

Bab / Chapter 2 : Daya & Gerakan / Force & Motion

- 1 Based on the velocity-time graph below, what is the displacement of the car in 14 s?
Berdasarkan graf halaju-masa di bawah, berapakah sesaran kereta dalam masa 14 s?

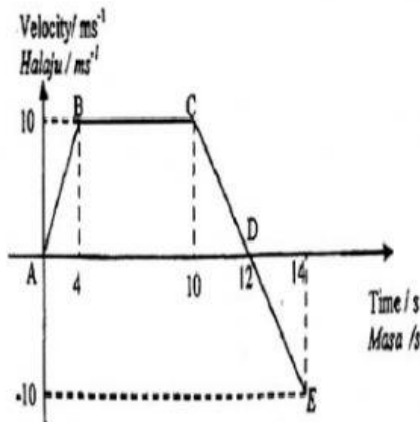


Diagram 2
Rajah 2

- A 110 m
B 100 m
C 80 m
D 10 m

- 3 Diagram 4 shows two spheres, R made of cork, and S made of steel. Both are moving at a speed of 3 m s^{-1} .

Rajah 4 menunjukkan dua sfera, R diperbuat daripada gabus, dan S diperbuat daripada keluli. Kedua-duanya bergerak dengan kelajuan 3 m s^{-1} .

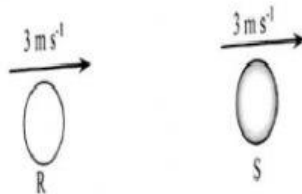


Diagram 4
Rajah 4

Which comparison about the momentum is correct?

Perbandingan manakah betul mengenai momentum?

- A Momentum R < Momentum S
B Momentum R > Momentum S
C Momentum R = Momentum S

2

Diagram 3 shows two steel balls, P and Q, are dropped from top of a building to the ground. Assume the air resistance is negligible.

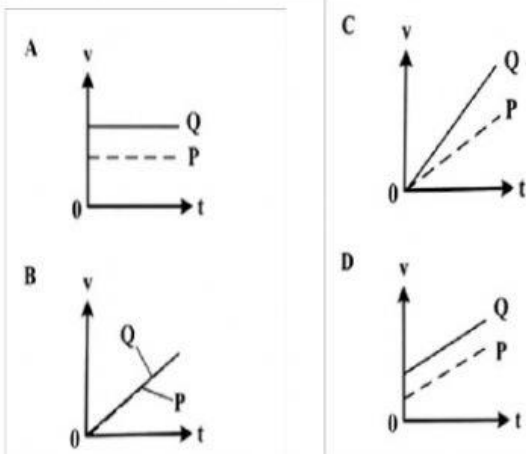
Rajah 3 menunjukkan dua biji bebola keluli, P dan Q dijatuhkan serentak dari puncak bangunan ke tanah. Abaikan rintangan udara.



Diagram 3
Rajah 3

Which of the following velocity-time graph shows the correct motion of P and Q?

Antara graf halaju-masa yang berikut yang manakah menunjukkan gerakan yang betul bagi P dan Q?



4

Force F acts on an object of mass 3 kg on a smooth floor produces an acceleration of 4.0 m s^{-2} . What is the acceleration of an object of mass 5 kg if force 2F acts on it?

Daya F bertindak ke atas jasad berjisim 3 kg di atas sebuah permukaan licin menghasilkan pecutan 4.0 m s^{-2} . Berapakah pecutan satu jasad berjisim 5 kg sekiranya daya 2F bertindak ke atasnya?

- A 2.0 m s^{-2}
B 2.4 m s^{-2}
C 4.0 m s^{-2}
D 4.8 m s^{-2}

- 5 A ball of 1.2 kg with velocity of 4 m s^{-1} hit by a car which moving in same direction with the ball. The velocity of the ball increases to 10 m s^{-1} in 0.5 s. What is the impulse on the ball?

Sebuah bola yang berjirim 1.2 kg bergerak dengan halaju 4 m s^{-1} dilanggar oleh sebuah kereta yang bergerak pada arah yang sama dengan bola tersebut. Halaju bola tersebut meningkat kepada 10 m s^{-1} dalam masa 0.5 s. Berapakah impuls pada bola tersebut?

- A 1.2 N s
- B 3.6 N s
- C 7.2 N s
- D 14.4 N s

- 7 Rajah 1 menunjukkan sepucuk senapang . Sebutir peluru ditembak keluar dengan halaju 150 ms^{-1} .
Diagram 1 shows a rifle. A bullet is fired with a velocity of 150 ms^{-1} .



Jisim senapang 2 kg
Mass of rifle 2 kg

Jisim peluru 0.02 kg
Mass of bullet 0.02 kg

Rajah 1
Diagram 1

Berapakah halaju sentakan senapang?
What is the recoil velocity of the rifle?

- A 0.15 ms^{-1}
- B 1.5 ms^{-1}
- C 15 ms^{-1}
- D 150 ms^{-1}

- 8 Seorang penjaga gol menangkap sebuah bola. Daya impuls boleh dikurangkan jika
A goalkeeper catches a ball. The impulsive force can be reduced if

- A penjaga gol bergerak ke hadapan untuk memberhentikan bola
the goalkeeper moves forward before stopping the ball
- B penjaga gol bergerak sedikit ke belakang sebelum memberhentikan bola
the goalkeeper moves slightly backwards before stopping the ball
- C penjaga gol berdiri tegak dan membiarkan bola diberhentikan di badannya.
the goalkeeper stood upright and letting the ball be stopped at his body.
- D penjaga gol berdiri tegak kemudian melompat ke atas dan membiarkan bola diberhentikan di badannya.
the goalkeeper stood up straight then jumped up and let the ball rest on his body

- 6 "Setiap objek tetap berada dalam keadaan rehat atau gerakan seragam dalam garis lurus kecuali jika terpaksa mengubah keadaan itu dengan daya luar yang dikenakan padanya".
"Every object remains in a state of rest or uniform motion in a straight line unless it is forced to change that state by an external force applied to it".

Pernyataan ini diterangkan oleh
This statement is explained by

- A Hukum Gerakan Newton Pertama
Newton's First Law of Motion
- B Hukum Gerakan Newton Kedua
Newton's Second Law of Motion
- C Prinsip Keabadian Tenaga
The Principle of Conservation of Energy
- D Prinsip Keabadian Momentum
The Principle of Conservation of Momentum

- 9 Rajah 2 menunjukkan seketul batu dan sehelai bulu ayam dijatuhkan serentak dari satu ketinggian yang sama.
Diagram 2 shows a stone and a piece of feather were dropped simultaneously from the same height.



Rajah 2
Diagram 2

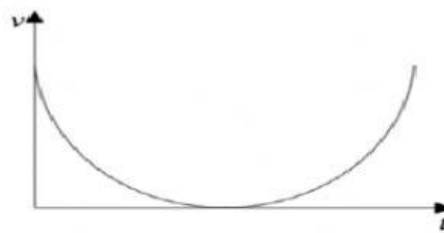
Apa yang berlaku kepada masa kejatuhan bagi kedua-dua objek?
What happens to the fall time for both objects?

- A Bulu ayam jatuh lebih cepat
The feather falls faster
- B Batu jatuh lebih cepat
The stone falls faster
- C Sama
Equal

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Rajah 3 menunjukkan graf perubahan halaju, v terhadap masa, t bagi sebuah objek yang bergerak.

Diagram 3 shows a graph of the variation with time t of the velocity v of an object.



Rajah 3
Diagram 3

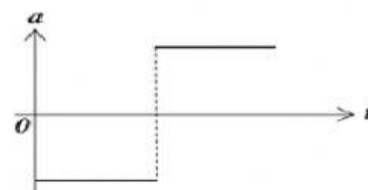
Antara graf-graf berikut yang manakah mewakili perubahan pecutan terhadap masa bagi objek tersebut?

Which one of the following graphs best represents the variation with time t of the acceleration a of the object?

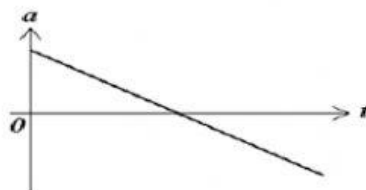
A.



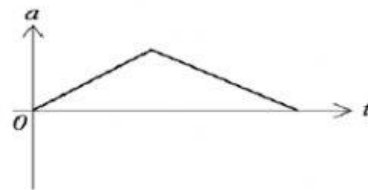
B.



C.



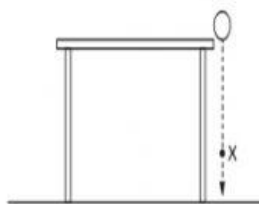
D.



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Rajah 4 menunjukkan sebuah bola dijatuhkan dari sebuah permukaan atas meja. Rintangan udara boleh diabaikan.

Diagram 4 shows a ball is dropped from a table-top. Air resistance may be ignored.



Rajah 4
Diagram 4

Baris yang manakah menerangkan halaju dan pecutan bola pada titik X?

Which row describes the velocity and the acceleration of the ball at point X?

	Halaju Velocity	Pecutan Acceleration
A.	Malar Constant	Malar Constant
B.	Meningkat Increasing	Malar Constant
C.	Malar Constant	Meningkat Increasing
D.	Meningkat Increasing	Meningkat Increasing

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Pernyataan manakah yang betul mengenai inersia?

Which statement is correct about inertia?

A. Inersia bergantung pada saiz objek.

Inertia depends on the size of an object.

B. Objek yang mudah bergerak sukar dihentikan.

Object that easy to move is difficult to stop.

C. Objek dengan jisim kecil lebih mudah bergerak.

Object with small mass is easier to move.

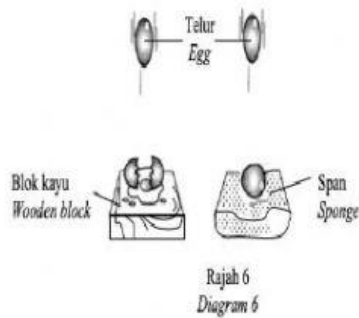
D. Inersia objek yang sama lebih besar di Bumi berbanding dengan inersia di Bulan.

Inertia of the same object is greater on Earth compare to its inertia on the Moon.

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Rajah 6 menunjukkan dua biji telur yang sama dilepaskan dari ketinggian yang sama ke satu permukaan kayu dan satu span tebal.

Diagram 6 shows two identical eggs released from the same height, on to a wooden surface and a thick sponge.



Kuantiti fizikal yang manakah sama dalam kedua-dua keadaan ketika telur terhempas ke permukaan?
Which of physical quantity is the same in both situations when the eggs hit on the surfaces?

- A. Impuls
Impulse
- B. Pecutan
Acceleration
- C. Masa hentaman
Time of impact
- D. Daya impuls
Impulsive force

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Diagram 3 shows the path travelled by a man.

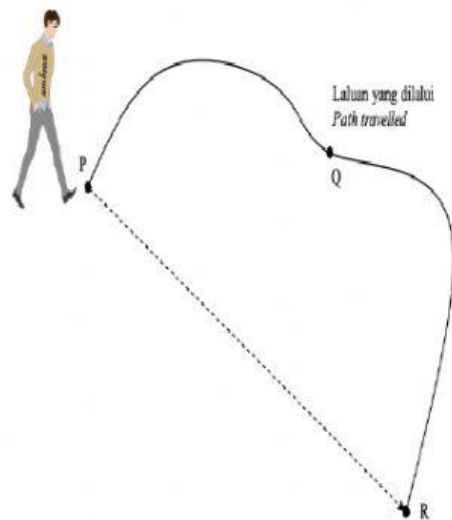


Diagram 3

What is the quantity can be determine from path PQR and PR?

	PQR	PR
A	Distance and speed	Displacement and velocity
B	Displacement and velocity	Distance and speed
C	Distance and speed	Distance and speed
D	Displacement and velocity	Displacement and velocity

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Diagram 2 shows collision between plasticine and steel balls.

Before collision

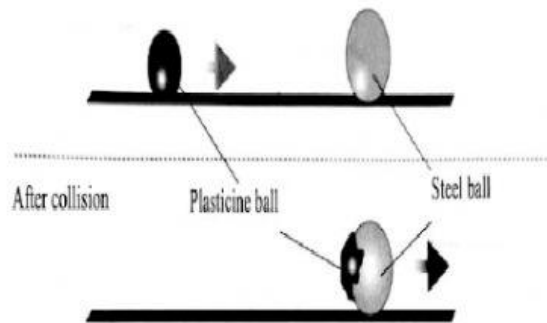


Diagram 2

Which of the following equation is the best representing the collision?

- A $m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$
- B $(m_1 + m_2)u = m_1v_1 + m_2v_2$
- C $m_1u_1 + m_2u_2 = (m_1 + m_2)v$
- D $p = mv$

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Diagram 4 shows Ball A and Ball B have different masses. One ball having the mass twice than the other ball.

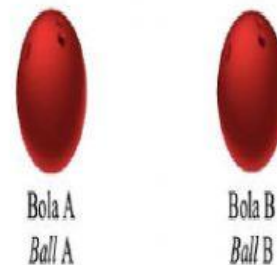


Diagram 4

Without lifting and weighing, how to determine which ball has greater mass?

- A Push the balls with the same force, the ball that harder to move has greater mass due to greater inertia
- B Move both the balls with the same force, the ball that having greater acceleration has greater mass
- C Rotate both balls, the ball that quickly stops has a greater mass
- D Move both balls on a flat floor, a ball moving straight has a greater mass

Diagram 5 shows follow through action by a football player.

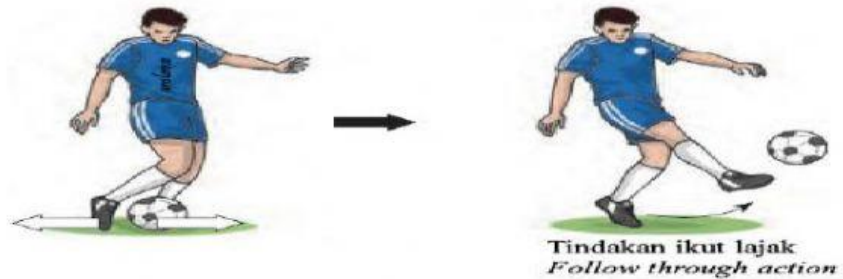


Diagram 5

What is the purpose of follow through action?

- A To increase the impulsive force
- B To increase the impulse
- C To increase the inertia of the ball
- D To decrease the change in momentum of the ball

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Antara berikut yang manakah menunjukkan kesan inersia?
Which of the following shows effect of inertia?

- I Seorang budak perempuan mengeringkan rambut yang basah dengan menggerakkan kepalanya dengan cepat
A girl dried her wet hair by moving her head quickly
- II Struktur keluli yang kukuh dipasang di ruang antara tempat duduk pemandu dengan kayu balak
A sturdy steel structure is installed in the space between the driver's seat and the logs
- III Kepala tukul diketatkan dengan menghentakkan bahagian pemegangnya pada lantai
The hammer head is tightened by striking the handle part on the floor

- A I dan II
I and II
- B I dan III sahaja
I and III only
- C II dan III sahaja
II and III only
- D I, II dan III sahaja
I, II and III only

18

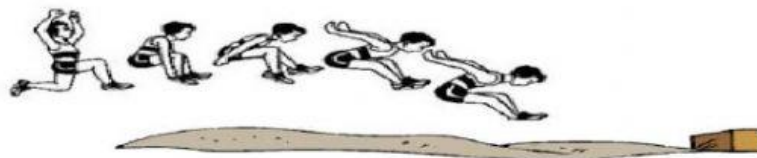
Antara yang berikut, yang manakah benar mengenai perlanggaran kenyal antara dua jasad?

Which of the following is true about an elastic collision between two bodies?

	Jumlah momentum <i>Total momentum</i>	Jumlah tenaga kinetik <i>Total kinetic energy</i>
A	Diabadikan <i>Conserved</i>	Diabadikan <i>Conserved</i>
B	Diabadikan <i>Conserved</i>	Tidak diabadikan <i>Not conserved</i>
C	Tidak diabadikan <i>Not conserved</i>	Diabadikan <i>Conserved</i>
D	Tidak diabadikan <i>Not conserved</i>	Tidak diabadikan <i>Not conserved</i>

19

Rajah 3 menunjukkan kawasan pendaratan lompat jauh yang berpasir.
Diagram 3 shows a long jump pit which is filled with sand.

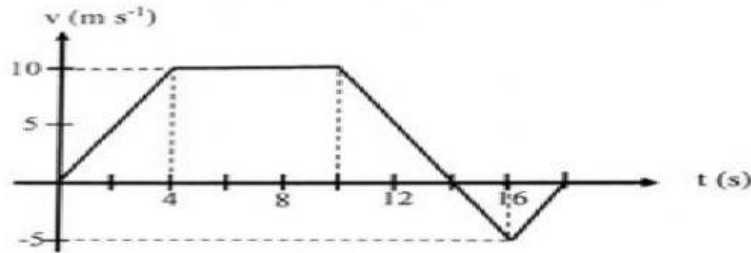


Rajah 3
Diagram 3

Tujuan pasir itu adalah untuk
The purpose of the sand in the pit is to

- A mengurangkan impuls pada kaki atlet.
reduce the impulse on the feet of the athlete.
- B mengurangkan daya impuls pada kaki atlet.
reduce the impulsive force that acts on the leg of the athlete.
- C mengurangkan halaju atlet sebelum mendarat.
reduce the velocity of the athlete just before landing.
- D mengurangkan masa tindak balas antara kaki atlet dengan tanah.
reduce the reaction time between the feet of the athlete and the ground

Rajah 1 menunjukkan graf halaju-masa bagi pergerakan suatu objek dalam garis lurus.
Diagram 1 shows a velocity-time graph for the motion of an object in a straight line.



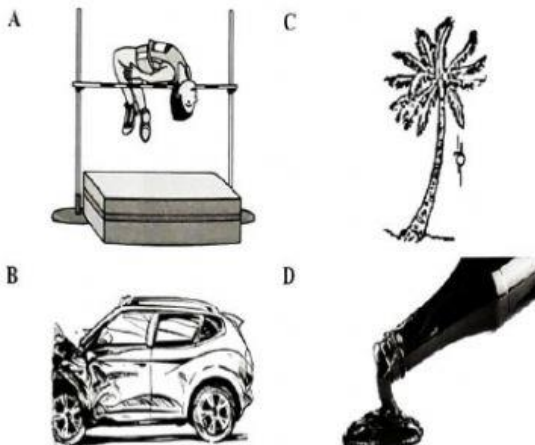
Rajah 1
Diagram 1

Hitungkan jumlah sesaran dan jarak yang dilalui oleh objek tersebut.
Calculate the total displacement and distance travelled by the object.

	Sesaran (m) Displacement (m)	Jarak dilalui (m) Distance travelled (m)
A	90	110
B	100	110
C	110	90
D	90	100

21

Situasi manakah yang melibatkan inersia?
Which situation involves inertia?



22

Prinsip keabadian momentum menyatakan bahawa
Principle of conservation of momentum states that

- A momentum berkadar terus dengan jisim dan halaju
momentum is directly proportional to mass and velocity
- B jumlah momentum sebelum perlanggaran adalah sama dengan jumlah momentum selepas perlanggaran jika tiada sebarang daya luar bertindak.
the total momentum before collision is equal to the total momentum after collision if no external force is acting on it.
- C jumlah momentum bagi suatu perlanggaran ataupun letupan adalah tidak diabadikan
the total momentum of collision or explosion are not conserved.
- D momentum sebelum perlanggaran adalah sama dengan momentum selepas perlanggaran.
momentum before collision is equal to momentum after collision.

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Rajah 2 menunjukkan sehelai bulu pelepah dan sebiji bola boling dijatuhkan di dalam vakum.
Diagram 2 shows a piece of feather and a bowling ball being dropped in a vacuum.



Rajah 2
Diagram 2

Antara graf halaju-masa berikut, yang manakah menunjukkan gerakan bulu pelepah dan bola boling yang betul?
Which of the following velocity-time graphs shows the correct motion of the feather and the bowling ball?



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Rajah 3 menunjukkan satu alu menghentam lesung.
Diagram 3 shows a pestle hitting a mortar.



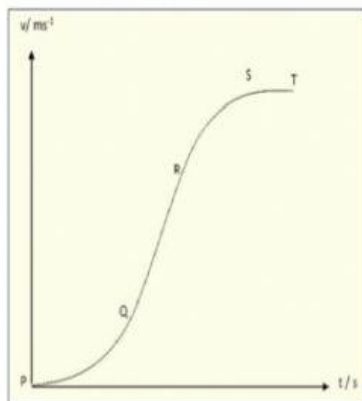
Rajah 3
Diagram 3

Satu daya yang besar bertindak pada alu disebabkan oleh
A large force acting on the pestle due to

- A perubahan momentum alu berlaku dalam tempoh masa yang pendek
change in momentum of the pestle occurs in a short period of time
- B perubahan momentum alu berlaku dalam tempoh masa yang panjang
change in momentum of the pestle occurs in a long period of time
- C alu itu mengalami perubahan jisim apabila ia menghentam lesung
the pestle undergoes a change of mass when it hits the mortar
- D alu itu mengalami geseran yang kecil apabila ia menghentam lesung
the pestle experiences little friction when it hits the mortar

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Rajah 2 menunjukkan graf halaju – masa bagi sebuah kereta.
Diagram 2 shows a velocity – time graph of a car.



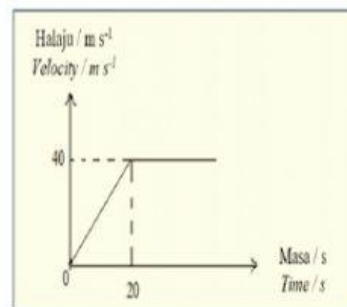
Rajah 2
Diagram 2

Pada bahagian manakah menunjukkan pecutan kereta itu adalah sifar?
Which part shows the acceleration of the car is zero?

- A PQ B PR C QS D ST

25

Rajah 1 menunjukkan graf halaju-masa bagi sebuah kereta yang bermula dari keadaan pegun.
Diagram 1 shows a velocity-time graph of a car that accelerates from rest.



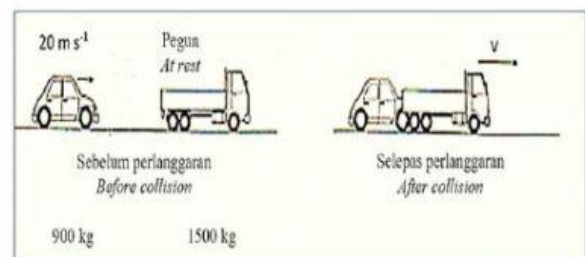
Rajah 1
Diagram 1

Berapa jauhkan kereta itu bergerak sebelum ia mencapai halaju seragam?
How far does the car travel before it reaches a constant velocity?

- A 200 m B 400 m C 600 m D 800 m

27

Rajah 3 menunjukkan suatu perlanggaran tak kenyal.
Diagram 3 shows an inelastic collision.



Rajah 3
Diagram 3

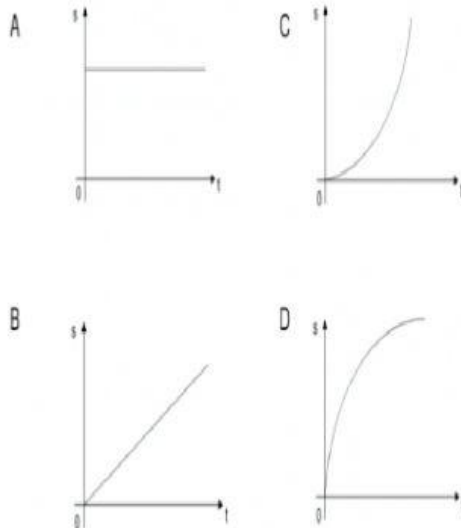
Berapakah halaju kedua-dua kenderaan selepas perlanggaran?
What is the velocity of both vehicles after collision?

- A 1.3 m s^{-1} C 7.5 m s^{-1}
B 2.5 m s^{-1} D 10.0 m s^{-1}

27

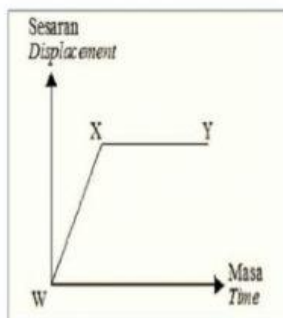
Manakah antara graf-graf sesaran melawan masa yang berikut mewakili pergerakan suatu objek yang sedang bergerak dengan pecutan seragam?

Which of the following displacement against time graphs represents the motion of an object moving at constant acceleration?



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Rajah 1 menunjukkan graf sesaran-masa bagi sebuah basikal yang sedang bergerak. Diagram 1 shows the displacement graph of a moving bicycle.



Rajah 1
Diagram 1

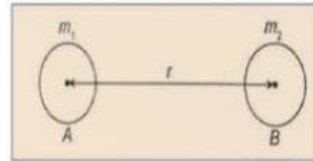
Antara yang berikut, yang manakah menerangkan pergerakan basikal tersebut?
Which of the following describes the motion of the bicycle?

	WX	XY
A	Halaju seragam Uniform velocity	Halaju sifar Zero velocity
B	Halaju bertambah Increasing velocity	Halaju sifar Zero velocity
C	Halaju seragam Uniform velocity	Halaju berkurang Decreasing velocity
D	Halaju bertambah Increasing velocity	Halaju berkurang Decreasing velocity

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Rajah 4 menunjukkan dua jasad A dan B dengan jisim m_1 dan m_2 masing-masing. Jarak antara pusat keduanya ialah r dan daya graviti ialah F .

Diagram 4 shows two object A and B with mass m_1 and m_2 respectively. The distance between center of the objects is r and the gravitational force is F .



Rajah 4
Diagram 4

Daya F akan berkurang sekiranya

F will decrease if

- | | | | |
|---|------------------------------------|---|--------------------------------|
| A | m_1 bertambah
m_1 increases | C | r bertambah
r increases |
| B | m_2 bertambah
m_2 increases | D | r berkurang
r decreases |

30

Antara yang berikut, yang manakah mempunyai inersia yang paling tinggi?
Which of the following has the highest inertia?

- A Sebuah kereta mainan berjisim 1.0 kg yang bergerak pada 2 m s^{-1}
A 1.0 kg toy car travelling at 2 m s^{-1}
- B Sebiji besbol berjisim 0.1 kg yang bergerak pada 20 m s^{-1}
A 0.1 kg baseball travelling at 20 m s^{-1}
- C Sebiji bola pantai berjisim 0.8 kg yang bergerak pada 20 m s^{-1}
A 0.8 kg beach ball travelling at 5 m s^{-1}
- D Sebiji bola boling berjisim 5.0 kg dalam keadaan rehat
A 5.0 kg bowling ball at rest

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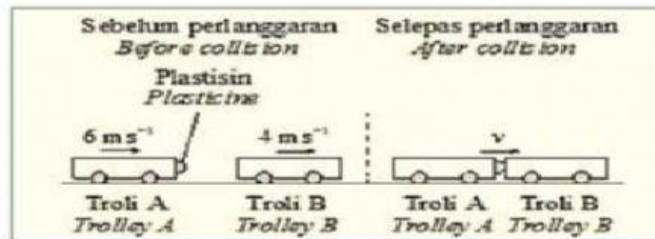
Apakah alat yang boleh digunakan untuk mengukur daya?
Which tool can be used to measure force?

- A Neraca tuas
Lever balance
- B Neraca spring
Spring balance
- C Neraca inersia
Inertia balance
- D Neraca elektronik
Electronic balance

32

Rajah 2 menunjukkan dua buah troli berjisim 1 kg masing-masing sebelum dan selepas perlanggaran. Halaju awal troli A dan troli B masing-masing ialah 6 m s^{-1} dan 4 m s^{-1} . Selepas perlanggaran, kedua-dua troli bergerak bersama-sama.

Diagram 3 shows two trolleys each of mass 1 kg, before and after collision. The initial velocity of trolley A and trolley B are 6 m s^{-1} and 4 m s^{-1} respectively. After collision, both trolleys move together.



Rajah 2
Diagram 2

Berapakah halaju kedua-dua troli selepas perlanggaran?

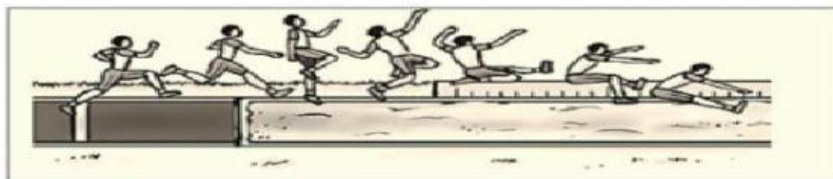
What is the velocity of both trolleys after collision?

- A 1.0 m s^{-1}
- B 2.0 m s^{-1}
- C 5.0 m s^{-1}
- D 10.0 m s^{-1}

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Rajah 3 menunjukkan seorang atlit berjisim 64 kg sedang beraksi dalam pertandingan lompat jauh. Dia menghentam tanah pada halaju 9 m s^{-1} dan berhenti selepas 0.4 s.

Diagram 3 shows the action of an athlete of mass 64 kg in long jump competition. He hits the sand at velocity 9 m s^{-1} and stop after 0.4 s.



Rajah 3
Diagram 3

Apakah magnitud daya impuls?

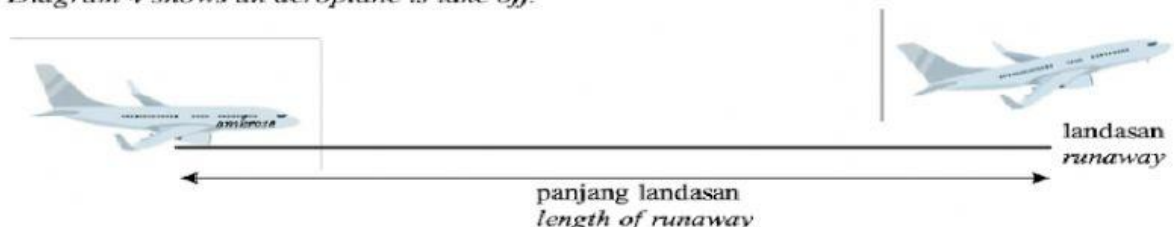
What is the magnitude of impulsive force?

- A 1440 N
- B 576 N
- C 640 N
- D 0 N

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Rajah 4 menunjukkan sebuah kapal terbang sedang berlepas.

Diagram 4 shows an aeroplane is take off.



Rajah / Diagram 4

Berapakah panjang landasan bagi sebuah kapal terbang untuk berlepas dengan halaju 75 m s^{-1} jika ia boleh memecut 2.0 m s^{-2} ?

How long must a runway be for an aeroplane to reach take off velocity 75 m s^{-1} if it can accelerate 2.0 m s^{-2} ?

- A. 1 000 m
- B. 1 200 m
- C. 1 400 m
- D. 2 000 m