

FIZIK

TINGKATAN 4

BAB 3

DAYA DAN
TEKANAN

MODUL

CEMERLANG

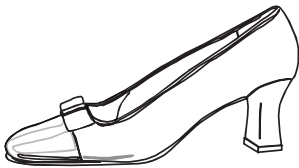
KERTAS 1

- 1 A woman has 4 type of shoes will exert the greatest pressure on the ground when she wears them?
Seorang wanita mempunyai 4 jenis kasut yang manakah akan mengalami tekanan yang paling besar apabila wanita itu memijak sesuatu permukaan dengan memakainya?

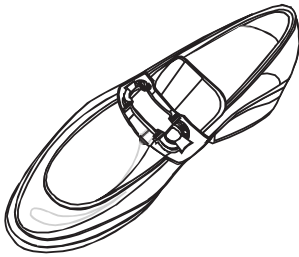
A.



B.



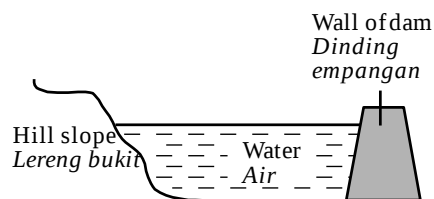
C.



D.



2. Diagram below shows a water reservoir
Rajah di bawah menunjukkan sebuah empangan.

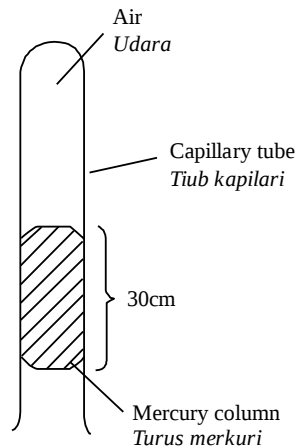


The base of the wall is thicker because
Bahagian bawah dinding lebih tebal kerana

- A. it will be more stable
dinding akan lebih stabil
B. the density of water is high
ketumpatan air tinggi
C. pressure of the water is highest at the surface

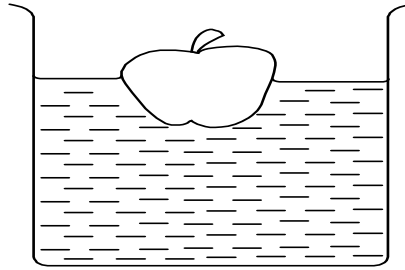
- tekanan paling tinggi di bahagian permukaan air*
D. Pressure of the water is highest at the base
Tekanan paling tinggi di bahagian bawah

- 3 Diagram below shows a mercury column in a capillary tube. There is air trapped in the upper part of the tube.
Rajah di bawah menunjukkan satu turus merkuri di dalam sebuah tiub kapilari. Terdapat udara terperangkap di bahagian atas tiub itu.



What is the air pressure in the tube? [Atmospheric pressure=76cmHg]
Berapakah tekanan udara di dalam tiub itu? [Tekanan atmosfera=76cmHg]

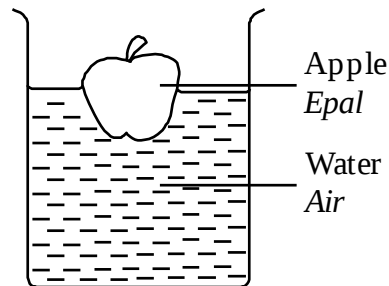
- A. 30cmHg
B. 46cmHg
C. 76cmHg
D. 106cmHg
- 4 Why is the atmospheric pressure at a higher altitude lower?
Mengapakah tekanan atmosfera pada tempat yang tinggi altitudnya adalah rendah?
- A. Temperature is high
Suhu adalah tinggi
B. Density of air is high
Ketumpatan udara adalah tinggi
C. The layer of air is thin
Lapisan udara adalah nipis
D. The volume of air does not change
Isipadu udara tidak berubah
- 5 Diagram below shows an apple is floating in a beaker of water.
Rajah di bawah menunjukkan sebuah epal sedang terapung dalam sebuah bikar berisi air.



Which of the following statements describes the buoyant force correctly?
Manakah pernyataan berikut menerangkan daya keapungan dengan betul?

- A. The buoyant force equals to the mass of the water displaced
Daya keapungan sama dengan jisim air yang disesarkan
- B. The buoyant force equals to the weight of the apple
Daya keapungan sama dengan berat epal
- C. The buoyant force equals to the volume of the water displaced
Daya keapungan sama dengan isipadu air yang disesarkan
- D. The buoyant force equals to the mass of the apple
Daya keapungan sama dengan jisim epal

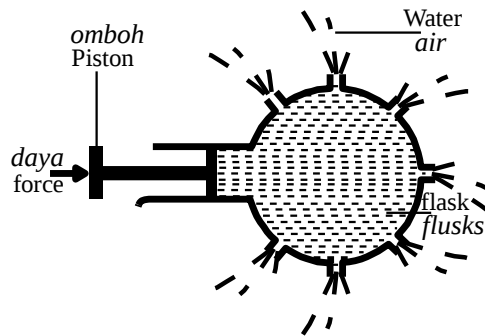
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- C. The buoyant force equals to the volume of the water displaced
Daya keapungan sama dengan isipadu air yang disesarkan
- D. The buoyant force equals to the mass of the apple
Daya keapungan sama dengan jisim epal

- 7 Diagram below shows water spurting out from a flask when a force is exerted on the piston.
Rajah di bawah menunjukkan pancutan air yang keluar dari flusk apabila satu daya dikenakan ke atas ombok.

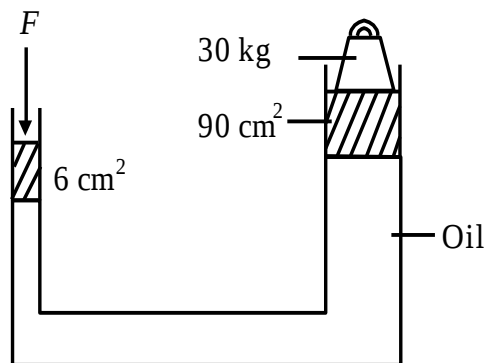


Why does the water spurt out uniformly in all directions?

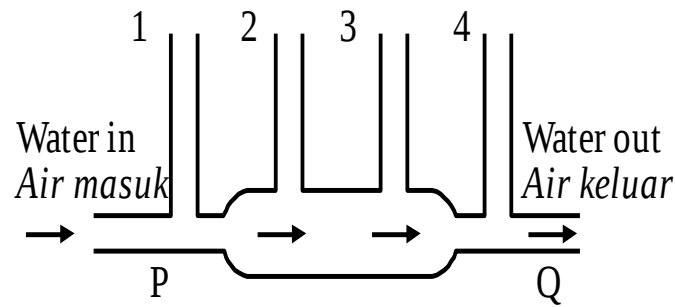
Kenapa pancutan air yang keluar adalah seragam kesemua arah?

- A. Force is exerted uniformly
Daya yang dikenakan adalah seragam
- B. Surface area of piston is small
Luas permukaan ombboh adalah kecil
- C. Pressure is transmitted uniformly
Tekanan yang dipindahkan adalah seragam
- D. The holes on the surface of the flask are small
Lubang-lubang yang berada di permukaan flusk adalah kecil

- 8 Diagram below shows a hydraulic jack in equilibrium. Calculate the value of F .
Rajah di bawah menunjukkan jek hidraulik dalam keseimbangan. Hitungkan nilai F .

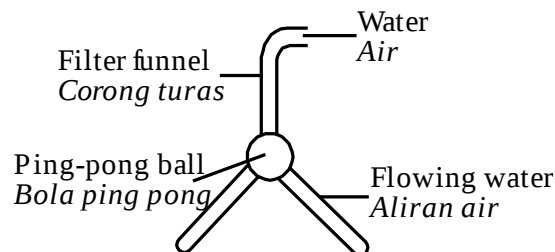


- A. 10 N
 - B. 20 N
 - C. 30 N
 - D. 40 N
- 9 Diagram below shows water is flowing in through P and flowing out from Q. This will affect the level of water in each tube. Which of these tubes will experience the highest pressure?
Rajah di bawah menunjukkan aliran air masuk melalui P dan keluar melalui Q. Hal ini memberi kesan kepada paras air dalam setiap tiub. Tiub yang manakah akan mengalami tekanan yang paling tinggi?

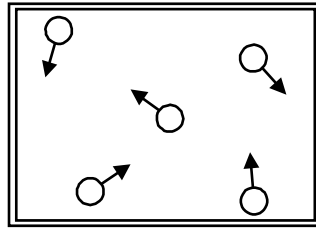


- A. Tube 1
Tiub 1
- B. Tube 2
Tiub 2
- C. Tube 3
Tiub 3
- D. Tube 4
Tiub 4

- 10 Diagram below shows the fast flowing water in the filter funnel. As a result the ping-pong ball sucked up. Which of the following statements is correct?
Rajah di bawah menunjukkan aliran air yang laju dalam suatu corong turas. Kesannya telah menyebabkan bola ping pong disedut ke atas. Antara pernyataan berikut yang manakah benar?



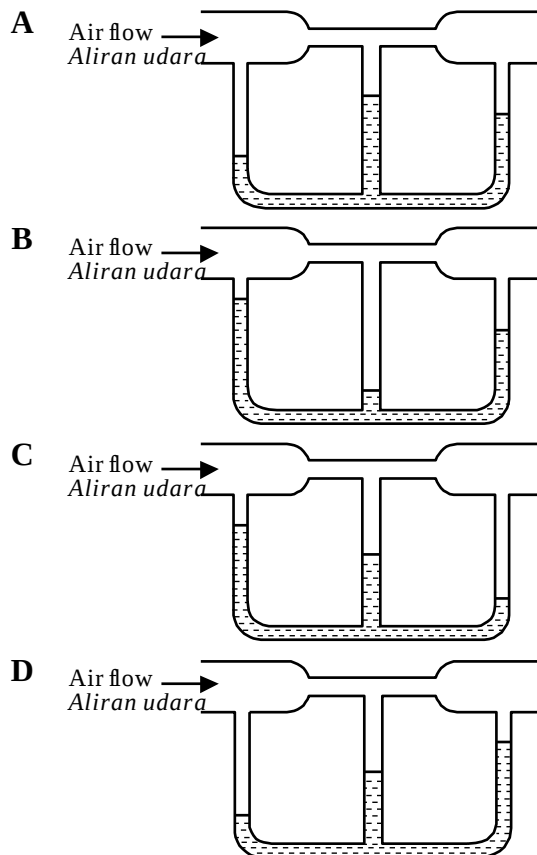
- A. The ping pong ball is sucked to the funnel by the water
Bola ping pong tersangkut pada corong turas oleh air
 - B. The upthrust from air is less than the weight of the ping pong ball
Tujahan ke atas oleh udara lebih besar berbanding berat bola ping pong
 - C. The flowing water has caused an apparent loss in weight of the ping pong ball
Aliran air telah menyebabkan kehilangan berat bola ping pong tersebut
 - D. There is a resultant force acting upwards to support the weight of the ping pong ball
Wujudnya daya paduan yang bertindak ke atas untuk menampung berat bola ping pong
- 11 Diagram below shows the random motion of the gas molecules inside a container.
Rajah di bawah menunjukkan gerakan rawak bagi molekul-molekul gas di dalam sebuah bekas.



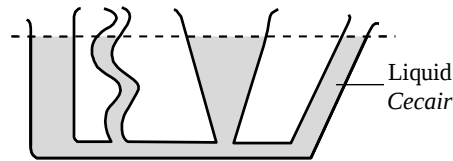
The pressure of the gas will not increase if
Tekanan gas tidak akan bertambah jika

- A** The number of molecules in the container is increased
Bilangan molekul di dalam bekas ditambah
- B** The mass of the molecules is increased
Jisim molekul ditambah
- C** The speed of the molecules is increased
Laju molekul ditambah
- D** The volume of the container is increased
Isipadu bekas ditambah

- 12 Which diagram shows the correct liquid level in the U-tube?
Maklumat berikut menunjukkan aras cecair yang betul di dalam tiub-U?



- 13 Diagram below shows the arrangement of an apparatus for an experiment.
Rajah di bawah menunjukkan susunan radas bagi satu eksperimen.

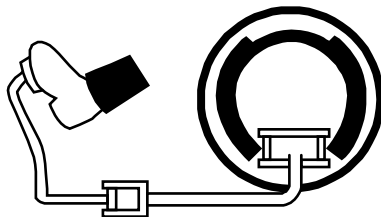


Which of the following conclusions is correct?

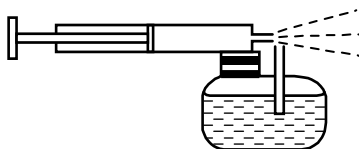
Yang manakah antara kesimpulan-kesimpulan berikut adalah betul?

- A Liquid pressure acts perpendicularly to its surface
Tekanan cecair bertindak tegak pada permukannya.
 - B Liquid pressure increases with depth
Tekanan cecair bertambah dengan kedalaman
 - C Liquid pressure does not depend on the shape of the container
Tekanan cecair tidak bergantung pada bentuk bekas isiannya
 - D Liquid pressure is caused by its weight acting on a surface
Tekanan cecair disebabkan oleh beratnya yang bertindak ke atas permukaan
- 14 Which of the following, works using Archimedes' Principle?
Manakah yang berikut, bekerja menggunakan Prinsip archimedes?

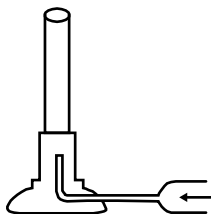
A



B



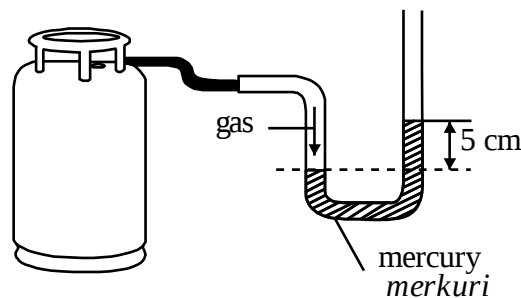
C



D



- 15 Diagram below shows a U-tube manometer connected to a gas tank whose valve is then turned on.
Rajah di bawah menunjukkan satu tiub-U manometer disambungkan kepada satu tangki gas yang kemudian dibuka injalnya.

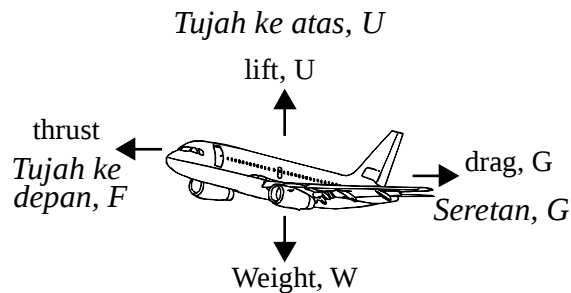


Determine the pressure of the gas in the tank.

Tentukan tekanan gas dalam silinder itu.

[Atmospheric pressure / Tekanan udara = 75 cm Hg]

- A 5 cm Hg
 B 70 cm Hg
 C 75 cm Hg
 D 80 cm Hg
 E 375 cm Hg
- 16 Diagram below shows an aeroplane flying at a constant height and at a uniform velocity.
Rajah di bawah menunjukkan sebuah kapal terbang yang sedang bergerak dengan halaju tetap pada ketinggian tetap.



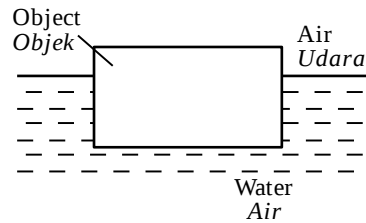
Which of the following pairs of forces are of the same magnitude?

Pasangan daya-daya manakah mempunyai magnitude yang sama?

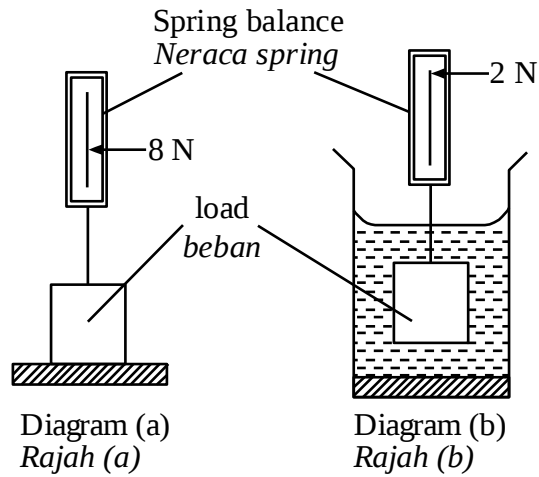
- A Thrust and drag
Tujah ke depan dan seretan
 B Drag and weight
Seretan dan berat
 C Lift and drag
Tujah ke atas dan seretan
 D Lift and thrust
Tujah ke atas dan tujah ke depan

- 17 Diagram below shows an object floating on the surface of water. Which statement is true?

Rajah di bawah menunjukkan satu objek terapung atas permukaan air. Pernyataan manakah adalah benar?



- A** The density of the object is greater than the density of the water
Ketumpatan objek lebih dari ketumpatan air
- B** The volume of water displaced is equal to the volume of the object
Isipadu air tersesar sama dengan isipadu objek
- C** The weight of water displaced is equal to the weight of the object
Berat air tersesar sama dengan berat objek
- D** The mass of the object is equal to the buoyant force on the object
Jisim objek sama dengan daya apungan objek
- 18 A balloon is rising vertically in the air. This is due to
Sebuah belon sedang naik menegak di udara. Ini adalah disebabkan oleh
- A** the balloon is filled with a light gas
belon tersebut telah diisi dengan gas yang ringan
- B** the gas in the balloon is cold
gas di dalam belon adalah sejuk
- C** the density of the balloon is more than the density of air
ketumpatan belon lebih besar berbanding ketumpatan udara
- D** the upthrust on the balloon is more than the weight of the balloon
tujahan ke atas belon lebih besar berbanding berat belon tersebut
- 19 The first Diagram below shows the weight of a load in air. The second Diagram below shows the same weight immersed in water.
Rajah pertama di bawah menunjukkan berat sebuah beban di udara. Rajah kedua di bawah menunjukkan beban yang sama dimasukkan ke dalam air?



What is the buoyant force when the load is fully immersed in water?

Berapakah daya tujah yang dialami oleh beban itu setelah dimasukkan ke dalam air?

- A 2N
- B 6N
- C 8N
- D 10N

- 20 Which of the following can be done to increase the kinetic energy of gas molecules in an air tight container?

Manakah yang berikut dapat dilakukan untuk menambah tenaga kinetik molekul-molekul gas dalam satu bekas yang kedap udara?

- A Increase the volume of the container.
Menambah isipadu bekas.
- B Decrease the volume of the container.
Mengurang isipadu bekas.
- C Increase the temperature of the container.
Menambah suhu bekas.
- D Decrease the temperature.
Mengurangkan suhu bekas.

KERTAS 2

BAHAGIAN A.

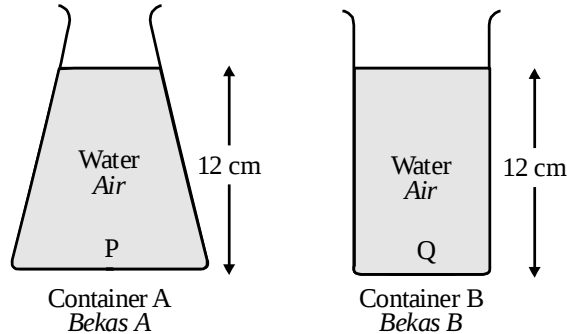
- 1 Diagram below shows cross-sectional of a wing of a moving aeroplane. The wing of aeroplane experiences a lift force.
Rajah di bawah menunjukkan suatu keratan rentas bagi sayap sebuah pesawat udara yang sedang bergerak. Sayap pesawat udara itu mengalami daya angkat.



- (a) Name the cross-section in diagram above.
Namakan bentuk keratan rentas dalam rajah di atas.
..... [1markah]
- (b) In diagram above,
Pada rajah di atas,
- (i) Draw and label the direction of the air flow.
Lukis dan labelkan arah aliran udara. [1markah]
- (ii) Label the region of high and low pressure.
Labelkan kawasan tekanan udara tinggi dan rendah. [1markah]
- (iii) Using an arrow, show the direction of the lift force, F .
Menggunakan anak panah, tunjukkan arah daya angkat F . [1markah]

2

Diagram below shows two different containers filled with water. The water pressure at point P and point Q are the same.
 Rajah di bawah menunjukkan dua bekas berlainan diisi dengan air.
 Tekanan air pada titik P dan titik Q adalah sama.



- (a) What is the meaning of pressure?
 Apakah maksud tekanan?

..... [1markah]

- (b) State one factor that affect the water pressure at point P and Q.
 Nyatakan satu faktor yang mempengaruhi tekanan air di titik P dan titik Q.

..... [1markah]

- (c) Calculate the water pressure at point P.
 [Density of water = 1000 kgm^{-3}]
 Hitungkan tekanan air pada titik P.
 [Ketumpatan air = 1000 kgm^{-3}]

- (d) Diagram A shows the water spurt when a hole is made near the base of container B.
 Rajah A menunjukkan pancutan air apabila satu lubang dibuat berdekatan dengan dasar bekas B. [2markah]

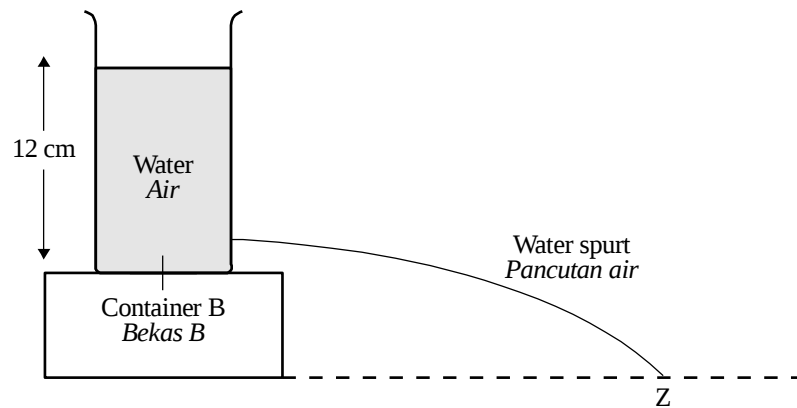


Diagram B shows the water in container B is replaced by liquid X which has higher density than water.

Rajah B menunjukkan air dalam bekas B digantikan dengan cecair X yang mempunyai ketumpatan yang lebih tinggi daripada air.

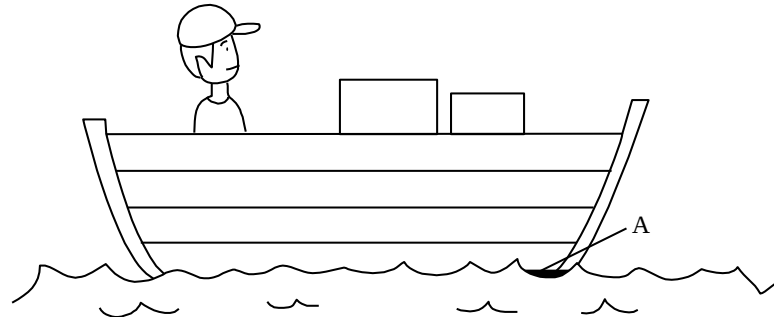
[1markah]

Sketch the spurt of liquid X in diagram B.

3

Diagram below shows a man in a boat filled with goods floating in the sea.

Rajah di bawah menunjukkan seorang lelaki di dalam sampan yang berisi muatan terapung di permukaan laut.

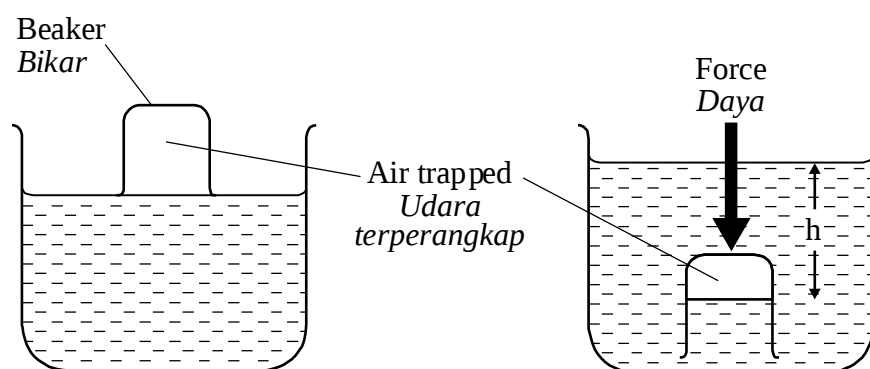


- (a) Explain why the boat does not sink in the sea?
Terangkan mengapa sampan tersebut tidak tenggelam ke dalam laut?
- [1markah]
- (b) State the principal involved in 4(a).
Nyatakan prinsip yang terlibat dalam 4 (a).
- [1markah]
- (c) When the boat entering a river mouth, will the water level on the boat be above mark “A” in Diagram above.
Explain your answer.
Apabila sampan memasuki muara sungai, adakah paras air pada sampan akan melebihi tanda “A” pada Rajah di atas.
Terangkan jawapan anda.
-
-
- [3markah]
- (d) If the density of water at river mouth is 1000 kgm^{-3} and the total mass of the boat, man and goods is 530 kg, calculate the volume of the water displaced.
Jika ketumpatan air di muara sungai 1000 kgm^{-3} dan jumlah jisim sampan, lelaki dan muatan ialah 530 kg, hitungkan isipadu air yang disesarkan.

4

Diagram (a) shows air was trapped in a beaker at the surface of water. The beaker is then push into water until it sinks at a depth, h , as shown in Diagram (b).

Rajah (a) menunjukkan udara terperangkap di dalam sebuah bikar pada permukaan air. Bikar itu kemudiannya ditolak masuk ke dalam air sehingga kepada kedalaman, h , seperti yang ditunjukkan pada Rajah (b).



- (a) Name the type of pressure that acts on the surface of water.
 Namakan jenis tekanan yang bertindak pada permukaan air itu.

..... [1markah]

- (b) Based on the Diagram (a) and Diagram (b); compare
 Berdasarkan Rajah (a) dan Rajah (b); bandingkan

- (i) The volume of air trapped in the beaker.
 Isipadu udara terperangkap dalam bikar.

..... [1markah]

- (ii) The pressure of air trapped in the beaker.
 Tekanan udara terperangkap dalam bikar.

..... [1markah]

- (c) (i) Based on the answer in (b)(i) and (b)(ii), state the relationship between the volume of air trapped and its pressure.
 Berdasarkan jawapan di (b)(i) dan (b)(ii), nyatakan hubungan antara isipadu udara terperangkap dan tekanannya.

..... [1markah]

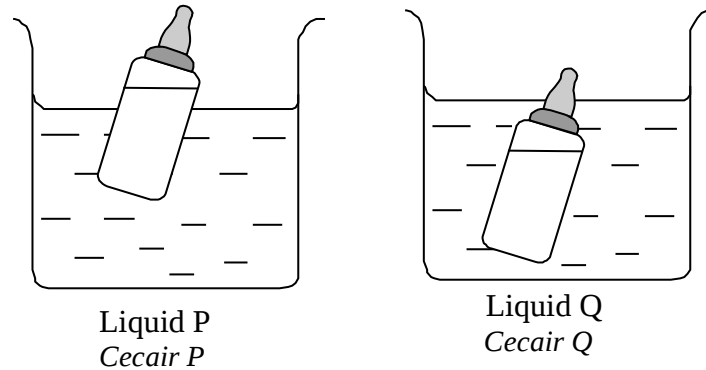
- (ii) Name the law involved in your answer in (c)(i).
Namakan hukum yang berkaitan dengan jawapan di (c)(i).

- (d) [1markah]
When the pushing force that pushes the beaker in Diagram (b) is removed, the beaker moved upward the water surface again.
Explain why the beaker moved upward the water surface.
Apabila daya yang menekan bikar dalam Rajah (b) dihilangkan, bikar itu diperhatikan bergerak ke permukaan air semula.
Terangkan mengapa bikar itu bergerak ke permukaan air.
-
.....
..... [3markah]

BAHAGIAN B [20 MARKAH]

- 5 (a) Diagram below shows two identical feeding bottle floating in liquid P and liquid Q respectively. The feeding bottle floats because the net force acting on the bottle is zero.

Rajah di bawah menunjukkan dua botol susu yang serupa terapung dalam cecair P dan cecair Q masing-masing. Botol susu itu terapung kerana daya bersih yang bertindak ke atas botol itu adalah sifar.



- (i) What is the meaning resultant force?
Apakah maksud daya paduan?

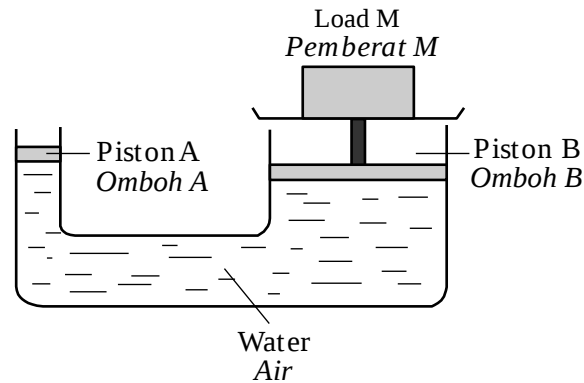
[1 mark/ markah]

- (ii) Using diagram above, compare the position of the bottles in liquid P and liquid Q. compare also the weights and buoyant forces that are acting on the bottles in liquid P and liquid Q. Compare the density of liquid P and liquid Q.

Menggunakan rajah di atas, bandingkan kedudukan botol susu dalam cecair P dan cecair Q. Bandingkan juga berat botol dan daya julangan yang bertindak ke atas botol dalam cecair P dan cecair Q. Bandingkan ketumpatan cecair P dan cecair Q. hubungkaitkan kedudukan botol dengan ketumpatan cecair bagi menghasilkan satu konsep fizik yang sesuai.

[5 marks/ markah]

- (b) Diagram below shows a simple hydraulic jack.
Rajah di bawah menunjukkan satu jek hidraulik yang ringkas.



Explain how load M can be lifted and give a reason why the cross sectional area of piston A is smaller than the cross sectional area of piston B.

Terangkan bagaimana pemberat M boleh diangkat dan berikan satu sebab mengapa luas keratan rentas omboh A lebih kecil dari luas keratan rentas omboh B.

[4 marks/ markah]

- (c) The simple hydraulic jack in diagram above is not suitable to use to lift a car in a workshop.

Using suitable physics concepts, explain the required modification that need to be done to enable the machine to lift a car easily in a workshop.

You can emphasise on the following aspects in your modification:

Jek hidraulik ringkas dalam rajah di atas tidak sesuai untuk digunakan bagi mengangkat sebuah kereta di dalam bengkel membaiki kereta. Menggunakan konsep fizik yang sesuai

[1 mark/ markah]

- (i) Method so that only small force is applied at piston A.
Kaedah supaya daya yang kecil sahaja dikenakan pada omboh A.
- (ii) Component to control flow of liquid in the hydraulic jack
Komponen untuk mengawal pengaliran cecair di dalam jek hidraulik.
- (iii) Component in the hydraulic jack to lower the car
Komponen di dalam jek hidraulik untuk menurunkan kereta
- (iv) Size of pistons
Saiz piston
- (v) Type of liquid used
Jenis cecair yang digunakan

[10 marks/ markah]

BAHAGIAN C [20 MARKAH]

- 6 Diagram (a) shows a small aircraft. Diagram (b) shows a cross section of the aircraft's wings.

Rajah (a) menunjukkan kapal terbang kecil. Rajah (b) menunjukkan keratan rentas sayap kapal terbang tersebut.

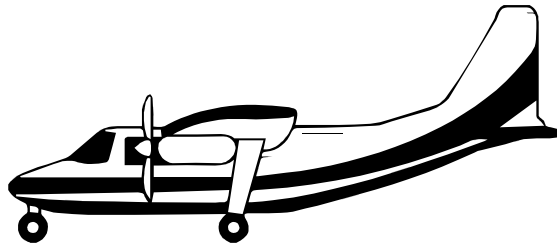


Diagram (a)
Rajah (a)

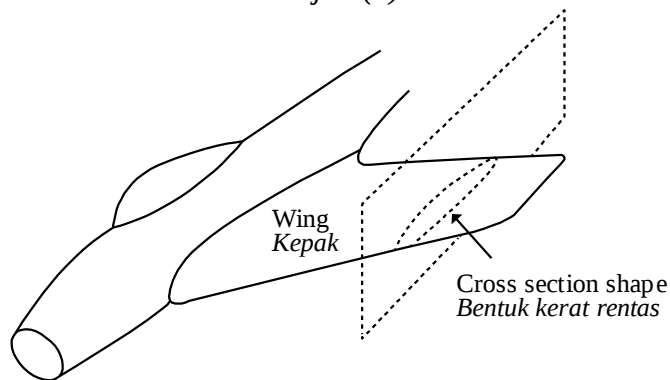
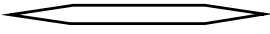


Diagram (b)
Rajah (b)

- (a) Name the shape of the cross section of the aircraft wings.
Namakan bentuk keratan rentas bagi sayap kapal terbang. [1 mark/ markah]
- (b) The aircraft is lifted when flying due to a difference pressure of the air between the upper and bottom sides of the wings.
Kapal terbang itu terangkat semasa terbang disebabkan adanya perbezaan tekanan udara di antara bahagian atas dan bawah sayapnya.
- (i) Explain how this difference in pressure is produced.
Terangkan bagaimana perbezaan tekanan ini terhasil. [3 marks/ markah]
- (ii) Name the principle involved in your answer in (b)(i).
Namakan prinsip yang terlibat dalam jawapan anda untuk (b)(i). [1 mark/ markah]
- (c) Table below shows the characteristic of four designs of the aircraft wings.
Jadual di bawah menunjukkan ciri-ciri bagi empat rekabentuk bagi sayap kapal terbang.
-

Design <i>Rekabentuk</i>	Shape of cross section of wing <i>Bentuk keratan rentas sayap</i>	Area of wing <i>Keluasan sayap / m²</i>	Density of wing material <i>Ketumpatan bahan sayap / kg m⁻³</i>	Difference in speed of air above and below the wing <i>Perbezaan laju udara diantara bahagian atas dan bawah sayap / ms⁻¹</i>
P		40.0	2100	10.0
Q		41.5	2300	0.0
R		42.5	2000	0.0
S		38.2	2050	8.0

You are requested to choose a suitable wing to be installed with the body of the aircraft.

Anda dikehendaki memilih sayap yang sesuai untuk dipasang bersama badan kapal terbang.

By referring to the information given in table above, explain the suitability of each characteristic and suggest the most suitable wing to be installed with the body of the aircraft.

Dengan merujuk kepada maklumat yang diberikan dalam jadual di atas, terangkan kesesuaian setiap ciri dan cadangkan sayap yang paling sesuai untuk dipasang bersama badan kapal terbang tersebut.

[10 mark/ markah]

- (d) An aircraft installation department chooses wing P to be installed with its aircrafts which has maximum mass 800 kg.

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

- (i) The different pressure between below and above the wing is 500 Nm^{-2} . Calculate the lift force exerted to the wing.

Beza tekanan udara antara bawah sayap di atasnya ialah 500 Nm^{-2} .

Kirakan daya angkat yang bertindak pada sayap.

[2 marks/ markah]

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

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

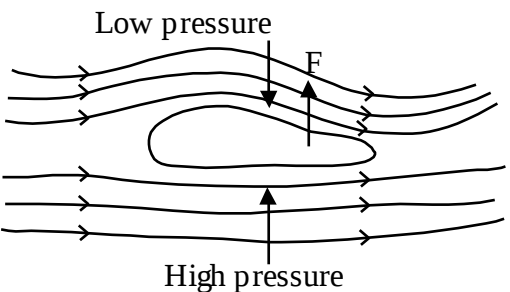
[3 marks/ markah]

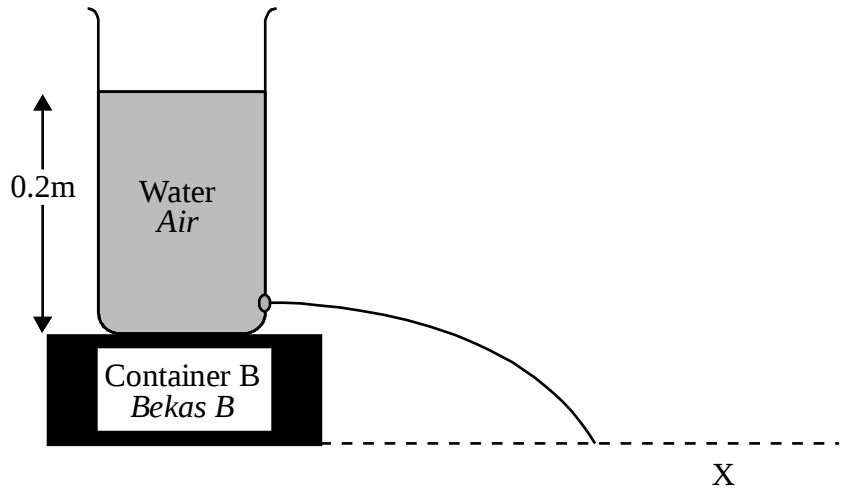
SKEMA

KERTAS 1 OBJEKTIF

1. D
2. D
3. B
4. C
5. B
6. B
7. C
8. C
9. B
10. D
11. A
12. B
13. C
14. D
15. D
16. A
17. C
18. D
19. B
20. C

KERTAS 2

1	(a)	Aerofoil	1	1
	(b)	(i) Draw the direction of the air flow correctly	1	
		(ii) Label the region of high and low pressure correctly	1	
		(iii) Show the direction of the lift force correctly	1	3
				

2	(a)	Pressure is force acting per unit area/ Pressure = Force / Area	1	
	(b)	Same	1	
	(c)	$P = h\rho g$ $= 1000 \times 0.2 \times 10$ $= 2000 \text{ kg m}^{-1} \text{ s}^{-2} \text{ or } 2000 \text{ Pa or } 2\text{kPa (with correct unit)}$	2	
	(d)		1	
				5

3	(a)	The upthrust force/buoyance force is greater than total weight of boat/density of the boat is less than density of sea water	1	
	(b)	Archimedes' Principle	1	
	(c)	Yes/water level increase. Density of water at river mouth less than sea water. Therefore upthrust force less than weight.	1 1 1	
	(d)	$pVg=5300$ $V = 5300/1000(10)$ $=0.53\text{m}^3$	1 1	
				7

4	(a)	Atmospheric pressure / Air pressure		1	
	(b)	(i)	The volume of air trapped in the beaker diagram (a) is larger	1	
		(ii)	The pressure of air trapped in the beaker diagram (b) is bigger	1	
	(c)	(i)	The higher the pressure, the lower the volume of air trapped	1	
		(ii)	Boyle's law	1	
	(d)	Density of air > water Water exerts upthrust Upthrust > weight of beaker + air trapped		3	
					8

5	(a)	(i)	Sum of two or more forces to produce one resultant force.		1											
		(ii)	1. Bottle in liquid Q floats lower 2. Weight and the buoyant force are equal and the same in both cases 3. Density of liquid P is higher 4. As the density of liquid decreases, the lower the bottle floats 5. When density of liquid decreases the volume of liquid displaced increases to produce the same buoyant force.	1 1 1 1 1	5											
	(b)	1. When force is applied to piston A 2. Pressure is produced and transmitted uniformly throughout the liquid towards point B // Pascal’s Principle 3. Pressure multiply by the surface area of piston B will produce the output force that lift load M. 4. Cross-sectional area of piston A is smaller than piston B to produce large output force.	1 1 1 1	4												
	(c)	<table><tr><th>Suggestion</th><th>Reasons</th></tr><tr><td>Fix a long handle on piston A</td><td>Small force can produce bigger force / torque to press piston A</td></tr><tr><td>Equip the hydraulic jack with valves</td><td>Liquid can flow in one direction and does not back flow</td></tr><tr><td>Use released valves</td><td>Liquid flows back to the storage reservoir</td></tr><tr><td>Piston A is made smaller // piston B bigger</td><td>To produce large output force</td></tr><tr><td>Oil as liquid</td><td>Does not evaporate easily // does not flow out easily // prevent from rust</td></tr></table>	Suggestion	Reasons	Fix a long handle on piston A	Small force can produce bigger force / torque to press piston A	Equip the hydraulic jack with valves	Liquid can flow in one direction and does not back flow	Use released valves	Liquid flows back to the storage reservoir	Piston A is made smaller // piston B bigger	To produce large output force	Oil as liquid	Does not evaporate easily // does not flow out easily // prevent from rust	2 2 2 2 2	10
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				20												

6	(a)	Aerofoil		1	1
	(b)	(i)	- the shape of cross section of wing causes the speed of airflow above the wing is higher than the speed of airflow below the wing -the higher the speed, the lower the pressure - hence the air pressure below the wing is higher than above	1 1 1	
		(ii)	Bernoulli's Principle	1	4
	(c)	Characteristics	Reasons	10	10
		Shape of cross section of wing is aerofoil	To produce speed of airflow above the wing is higher than the speed of airflow below the wing		
		Large area of wing	To produce larger lift force		
		Density of the wing material is low	It is lighter // it can produce more upward force		
		High difference in speed of air	To produce higher difference in pressure		
		P is chosen because the shape is aerofoil, large area of wing, low density of wing material and high difference in speed of air.		10	10
	(d)	(i)	$\frac{F}{500} = \frac{20000}{40}$ $F = 500 \times 40$ $= 20000 \text{ N}$	1 1	
		(ii)	Resultant force = 20000 – 800 (10) = 12000 N Direction of force : upwards	1 1 1	5
					20