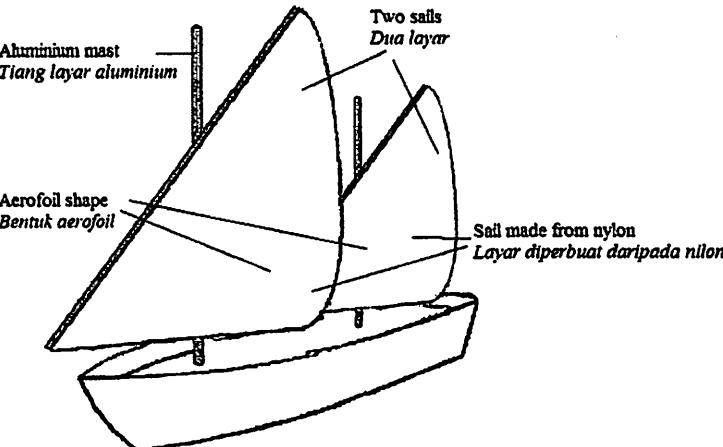
[4 marks]

- (b) You are required to design a sailboat which can travel fast in the wind flows in different directions.

Anda dikehendaki mereka bentuk sebuah perahu layar yang boleh bergerak dengan lebih laju dalam angin yang mengalir pada arah yang berlainan.

You are required to investigate the characteristics of sail of the sailbot as shown in Table 12.

Anda dikehendaki menyiasat ciri-ciri layar bagi perahu layar itu seperti ditunjukkan dalam Jadual 11.

Sailboat Perahu layar	Characteristics <i>Ciri-ciri</i>
K	 <p>Iron mast <i>Tiang layar besi</i></p> <p>Aerofoil shape <i>Bentuk aerofoil</i></p> <p>One sail <i>Satu layar</i></p> <p>Sail made from nylon <i>Layar diperbuat daripada nilon</i></p>
L	 <p>Aluminium mast <i>Tiang layar aluminium</i></p> <p>Rectangular shape <i>Bentuk segiempat tepat</i></p> <p>One sail <i>Satu layar</i></p> <p>Sail made from canvas <i>Layar diperbuat daripada kanvas</i></p>
M	 <p>Aluminium mast <i>Tiang layar aluminium</i></p> <p>Aerofoil shape <i>Bentuk aerofoil</i></p> <p>Two sails <i>Dua layar</i></p> <p>Sail made from nylon <i>Layar diperbuat daripada nilon</i></p>

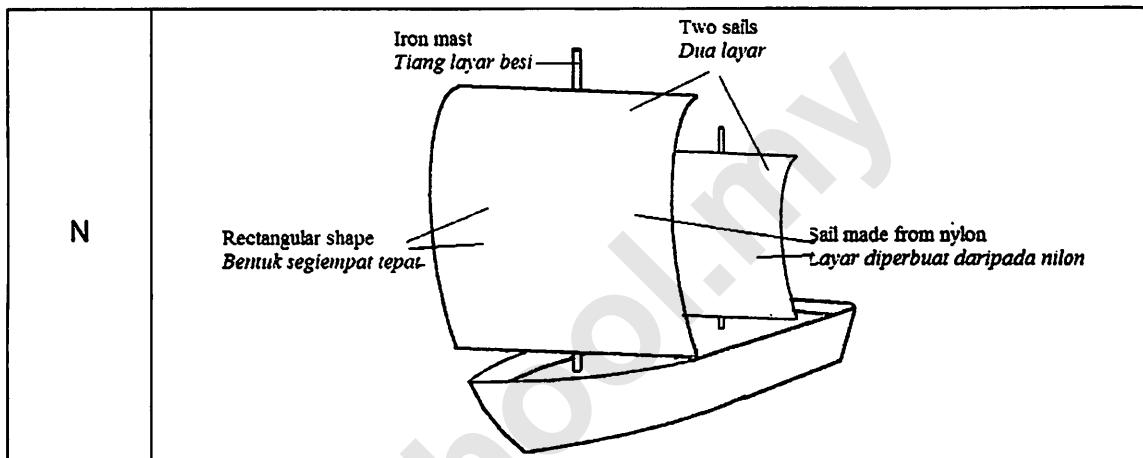


Table 12
Jadual 12

Explain the suitability of each characteristic of sail of the sailbot.

Terangkan kesesuaian setiap ciri layar bagi perahu layar.

Determine the most suitable sailbot which can travel faster in the wind flows in different directions.

Tentukan perahu layar yang paling sesuai untuk bergerak dengan lebih laju dalam angin yang mengalir pada arah yang berlainan.

Give reasons for your choice.

Berikan sebab-sebab untuk pilihan anda.

[10 marks]

- (c) An aircraft installation department chooses a wing to be installed with its aircrafts which has maximum mass 800 kg. The air pressure below the wing is more than the air pressure above the wing by 500 N m^{-2} .

Sebuah syarikat pemasangan kapal terbang memilih sebuah sayap untuk dipasang pada pesawatnya yang berjisim maksimum 800 kg.

Tekanan udara di bawah sayap melebihi tekanan udara di atasnya sebanyak 500 N m^{-2} .

Calculate

Hitungkan

- (i) the lifting force that exerted from below of the wing.

daya angkat yang bertindak dari bawah sayap kapal terbang tersebut

[2 marks]

- (ii) the resultant force and its direction that exerted to the wing of the aircraft.

daya paduan dan arahnya yang bertindak terhadap sayap kapal terbang tersebut.

[1 mark]

- (iii) upwards acceleration of the aircraft.

pecutan ke atas bagi kapal terbang itu.

[2 marks]

BAHAN KECEMERLANGAN
SPM 2015

**Skema
BK 1**

FIZIK

DIBIAYAI OLEH
KERAJAAN NEGERI TERENGGANU

Question 1

sect	mrk	Answer	Note
(a)	1	Inner jaw	
(b)	1	Measure inner/internal diameter	
(c)(i) (ii)	1 1	Zero error/systematic error/negative zero error - 0.07 cm	
total :	4		

Question 2

sect	mark	Answer	Note
(a)(i)	1	Manometer	
(a)(ii)	1	High density // opaque // easy to see// not stick	
(b)(i)	1	76 + 8 // 84	Unit is negligible
(b)(ii)	1 1	$0.84 \times 1.36 \times 10^4 \times 10 // 84 \times 1.36 \times 10^4 \times 10$ $114240 // 1.1424 \times 10^5$	Unit is negligible
Total	5		

Question 3

sect	mark		
(a)	1	Distance per time// $\frac{\text{distance}}{\text{time}}$	
(b)	1 1	Momentum = mass x velocity High speed produce greater momentum Difficult to stop/ take longer time to stop	MAX 2
(c)(i)	1	$\frac{90 \times 1000}{3600}$ // 25	
c(ii)	1 1	3000×25 75000	
Total	6		

Question 4

Sect	Mark	Answer	Notes
1 (a)	1	Gas pressure	
(b)(i)	1	Same // Equal	
(b)(ii)	1		

(c)	1 1	$1.1 \times 0.4 = 2.2V_2$ $V_2 = 0.2 \text{ m}^3$	Jwpt dgn unit
(d)(i) (d)(ii)	1 1	Same // Remain unchanged Constant / Same temperature / speed of gas particles	
Total	7		

Question 5

Sect	Mark	Answer	Note
(a)	1	Number of ticks	
(b)(i) (ii) (iii) (iv)	1 1 1 1	Same Same $5.2 > 5.1$ $5.2 > 5.1$	
(c)	1	high , high // directly proportional	
(d)	1	Constant velocity // zero acceleration	
(e)	1	Drawing shows distance between ticks decreases.	
Total	8		

QUESTION 6

Sect.	Mark	Answer	Note
(a)	1	phenomenon where the direction and speed of light are changed (change in velocity) when it crosses the boundary between two materials of different optical densities.	
(b)(i)	1	$6.2 > 6.1$	Vice versa
(ii)	1	$6.1 > 6.2$ // glass> diamond	
(iii)	1	inversely proportional// high, low	

(c)	1	$n = \frac{\text{speed of light in vacuum (air)}}{\text{speed of light in medium}}$ $2.49 = \frac{3 \times 10^8}{\text{speed of light in medium}}$ $1.2 \times 10^8 \text{ ms}^{-1} / 120481927.7$	Accept answer without unit
(d)(i)	1	liquid A - water, liquid B- cooking oil or another combination.	liquid A must be denser than liquid B
(ii)	1	large density, low apparent depth // density inversely apparent depth.	

QUESTION 7

sect	mark		Note
a(i)	1	Fall with gravitational acceleration/ $g/10 \text{ ms}^{-2}$	
a(ii)	1	constant acceleration/ increasing velocity	
b(i)	1 1	increase increase air friction / slower velocity	
b(ii)	1 1	high $t \propto s/\sqrt{h}$ place, longer time	
c(i)		$t^2 = 2g/s$	
	1 1	$= (2 \times 10) / 2$ $= 10$	
c(ii)	1 1	$t = 3.16 \text{ s}$ same mass does not affect the time / $t^2 = 2g/s$	
TOTAL	10 M		

Question 8

Section	Mark	Answer	Note
(a)	1	Elastic potential energy	
(b)	1	$E_e \rightarrow E_k$ // elastic potential energy to kinetic energy	
(c)(i)	1 1	$40/5/40/0.05$ $8/800$	
(ii)	1 1	$(1/2)x40x5/1/2X 40 X 0.05$ // $(1/2)x8x5^2/1/2 X 800 X 0.05^2$ $100/1$	
(d)(i)	1 1	Low Extend more // stored more energy	
(ii)	1 1	Hollow aluminium Low mass // light	
(iii)	1	S	
(e)	1	Safety net // low height	
Total	12		

Question 9

Section	Mark	Answer	Note								
9(a)(i)	1	State the meaning of heat correctly A form of energy//energy									
(a)(ii)	1 1 1 1 1	State the correct comparison Reading of thermometer in Diagram 9.1 > in Diagram 9.2. The volume of water in Diagram 9.1 < in Diagram 9.2 The time of heating for both diagrams is the same. State the correct relationship The lower the volume of water, the higher the reading of thermometer // inversely proportional State the correct relationship The lower the mass of water, the higher the increase of temperature // inversely proportional	Vice versa Vice versa Vice versa								
(b)	1 1 1 1	State the explanation correctly Land has lower specific heat capacity than sea. At day time, land get hot faster than sea // Land rise of temperature is higher than sea. Hot air at land rises up // Hot air causing a lower pressure region. Cold air from sea moves /flow to the land // Convection of air									
(c)	1,2 3,4 5,6	<table border="1"> <thead> <tr> <th>Modification</th> <th>Explanation</th> </tr> </thead> <tbody> <tr> <td>Big / large / increase size of fan</td> <td>Absorb / suck / blow more air to the radiator.</td> </tr> <tr> <td>High number of fin blade // Idea more number</td> <td>Large surface area/diameter // Allow more heat to release.</td> </tr> <tr> <td>Any metal / conductor /</td> <td>Heat can be released</td> </tr> </tbody> </table>	Modification	Explanation	Big / large / increase size of fan	Absorb / suck / blow more air to the radiator.	High number of fin blade // Idea more number	Large surface area/diameter // Allow more heat to release.	Any metal / conductor /	Heat can be released	Accept any reasonable modification and explanation.
Modification	Explanation										
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Any metal / conductor /	Heat can be released										

	7,8	copper // Low specific heat capacity metal	easily.	
	9,10	High specific heat capacity of cooling liquid	Heat up / hot /absorb heat slower // Temperature not increase.	
		High boiling point of liquid	Not easy / difficult to boil // Not vaporized // Difficult to change from liquid to gas // Not evaporated	
TOTAL	20			

Question 10

sect	mark	Answer														
(a)(i)	1	Image that can formed on the screen														
(ii)	1 2 3 4 5	Thickness lens $10.1 > 10.2$ object distance Diagram 10.1 equal in Diagram 10.2. Image in Diagram 10.2 > in Diagram 10.1. Size image in Diagram 10.2 > 10. If the thickness increase, the size image decrease														
(b)	1 2 3 4	The light propagate from denser medium to less dense The velocity of light increase The light bend Away from normal		Reject ; the light focused to focal point												
(c)	1, 2 3, 4 5, 6 7, 8 9, 10	<table border="1"> <thead> <tr> <th>Suggestion / Modification</th> <th>Explanation / Reason</th> </tr> </thead> <tbody> <tr> <td>Type of lens : convex</td> <td>To produce real image.</td> </tr> <tr> <td>Large diameter.</td> <td>More light.</td> </tr> <tr> <td>Longer focusing ring</td> <td>Range of object distance increase</td> </tr> <tr> <td>thinner convex lens</td> <td>Longer focal length/larger image.</td> </tr> <tr> <td>Use high sensitive film/digital detector/digital film</td> <td>Sharp image</td> </tr> </tbody> </table>		Suggestion / Modification	Explanation / Reason	Type of lens : convex	To produce real image.	Large diameter.	More light.	Longer focusing ring	Range of object distance increase	thinner convex lens	Longer focal length/larger image.	Use high sensitive film/digital detector/digital film	Sharp image	Rej : clear image
Suggestion / Modification	Explanation / Reason															
Type of lens : convex	To produce real image.															
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Longer focusing ring	Range of object distance increase															
thinner convex lens	Longer focal length/larger image.															
Use high sensitive film/digital detector/digital film	Sharp image															
Tot/Jum : 20																

Question 11

sect	mark	Answer		
(a)(i)	1	Rate of change of momentum		
(ii)	1 1 1 1	Place the pile driver at a certain height Release the steel pile onto the pile driver Causes an impact on the pile driver in a short time Produces high impulsive force on the pile driver		
(b)	1,2 3,4 5,6 7,8 9,10	Technique// Characteristics	Explanation	
		Continue to swing the racket after hitting the ball	Ball will move further // produce higher impulse	
		Short time of contact between the ball and racket	High impulsive force	
		low string tension	High energy/power	
		Nylon	High durability // not easy to break // more elastic	
		Q	Continue to swing the racket after hitting the ball, Short time of contact between the ball and racket ,low string tension, Nylon	
(c)(i)	1 1 1 1 1	$\frac{100}{1000} // 0.1 \text{ kg}$ $20 \times 10^{-3} //$ $= 2 \times 10^{-2} \text{ s} // 0.02$ $F = \frac{m(v-u)}{t}$ $\frac{0.1(-50 - 40)}{0.02}$ $= -450$		
Total	20			

Question 12

Secti on	Mark	Answer	Note
(a)(i)	1	Rate of change of distance // <u>distance</u> time	
(a)(ii)	1	At upper section ,the direction of ball spins same as thice ve direction of air flow // vice versa	
	1	At upper section , high speed // vice versa	
	1	At upper section . low pressure // vice versa	
	1	The diffirence pressure produce force	
(b)	1	Aerofoil shape	
	1	Produce difference pressure between two sides//produce force from sides	
	1	Two sails	
	1	Can change directions // easy to turn	
	1	Sail made from nylon	
	1	Strong and lighter	
	1	Aluminium mast	
	1	Lighter and not easy rusted	
	1	M	
	1	Because aerofoil shape, two sails , sail made from nylon and aluminium mast	
(c)(i)	1	$F=500 \times 40$	
	1	$F = 20000N$	
(c)(ii)	1	$20000 - 900(10) // 11000$	
(c)(iii)	1	$\frac{11000}{800}$	
	1	13.75	
Total	20		