



MAJLIS PENGETUA SEKOLAH MALAYSIA CAWANGAN PULAU PINANG

MODUL KBAT SPM 2020

4531/1

FIZIK

Kertas 1

1 ¼ jam

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.*
3. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

The following information may be useful. The symbols have their usual meaning.

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

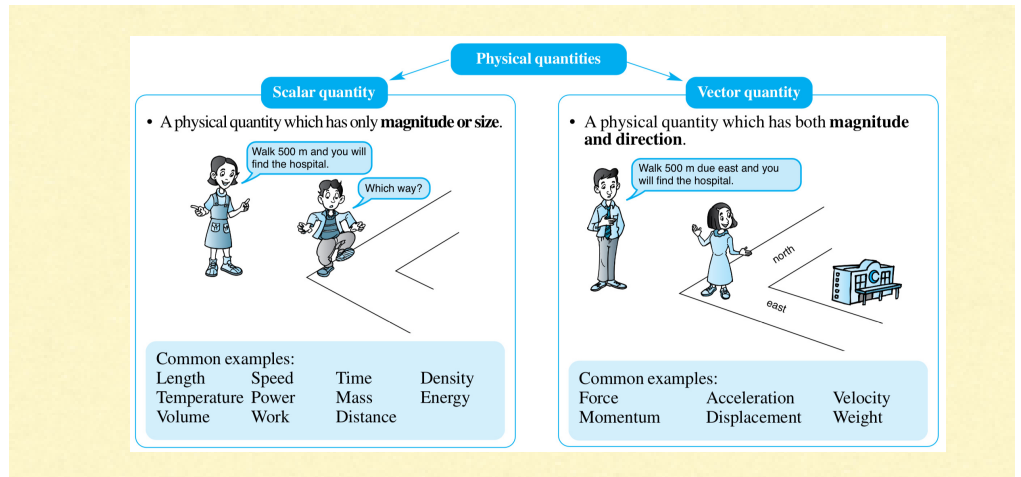
1. $a = \frac{v - u}{t}$
2. $v^2 = u^2 + 2as$
3. $s = ut + \frac{1}{2}at^2$
4. Momentum = mv
5. $F = ma$
6. Kinetic energy / *Tenaga kinetik* = $\frac{1}{2}mv^2$
7. Gravitational potential energy / *Tenaga keupayaan graviti* = mgh
8. Elastic potential energy / *Tenaga keupayaan kenyal* = $\frac{1}{2}Fx$
9. $\rho = \frac{m}{V}$
10. Pressure / *Tekanan*, $P = h\rho g$
11. Pressure / *Tekanan*, $P = \frac{F}{A}$
12. Heat / *Haba*, $Q = mc\theta$
13. Heat / *Haba*, $Q = ml$
14. $\frac{PV}{T} = \text{constant} / \text{pemalar}$
15. $E = mc^2$
16. $v = f\lambda$
17. Power, $P = \frac{\text{energy}}{\text{time}}$
Kuasa, $P = \frac{\text{tenaga}}{\text{masa}}$
18. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
19. $\lambda = \frac{ax}{D}$
20. $n = \frac{\sin i}{\sin r}$

21. $n = \frac{\text{real depth}}{\text{apparent depth}}$
 $n = \frac{\text{dalam nyata}}{\text{dalam ketara}}$
22. $Q = It$
23. $V = IR$
24. $E = VQ$
25. Power / Kuasa, $P = IV$
26. $\frac{N_s}{N_p} = \frac{V_s}{V_p}$
27. Efficiency / Kecekapan = $\frac{I_s V_s}{I_p V_p} \times 100\%$
28. $g = 10 \text{ ms}^{-2}$
29. $c = 3.0 \times 10^8 \text{ ms}^{-1}$

1. Which of the following quantities is a scalar quantity?

Manakah antara kuantiti berikut merupakan kuantiti skalar?

- A. Force
Daya
- ☒ B. Density
Ketumpatan
- C. Weight
Berat
- D. Momentum
Momentum



2. Diagram 1 shows a measuring tool Q in an electric circuit.

Rajah 1 menunjukkan suatu alat pengukuran Q dalam sebuah litar elektrik.

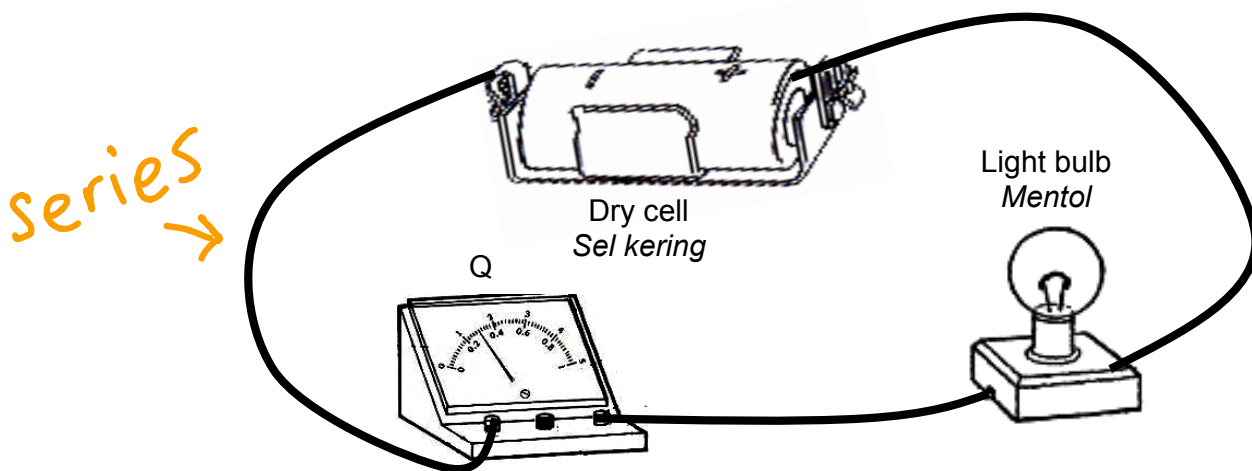


Diagram 1

Rajah 1

What is the physical quantity measured by measuring tool Q?

Apakah kuantiti fizikal yang diukur oleh alat pengukuran Q?

- A. Light intensity
Keamatan cahaya
- ☒ B. Electric current
Arus elektrik

- C. Potential difference
Beza keupayaan

- D. Electromotive force
Daya gerak elektrik

series connection

parallel connection

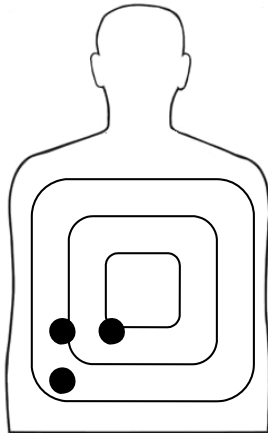
must parallel to dry cell

3. **A, B, C** and **D** show the shooting marks on a target. *degree of how close a measurement is from an actual value.*

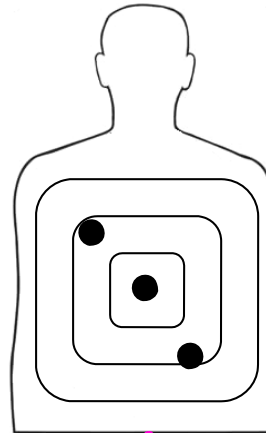
Which shooting marks can explain the concept of precision of a measurement?

A, B, C dan **D** menunjukkan kesan tembakan pada suatu sasaran.

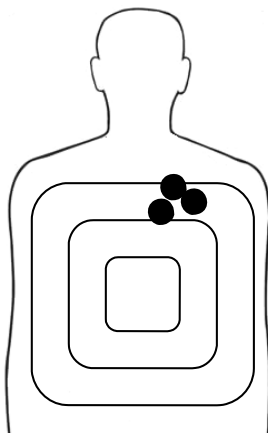
Kesan tembakan yang manakah dapat menerangkan konsep kepersisan suatu pengukuran?



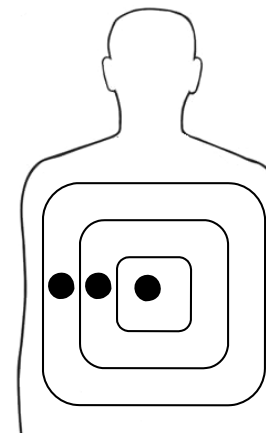
A.



B.



C.



D.

4. Which of the following ticker tapes shows an object moves at constant acceleration?

Manakah antara pita detik berikut menunjukkan suatu objek bergerak pada pecutan seragam?

Direction of motion
Arah gerakan

A. *final* *initial*
Constant Velocity

Direction of motion
Arah gerakan

B. **increasing v , constant a**

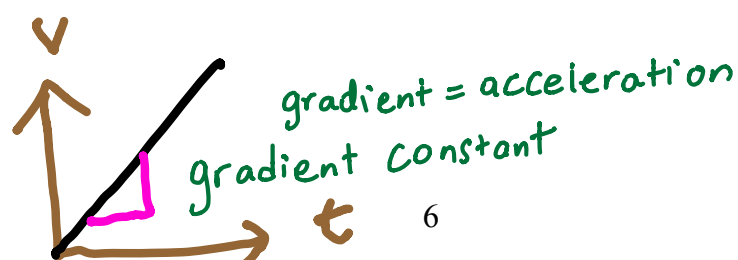
Direction of motion
Arah gerakan

C. **decreasing v**

Direction of motion
Arah gerakan

D. **decreasing v** **increasing v**

* constant acceleration = velocity increase



5. Diagram 2 shows water flows out from a water tank.

Rajah 2 menunjukkan air mengalir keluar dari sebuah tangki air.

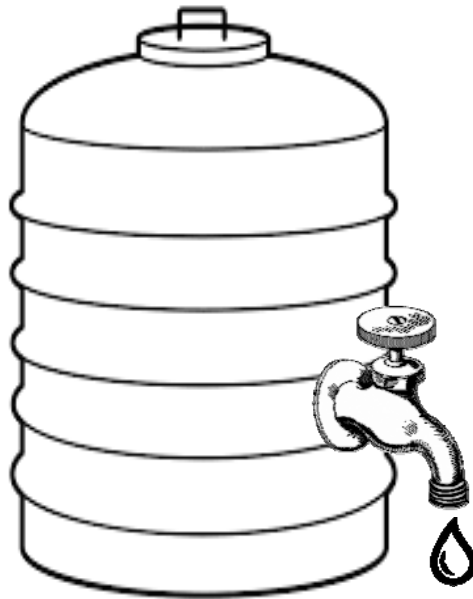


Diagram 2

Rajah 2

Which of the following statements is **true** after the water continuously flows out for some times?

Manakah antara pernyataan berikut adalah **benar** selepas air mengalir keluar secara berterusan beberapa ketika?

A. Inertia of the water tank decreases

Inersia tangki air berkurang

B. Acceleration of water drop decreases

Pecutan titisan air berkurang

C. Density of water in the tank decreases

Ketumpatan air dalam tangki berkurang

D. Time for water drop to reach the ground decreases

Masa bagi titisan air sampai ke bumi berkurang

mass of water tank ↓, inertia ↓

a constant, because gravitational acceleration constant, $g = 10 \text{ m s}^{-2}$

unchange

equal

6. Diagram 3 shows a velocity against time graph for an object.

Rajah 3 menunjukkan sebuah graf halaju melawan masa bagi suatu objek.

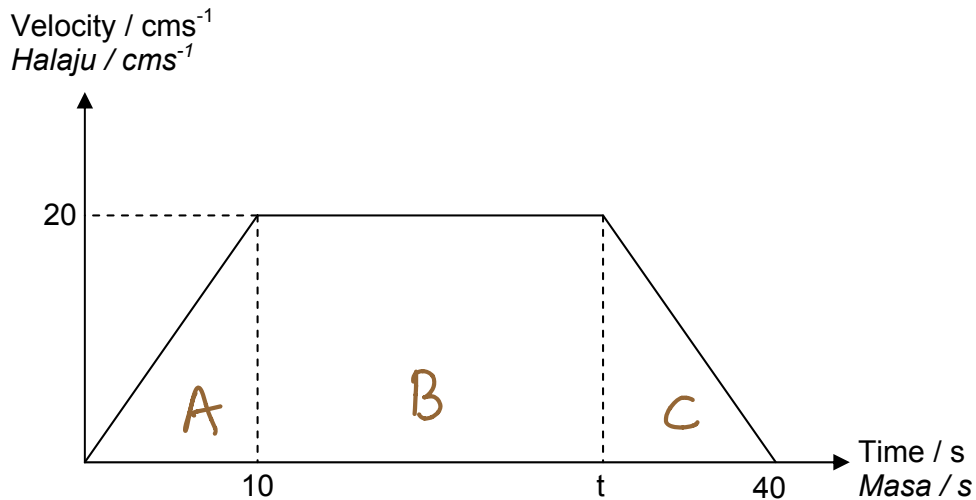


Diagram 3

Rajah 3

If total distance traveled is 600 cm. Determine value of t.

Jika jumlah jarak yang dilalui ialah 600 cm. Tentukan nilai t.

A. 15 s

B. 20 s

C. 25 s

☒ D. 30 s

Distance = Area under the graph travelled

$$600 \text{ cm} = A + B + C$$

$$600 = 100 + 20t - 200 + 400 - 10t$$

$$300 = 10t$$

$$30 \text{ s} = t$$

$$A = \frac{1}{2} \times 10 \times 20$$

$$= 100 \text{ cm}$$

$$B = 20 \times (t - 10)$$

$$= 20t - 200$$

$$C = \frac{1}{2} (40 - t) \times (20)$$

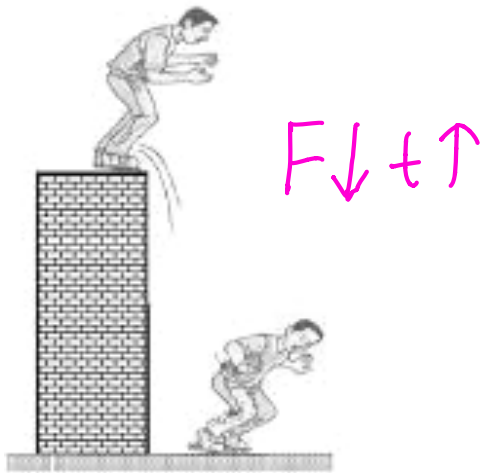
$$= \frac{800 - 20t}{2}$$

$$= 400 - 10t$$

7. Which of the following measures shown in diagrams **does not** reduced the impulsive force?

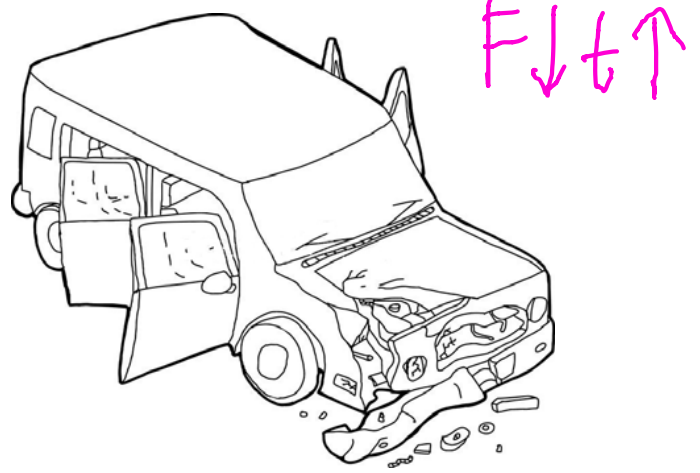
Manakah antara langkah-langkah yang ditunjukkan dalam rajah **tidak** mengurangkan daya impuls?

A.



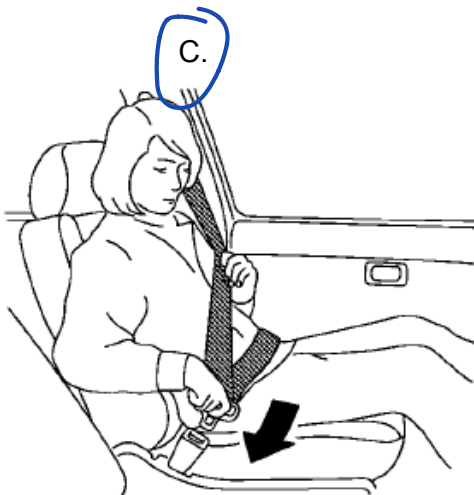
Bend knees upon landing
Membengkokkan lutut semasa mendarat

B.



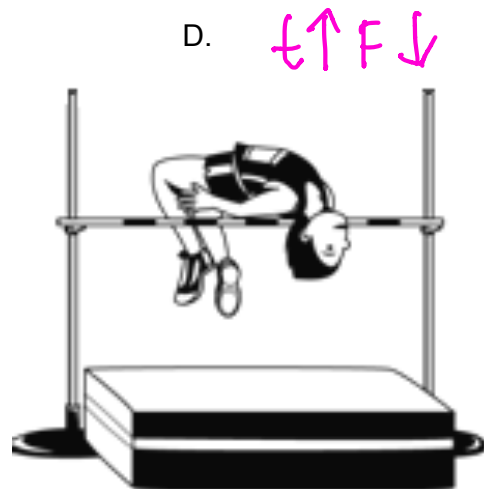
Easily crumple zone on vehicle
Zon mudah remuk pada kenderaan

C.



Wearing seat belt
Memakai tali pinggang keledar

D.



Lands on soft mattress
Mendarat di atas tilam lembut

Safety seat belts

- Prevents the passenger from being thrown forward or out of the car. Slows down the forward movement of the passenger when the car stops abruptly.

Impulsive force is defined as the **rate of change of momentum** during a **collision** or **explosion**.

Impulsive force is the **large force** produced in a collision or explosion that happens in a **short time of impact**.

8. Diagram 4 shows a 1.2 m height girl throwing a ball vertically upwards at velocity of 20 ms^{-1} .

Rajah 4 menunjukkan seorang budak perempuan berketinggian 1.2 m melontar sebiji bola ke atas secara menegak pada kelajuan 20 ms^{-1} .

A → B
 $u = 20 \text{ m/s}$
 $v = 0$
 $v^2 = u^2 + 2as$
 $0 = 20^2 + 2(10)s$
 $s = 20 \text{ m}$

B → D
 $u = 0$ (B)
 $v = 20 \text{ m/s}$ (D)
 $v^2 = u^2 + 2as$
 $20^2 = 0 + 2(10)s$
 $s = 20 \text{ m}$

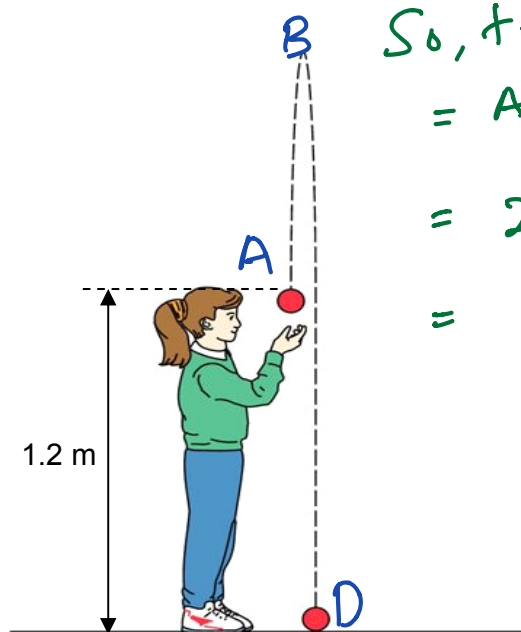


Diagram 4

Rajah 4

So, total distance
 $= AB + BD + 1.2 \text{ m}$
 $= 20 \text{ m} + 20 \text{ m} + 1.2 \text{ m}$
 $= 41.2 \text{ m}$ ✗

Determine total distance taken by the ball until it reaches the ground.

Tentukan jumlah jarak yang diambil oleh bola sehingga mencecah bumi.

- A. 20.0 m
- B. 21.2 m
- C. 40.0 m
- ☒ D. 41.2 m

✗ direction +ve & -ve sign is neglected because involving distance only.

✗ If displacement, must consider +ve and -ve direction in calculation, for value of a.

distance: scalar quantity
displacement: vector quantity
(must consider direction)

$$F = ma$$

* F: resultant force

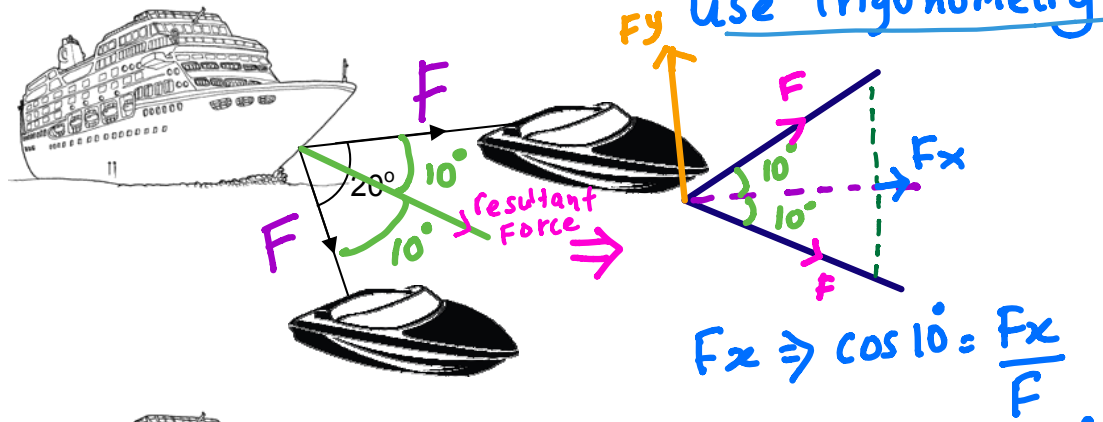
$$F \propto a$$

9. Diagrams show two similar towing boats tow a vessel. Which diagram produces the highest acceleration?

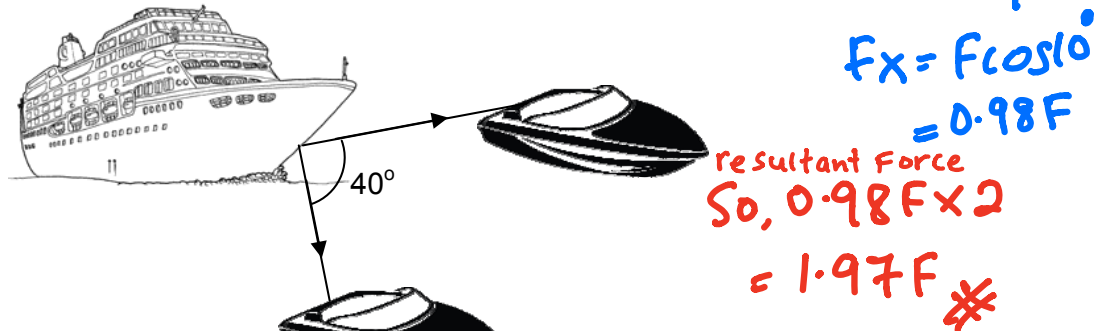
$$F \uparrow \Rightarrow a \uparrow$$

Rajah menunjukkan dua buah bot penunda yang serupa menunda sebuah kapal. Rajah manakah menghasilkan pecutan paling tinggi?

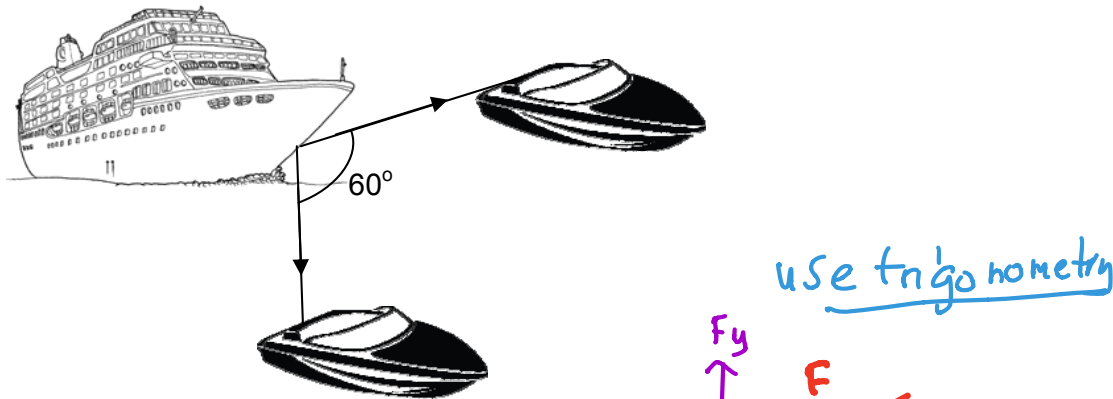
A.



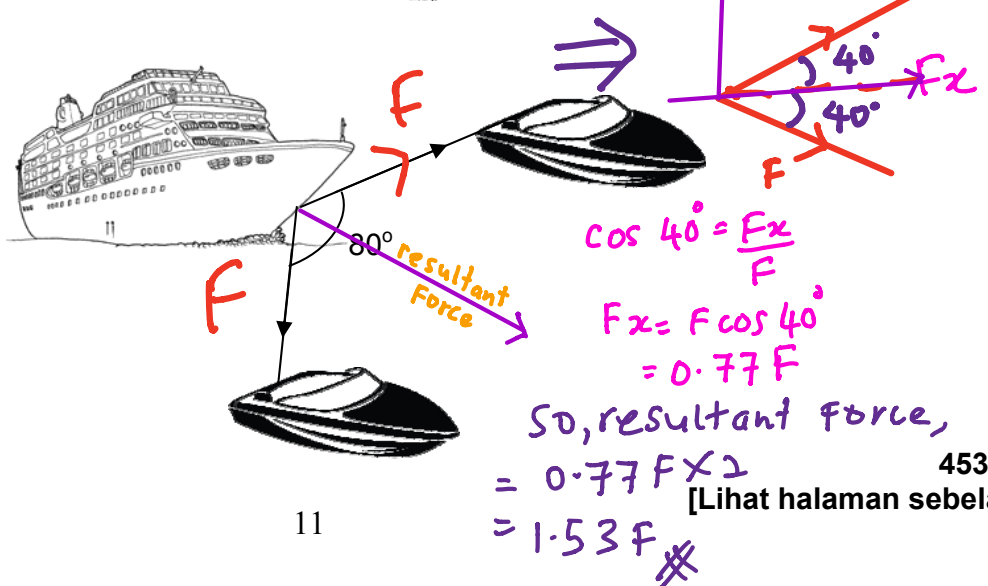
B.



C.



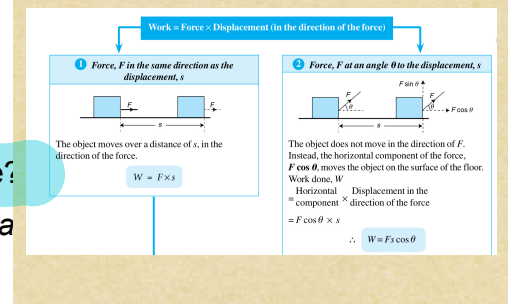
D.



When angle increase, resultant force decrease, So acceleration also decrease.

10. Which of the following diagrams shows the smallest work done?

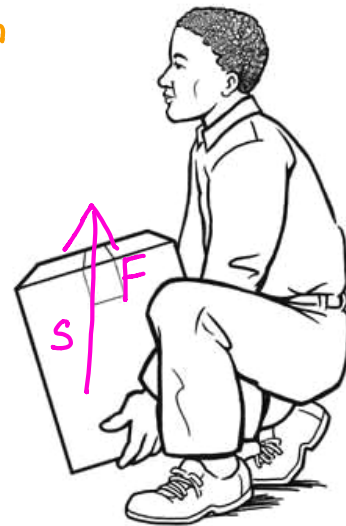
Manakah antara rajah berikut menunjukkan kerja yang dilakukan



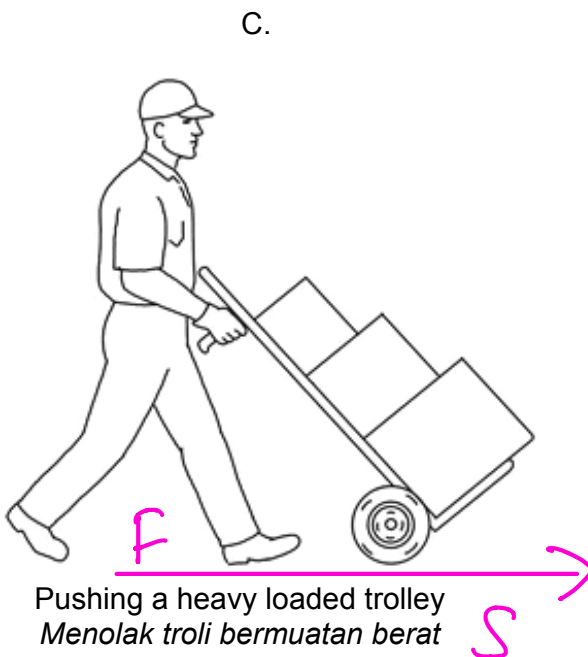
Wall remain at rest, $s = 0\text{m}$

$$W = Fs \\ = F(0) \\ = 0\text{J} *$$

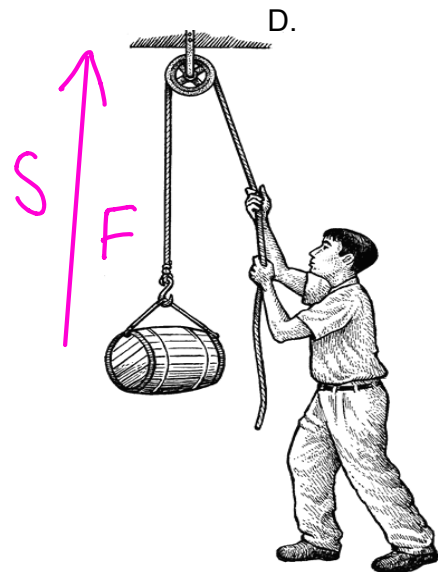
Pushing very hard a concrete wall
Menolak dengan kuat dinding konkrit



Lifting a light box
Mengangkat sebuah kotak ringan



Pushing a heavy loaded trolley
Menolak troli bermuatan berat



Pulling a load using a pulley
Menarik beban menggunakan takal

No work is done when ...

1 Force, F does not move

2 Force, F is at a right angle (perpendicular) to the displacement, s

11. Diagram 5 shows a glass block is put on a table top.

Area of the glass block in contact with the table is K and the area of the table top is L .

The weight of the glass block is W_b and the weight of the table is W_t .

Rajah 5 menunjukkan satu blok kaca yang diletak di atas sebuah permukaan meja.

Luas permukaan blok kaca bersentuhan dengan meja ialah K dan luas permukaan permukaan meja ialah L .

Berat blok kaca ialah W_b dan berat meja ialah W_t .

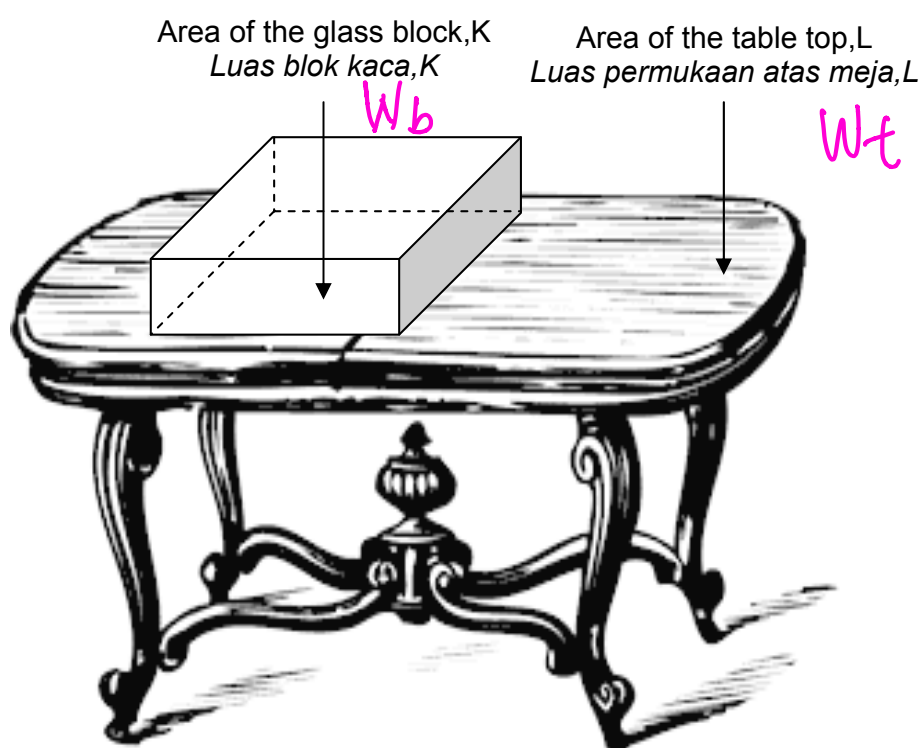


Diagram 5

Rajah 5

glass
block
table

Which expression gives the pressure exerted on the glass block by the table?

Ekspresi yang manakah memberikan tekanan yang dikenakan pada blok kaca oleh meja?

blok kaca

$$P = \frac{F}{A}$$

$F = \text{force}$
 $A = \text{area}$

meja

A. $\frac{W_t}{K}$

B. $\frac{W_t}{L}$

C. $\frac{W_b}{K}$

D. $\frac{W_b}{L}$

$$= \frac{W_b}{K}$$

12. Diagram 6 shows an empty glass is at rest on a table.

Rajah 6 menunjukkan satu gelas kosong berada dalam keadaan rehat di atas meja.

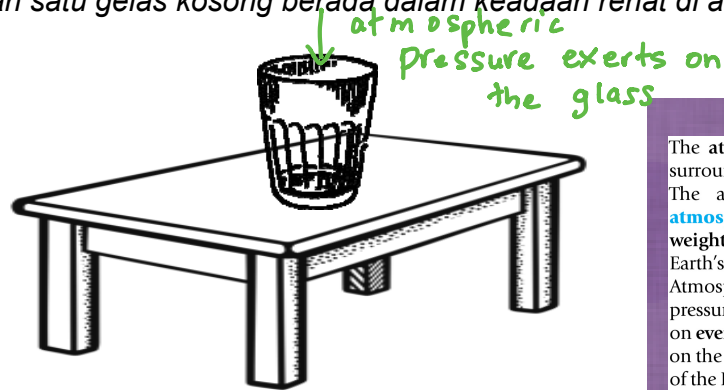
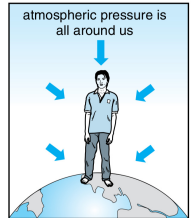


Diagram 6

Rajah 6

The atmosphere is a thick layer of air that surrounds the Earth. The atmosphere exerts a pressure called **atmospheric pressure** which is caused by the weight of the thick layer of air above the Earth's surface. Atmospheric pressure acts on every object on the surface of the Earth.



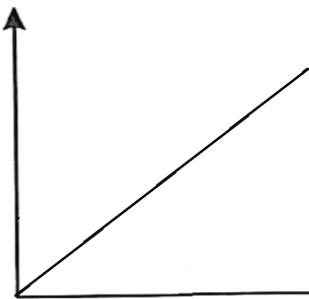
How does the pressure exerted by the glass on the table change as the water is gradually poured into it?

Bagaimanakah tekanan yang dikenakan oleh gelas pada meja berubah apabila air dituang ke dalamnya secara perlahan-lahan?

A.

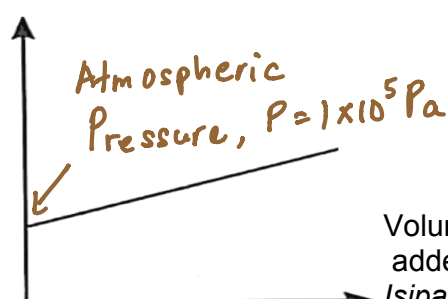
B.

Pressure / Pa
Tekanan / Pa



Volume of water added / cm³
Isipadu air yang ditambah / cm³

Pressure / Pa
Tekanan / Pa

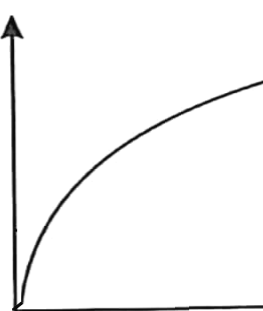


Volume of water added / cm³
Isipadu air yang ditambah / cm³

C.

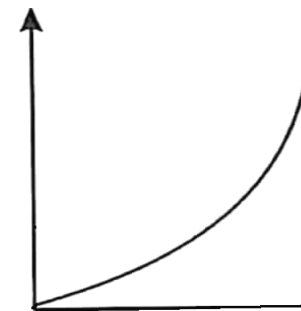
D.

Pressure / Pa
Tekanan / Pa



Volume of water added / cm³
Isipadu air yang ditambah / cm³

Pressure / Pa
Tekanan / Pa



Volume of water added / cm³
Isipadu air yang ditambah / cm³

13. Diagram 7(a) shows a wooden cylinder that is half-immersed in a fluid when it is placed vertically.

Rajah 7(a) menunjukkan satu silinder kayu yang tenggelam separuh dalam bendalir apabila diletakkan secara menegak.

same object has same buoyant force

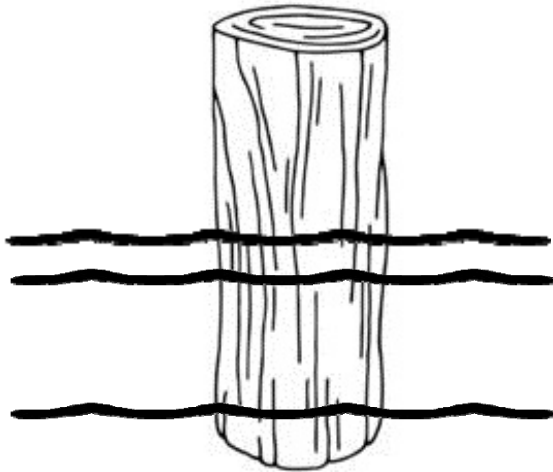


Diagram 7(a)
Rajah 7(a)

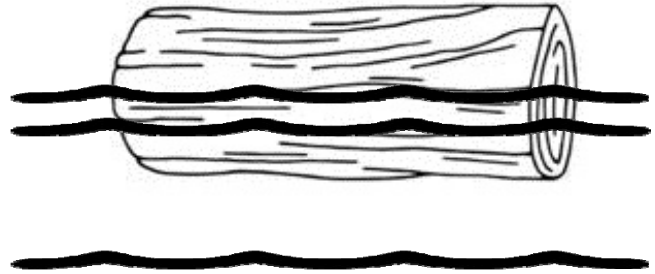


Diagram 7(b)
Rajah 7(b)

What will happen when the same wooden cylinder is placed horizontally in the fluid as shown in Diagram 7(b)?

Apakah yang berlaku apabila silinder kayu yang sama diletakkan secara mengufuk dalam bendalir seperti yang ditunjukkan dalam Rajah 7(b)?

- ☒ A. It will immerse half in the fluid
ia akan tenggelam separuh dalam bendalir
- B. It will immerse completely in the fluid
ia akan tenggelam sepenuhnya dalam bendalir
- C. It will immerse less than half in the fluid
ia akan tenggelam kurang daripada separuh dalam bendalir
- D. It will immerse more than half in the fluid
ia akan tenggelam lebih daripada separuh dalam bendalir

14. Diagram 8 shows a simple mercury barometer, used to measure atmospheric pressure.
Rajah 8 menunjukkan sebuah barometer merkuri ringkas, digunakan untuk mengukur tekanan atmosfera.

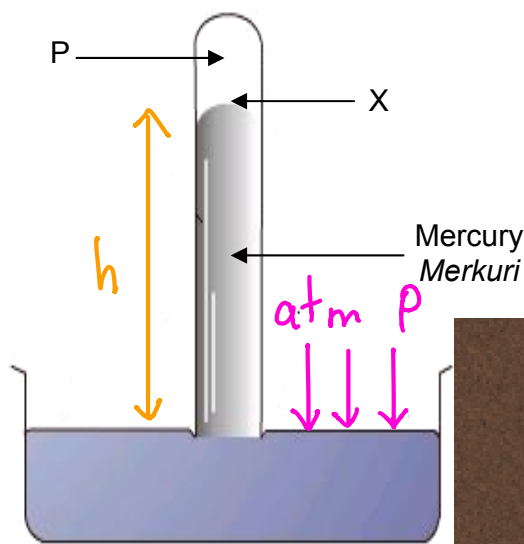
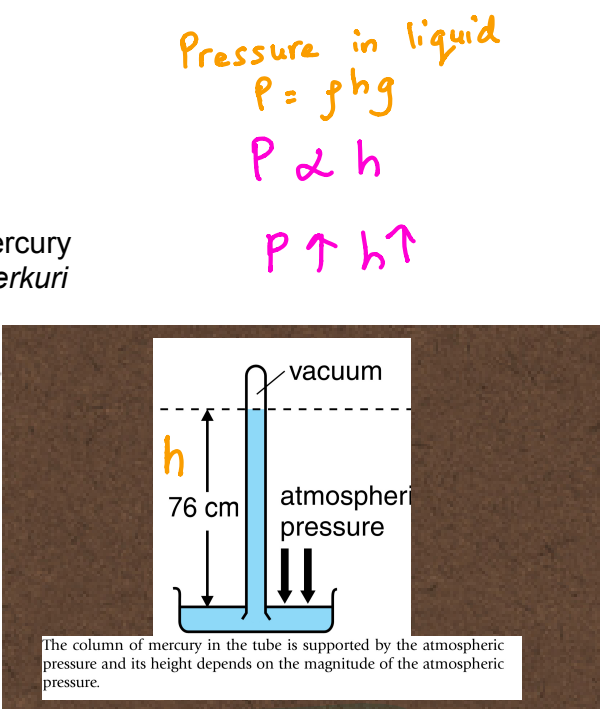


Diagram 8
Rajah 8



When the atmospheric pressure increases, what happen to the level X and pressure in P?

Apabila tekanan atmosfera bertambah, apakah yang berlaku kepada paras X dan tekanan dalam P?

atm P increase, level x also increase

	Level X Paras X	Pressure at P Tekanan di P
A.	Rises Meningkat	Increases Bertambah
☒ B.	Rises Meningkat	Remains unchanged Tidak berubah
C.	Falls Menurun	Increases Bertambah
D.	Falls Menurun	Remains unchanged Tidak berubah

15. Diagram 9 shows the water level when the water manometer is connected to a gas supply.

Diagram 9 menunjukkan paras air apabila manometer air disambungkan ke bekalan gas.

Water Density = 1000 kgm^{-3}
mercury density = 13600 kgm^{-3}

Pressure to be measured
Tekanan yang akan diukur

atm P

h

Water
Air

Pressure in liquid, $P = \rho h g$
 ρ = density of liquid
 h = depth
 g = grav-field strength
 $\uparrow \rho = \frac{P}{h g}$

Diagram 9

Rajah 9

The water in the manometer is replaced with mercury. How does the value of h change?

Air di dalam manometer digantikan dengan merkuri. Bagaimanakah perubahan nilai h ?

A. It become zero

la menjadi sifar

B. It increases

la bertambah

C. It remains unchanged

la tidak berubah

☒ D. It decreases, but not become zero

la berkurang, tetapi tidak menjadi sifar

16. Diagram 10 shows a hydraulic jack which is used to lift up a trishaw. 50 N force is exerted on the small piston.

Rajah 10 menunjukkan satu jek hidraulik yang digunakan untuk mengangkat sebuah beca. Daya 50 N dikenakan pada omboh kecil.

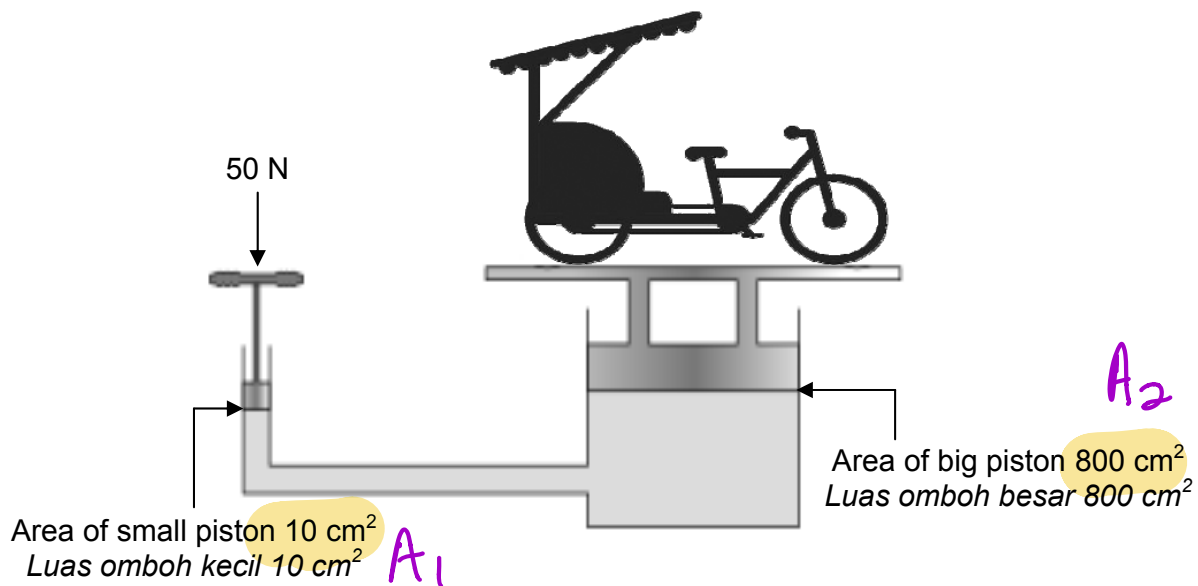


Diagram 10
Rajah 10

Calculate the weight of the trishaw.
Kira berat beca tersebut.

- A. 500 N
- ☒ B. 4000 N
- C. 8000 N
- D. 40 000 N

$$\frac{F_1}{A_1} = \frac{F_2}{A_2}$$

$$\frac{50 \text{ N}}{10 \text{ cm}^2} = \frac{F_2}{800 \text{ cm}^2}$$

$$F_2 = 4000 \text{ N}$$

Pascal's principle states that pressure exerted on an enclosed liquid is transmitted equally throughout the liquid.

$$\frac{F_2}{F_1} = \frac{A_2}{A_1} \quad @ \quad \frac{F_1}{A_1} = \frac{F_2}{A_2}$$

$$\frac{\text{Output force}}{\text{Input force}} = \frac{\text{Output piston area}}{\text{Input piston area}}$$

17. Diagram 11 shows a hydrometer placed in three different liquids, P, Q and R.

Rajah 11 menunjukkan suatu hidrometer yang ditempatkan dalam tiga jenis cecair, P, Q dan R.

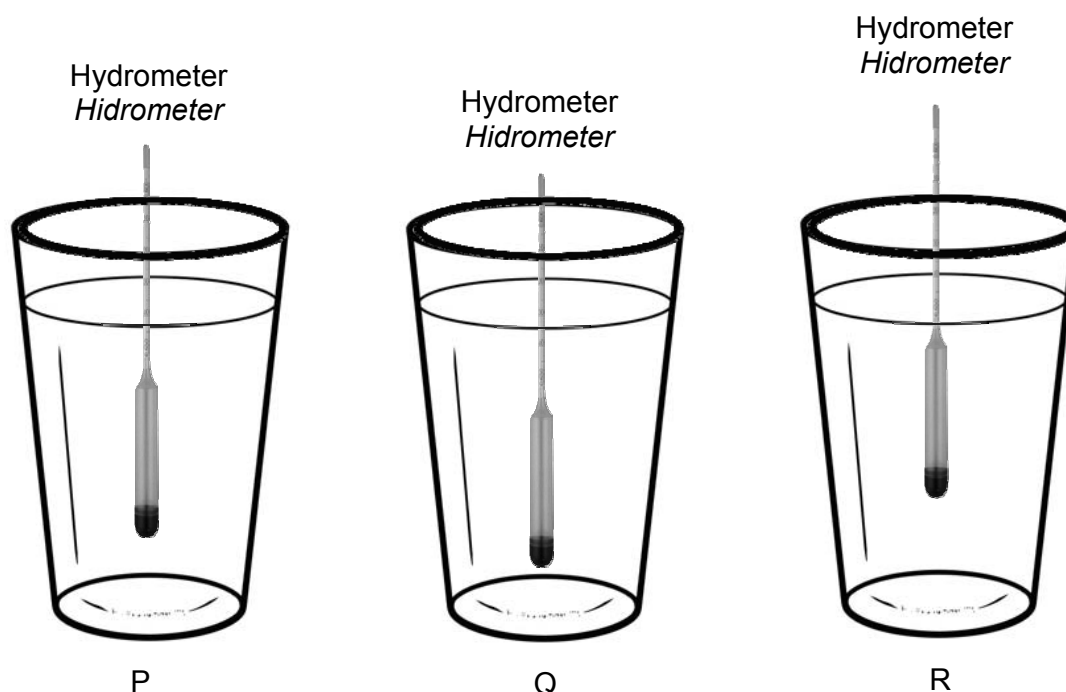


Diagram 11

Rajah 11

The densities of liquids P, Q and R are ρ_P , ρ_Q and ρ_R respectively.

Which of the following is **correct**?

Ketumpatan cecair P, Q dan R ialah ρ_P , ρ_Q dan ρ_R masing-masing.

Manakah antara berikut adalah **betul**?

A. $\rho_P > \rho_Q > \rho_R$

B $\rho_P < \rho_Q < \rho_R$

C. $\rho_P > \rho_R > \rho_Q$

D. $\rho_R > \rho_P > \rho_Q$

Hydrometer

- 1 A hydrometer is an instrument used to measure the **relative density of liquids** such as milk or acid in accumulators.
- 2 It consists of a tube with a bulb at one end. Lead shots are placed in the bulb to weigh it down and enable the hydrometer to float vertically in a liquid.

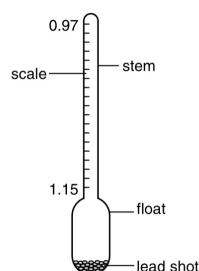


Figure 3.54 Hydrometer

- 3 In a liquid of lower density, a greater volume of liquid must be displaced for the buoyant force to

equal the weight of the hydrometer and so it sinks lower. However, the hydrometer floats higher in a liquid of higher density.

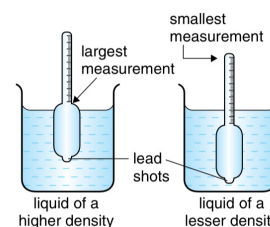


Figure 3.55

- 4 On the basis of the above mentioned law of flotation, the scale on the stem can be calibrated to give readings for density in units of g cm^{-3} .

18. Diagram 12 shows a flying unmanned aerial vehicle (drone).

Rajah 12 menunjukkan sebuah pesawat udara tanpa pemandu (dron) yang sedang terbang.

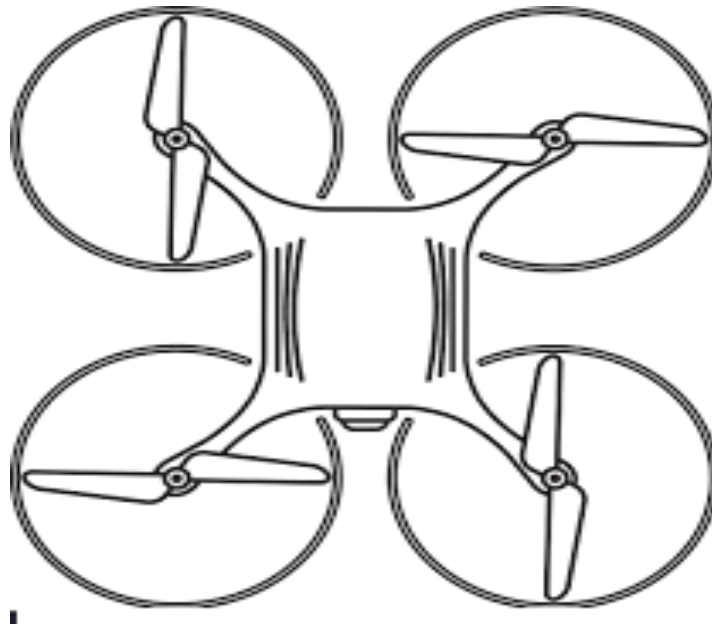


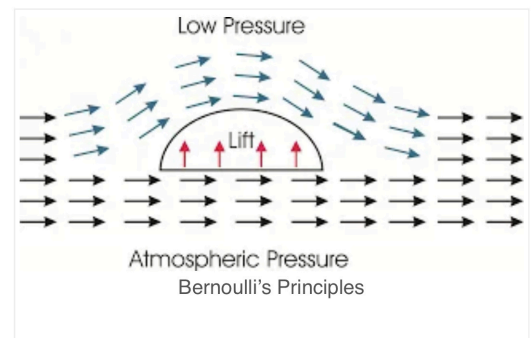
Diagram 12
Rajah 12

The flying of drone can be explained by
Penerbangan dron dapat diterangkan dengan

- A. Pascal's Principle
Prinsip Pascal
- B. Archimedes' Principle
Prinsip Archimedes
- ☒ C. Bernoulli's Principle
Prinsip Bernoulli
- D. Charles' Law
Hukum Charles

1. Working Principle of Drones - Fixed wing

Fixed-wing Drone/UAV follows the **Bernoulli's** Principles's, according to him airplane flies because of shape of 'Wing' also called airfoil, in air airfoil splits into two parts i.e. Leading Edge and trailing Edge. Air passing above and below the wing at different speed so that air reaches to same endpoint at the same time that is called trailing edge. In general, the wing's upper surface is curved so that the air rushing over the top of the wing speeds up and stretches out, which decrease the air pressure above the wing.



In contrast, the air flowing below the wing moves in a straighter line, thus its speed and pressure remain about the same. Since high pressure always moves toward low pressure, the air below the wing pushes upward toward the air above the wing. The wing, in the middle, is then "lifted" by the force of the air perpendicular to the wing. The faster an airplane moves, the more lift there is. When the force of lift is greater than the force of gravity, the airplane is able to fly, and because of thrust, the airplane is able to move forward in flight. According to Newton's third law of motion, the action of the wings moving through the air creates lift.

19. Diagram 13 shows a thermometer.

Rajah 13 menunjukkan sebuah termometer.

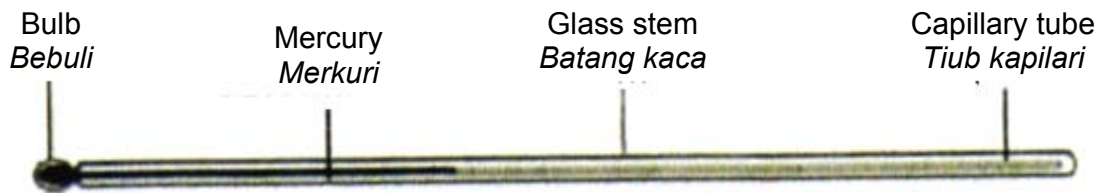


Diagram 13

Rajah 13

Which modification will increase the sensitivity of the thermometer?

Manakah antara pengubahsuaian berikut akan meningkatkan kepekaan termometer itu?

- A. Using a longer capillary tube
Menggunakan satu tiub kapilari yang lebih panjang
- B. Using a glass stem with a thicker wall
Menggunakan satu batang kaca berdinding lebih tebal
- C. Using a bulb with a thicker wall
Menggunakan satu bebuli berdinding lebih tebal
- D. Using a narrower bore of capillary tube**
Menggunakan tiub kapilari yang bersalur lebih halus

The sensitivity of a mercury thermometer can be increased by using the following:

(a) **Capillary tube with a finer bore**

Figure 4.8 shows two thermometers with the same volume of mercury at low temperature.

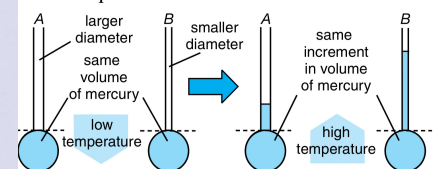


Figure 4.8

When the temperature rises, the increase in volume of the mercury is the same in both cases. However, to accommodate for

this increase in volume, the mercury rises higher in tube B which has a smaller diameter. Thus, a thermometer with a finer capillary tube is more sensitive than a thermometer with a capillary tube of larger diameter.

(b) **A smaller bulb**

A smaller bulb contains less mercury. It will absorb heat from the surroundings in a **shorter time** and thus respond faster to a temperature change. Hence, the thermometer is more sensitive.

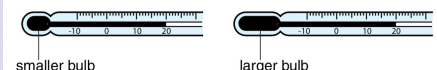


Figure 4.9

(c) **A glass bulb with a thinner wall**

The wall of the glass bulb is made thin to enable a quick heat transfer from the surroundings to the mercury. Hence, the thermometer is more sensitive.



Figure 4.10

20. Diagram 14 shows a heating curve for a solid substance.

Rajah 14 menunjukkan suatu lengkung pemanasan suatu bahan pepejal.

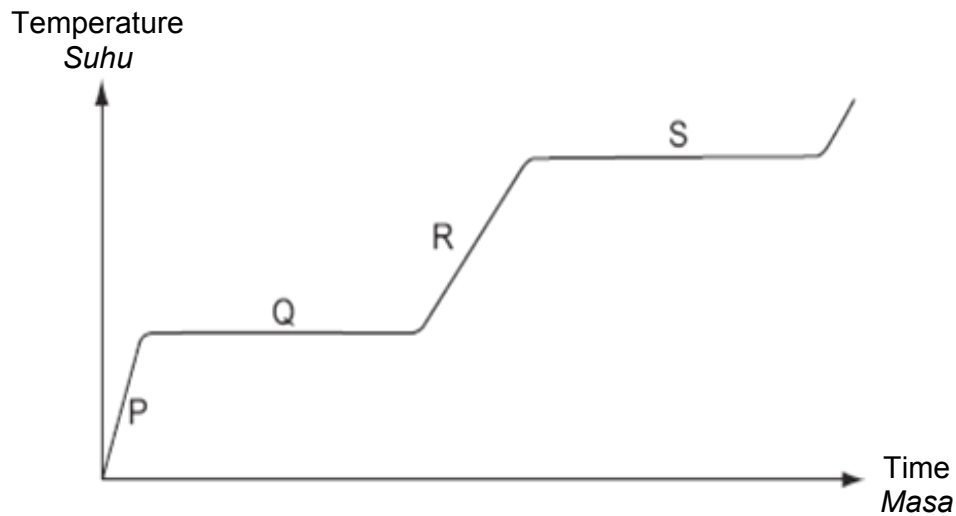


Diagram 14

Rajah 14

Heat absorbed to overcome the bonding of molecules at

Haba diserap bagi mengatasi ikatan antara molekul pada

A. P and R

P dan R

B. Q and S

Q dan S

C. R and S

R dan S

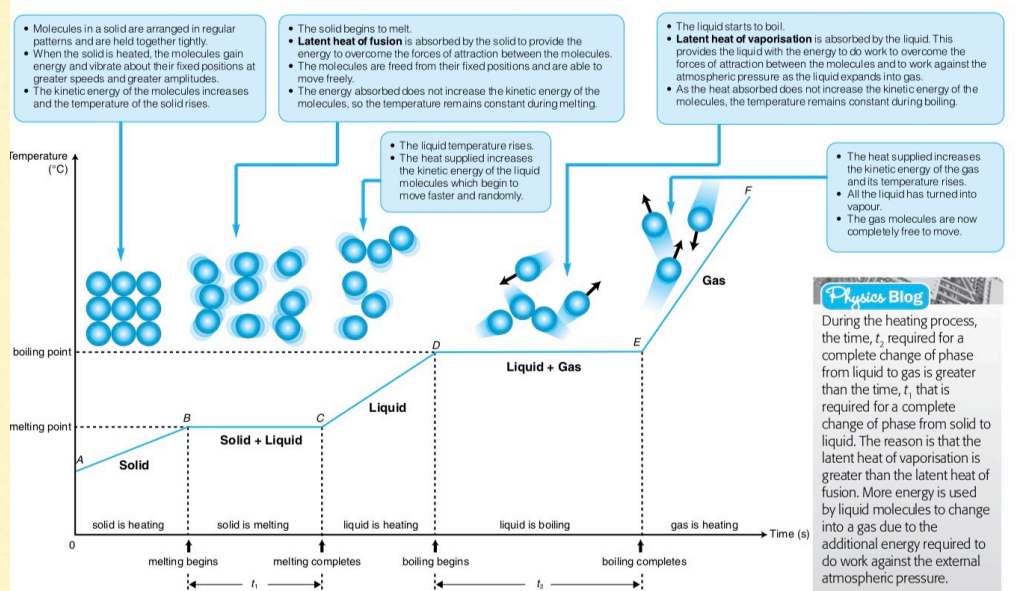
D. Q and R

Q dan R

Heating Curve

Explanation of the Temperature-Time Graph Based on the Kinetic Theory of Matter

The heating curve in Figure 4.26 shows the temperature variation of a substance being heated at a fixed rate.



21. Diagram 15 shows a pot of hot rice which is covered with an airtight lid and left to cool.

Rajah 15 menunjukkan satu periuk nasi yang panas ditutup dengan penutup yang kedap udara dan dibiarkan menyejuk.

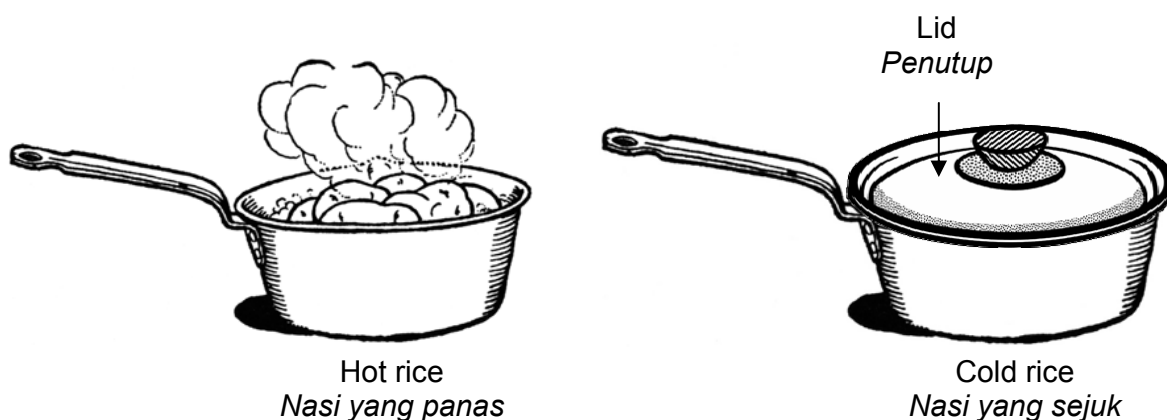


Diagram 15

Rajah 15

Why is it difficult to lift the lid when the rice is cold?

Mengapakah penutup itu sukar diangkat apabila nasi itu sejuk?

A. Water vapour condenses on the lid

Wap air terkondensasi pada penutup

B. The number of air molecules in the pot has decreased *unchanged*

Bilangan molekul udara dalam periuk berkurang

C. The adhesive force between the water molecules and the lid is strong

Daya lekat molekul air dengan penutup adalah kuat

☒ D. The air pressure inside the pot is lower than the atmospheric pressure

Tekanan udara dalam periuk lebih rendah daripada tekanan atmosfera

Higher atm P push the lid, which has lower air pressure inside.

22. Diagram 16 shows a metal spoon immersed in a cup of hot tea.

Rajah 16 menunjukkan satu sudu logam direndamkan dalam satu cawan teh panas.



Diagram 16

Rajah

Thermal equilibrium is reached when

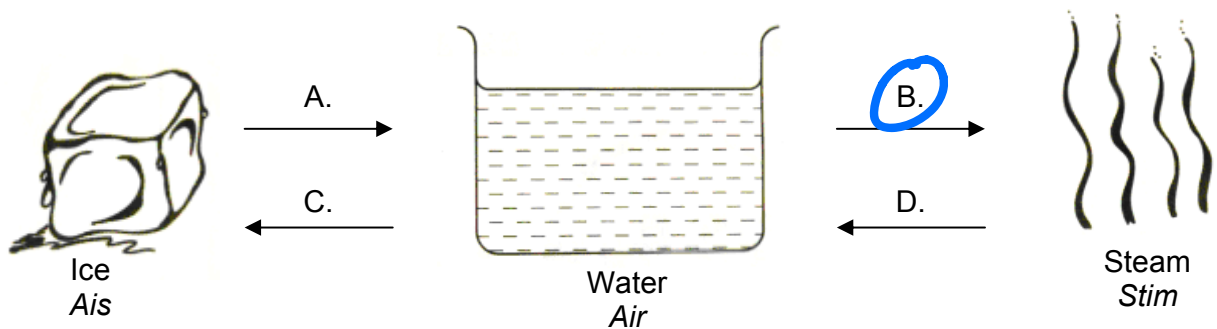
Keseimbangan terma dicapai apabila

Thermal equilibrium is a state in which
⇒ there is **no net flow of heat** between two objects.
⇒ temperature of the two objects are **equal**.

- A. Temperature of metal spoon = temperature of tea
Suhu sudu logam = suhu teh
- B. Mass of displaced tea = mass of metal spoon
Jisim teh yang tersesar = jisim sudu logam
- C. Volume of displaced tea = volume of metal spoon
Isipadu teh yang tersesar = isipadu sudu logam
- D. Specific heat capacity of tea = specific heat capacity of metal spoon
Muatan haba tentu teh = muatan haba tentu sudu logam

23. Diagram shows a process of change of state.

Rajah menunjukkan proses perubahan keadaan jirim.



In which process, A, B, C or D, is latent heat of vaporization absorbed?

Antara proses A, B, C atau D, yang manakah haba pendam pengewapan diserap?

24. Diagram 17 shows images of birds appear in water.

Rajah 17 menunjukkan imej-imej burung yang kelihatan di dalam

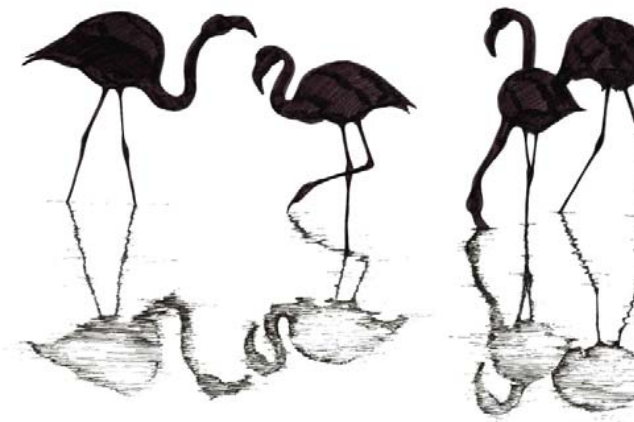


Diagram 17

Rajah 17

Images of birds appear due to

Imej-imej burung kelihatan disebabkan oleh

A. Refraction

Pembiasan

B. Diffraction

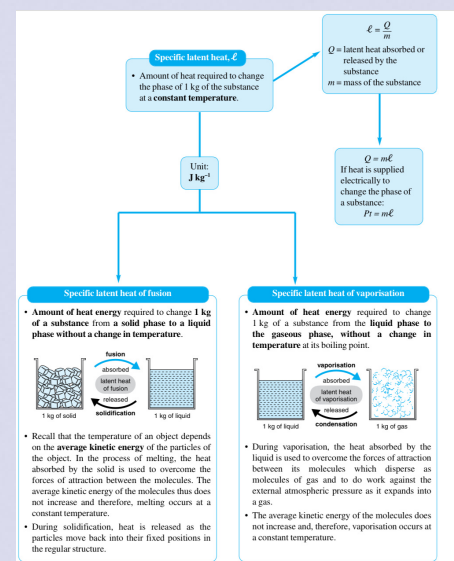
Pembelauan

C. Reflection

Pantulan

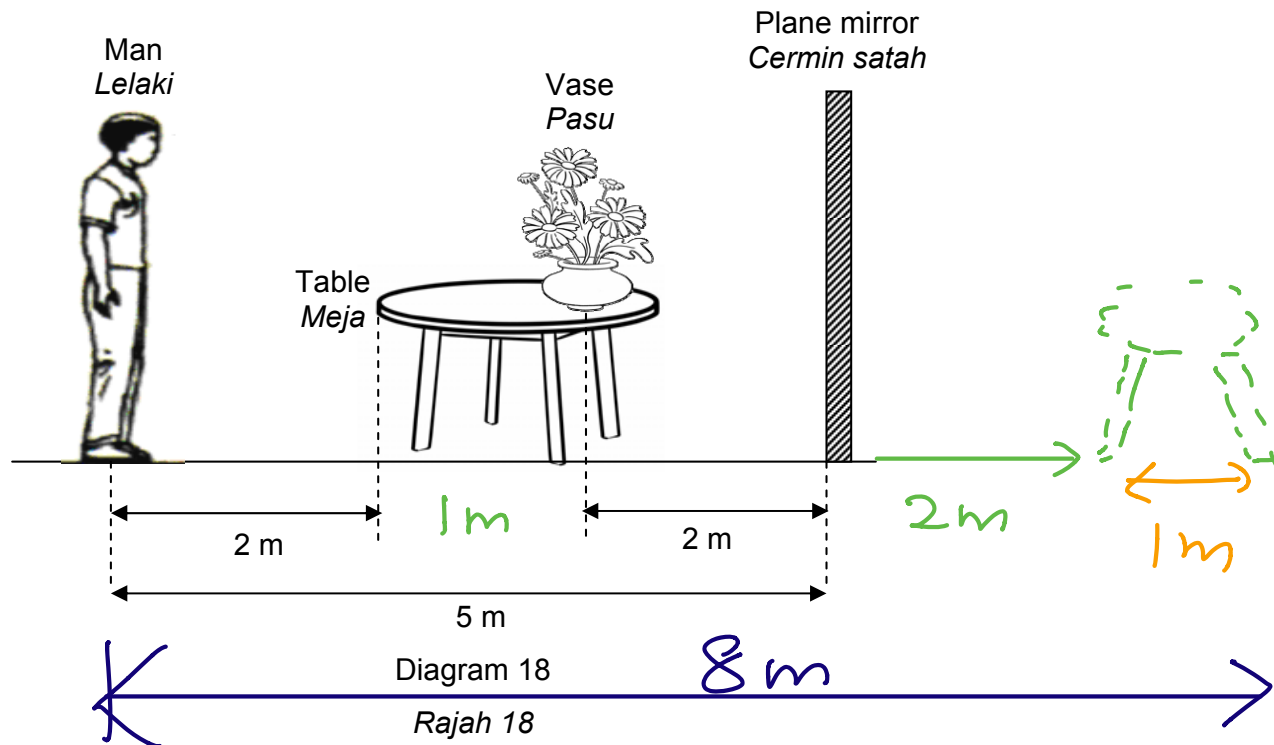
D. Total internal reflection

Pantulan dalam penuh



25. Diagram 18 shows position of man, table and vase in front of a plane mirror.

Rajah 18 menunjukkan kedudukan lelaki, meja dan pasu di hadapan sebuah cermin satah.



What is the distance of table's image as seen by man?

Berapakah jarak antara imej meja yang dilihat oleh lelaki?

A. 2 m

B. 4 m

C. 5 m

D. 8 m

26. Diagram 19 shows the formation of image in human eye.

Rajah 19 menunjukkan pembentukan imej dalam mata manusia.

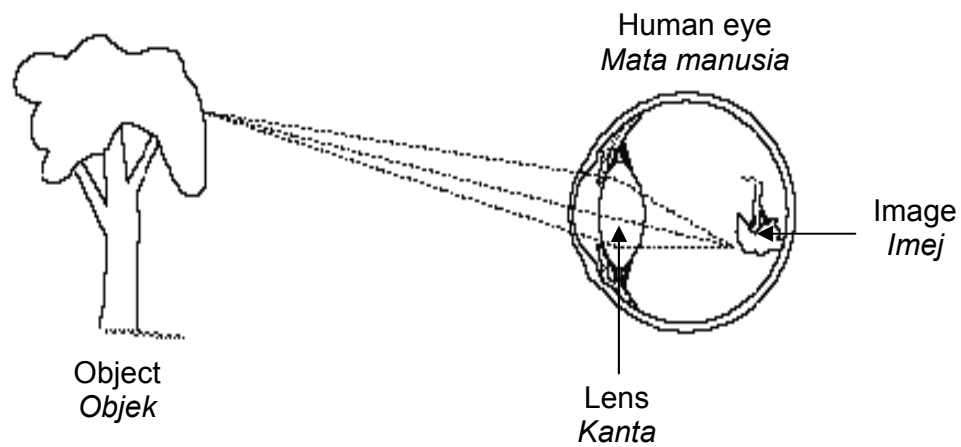


Diagram 19

Rajah 19

Which light phenomenon explains this situation?

Fenomena cahaya manakah yang menerangkan situasi ini?

A. Inversion

Pembalikan

B. Refraction

Pembiasan

C. Diffraction

Pembelauan

D. Convergence

Penumpuan

27. Diagram 20 shows two cars, P and Q, travelling in the opposite directions, passing through a sharp bend.

Rajah 20 menunjukkan dua buah kereta, P dan Q, dari arah yang bertentangan melalui suatu selekoh tajam.

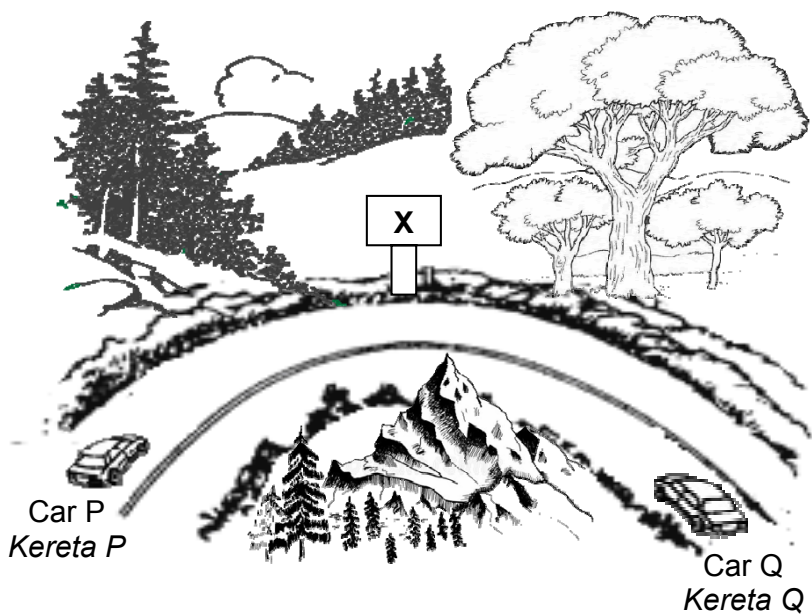


Diagram 20
Rajah 20

Which mirror is the most suitable to be placed at X so that the driver in car P can see car Q?

Cermin yang manakah paling sesuai diletakkan di X supaya pemandu kereta P dapat melihat kereta Q?

A.

Plane mirror
Cermin rata

B.

Concave mirror
Cermin cekung

C.

Convex mirror
Cermin cembung

D.

Two plane mirrors at an angle of 60°
Dua cermin rata pada sudut 60°

Uses of convex mirrors

Rear-view Mirrors
Convex mirrors are used as rear-view mirrors in motor vehicles to give drivers a wide-angle view of the vehicles behind them.

Figure 5.21

Wide-angle view Mirrors
Convex mirrors are hung from the corners of supermarket ceilings to provide a wider field of vision of the activities taking place in the shopping areas.

Figure 5.22

Safety Mirrors
Convex mirrors are also mounted at sharp corners of roads so that drivers are able to see oncoming cars on their blind side.

Figure 5.23

28. Diagram 21 shows a ray of light passing into a glass block. The refractive index of the glass is 1.54. n

Rajah 21 menunjukkan satu sinar cahaya melalui satu bongkah kaca. Indeks biasan bagi kaca itu ialah 1.54.

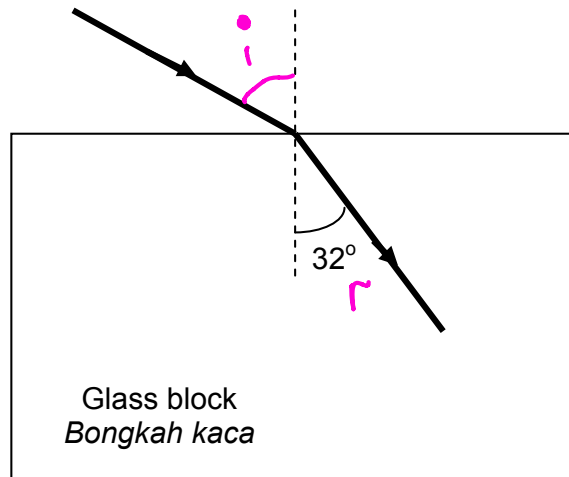


Diagram 21
Rajah 21

What is the angle of incidence? i

Berapakah sudut tuju?

- A. 19.7°
- B. 33.7°
- ☒ C. 54.7°
- D. 58.0°

$$n = \frac{\sin i}{\sin r}$$

$$1.54 = \frac{\sin i}{\sin 32}$$

$$\sin i = \sin 32 \times 1.54$$

$$i = \sin^{-1} 0.81607$$

$$= 54.69^\circ$$

29. Diagram 22 shows a wave.

Rajah 22 menunjukkan suatu gelombang.

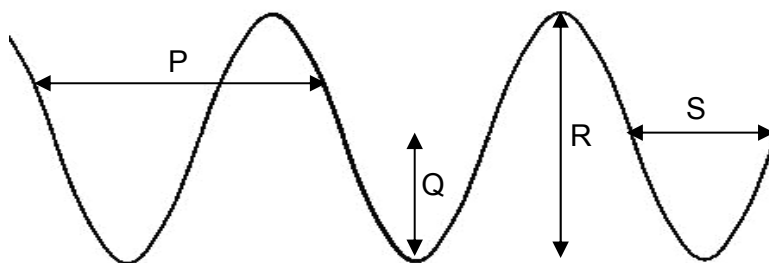


Diagram 22

Rajah 22

Wavelength is shown by

Jarak gelombang ditunjukkan oleh

- ☒ A. P
- ☐ B. Q
- ☐ C. R
- ☐ D. S

The **wavelength**, λ is the distance between two successive points of the same phase in a wave.

30. Which of the following is the characteristic of reflected waves?

Manakah antara berikut merupakan ciri-ciri gelombang terpantul?

- A. Wavelength increases
Jarak gelombang bertambah
- B. Frequency of waves increases
Frekuensi gelombang bertambah
- C. Velocity of propagation increases
Halaju perambatan bertambah
- ☒ D. Direction of propagation of waves changed
Arah perambatan gelombang berubah

31. Diagram 23 shows water waves heading towards an island.

Rajah 23 menunjukkan gelombang air menghala ke arah sebuah pulau.

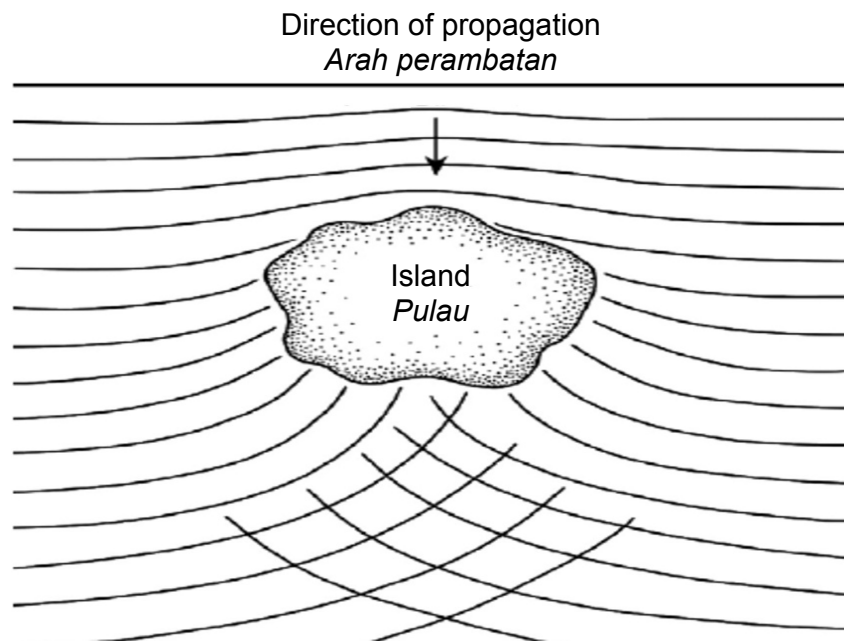


Diagram 23

Rajah 23

Which of the following phenomenon experienced by the water waves?

Manakah antara fenomena berikut dialami oleh gelombang air?

A. Refraction

Pembiasan

☒ B. Diffraction

Pembelauan

C. Interference

Interferens

D. Superposition

Superposisi

Diffraction of waves is a phenomenon in which waves **spread out** as they pass through an **aperture** or round a small **obstacle**.



(a) Low pitch



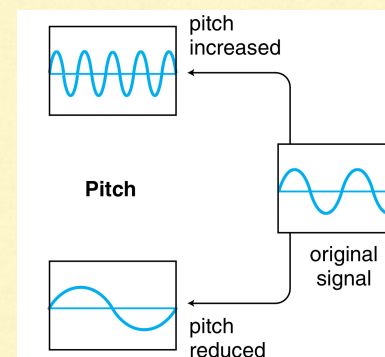
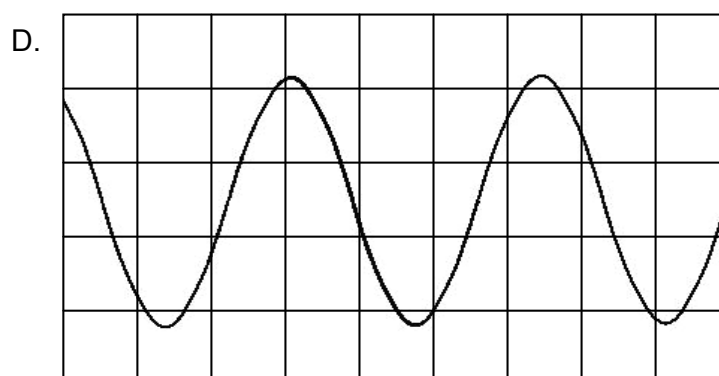
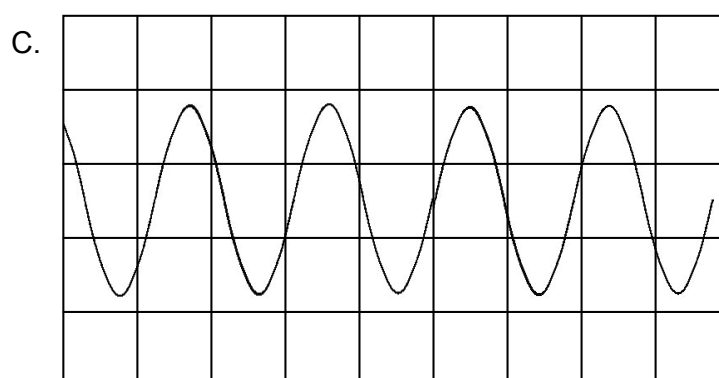
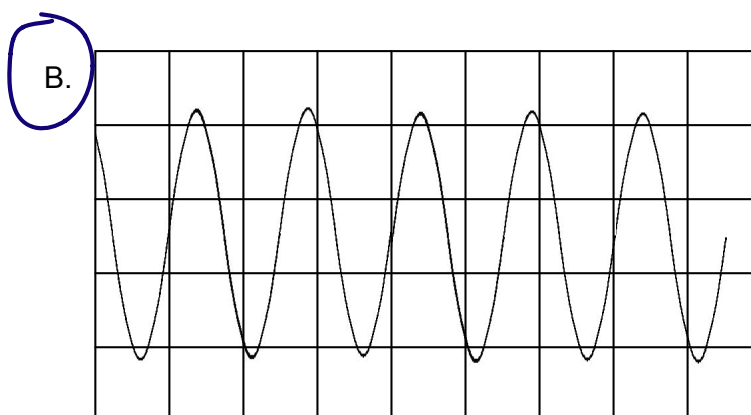
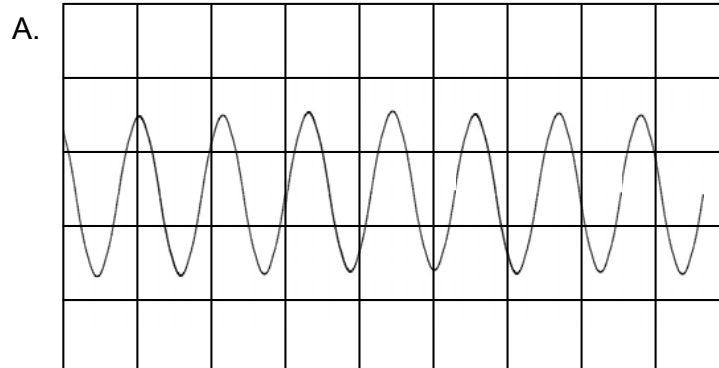
(b) High pitch

32. Diagram shows audio signals on the same scaled displacement-time graphs.

Which graph shows the highest pitch audio signal?

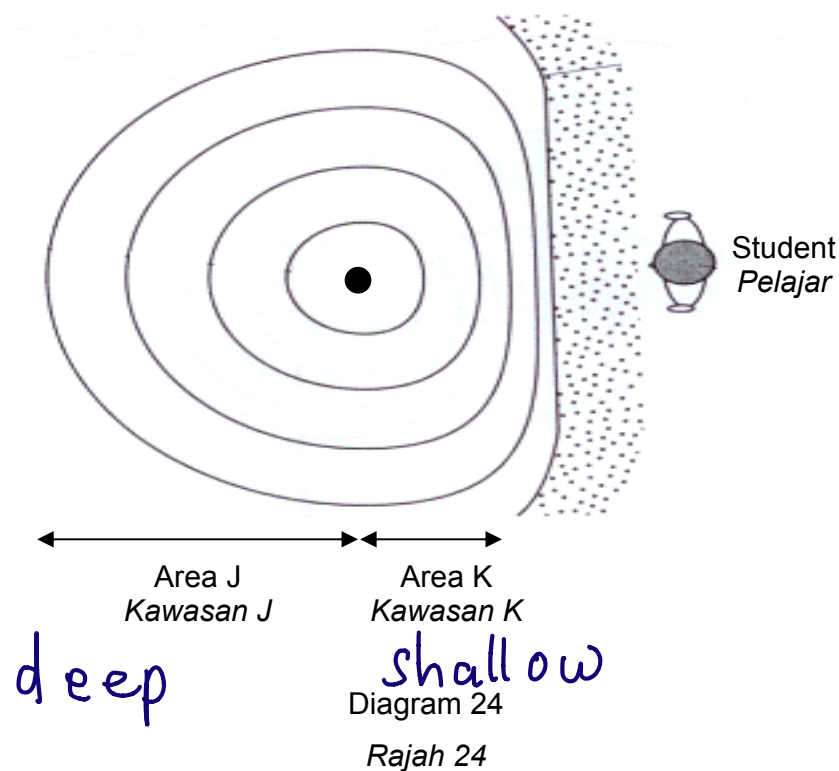
Rajah menunjukkan isyarat audio di atas graf sesaran-masa yang berskala

sama. Manakah graf yang menunjukkan isyarat audio berkelangsingan paling tinggi?



33. Diagram 24 shows a pattern of water waves observed by a student after he threw a stone into a lake.

Rajah 24 menunjukkan suatu corak gelombang air yang diperhatikan oleh seorang pelajar selepas dia membalungkan seketul batu ke dalam sebuah tasik.



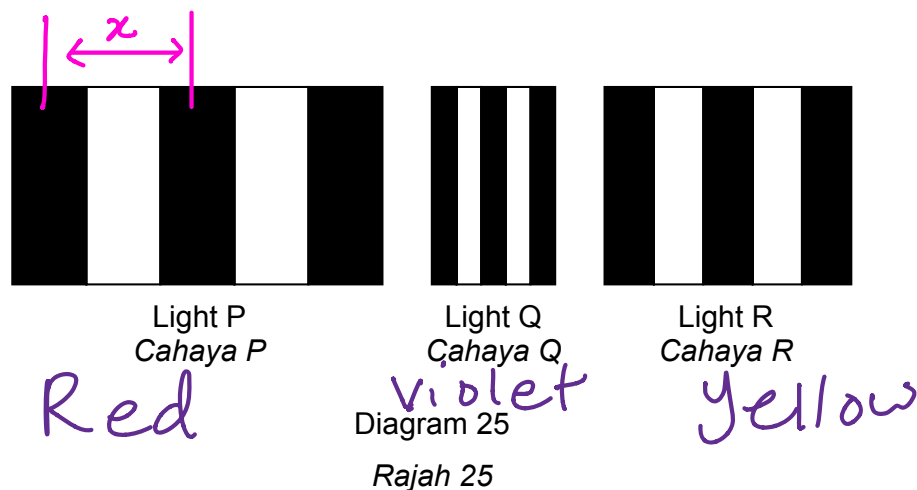
Which of the following comparisons is **true** about area J and area K?

Manakah antara perbandingan berikut **benar** mengenai kawasan J dan kawasan K?

- A. Area K is deeper than area J
Kawasan K lebih dalam daripada area J
- ☒ B. Velocity of water waves at area K is smaller than area J
Halaju gelombang air di kawasan K lebih kecil daripada kawasan J
- C. Wavelength of water waves at area K is bigger than area J
Jarak gelombang air di kawasan K lebih besar daripada kawasan J
- D. Frequency of water waves at area K is bigger than area J
Frekuensi gelombang air di kawasan K lebih besar daripada kawasan J

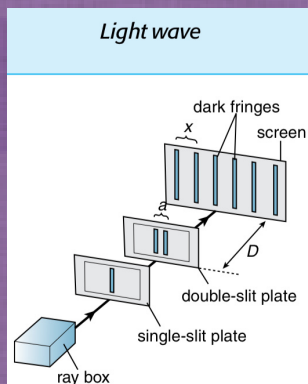
Aspect	Water region	
	Deep water	Shallow water
Velocity	Increase	Decrease
Wavelength	Increase	Decrease
Frequency	Unchanged	Unchanged

Rajah 25 menunjukkan corak interferens bagi tiga cahaya monokromatik.



Manakah antara berikut merupakan warna-warna bagi cahaya monokromatik tersebut?

	Light P <i>Cahaya P</i>	Light Q <i>Cahaya Q</i>	Light R <i>Cahaya R</i>
A.	Yellow <i>Kuning</i>	Green <i>Hijau</i>	Blue <i>Biru</i>
B.	Green <i>Hijau</i>	Red <i>Merah</i>	Blue <i>Biru</i>
C.	Orange <i>Oren</i>	Yellow <i>Kuning</i>	Green <i>Hijau</i>
D.	Red <i>Merah</i>	Violet <i>Ungu</i>	Yellow <i>Kuning</i>



The wavelength of light depends on its colour, λ

Distance between the double-slit plate and the screen

Distance between the two slits
on the double-slit plate

Distance between two consecutive bright fringes or dark fringes x

$$\lambda = \frac{ax}{D}$$

 $\lambda \uparrow, x \uparrow$

merah Jingga Kuning Hijau Biru Indigo Ungu
Malam Jangan Keluar Hantu Boleh Ikut U

35. Diagram 26 shows two consecutive loud sounds heard along PQ line at 3.0 m from two similar loud speakers connected to an audio generator.

Determine the distance between two consecutive loud sounds along RS line located 1.0 m from PQ line.

Rajah 26 menunjukkan dua bunyi kuat berturutan yang kedengaran di sepanjang garis PQ pada jarak 3.0 m dari dua buah pembesar suara yang serupa yang disambungkan kepada suatu penjana audio.

Tentukan jarak antara dua bunyi kuat yang berturutan di sepanjang garis RS pada jarak 1.0 m dari garis PQ.

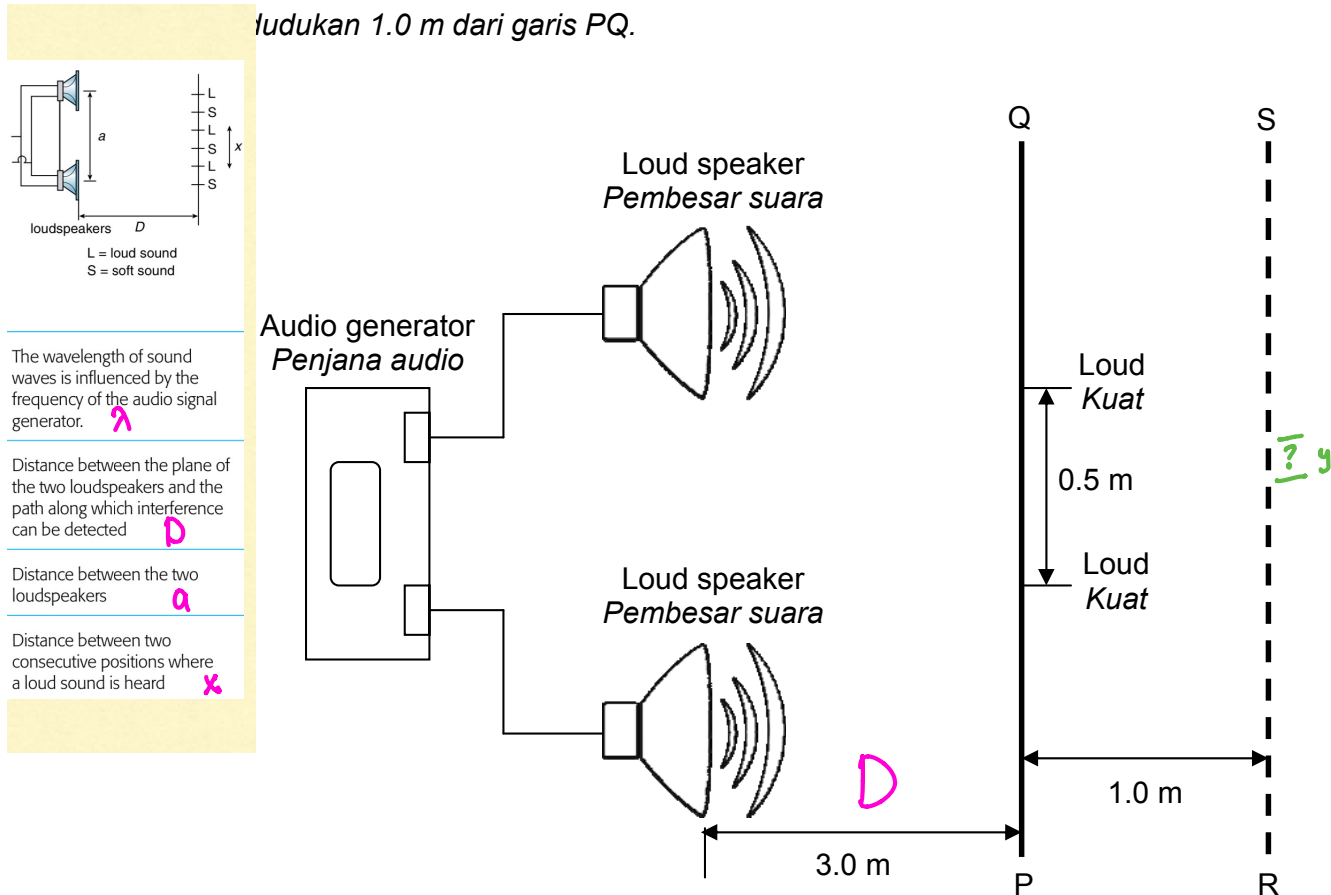


Diagram 26

Rajah 26

$$\lambda = \frac{ax}{D}$$

- A. 0.16 m
- B. 0.50 m
- C. 0.55 m
- D. 0.67 m**

1 From information, only have x and D

Relationship between x and D

$$x = \frac{\lambda D}{a}$$

So, x directly proportional to D

$$x \propto D$$

4531/1

[Lihat halaman sebelah]

2 at PQ : at RS

$$x : D$$

PQ 0.5 m : 3.0 m

RS y : 4.0 m

So, $y = \frac{4.0 \times 0.5}{3.0 \text{ m}}$

$$= 0.67m \text{ \#}$$

36. Diagram 27 shows two light charged spheres, R and S, hung from point T by two threads of the same length, made of a material that does not conduct electricity. It is found that the angle of deflection $\theta > a$.

Rajah 27 menunjukkan dua sfera bercas yang ringan, R dan S, digantung pada titik T menggunakan dua benang yang sama panjang, diperbuat daripada bahan yang tidak mengkonduksi elektrik. Ia didapati bahawa sudut pesongan $\theta > a$.

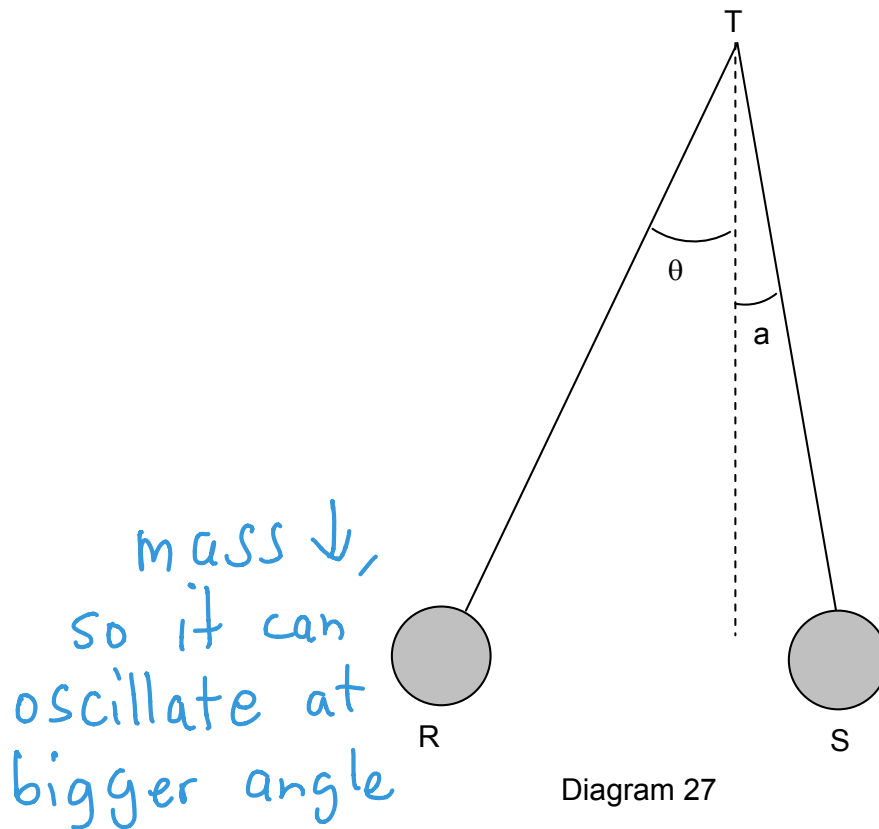


Diagram 27
Rajah 27

Which of the following statements is **true**?

Pernyataan yang manakah adalah **benar**?

- A. The charge of R is less than the charge of S
Cas R kurang daripada cas S
- B. The charge of R is greater than the charge of S
Cas R lebih besar daripada cas S
- ☒ C. The mass of R is less than the mass of S
Jisim R kurang daripada jisim S
- D. The mass of R is greater than the mass of S
Jisim R lebih besar daripada jisim S

37. Diagram 28 shows three different types of wires, X, Y and Z with the same length and thickness. X is copper wire, Y is iron wire and Z is constantan wire.

Rajah 28 menunjukkan tiga jenis dawai, X, Y dan Z dengan panjang dan ketebalan yang sama. X ialah dawai kuprum, Y ialah dawai besi dan Z ialah dawai konstantan.

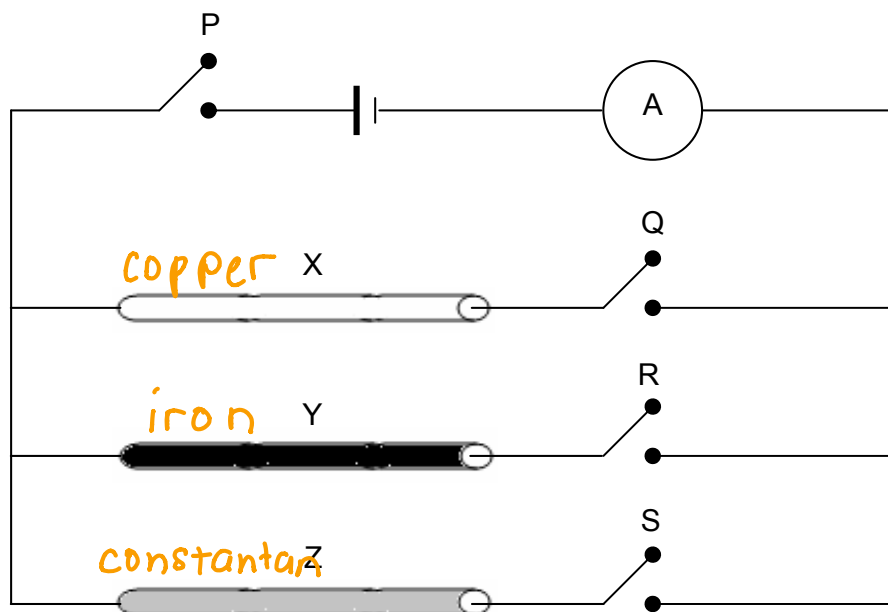


Diagram 28

Rajah 28

Ohm's Law,
 $V = IR$
 $I = \frac{V}{R}$
 $I \propto \frac{1}{R}$

$I \uparrow R \downarrow$

Which switch(es) should be switched on to get the highest reading of ammeter?

Suis yang manakah harus dihidupkan untuk menghasilkan bacaan ammeter yang paling tinggi?

- A. P and Q
P dan Q
- B. P and R
P dan R
- C. P and S
P dan S
- D. P only
P sahaja

38. Diagram 29 shows two resistors $R = 3\ \Omega$ that are connected to a dry cell which has an electromotive force, $E = 12\text{ V}$ and internal resistance $1.5\ \Omega$.

Rajah 29 menunjukkan dua perintang $R = 3\ \Omega$ yang dipasang ke suatu sel kering yang mempunyai daya gerak elektrik, $E = 12\text{ V}$ dan rintangan dalam $1.5\ \Omega$.

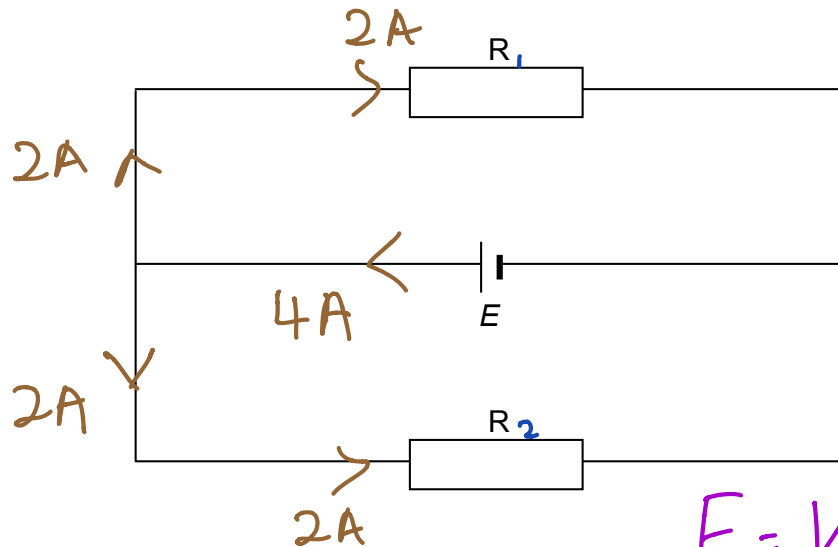


Diagram 29
Rajah 29

What is the current flows through each resistor?

Apakah arus yang mengalir melalui setiap perintang?

- A. 1 A
- ☒ B. 2 A
- C. 3 A
- D. 4 A

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$= \frac{1}{3} + \frac{1}{3}$$

$$\frac{1}{R} = \frac{2}{3}$$

$$R = \frac{3}{2}$$

$$= 1.5\ \Omega$$

Emf,

$$E = V + Ir$$

$$E = I(R + r)$$

$$I = \frac{E}{R + r}$$

$$= \frac{12}{1.5 + 1.5}$$

$$= \frac{12}{3}$$

$$= 4\text{ A}$$

So $4\text{ A} \div 2$ (parallel circuit)

$$= 2\text{ A}$$

39. Diagram 30 shows label on the mini hair dryer.

Rajah 30 menunjukkan label pada pengering rambut mini.

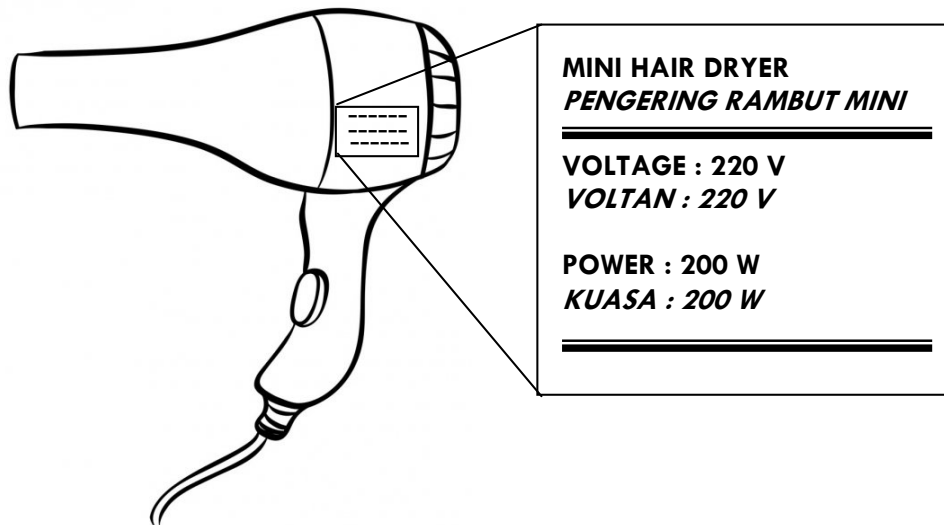


Diagram 30

Rajah 30

What is the meaning of 220 V, 200 W labeled on the hair dryer?

Apakah yang dimaksudkan dengan 220 V, 200 W yang dilabelkan pada pengering rambut tersebut?

- A. When a power of 200 watts is supplied to the hair dryer, it will release potential difference at 220 volts
Apabila satu kuasa 200 watt dibekalkan kepada pengering rambut, ia akan membebaskan beza keupayaan pada 220 volt
- B. When a potential difference of 200 watts is supplied to the hair dryer, it will release power at 220 volts per second
Apabila satu beza keupayaan 200 watt dibekalkan kepada pengering rambut, ia akan membebaskan kuasa pada 220 volt per saat
- ☒ C. When a potential difference of 220 volts is supplied to the hair dryer, it will release power at 200 joules per second
Apabila satu beza keupayaan 220 volt dibekalkan kepada pengering rambut, ia akan membebaskan kuasa pada 200 joule per saat
- D. When a potential difference of 220 volts is supplied to the hair dryer, it will release power at 200 watt per second
Apabila satu beza keupayaan 220 volt dibekalkan kepada pengering rambut, ia akan membebaskan kuasa pada 200 watt per saat

40. Diagram 31 shows a wire carrying a current, I is placed between two magnetic poles.
Rajah 31 menunjukkan satu dawai membawa arus, I ditempatkan di antara dua kutub magnet.

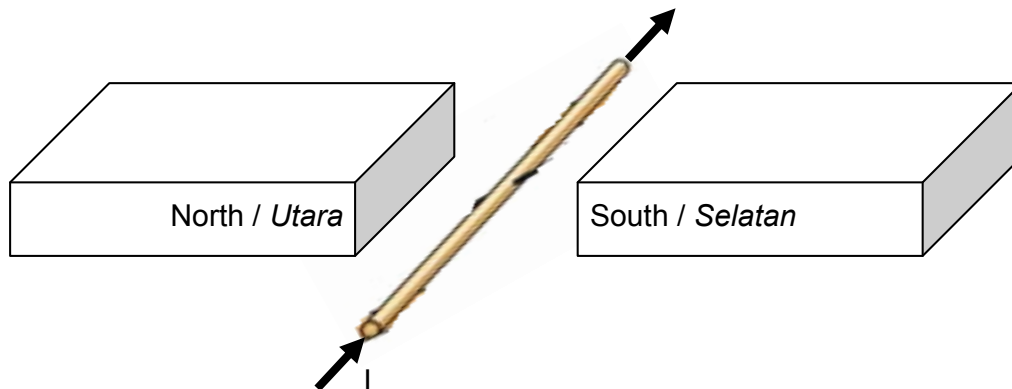
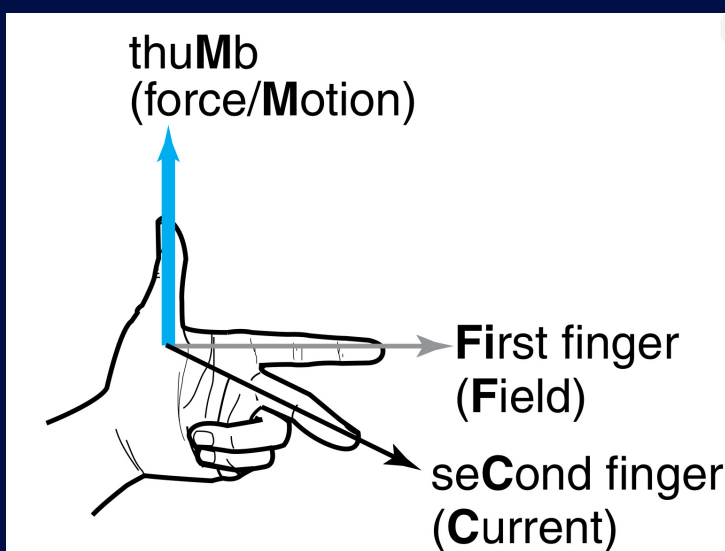
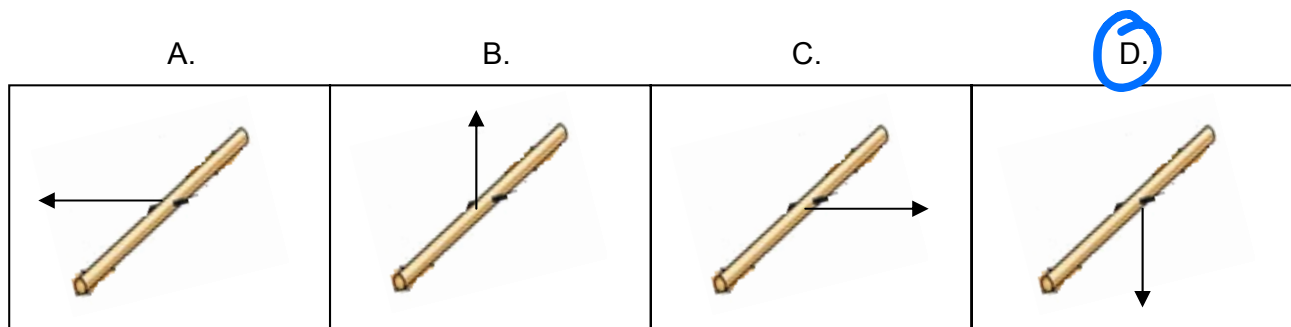


Diagram 31
Rajah 31

Which of the directions indicates the direction of the force acting on the wire?
Arah yang manakah menunjukkan arah daya bertindak ke atas wayar tersebut?



To determine the direction of the force or motion correctly:

- 1 Point the first finger of your left hand in the direction of the magnetic field.
Hold it with your right hand.
- 2 Point the second finger of your left hand in the direction of the current while you still hold your first finger firmly without changing its direction.
- 3 The thumb will point in the direction of the force/motion.

41. Diagram 32 shows a coil of wire is wrapped round a soft iron rod.

Rajah 32 menunjukkan suatu gegelung dawai dibalut mengelilingi rod besi lembut.

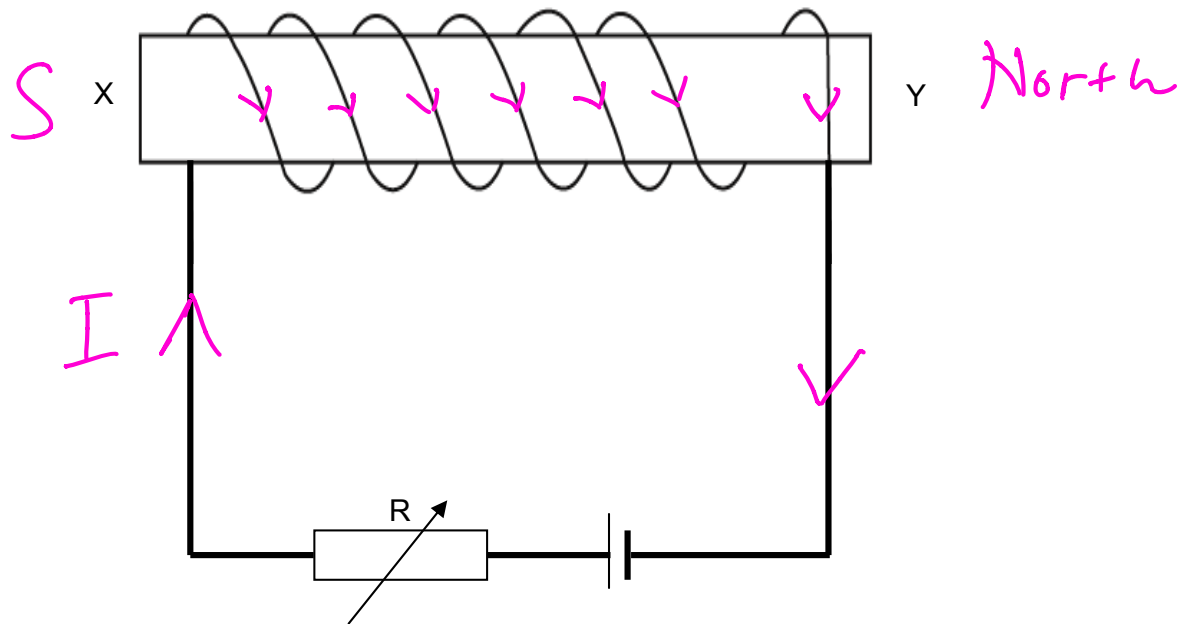


Diagram 32

Rajah 32

Which of the following statement is **true**?

Pernyataan yang manakah adalah **benar**?

A. The strength of the magnet decreases by increasing the resistance of R

Kekuatan magnet berkurang dengan peningkatan rintangan R

B. End Y of the rod behaves as a north pole magnet

Hujung rod Y bertindak sebagai kutub magnet utara

C. The polarity at the ends of the rod depends on the strength of the current in the circuit

Kekutuban pada hujung rod bergantung kepada kekuatan arus dalam litar

D. End Y of the rod behaves as a south pole magnet

Hujung rod Y bertindak sebagai kutub magnet selatan

(a) the **right-hand grip rule** (for a solenoid)

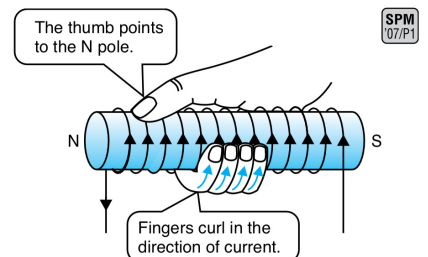


Figure 3.16 Right-hand grip rule for a solenoid

Imagine gripping the current-carrying solenoid with your **right hand** so that your fingers curl round the solenoid in the direction of the current. Your **thumb** will then point towards the **north pole** (N pole) of the solenoid.

42. Diagram 33 shows a transformer consists of primary coil with 1000 turns and a secondary coil, with total of 100 turns, which can be adjusted at various position.
Rajah 33 menunjukkan suatu transformer yang terdiri daripada gegelung primer 1000 lilitan dan suatu gegelung sekunder, dengan jumlah 100 lilitan, yang boleh dilaraskan pada pelbagai kedudukan.

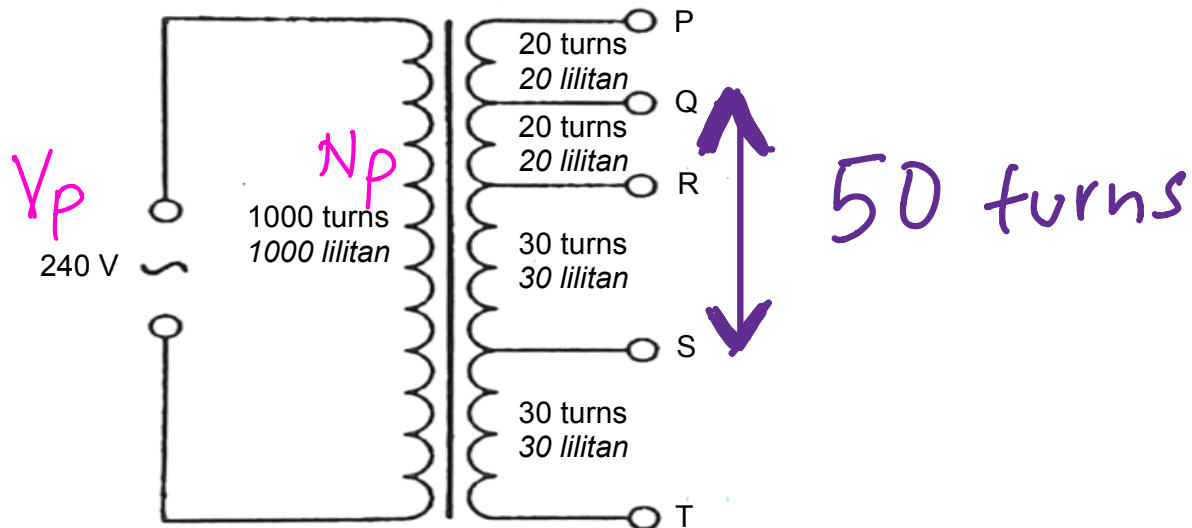


Diagram 33

Rajah 33

Which pair of terminals should be connected to a 12 V, 24 W lamp for it to be lit with normal brightness?

Pasangan terminal yang manakah sepatutnya disambungkan kepada suatu lampu 12V, 24 W supaya ia dapat menyala dengan kecerahan biasa?

- A. PR
- B. PT
- ☒ C. QS
- D. RT

$$\frac{V_s}{V_p} = \frac{N_s}{N_p}$$

$$\frac{12}{240} = \frac{N_s}{1000}$$

$$N_s = 50 \text{ turns}$$

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[Lihat halaman sebelah]

43. The National Grid Network is a network of electrical cables connecting electrical power stations to consumer of electricity as shown in diagram 34.

Rangkaian Grid Nasional ialah suatu rangkaian kabel elektrik yang menghubungkan stesen kuasa elektrik kepada pengguna elektrik seperti yang ditunjukkan dalam rajah 34.

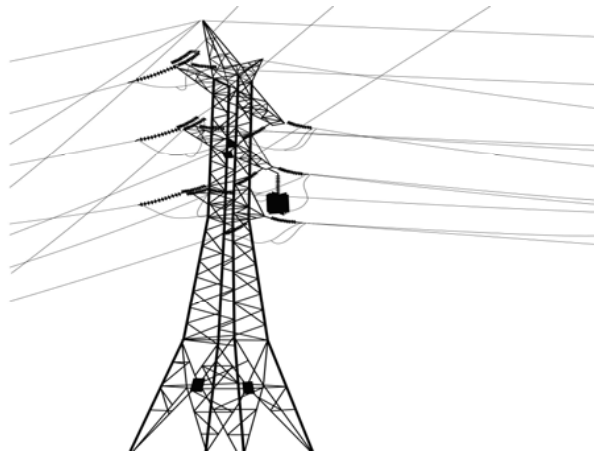


Diagram 34

Rajah 34

Which of the following is the characteristic of the National Grid Network in electricity transmission?

Manakah yang berikut adalah ciri-ciri Rangkaian Grid Nasional dalam penghantaran tenaga elektrik?

- A. The electricity can be transmitted at low potential difference during peak hours of electricity usage
Tenaga elektrik boleh diagihkan pada beza keupayaan rendah semasa penggunaan elektrik pada waktu puncak
- B. The whole country's electricity supply will be affected when one power station breaks down
Keseluruhan bekalan kuasa negara akan terganggu apabila sebuah stesen kuasa rosak
- C. During non-peak hours of electricity usage, the operation of some power stations can not be stopped for repair and maintenance purposes
Semasa penggunaan elektrik pada bukan waktu puncak, sebahagian stesen kuasa tidak boleh diberhentikan untuk tujuan pembaikan dan penyelenggaraan
- ☒ D. Some power stations can be closed during non-peak hours to cut cost
Sebahagian stesen kuasa boleh ditutup semasa bukan waktu puncak untuk menjimatkan kos

44. Diagram 35 shows the structure of a cathode ray oscilloscope.

Rajah 35 menunjukkan struktur sebuah osiloskop sinar katod.

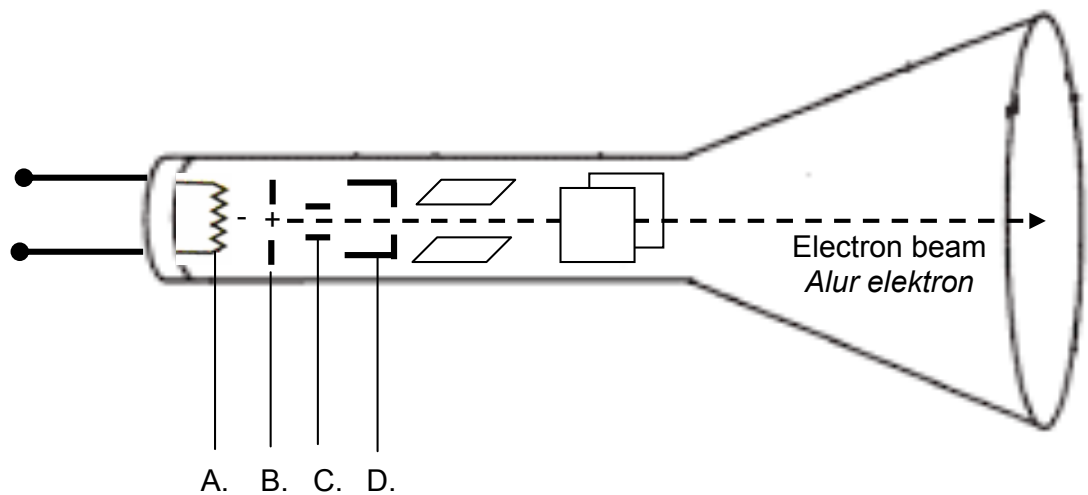


Diagram 35

Rajah 35

Which component, **A**, **B**, **C** or **D** causes the electrons to accelerate?

Antara komponen **A**, **B**, **C** atau **D**, manakah yang menyebabkan elektron dipecutkan?

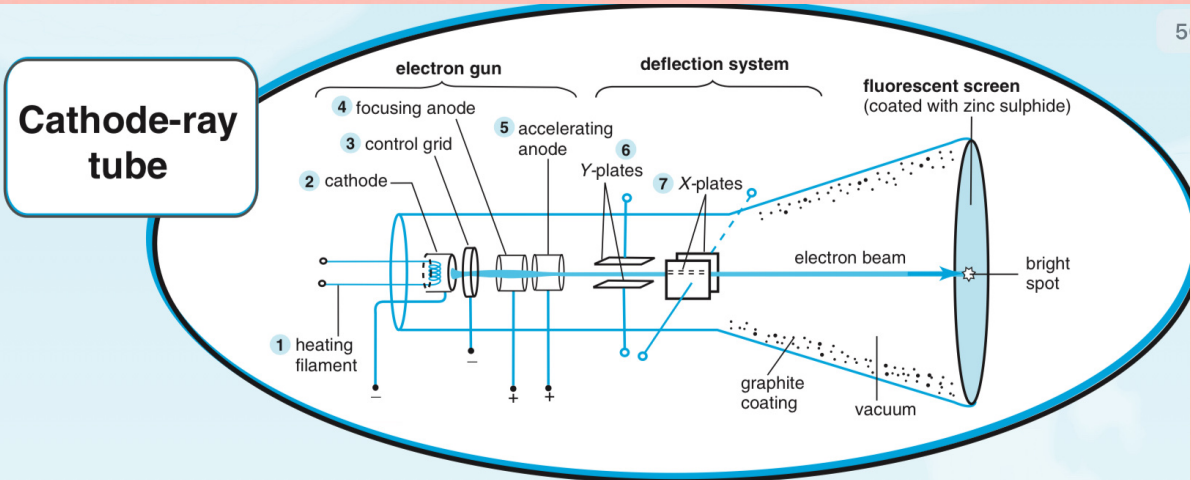


Figure 4.9

(a) An **electron gun** which is used to produce a narrow beam of electrons. Table 4.3 describes the function of each component in the electron gun.

Component	1 Heating filament	2 Cathode	3 Control grid	4 Focusing anode	5 Accelerating anode
Function	Heats the cathode to a high temperature.	Emits electrons from its surface after being heated to a high temperature.	Regulates the number of electrons which reach the anode and therefore control the brightness of the spot on the screen.	Focuses the electrons leaving the cathode to a narrow beam so that they arrive at the same spot on the screen.	Accelerates the electron beam to a high velocity.

45. Diagram 36 shows an automatic switch circuit to light up a bulb at night.

Rajah 36 menunjukkan suatu litar suis automatik untuk menyalakan mentol pada waktu malam.

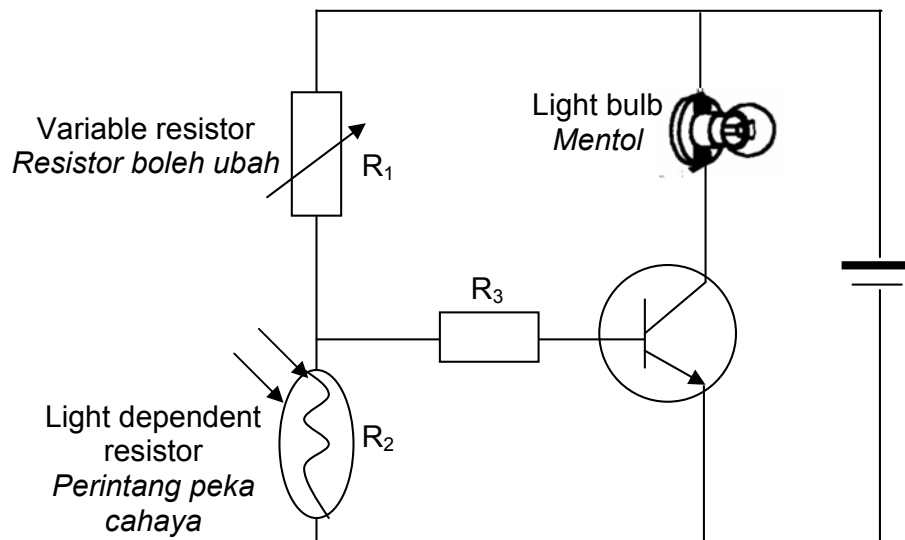


Diagram 36

Rajah 36

What changes should be done to light up the bulb during the day time?

Apakah perubahan yang perlu dilakukan untuk menyalakan mentol pada waktu siang?

A. Reverse the terminals of the battery

Songsangkan terminal bateri

B. Interchange R_1 and R_2

Tukar antara R_1 dan R_2

C. Replace the npn transistor with a pnp transistor

Ganti transistor npn dengan transistor pnp

D. Replace resistor R_3 with a resistor of lower resistance

Ganti perintang R_3 dengan perintang yang lebih rendah rintangan

The Transistor as a Switch

- 1 In a transistor, no current can flow in the collector circuit unless a current flows in the base circuit. This property allows a transistor to be used as a switch.
- 2 The transistor can be turned on or off by changing the base current.
- 3 There are a few types of switching circuits operated by transistors.

(A) Light-operated switch

- The circuit in Figure 4.53 is designed to light the bulb in a bright environment and to turn it off in the dark.

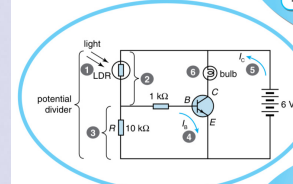
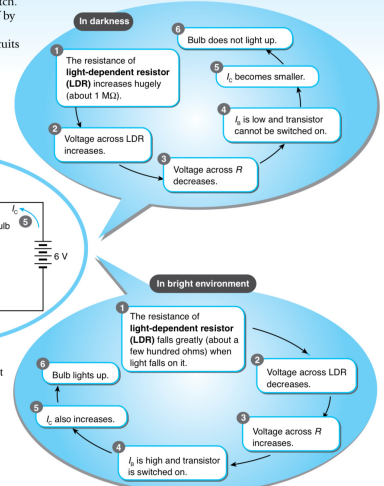


Figure 4.53 A light-operated switch circuit

- If the positions of the LDR and resistor R are interchanged, the bulb switches off in the bright environment and turns on in the dark.



46. Diagram 37 shows a circuit consisting of a diode and a bulb. When the switch is on, the bulb does not light up.

Rajah 37 menunjukkan suatu litar yang mengandungi diod dan mentol. Apabila suis dihidupkan, mentol tidak menyala.

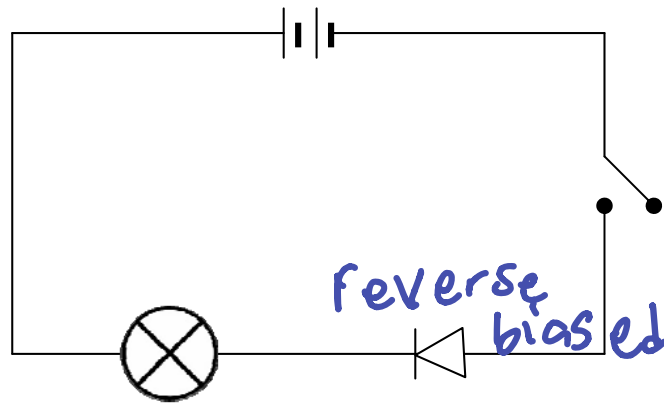


Diagram 37

Rajah 37

What needs to be done to light up the bulb?

Apakah yang perlu dilakukan untuk menyalakan mentol tersebut?

A. Replace with a new bulb

Menggantikan mentol baru

B. Increase the number of dry cells

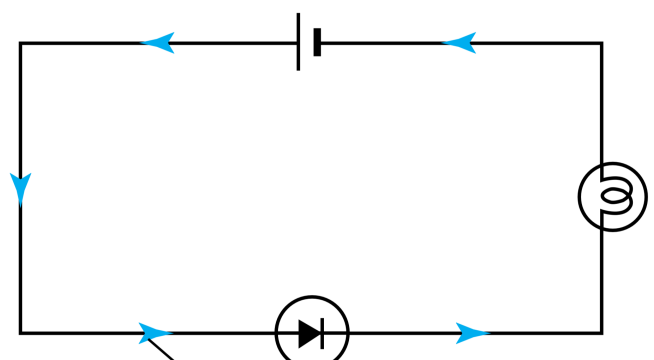
Menambahkan bilangan sel kering

C. Reverse the diode connection

Menyongsangkan sambungan diod

D. Connect a resistor parallel to the bulb

Menyambungkan satu perintang selari dengan mentol



both current and symbol of diode
in the same direction

47. Diagram 38 shows the combination of three logic gates.

Rajah 38 menunjukkan kombinasi tiga get logik.

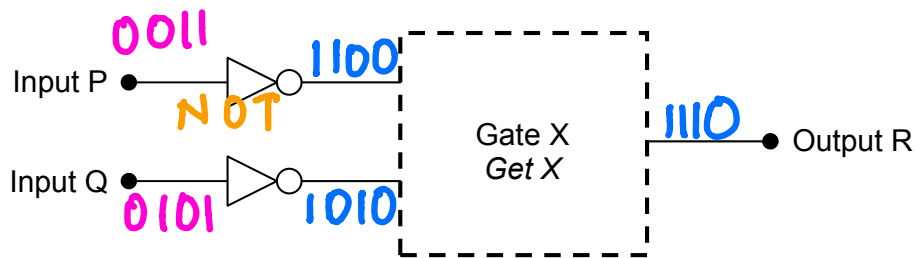


Diagram 38

Rajah 38

The truth table for the combination of the three logic gates is as follows :

Jadual kebenaran bagi kombinasi tiga get logik tersebut adalah seperti berikut :

Input		Output
P	Q	R
0	0	1
0	1	1
1	0	1
1	1	0

What is gate X?

Apakah get X?

A. AND

DAN

B. OR

ATAU

C. NAND

TAKDAN

D. NOR

TAKATAU

NOT output R output

P	Q	R
1	1	1
1	0	1
0	1	1
0	0	0

OR gate

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[Lihat halaman sebelah]

48. Diagram 39 shows the path of radioactive rays, S and T.

Rajah 39 menunjukkan lintasan sinaran radioaktif S dan T.

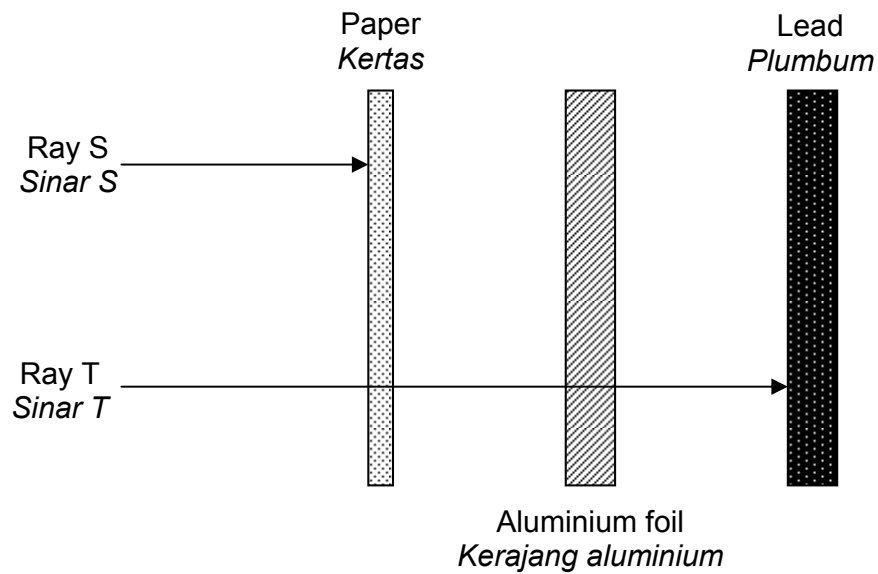


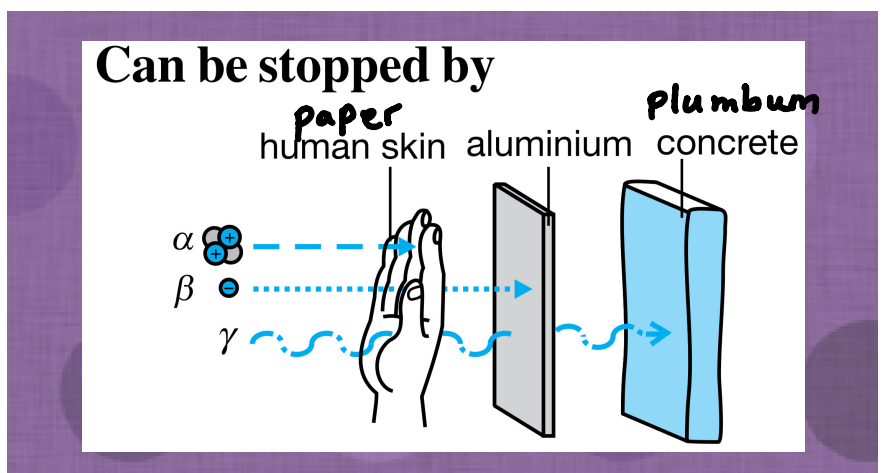
Diagram 39

Rajah 39

Which of the following shows the type of ray S and ray T?

Manakah antara berikut menunjukkan jenis sinar S dan sinar T?

	Ray S <i>Sinar S</i>	Ray T <i>Sinar T</i>
A.	α	β
B.	α	γ
C.	β	γ
D.	γ	β



49. Diagram 40 shows decay curve of a radioactive material.

Rajah 40 menunjukkan lengkung pereputan satu bahan radioaktif.

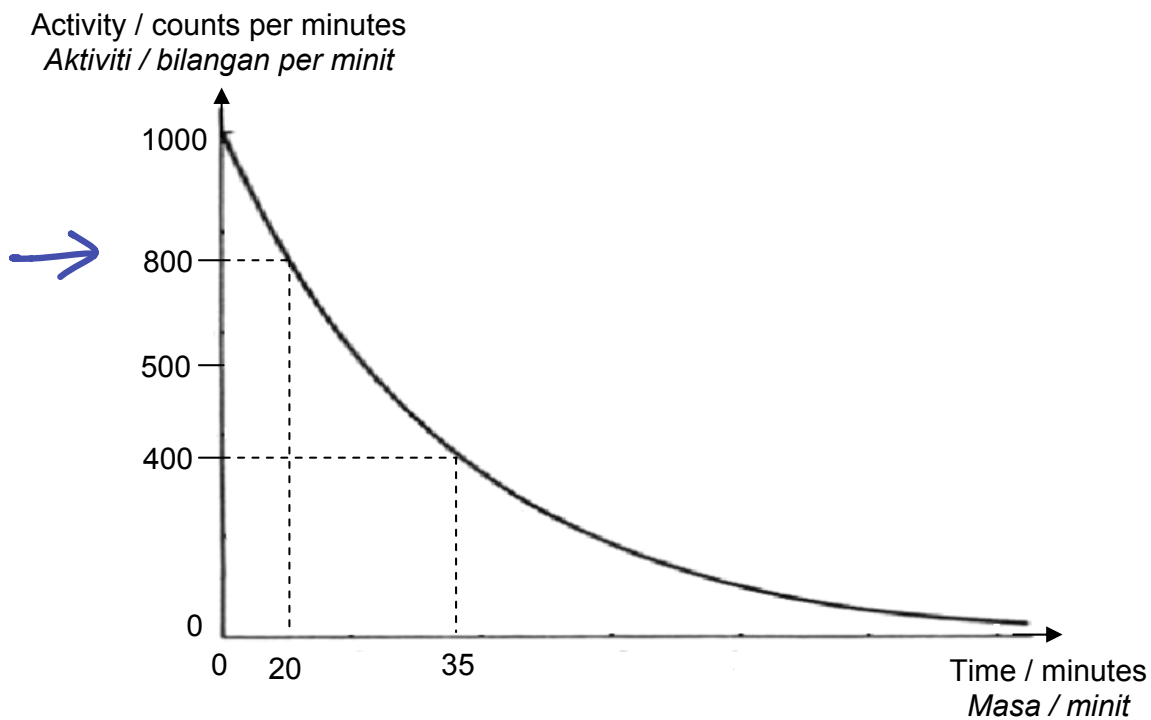


Diagram 40

Rajah 40

What is the activity after 1 hour?

Berapakah aktiviti selepas 1 jam?

- A. 50
- B. 100
- C. 200
- D. 400

Activity 800 → 400

20 min → 35 min

So, 15 min to become half from initial activity

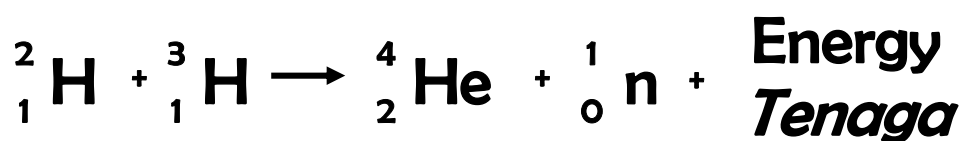
Half life, $T_{1/2} = 15 \text{ min}$

Activity

So 800 → 400 → 200 → 100 → 50
15min 15min 15min 15min

50. The following equation represents a nuclear fusion.

Persamaan berikut mewakili pelakuran nuklear.



The mass defect from the reaction is 0.018863 a.m.u.

What is the energy released in the reaction?

↑
must convert to kg

Cacat jisim daripada tindak balas itu ialah 0.018863 u.j.a.

Berapakah tenaga yang dibebaskan semasa tindak balas tersebut?

Given :

[1 a.m.u = 1.66×10^{-27} kg]

Diberi :

[1 u.j.a = 1.66×10^{-27} kg]

$$E = mc^2$$

$$= 0.018863 \times (1.66 \times 10^{-27}) \times (3 \times 10^8)^2$$

$$= 2.8181 \times 10^{-12} \text{ J}$$

A. 9.39×10^{-21} J

☒ B. 2.82×10^{-12} J

C. 5.66×10^6 J

D. 1.70×10^{15} J

END OF EVALUATION MODULE
MODUL PENILAIAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **50** questions.
*Kertas soalan ini mengandungi **50** soalan.*
2. Answer **all** questions.
*Jawab **semua** soalan.*
3. Each question is followed by **four** options. Choose the best option for each question and blacken the correct space on the objective answer sheet.
*Tiap-tiap soalan diikuti oleh **empat** pilihan jawapan. Pilih satu jawapan yang terbaik bagi setiap soalan dan hitamkan ruangan yang betul pada kertas jawapan objektif.*
4. Blacken only **one** space for each question.
*Hitamkan **satu** ruangan sahaja bagi setiap soalan*
5. If you wish to change your answer, erase the blackened mark that you have made.
Then blacken the space for the new answer.
*Sekiranya anda telah menukarkan jawapan, padamkan tanda yang telah dibuat.
Kemudian hitamkan jawapan yang baru.*
6. The diagrams in the questions provided are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
7. You may use a non programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.
8. A list of the formulae is provided on pages 2 and 3.
Satu senarai formula disediakan di halaman 2 dan 3