1 **A car is tra e ing it uni orm acce eration a ong a straig t roa e roa as mar er osts e er 1 m en t e car asses one ost it as a s ee o 1 ms ^{1} an en it asses t e ne t one its s ee is 2 ms ^{1}** 97 2 1 4/Q.7

at is t e car s acce eration

A 7ms ^{2} **B** 1 ms ^{2} **C** 2 ms ^{2} **D** ms ^{2}

2 What is meant by the weight of an object? 9702/1/O/N/02/Q.4

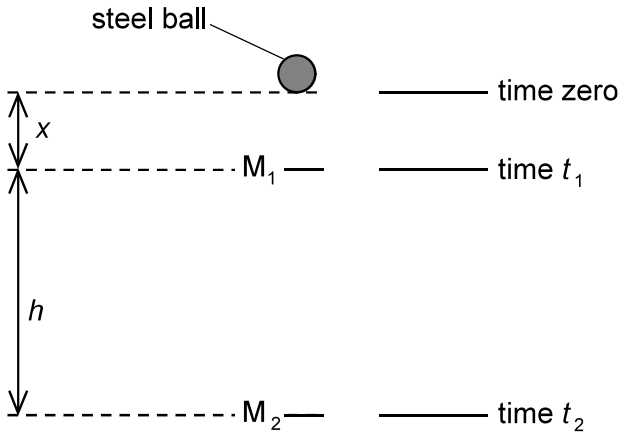
A the gravitational field acting on the object

B the gravitational force acting on the object

C the mass of the object multiplied by gravity

D the object's mass multiplied by its acceleration

3 Two markers M_1 and M_2 are set up a vertical distance h apart. 9702/1/O/N/02/Q.3



When a steel ball is released from rest from a point a distance x above M_1, it is found that the ball takes time t_1 to reach M_1 and time t_2 to reach M_2.

Which expression gives the acceleration of the ball?

A $\frac{2h}{t_2^2}$ **B** $\frac{2h}{(t_2 + t_1)}$ **C** $\frac{2h}{(t_2 - t_1)^2}$ **D** $\frac{2h}{(t_2^2 - t_1^2)}$

4 **e acce eration o ree a on a anet is $\frac{1}{}$ o t e acce eration o ree a on art** 97 2 1 8/Q.7

e mass o a o on anet is g

at is its eig t on anet

A 4 9 **B** 49 **C** 18 **D** 29

5 An o ect a s 1 m rom rest e ore entering some ater 97 2 1 4/Q.9

Assuming neg igi e air resistance at is t e time ta en to reac t e ater an t e s ee it ic t e o ect reac es t e ater

	time ms	s ee ms ^{1}
A	1 2	1
B	1 2	14
C	1 4	1
D	1 4	14

6 A constant mass un ergoes uni orm acce eration 97 2 1 4/Q.10

ic o t e o o ing is a correct statement a out t e resu tant orce acting on t e mass

A t increases uni orm it res ect to time

B t is constant ut not ero

C t is ro ortiona to t e is acement rom a i e oint

D t is ro ortiona to t e e ocit

7 An e eriment is one to measure t e acce eration o ree a o a o rom rest 97 2 1 /Q.7

ic measurements are nee e

A t e eig to a an t e time o a

B t e eig to a an t e eig to t e o

C t e mass o t e o an t e eig to a

D t e mass o t e o an t e time o a

8 A orce is a ie to a ree mo ing o ect At one instant o time t e o ect as e ocit an acce eration a 97 2 1 /Q.10

ic uantities must e in t e same irection

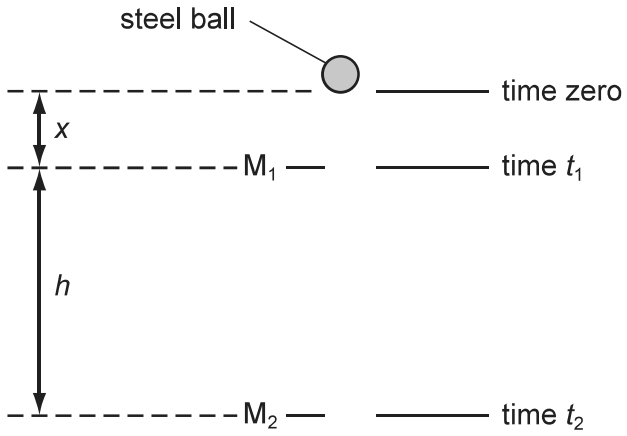
A a an on

B a an on

C an on

D an a

9 o mar ers $_1$ an $_2$ are set u a ertica istance a art 97 2 1 /Q7



A stee a is re ease at time ero rom a oint a istance a o e $_1$ e a reac es $_1$ at time t_1 an reac es $_2$ at time t_2 e acce eration o t e a is constant

ic e ression gi es t e acce eration o t e a

A $\frac{2}{t_2^{\ 2}}$ B $\frac{2}{t_2\ \ t_1}$ C $\frac{2}{t_2\ \ t_1^{\ 2}}$ D $\frac{2}{t_2^{\ 2}\ \ t_1^{\ 2}}$

10 A stone is ro e rom t e to o a to er o eig t 4 m e stone a s rom rest an air resistance is neg igi e 97 2 1 7Q8

at time is ta en or t e stone to a t e ast 1 m to t e groun

A 8 s B 1 4 s C 2 s D 2 9 s

11 at is meant t e eig t o an o ect 97 2 1 7/Q9

A t e gra itationa ie acting on t e o ect

B t e gra itationa orce acting on t e o ect

C t e mass o t e o ect mu ti ie gra it

D t e o ect s mass mu ti ie its acce eration

12 e s m o g re resents t e acce eration o ree a 97 2 1 7/Q7

ic o t ese statements is correct

A g is gra it

B g is re uce air resistance

C g is t e ratio eig t mass

D g is t e eig t o an o ect

13 An o ect acce erates in a irection t at is a a s er en icu ar to its motion 97 2 1 8/Q6

at is t e e ect i an o t e acce eration on t e o ect s s ee an irection

	s ee	irection
A	c anges	c anges
B	c anges	constant
C	constant	c anges
D	constant	constant

14 n a articu ar rai a a train ri er a ies t e ra e o t e train at a e o signa a istance o 1 m rom a re signa ere it sto s 97 2 11 9/Q5

e ma imum ece eration o t e train is 2 ms ^{2}

Assuming uni orm ece eration at is t e ma imum sa e s ee o t e train at t e e o signa

A 2 ms ^{1} B 4 ms ^{1} C 2 ms ^{1} D 4 ms ^{1}

15 our stu ents eac ma e a series o measurements o t e acce eration o ree a g e ta e s o s t e resu ts o taine 97 2 1 8/Q5

ic set o resu ts cou e escri e as recise ut not accurate

	g ms ^{2}			
A	9 81	9 79	9 84	9 8
B	9 81	1 12	9 89	8 94
C	9 4	9 21	8 99	8 7
D	8 4	8 4	8	8 41

16 ic statement a out a a t at stri es a tennis rac et an re oun s is a a s correct 97 2 12 9/Q7

A ota inetic energ o t e a is conser e

B ota inetic energ o t e s stem is conser e

C ota momentum o t e a is conser e

D ota momentum o t e s stem is conser e

17 A a is t ro n ori onta in sti air rom t e to o a er ta ui ing e a is a ecte air resistance 97 2 11 1 /Q7

at a ens to t e ori onta an to t e ertica com onents o t e a s e ocit

	ori onta com onent o e ocit	ertica com onent o e ocit
A	ecreases to ero	increases at a constant rate
B	ecreases to ero	increases to a constant a ue
C	remains constant	increases at a constant rate
D	remains constant	increases to a constant a ue

18 n or er t at a train can sto sa e it i a a s ass a signa s o ing a e o ig t e ore it reac es a signa s o ing a re ig t Dri ers a t e ra e at t e e o ig t an t is resu ts in a uni orm ece eration to sto e act at t e re ig t 97 2 11 1 /Q9

e istance et een t e re an e o ig ts is

at must e t e minimum istance et een t e ig ts i t e train s ee is increase 2 it out c anging t e ece eration o t e trains

A 1 2 B 1 2 C 1 44 D 1

19 e gra itationa ie strengt on t e sur ace o anet is one tent o t at on t e sur ace o anet 97 2 11 1 /Q10

n t e sur ace o a o as a mass o 1 g an a eig t o 1

at are t e mass an eig t o t e same o on t e sur ace o anet

	mass on g	eig t on
A	1	1
B	1	1
C	1	1
D	1	1

20 A oot a is ro e rom t e to o a t ree store ui ing t a s t roug air unti it reac es t e groun 97 2 12 1 /Q6

at remains constant t roug out t e a

A acce eration o t e oot a

B air resistance on t e oot a

C e ocit o t e oot a

D eig t o t e oot a

21 A mo ing o un ergoes uni orm acce eration i e tra e ing in a straig t ine et een oints an e istances an are ot 4 m e time to tra e rom to is 12 s an rom to is s 97 2 12 1 /Q8

at is t e acce eration o t e o

A 7 ms^{2} B 49 ms^{2} C ms^{2} D 1 1 ms^{2}

22 A u et is ire ori onta it s ee rom a ri e or a s ort time t a ter ea ing t e ri e t e on orce a ecting its motion is gra it e acce eration o ree a is g 97 2 12 11/Q6

ic e ression gi es t e a ue o $\frac{\text{t e ori onta istance tra e e in time t}}{\text{t e ertica istance tra e e in time t}}$

A $\frac{t}{g}$ B $\frac{}{gt}$ C $\frac{2t}{g}$ D $\frac{2}{gt}$

23 A o as a eig t o 8 9 en on t e art n t e oon t e acce eration o ree a is 1 4 ms^{2} 97 2 11 11/Q8

at are t e eig t an t e mass o t e o en it is on t e oon

	eig t	mass g
A	9 8	1
B	9 8	
C	8 9	1
D	8 9	

24 A o t ro s a a ertica u ar s t rises to a ma imum eig t ere it is momentari at rest an t en a s ac to is an s 97 2 11 11/Q8

ic ro gi es t e acce eration o t e a at arious stages in its motion a e ertica u ar s as ositi e gnore air resistance

	rising	at ma imum eig t	a ing
A	9 81 ms^{2}		9 81 ms^{2}
B	9 81 ms^{2}	9 81 ms^{2}	9 81 ms^{2}
C	9 81 ms^{2}	9 81 ms^{2}	9 81 ms^{2}
D	9 81 ms^{2}		9 81 ms^{2}

25 **A o as a eig t o 8 9 en on t e art n t e oon t e acce eration o ree a is 1 4ms²** 97 2 1 11/Q6

at are t e eig t an t e mass o t e o en it is on t e oon

	eig t	mass g
A	9 8	1
B	9 8	
C	8 9	1
D	8 9	

26 **A o a ing in a uni orm gra itationa ie encounters air resistance e air resistance increases unti termina e ocit is reac e** 97 2 11 11/Q9

ic actor oes not a ect its termina e ocit

A t e ensit o t e air

B t e eig t rom ic t e o a s

C t e mass o t e o

D t e s a e o t e o

27 **A stone o mass m is ro e rom a ta ui ing ere is signi icant air resistance e acce eration o ree a is g** 97 2 12 11/Q7

en t e stone reac es its termina e ocit ic in ormation is correct

	magnitu e o t e acce eration o t e stone	magnitu e o t e orce o gra it on t e stone	magnitu e o t e orce o air resistance on t e stone
A	g	mg	mg
B	ero	mg	mg
C	ero	ero	mg
D	ero	ero	ero

28 **A science museum esigns an e eriment to s o t e a o a eat er in a ertica g ass acuum tu e** 97 2 12 12/Q8

e time o a rom rest is to e c ose to s

at engt o tu e is re uire

A 1 m B 2 m C m D 1 m

29 n an e eriment to etermine t e acce eration o ree a using a a ing o at ou ea to a a ue t at is too arge

97 2 11 12/Q6

A air resistance

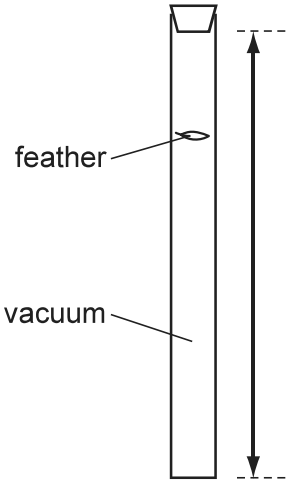
B imensions o t e o are too arge

C measure istance onger t an true istance

D measure time onger t an true time

30 e iagram s o s a a orator e eriment in ic a eat er a s rom rest in a ong e acuate ertica tu e o engt

97 2 11 12/Q8



e eat er ta es time to a rom t e to to t e ottom o t e tu e

o ar i t e eat er a e a en rom t e to o t e tu e in time

A 1 B 2 C 8 D

31 e s ee o a car is ca cu ate rom measurements o t e istance tra e e an t e time ta en

97 2 12 12/Q7

e istance is measure as 2 m it an uncertaint o 2 m

e time is measure as 1 s it an uncertaint o 2 s

at is t e ercentage uncertaint in t e ca cu ate s ee

A B 1 C 2 D

32 A a is t ro n ertica in air

97 2 11 12/Q9

eg ecting air resistance ic ro ert o t e a can ne er e ero at an time uring t e ig t

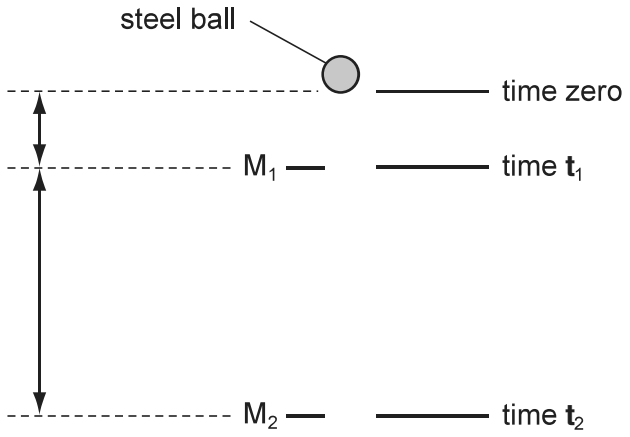
A acce eration

B inetic energ

C s ee

D e ocit

33 o mar ers 1 an 2 are set u a ertica istance a art 97 2 12 12/Q8

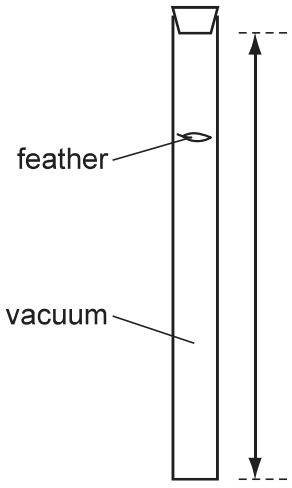


A stee a is re ease at time ero rom a oint a istance a o e 1 e a reac es 1 at time t1 an reac es 2 at time t2 e acce eration o t e a is constant

ic e ression gi es t e acce eration o t e a

A $\frac{2}{t_2^{\ 2}}$ B $\frac{2}{t_2 \quad t_1}$ C $\frac{2}{t_2 \quad t_1^{\ 2}}$ D $\frac{2}{t_2^{\ 2} \quad t_1^{\ 2}}$

34 e iagram s o s a a orator e eriment in ic a eat er a s rom rest in a ong e acuate ertica tu e o engt 97 2 1 12/Q9



e eat er ta es time to a rom t e to to t e ottom o t e tu e

o ar i t e eat er a e a en rom t e to o t e tu e in time

A 1 B 2 C 8 D

35 A ic c e ra es so t at it un ergoes uni orm ece eration rom a s ee o 8 ms 1 to ms 1 o er a istance o 7 m 97 2 1 12/Q8

t e ece eration o t e ic c e remains constant at urt er istance i it tra e e ore coming to rest

A 7 m B 9 m C 1 m D 21 m

36 **A o is re ease rom rest an a s ertica in air o constant ensit** **97 2 11 1 /Q7**

ic statement a out t e motion o t e a ing o is correct

A As it acce erates its eig t ecreases so t at its acce eration ecreases unti it tra e s it constant e ocit

B t acce erates initia at 9 8 m s ^{2} ut t e rag orce increases so its acce eration ecreases

C ts e ocit increases at a constant rate unti its e ocit ecomes constant

D e rag orce o t e air increases continua an e entua t e e ocit ecreases

37 **A goo s train asses t roug a station at a stea s ee o 1 m s ^{1} An e ress train is at rest at t e station e e ress train ea es t e station it a uni orm acce eration o m s ^{2} ust as t e goo s train goes ast Bot trains mo e in t e same irection on straig t ara e trac s**

97 2 11 1 /Q8

o muc time asses e ore t e e ress train o erta es t e goo s train

A s B 1 s C 2 s D 4 s

38 **e iagram s o s an arrangement to sto trains t at are tra e ing too ast** **97 2 12 1 /Q7**

rains coming rom t e e t tra e at a s ee o m s ^{1} At mar er 1 t e ri er must a t e ra es so t at t e train ece erates uni orm in or er to ass mar er 2 at no more t an 1 m s ^{1}

e train carries a etector t at notes t e times en t e train asses eac mar er an i a an emergenc ra e i t e time et een assing mar er 1 an mar er 2 is ess t an 2 s

o ar rom mar er 2 s ou mar er 1 e ace

A 2 m B 4 m C m D m

39 **An aero ane tra e s at an a erage s ee o m ^{1} on an out ar ig t an at 4 m ^{1} on t e return ig t o er t e same istance** **97 2 11 1 /Q8**

at is t e a erage s ee o t e oe ig t

A 111 m s ^{1} B 1 7 m s ^{1} C 48 m ^{1} D m ^{1}

40 ne o ect mo es irect rom to 97 2 11 1 /Q6

n a s orter time a secon o ect mo es rom to to

ic statement a out t e t o o ects is correct or t e ourne rom to

A e a e t e same a erage s ee

B e a e t e same a erage e ocit

C e a e t e same is acement

D e tra e t e same istance

41 n a articu ar rai a a train ri er a ies t e ra e o t e train at a e o signa a istance o 1 m rom a re signa ere t e train sto s 97 2 1 1 /Q8

e ma imum ece eration o t e train is 2 ms^{2}

Assuming uni orm ece eration at is t e ma imum sa e s ee o t e train at t e e o signa

A 14ms^{1} B 2 ms^{1} C 4 ms^{1} D 4 ms^{1}

42 A erson tra e ing on a motor a a tota istance o 2 m tra es t e irst 9 m at an a erage s ee o 8 m ^{1} 97 2 1 1 /Q9

ic a erage s ee must e o taine or t e rest o t e ourne i t e erson is to reac t e estination in a tota time o 2 ours minutes

A 11 m ^{1} B 12 m ^{1} C 122 m ^{1} D 12 m ^{1}

43 A mass acce erates uni orm en t e resu tant orce acting on it 97 2 1 1 /Q12

A is ero

B is constant ut not ero

C increases uni orm it res ect to time

D is ro ortiona to t e is acement rom a i e oint

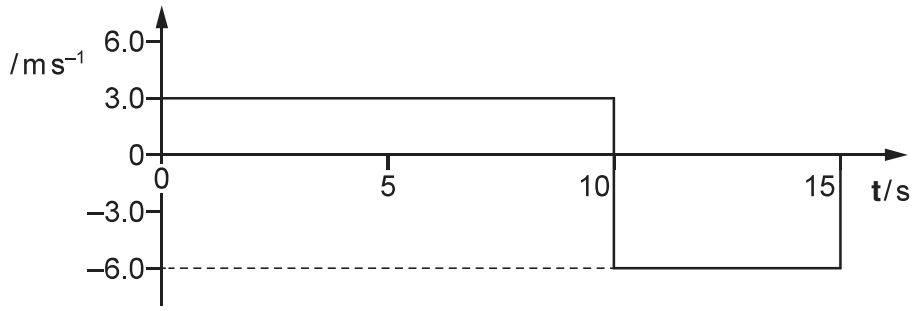
44 An o ect is t ro n it e ocit 2ms 1 ertica u ar s on t e oon e acce eration ue to gra it on t e oon is 1 2ms 2 97 2 11 14/Q7

at is t e time ta en or t e o ect to return to its starting oint

A 2 s B 2s C 4 s D 4s

45 A ra io contro e to car tra e s a ong a straig t ine or a time o 1 s 97 2 12 14/Q6

e ariation it time to o t e e ocit o t e car is s o n e o



at is t e a erage e ocit o t e to car or t e ourne s o n t e gra

A 1 ms 1 B ms 1 C 4 ms 1 D 4 ms 1

46 n a cat o e ra tu e an e ectron is acce erate uni orm in a straig t ine rom a s ee o 4 1 ms 1 to 2 1 7ms 1 o er a istance o 1 mm 97 2 1 14/Q8

at is t e acce eration o t e e ectron

A 2 1 ms 2

B 2 1 ms 2

C 2 1 1 ms 2

D 2 1 1 ms 2

47 An e eriment is er orme to measure t e acce eration o ree a g A o a s et een t o i e oints e our measurements s o n e o are ta en 97 2 1 14/Q7

ic measurement is not re uire or t e ca cu ation o g

A t e istance a en t e o

B t e initia e ocit o t e o

C t e mass o t e o

D t e time ta en or t e o to a

48 n an e eriment to etermine t e acce eration o ree a g a a earing is e an e ectromagnet en t e current to t e e ectromagnet is s itc e o a c oc starts an t e a earing a s A ter a ing a istance t e a earing stri es a s itc to sto t e c oc ic measures t e time t o t e a

97 2 1 14/Q6

ic e ression can e use to ca cu ate t e a ue o g

A $\frac{t^2}{2}$ B $\frac{t^2}{2}$ C $\sqrt{\frac{2t}{2}}$ D $\frac{2}{t^2}$

49 e acce eration o ree a on t e oon is one si t o t at on art

97 2 11 14/Q5

n art it ta es time t or a stone to a rom rest a istance o 2 m

at is t e time ta en or a stone to a rom rest a istance o 2 m on t e oon

A t B $\frac{t}{}$ C $t\sqrt{6}$ D $\frac{t}{\sqrt{}}$

50 n an e eriment to etermine t e acce eration o ree a g a a earing is e an e ectromagnet en t e current to t e e ectromagnet is s itc e o a c oc starts an t e a earing a s A ter a ing a istance t e a earing stri es a s itc to sto t e c oc ic measures t e time t o t e a

97 2 12 1 /Q7

s stematic errors cause t an to e measure incorrect ic error must cause g to a ear greater t an 9 81 m s ^{2}

A measure as eing sma er t an it actua is an t is measure correct

B measure as eing sma er t an it actua is an t measure as eing arger t an it actua is

C measure as eing arger t an it actua is an t measure as eing arger t an it actua is

D is measure correct an t measure as eing sma er t an it actua is

51 A o a ing uni orm acce eration a increases its e ocit rom u to in time t

97 2 11 1 /Q9

ic e ression ou not gi e a correct a ue or t e o s is acement uring time t

A ut $\frac{1}{2}at^2$

B t $\frac{1}{2}at^2$

C $\frac{u \quad u}{2a}$

D $\frac{u\,t}{2}$

52 A s rinter runs a 1 m race in a straig t ine e acce erates rom t e starting oc at a constant acce eration o 2 ms ^{2} to reac is ma imum s ee o 1 ms ^{1} e maintains t is s ee unti e crosses t e inis ine

97 2 12 1 /Q9

ic time oes it ta e t e s rinter to run t e race

A 4s B 1 s C 12s D 2 s

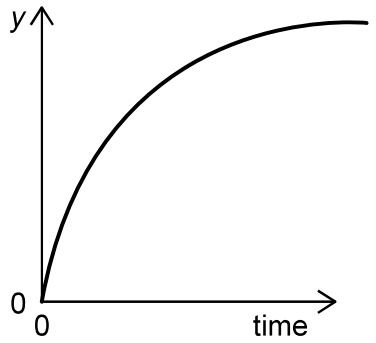
53 An insect um s it an initia ertica e ocit o 1 ms ^{1} reac ing a ma imum eig t o 1 ^{2}m Assume t e ece eration is uni orm

97 2 11 1 /Q8

at is t e magnitu e o t e ece eration

A ms ^{2} B 9 8ms ^{2} C 14ms ^{2} D 29ms ^{2}

1 The graph relates to the motion of a falling body. 9702/1/M/J/02/Q6



Which is a correct description of the graph?

A *y* is distance and air resistance is negligible

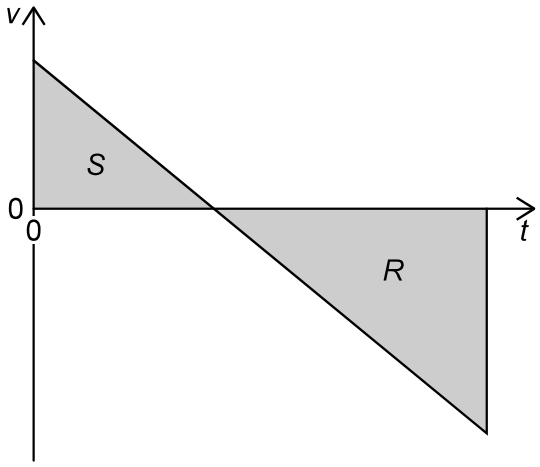
B *y* is distance and air resistance is not negligible

C *y* is speed and air resistance is negligible

D *y* is speed and air resistance is not negligible

2 A stone is thrown upwards from the top of a cliff. After reaching its maximum height, it falls past the cliff-top and into the sea. 9702/1/M/J/02/Q8

The graph shows how the vertical velocity *v* of the stone varies with time *t* after being thrown upwards. *R* and *S* are the magnitudes of the areas of the two triangles.



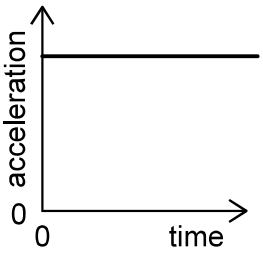
What is the height of the cliff-top above the sea?

A *R** **B** *S** **C** *R* + *S** **D** *R* - *S*

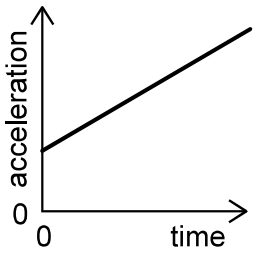
3 Which graph represents the motion of a car that is travelling along a straight road with a uniformly increasing speed?

9702/1/M/J/02/Q7

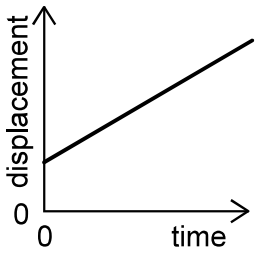
A



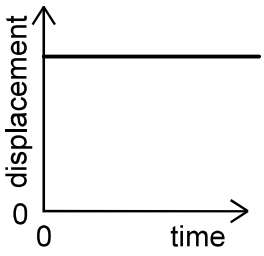
B



C

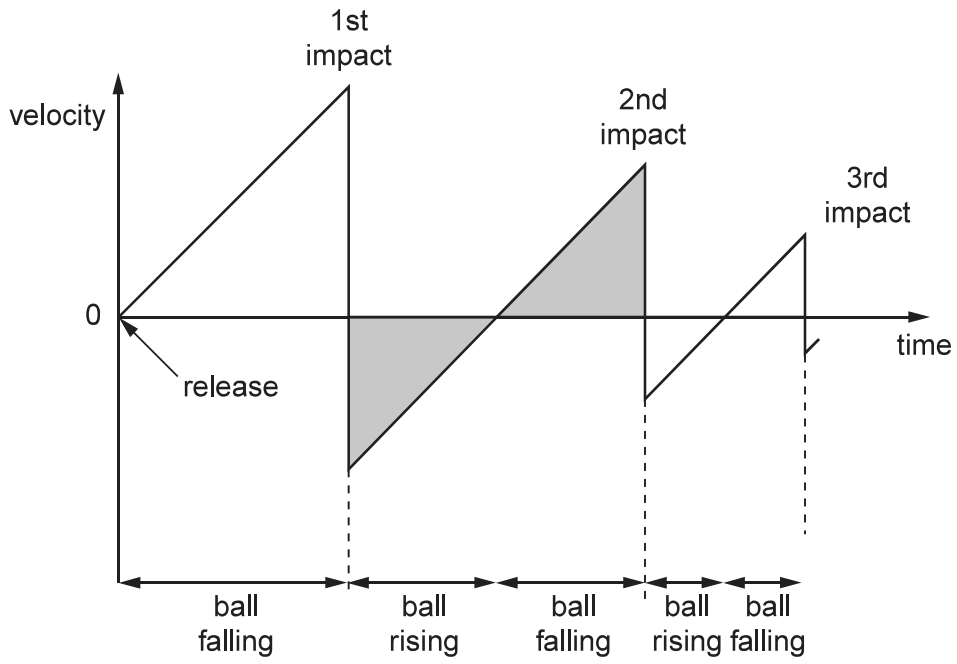


D



4 A ball is released from rest above a horizontal surface. The graph shows the variation with time of its velocity.

9702/1/M/J/03/Q9



Areas and are equal.

This is because

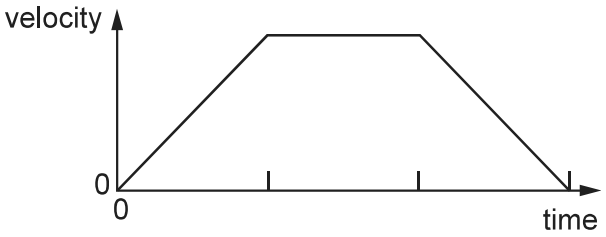
A the ball's acceleration is the same during its upward and downward motion.

B the speed at which the ball leaves the surface after an impact is equal to the speed at which it returns to the surface for the next impact.

C for one impact, the speed at which the ball hits the surface equals the speed at which it leaves the surface.

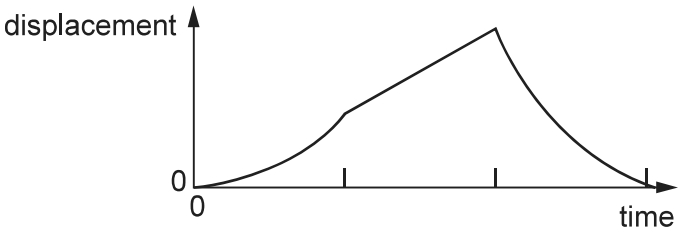
D the ball rises and falls through the same distance between impacts.

5 The graph of velocity against time for an object moving in a straight line is shown. 9702/01/M/J/03/Q8

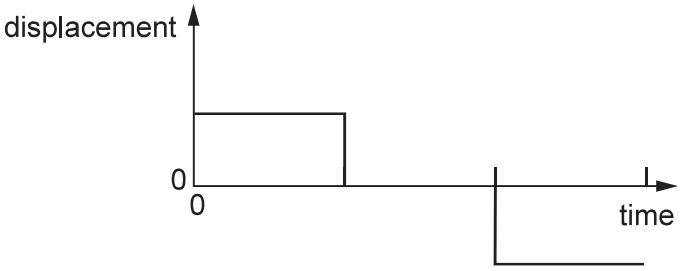


Which of the following is the corresponding graph of displacement against time?

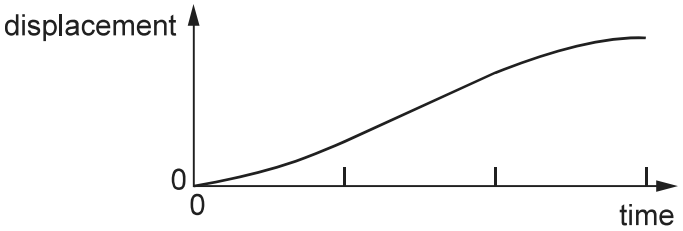
A



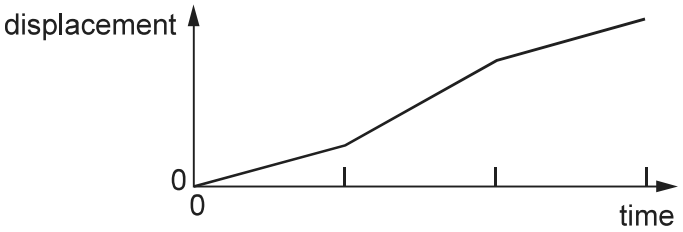
B



C



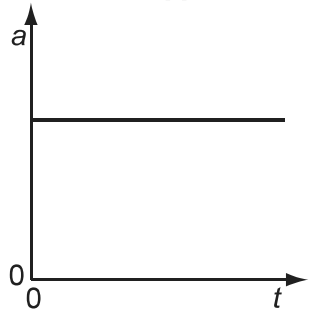
D



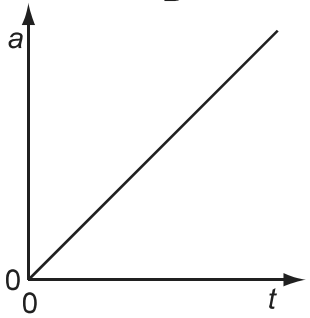
6 **A tennis a is re ease rom rest at t e to o a ta ui ing** **97 2 1 4/Q8**

ic gra est re resents t e ariation it time t o t e acce eration a o t e a as it a s assuming t at t e e ects o air resistance are a recia e

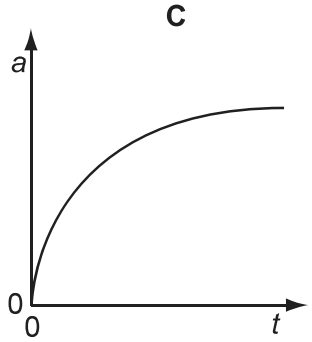
A



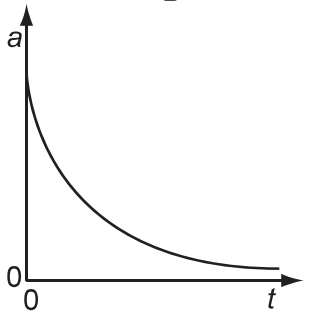
B



C



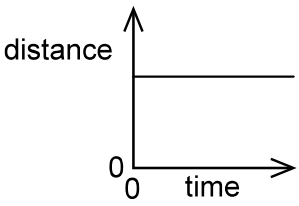
D



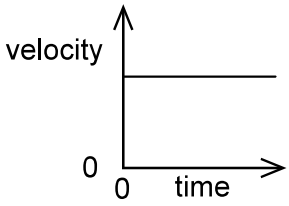
7 A particle is moving in a straight line with uniform acceleration. 9702/1/O/N/02/Q2

Which graph represents the motion of the particle?

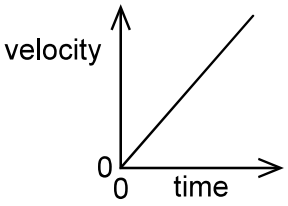
A



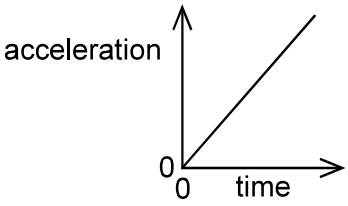
B



C



D



8 **ic eature o a gra a o s acce eration to e etermine** **97 2 1 /Q6**

A t e area un er a is acement time gra

B t e area un er a e ocit time gra

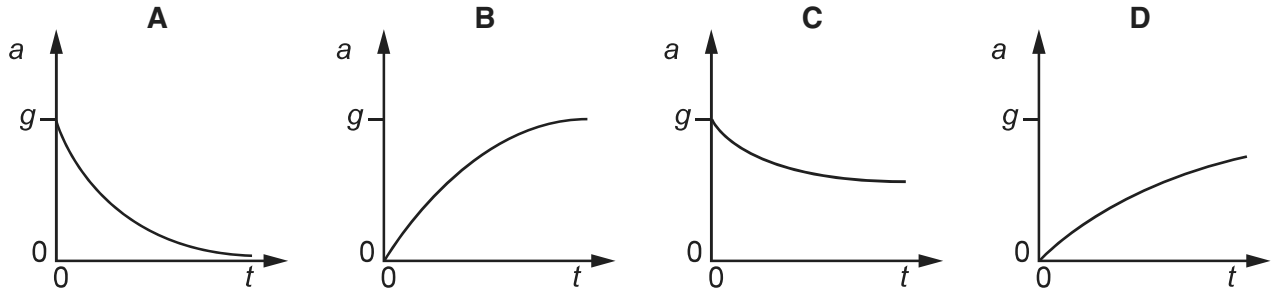
C t e so e o a is acement time gra

D t e so e o a e ocit time gra

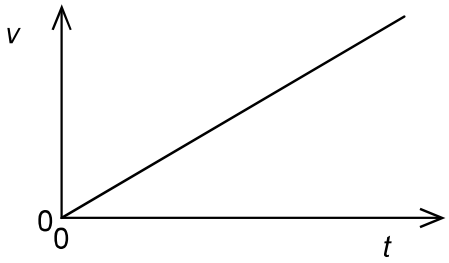
9 An object is dropped from a great height and falls through air of uniform density. 9702/01/O/N/03/Q8

The acceleration of free fall is g.

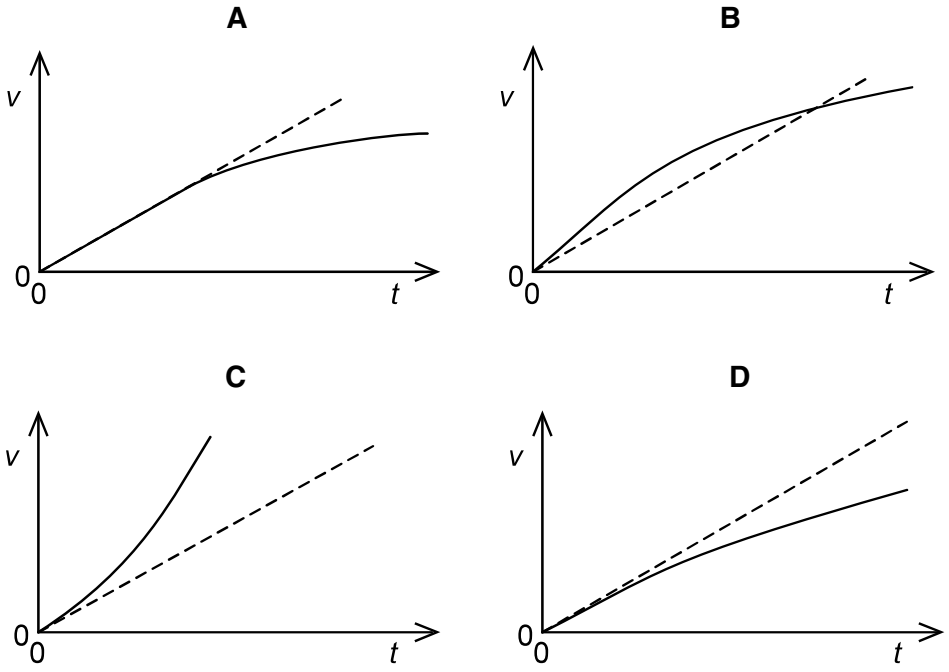
Which graph could show the variation with time t of the acceleration a of the object?



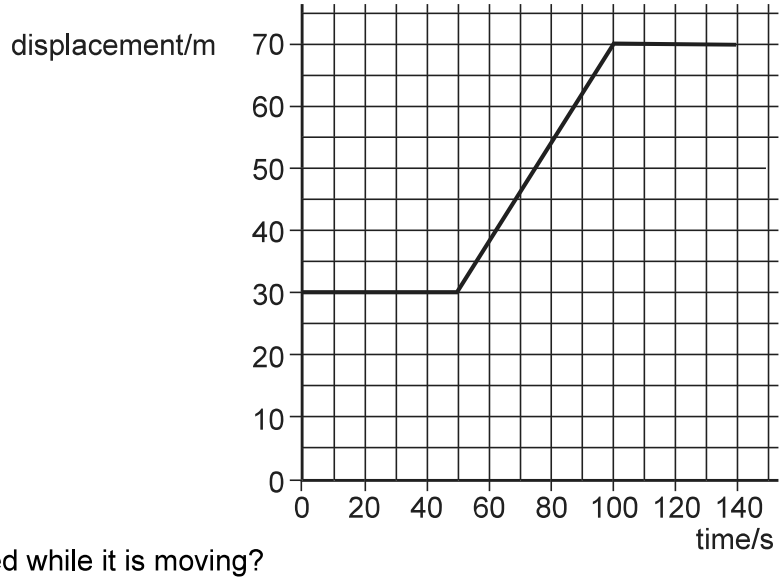
1 A body falls from rest in a vacuum near the Earth's surface. The variation with time t of its speed v is shown below. 9702/1/O/N/02/Q10



Which graph shows the variation with time t of the speed v of the same ball falling in air at the same place on Earth?



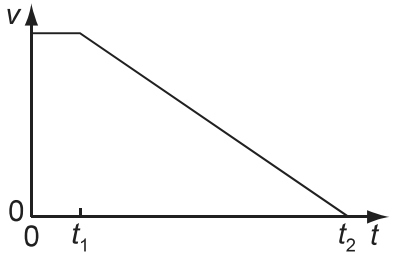
11 A car at rest in a traffic queue moves forward in a straight line and then comes to rest again. The graph shows the variation with time of its displacement. 9702/01/O/N/03/Q7



What is its speed while it is moving?

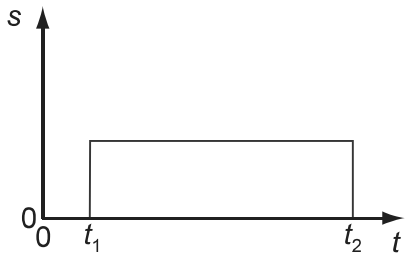
A $0.70\,m\,s^{-1}$ **B** $0.80\,m\,s^{-1}$ **C** $1.25\,m\,s^{-1}$ **D** $1.40\,m\,s^{-1}$

12 **en a car ri er sees a a ar a ea s e a ies t e ra es as soon as s e can an rings t e car to rest e gra s o s o t e s ee o t e car aries it time t a ter t e a ar is seen** **97 2 1 4**/Q8

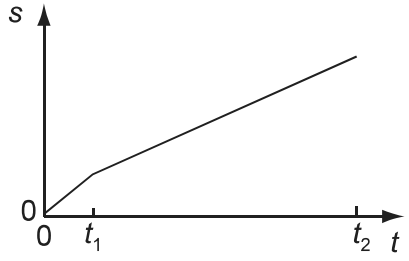


ic gra re resents t e ariation it time t o t e istance s tra e e t e car a ter t e a ar as een seen

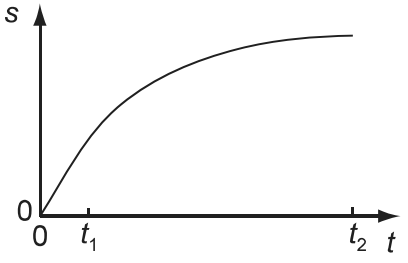
A



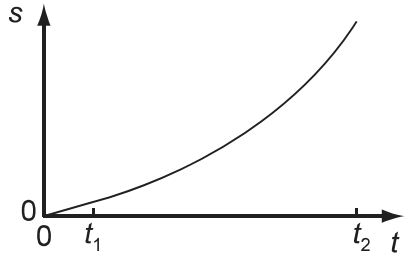
B



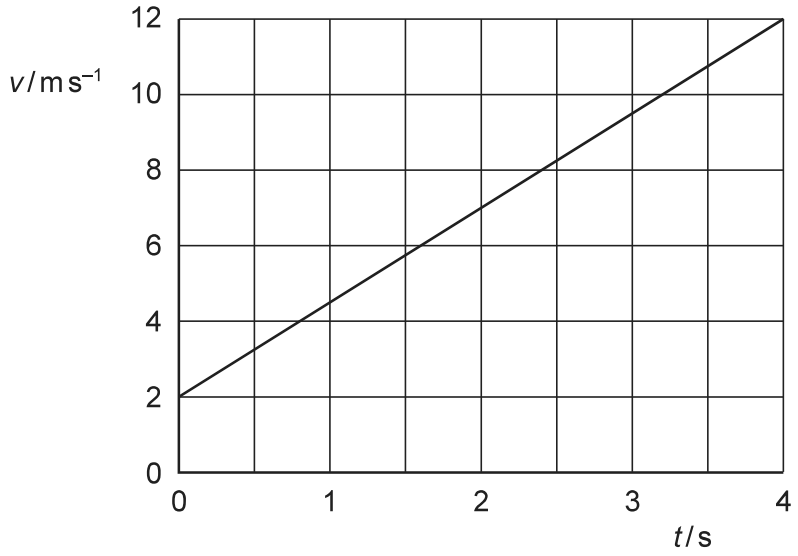
C



D



13 e iagram s o s a e ocit time gra or a car 97 2 1 /Q8



at is t e istance tra e e et een time t an t 4 s

A 2 m B m C 2 m D 28 m

14 A o t ro s a a ertica u ar s t rises to a ma imum eig t ere it is momentari at rest an a s ac to is an s 97 2 1 /Q7

ic o t e o o ing gi es t e acce eration o t e a at arious stages in its motion a e ertica u ar s as ositi e eg ect air resistance

	rising	at ma imum eig t	a ing
A	9 81 ms ^{2}		9 81 ms ^{2}
B	9 81 ms ^{2}	9 81 ms ^{2}	9 81 ms ^{2}
C	9 81 ms ^{2}	9 81 ms ^{2}	9 81 ms ^{2}
D	9 81 ms ^{2}		9 81 ms ^{2}

15 A oot a is ro e rom t e to o a t ree store ui ing t a s t roug air unti it reac es t e groun 97 2 12 1 /Q6

at remains constant t roug out t e a

A acce eration o t e oot a

B air resistance on t e oot a

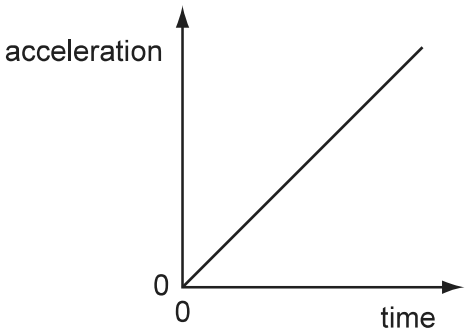
C e ocit o t e oot a

D eig t o t e oot a

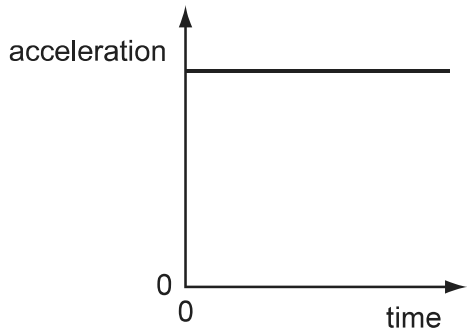
16 A oot a is ro e rom t e to o a ta ui ing 97 2 1 /Q6

ic acce eration time gra est re resents t e motion o t e oot a t roug t e air

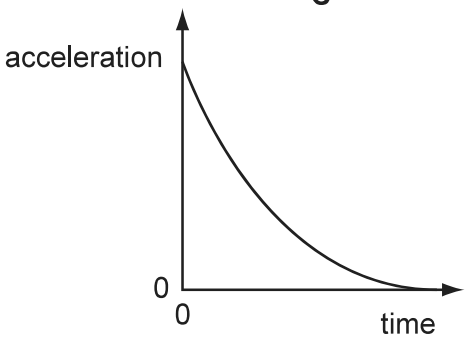
A



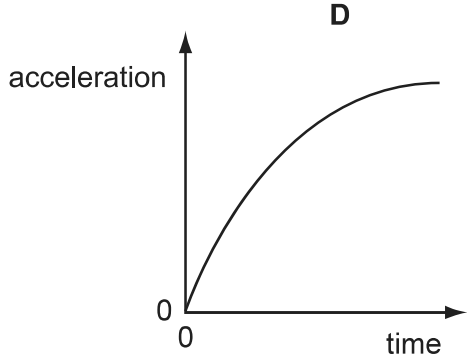
B



C



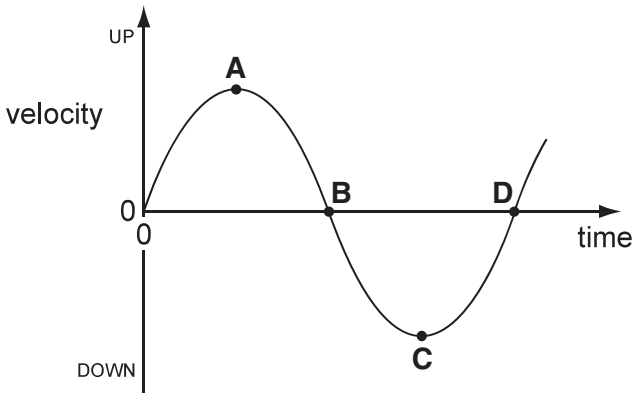
D



17 e iagram s o s a e ocit time gra or a mass mo ing u an o n on t e en o a s ring

ic oint re resents t e e ocit o t e mass en at t e o est oint o its motion

97 2 1 M/J 6/Q9



18 at gi es t e a ue o a o s acce eration 97 2 1 7/Q6

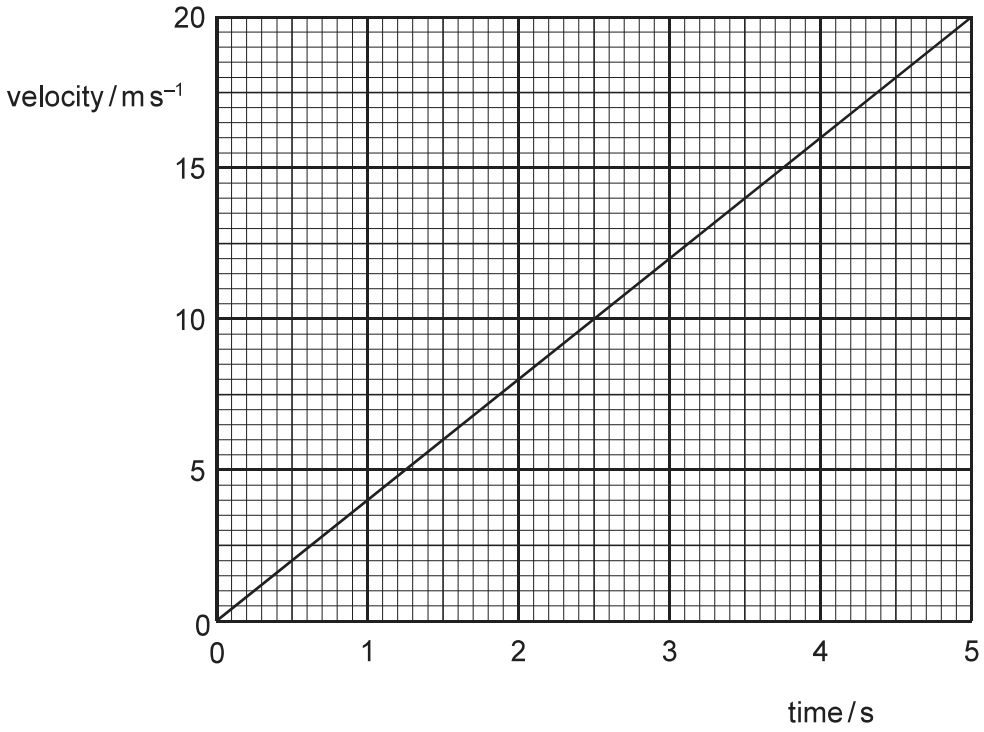
A t e area un er its is acement time gra

B t e area un er its e ocit time gra

C t e gra ient o its is acement time gra

D t e gra ient o its e ocit time gra

19 **e e ocit o an o ect uring t e irst i e secon s o its motion is s o n on t e gra** 97 2 1 /Q8

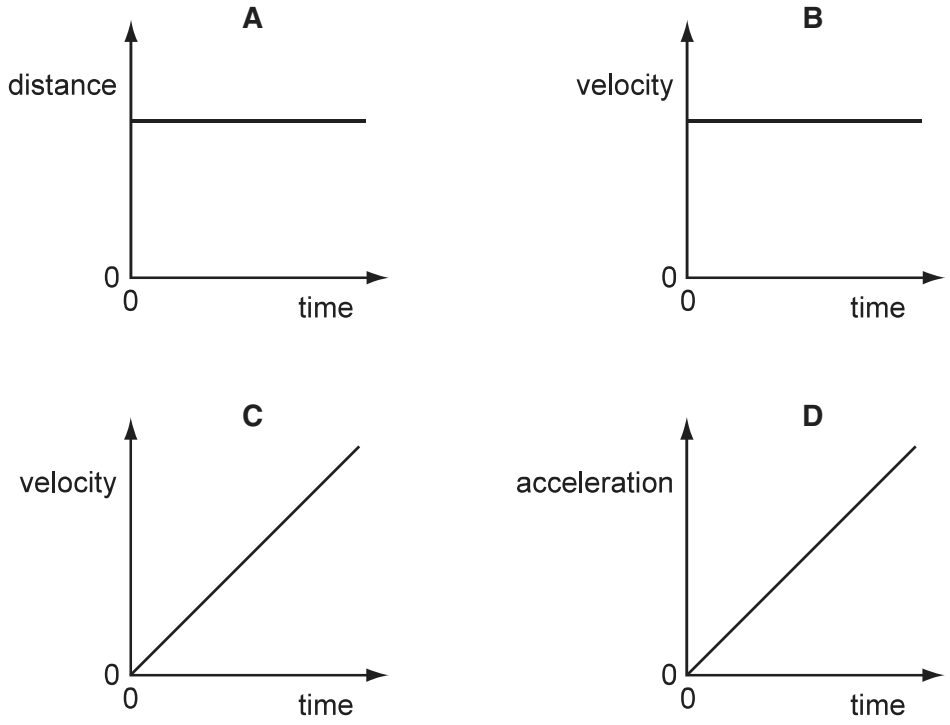


at is t e istance tra e e t e o ect in t is time

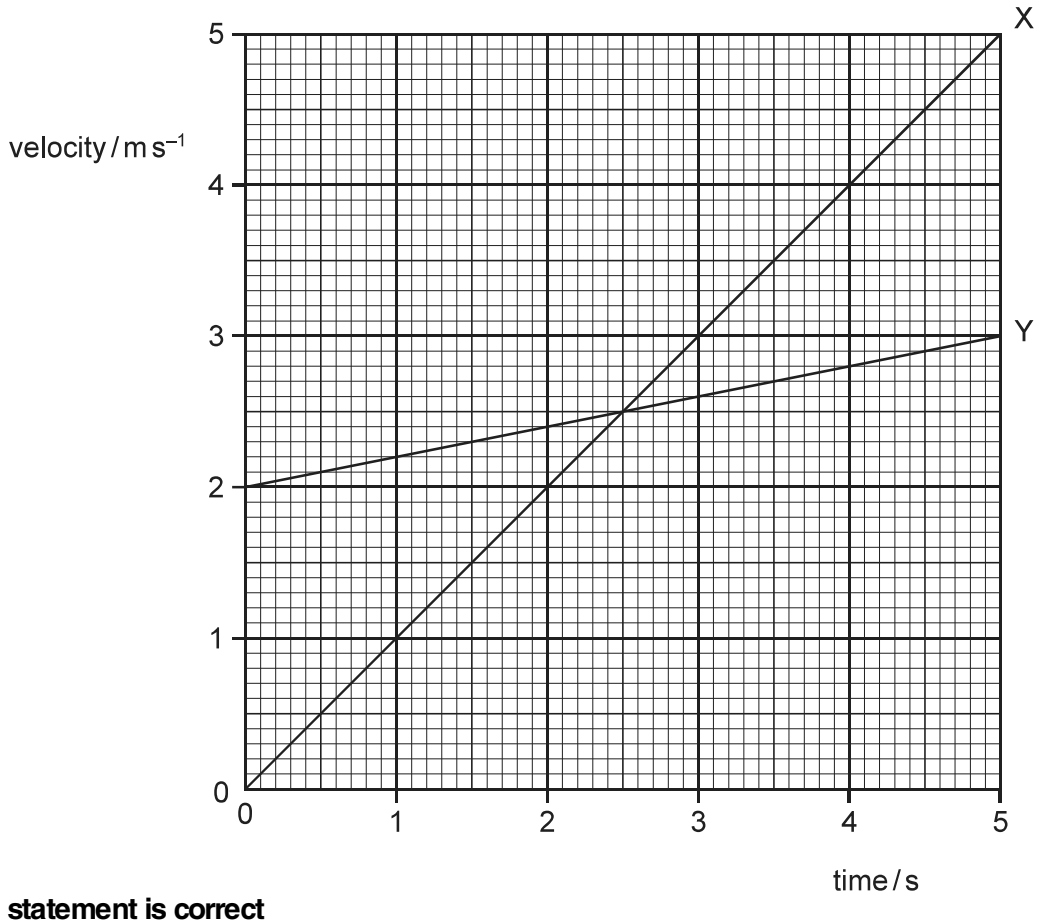
A 4 m **B** 2 m **C** m **D** 1 m

20 **A artic e is mo ing in a straig t ine it uni orm acce eration** 97 2 1 /Q7

ic gra re resents t e motion o t e artic e



21 e gra s o s e ocit time ots or t o e ic es an e acce erations an istances tra e e t e t o e ic es can e estimate rom t ese ots 97 2 1 /Q8



ic statement is correct

A e acce erations o an are t e same at 2 s

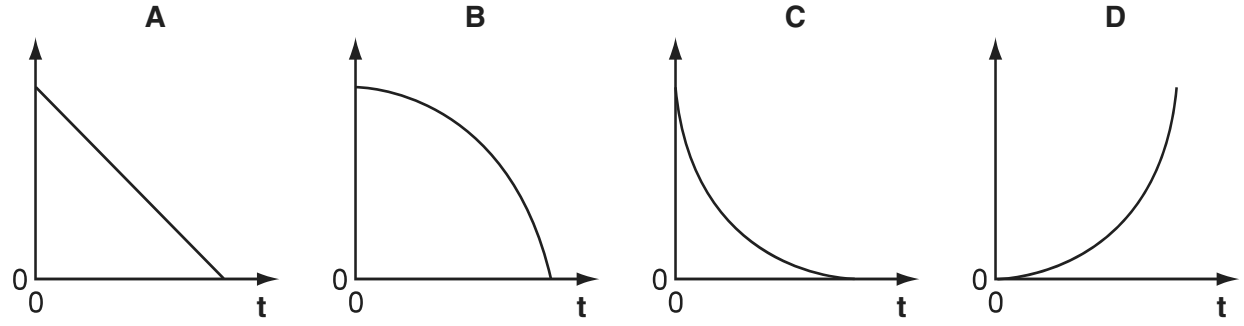
B e initia acce eration o is greater t an t at o

C e istance tra e e is greater t an t at tra e e in t e s erio

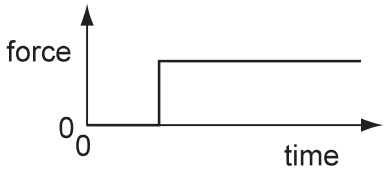
D e istances tra e e an in t e s erio are t e same

22 A sma stee a a s ree un er gra it a ter eing re ease rom rest 97 2 1 1 /Q13

ic gra est re resents t e ariation o t e eig t o t e a it time t

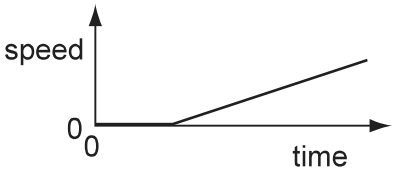


23 **A car ri er s ar resses o n t e acce erator en t e tra ic ig ts go green e resu tant ori onta orce acting on t e car aries it time as s o n** 97 2 1 /Q8

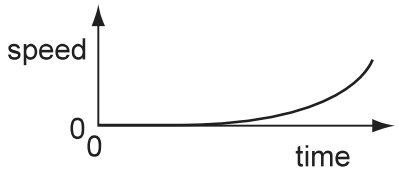


ic gra s o s t e ariation it time o t e s ee o t e car

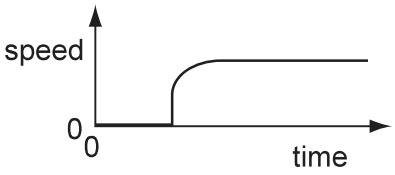
A



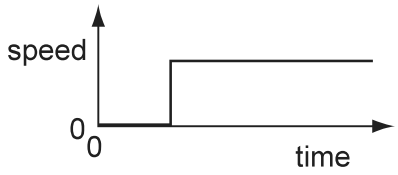
B



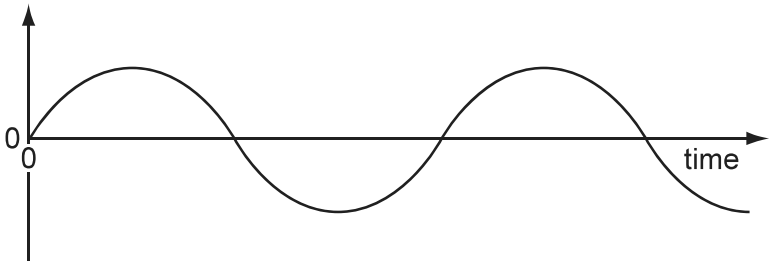
C



D



24 **A artic e mo es a ong a straig t ine A articu ar ro ert o t e artic e s motion is otte against time** 97 2 1 7/Q8



At an time t e so e o t e gra is t e acce eration o t e artic e

at is t e ro ert

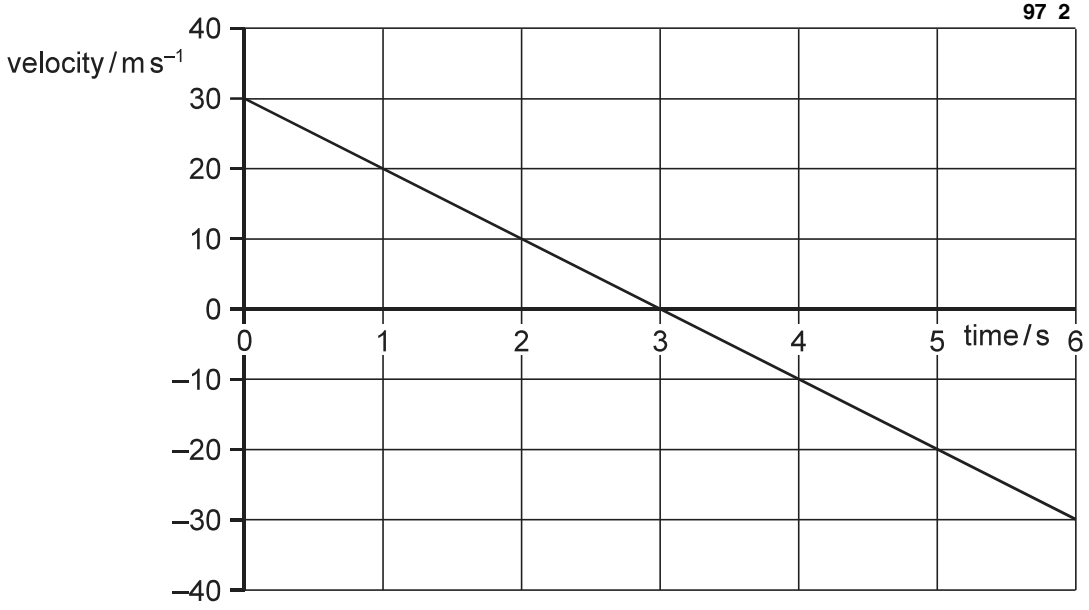
A t e is acement o t e artic e

B t e istance tra e e t e artic e

C t e s ee o t e artic e

D t e e ocit o t e artic e

25 **A stone is t ro n ertica u ar s A stu ent ots t e ariation it time o its e ocit** 97 2 1 7/Q9

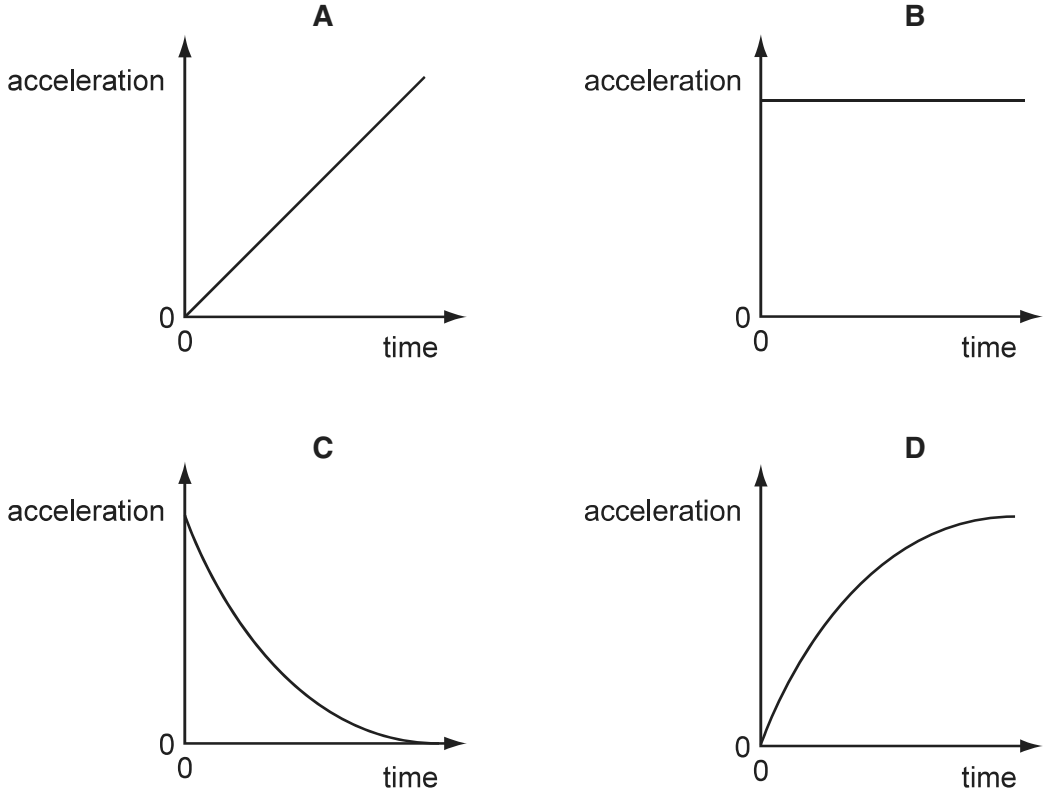


at is t e ertica is acement o t e stone rom its starting oint a ter secon s

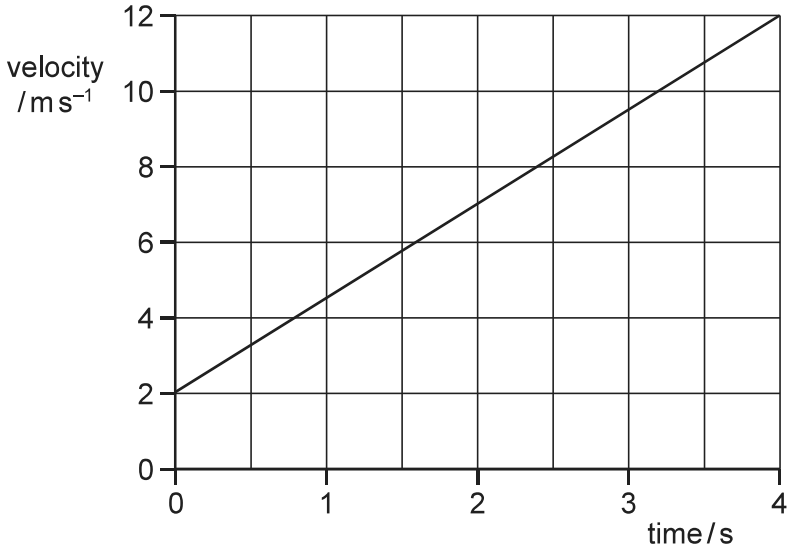
A 2 m B 2 m C 4 m D m

26 **A oot a is ro e rom t e to o a ta ui ing** 97 2 1 8/Q8

ic acce eration time gra est re resents t e motion o t e oot a t roug t e air



27 **e iagram s o s a e ocit time gra or a car** **97 2 1 8/Q6**



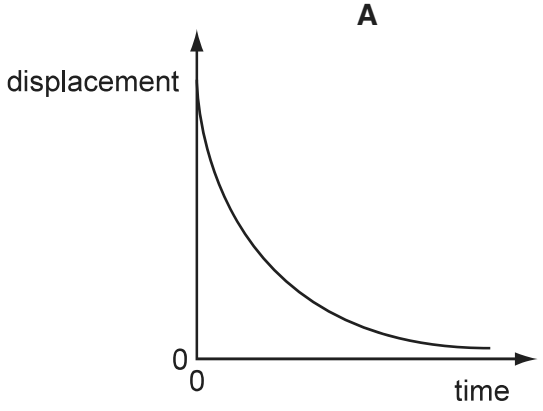
at is t e istance tra e e uring t e irst 4 s

A 2 m B m C 2 m D 28 m

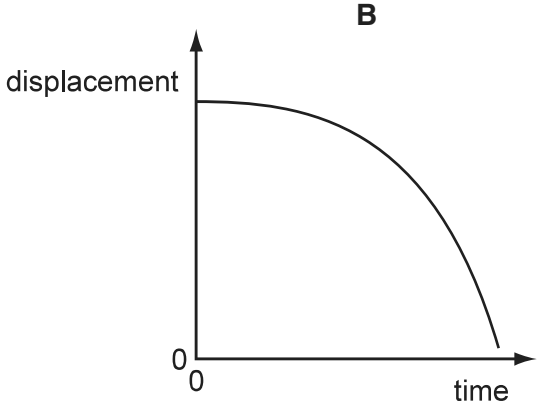
28 **ic is acement time gra est re resents t e motion o a a ing s ere t e initia acce eration o ic e entua re uces unti it egins to tra e at constant termina e ocit**

97 2 1 9/Q5

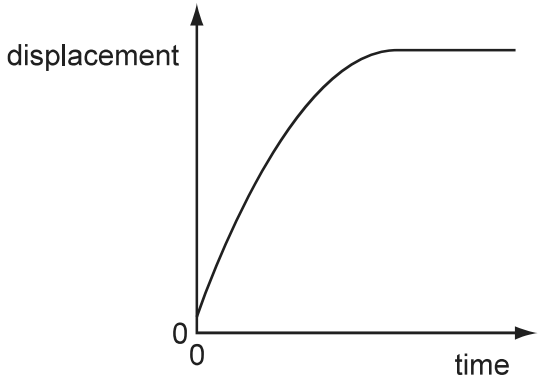
A



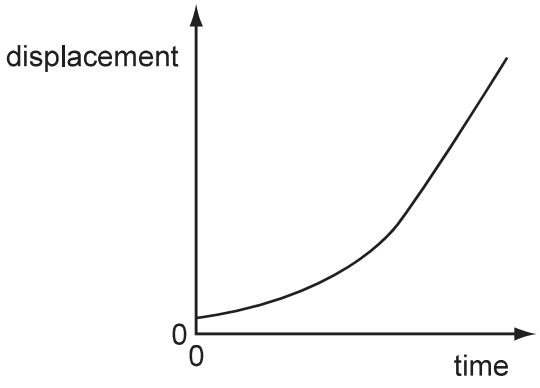
B



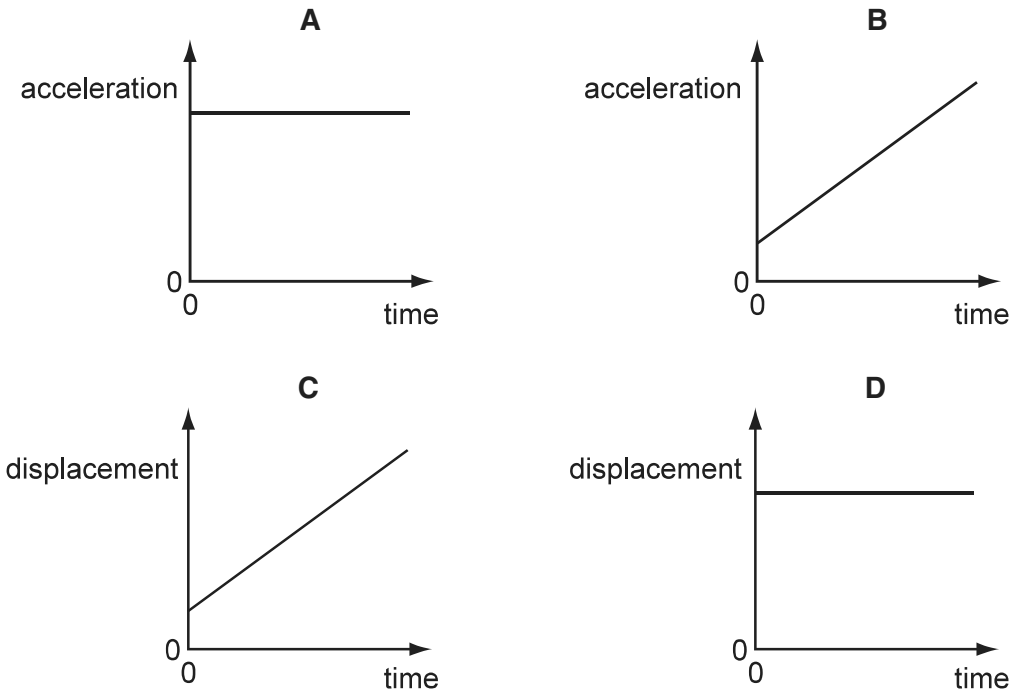
C



D

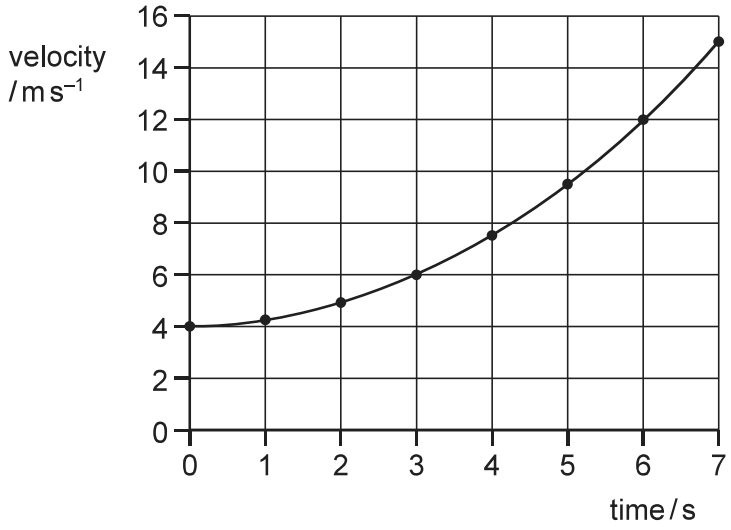


29 ic gra re resents t e motion o a car t at is tra e ing a ong a straig t roa it a s ee t at increases uni orm it time 97 2 1 8/Q8



30 e iagram s o s a e ocit time gra or a e ice e ice mo ing at 4 ms 1 egins to acce erate at time at is t e e ice s acce eration at time s

97 2 11 1 /Q8

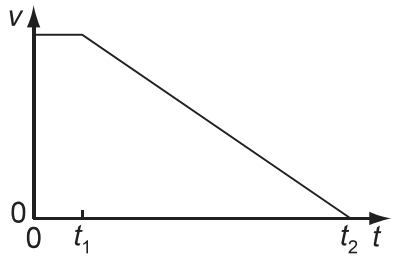


A 7ms 2 B 1 ms 2 C 1 ms 2 D 2 ms 2

31 en a car ri er sees a a ar a ea s e a ies t e ra es as soon as s e can an rings t e car to rest

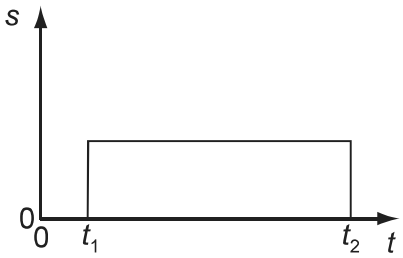
97 2 1 9/Q6

e gra s o s o t es ee o t e car aries it time t a ter s e sees t e a ar

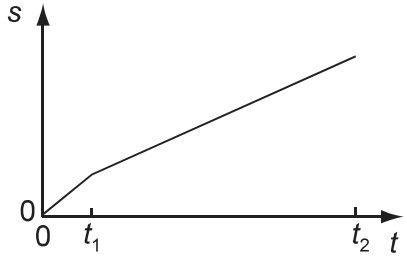


ic gra re resents t e ariation it time t o t e istance s tra e e t e car a ter s e as seen t e a ar

A



B



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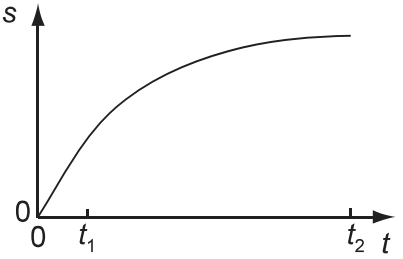
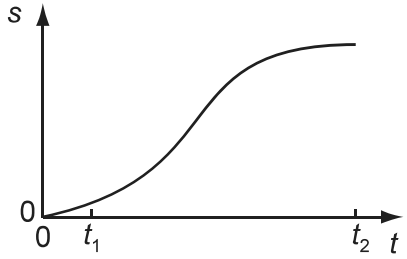
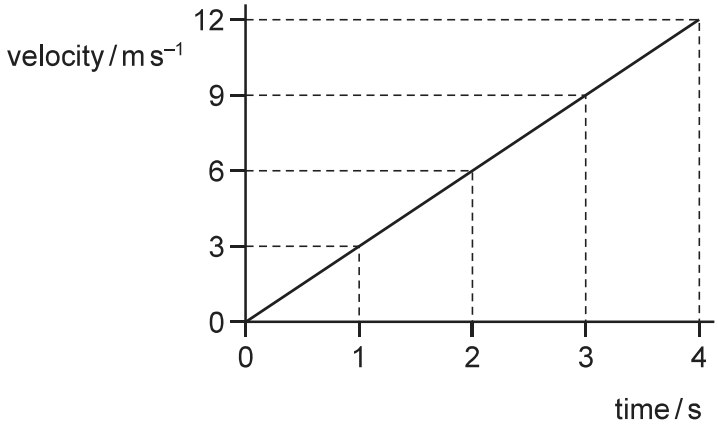


D



32 e iagram s o s a e ocit time gra

97 2 12 9/Q6

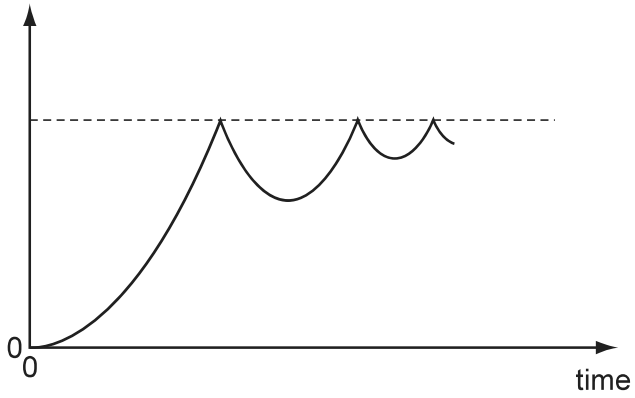


at is t e is acement uring t e ast 2 secon s o t e motion

A m B 12 m C 18 m D 24 m

33 **A a is re ease rom rest a o e a ori onta sur ace an ounces se era times** 97 2 11 9/Q6

e gra s o s o or t is a a uantit aries it time



at is t e uantit

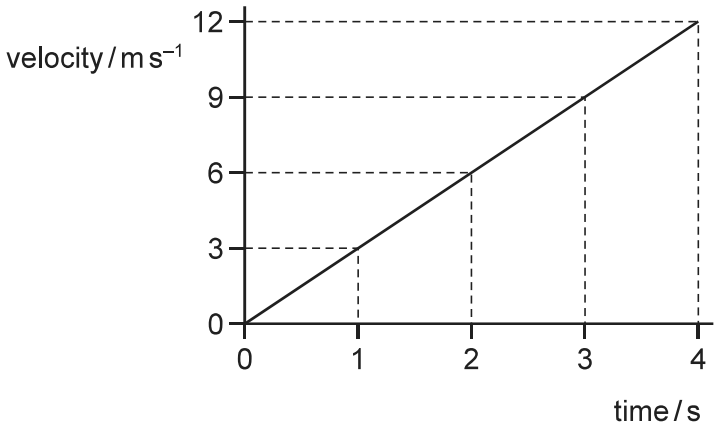
A acce eration

B is acement

C inetic energ

D e ocit

34 **e iagram s o s a e ocit time gra** 97 2 11 9/Q7



at is t e is acement uring t e ast 2 secon s o t e motion

A m B 12 m C 18 m D 24 m

35 **ic statement a out a a t at stri es a tennis rac et an re oun s is a a s correct** 97 2 12 9/Q7

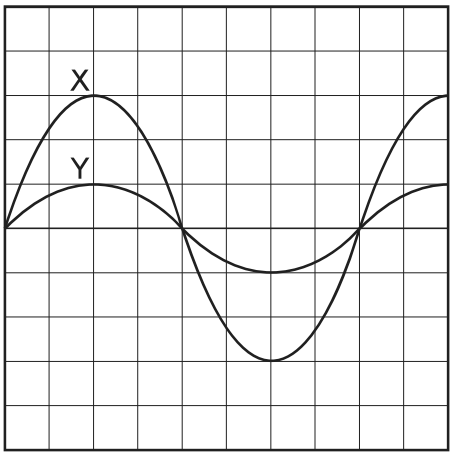
A ota inetic energ o t e a is conser e

B ota inetic energ o t e s stem is conser e

C ota momentum o t e a is conser e

D ota momentum o t e s stem is conser e

36 e iagram s o s an osci osco e screen is a ing t o signa s 97 2 12 9/Q3



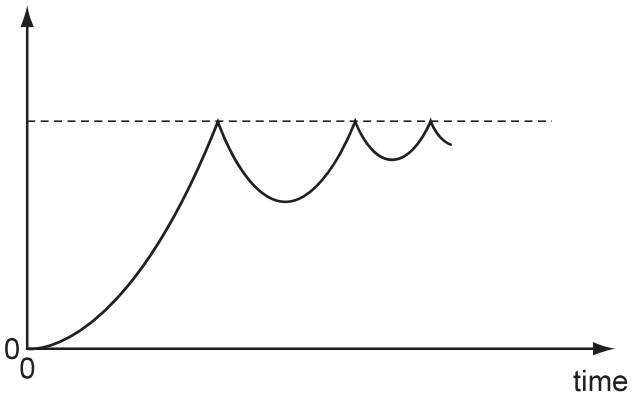
igna as a re uenc o an ea o tage o 12

at is t e erio an ea o tage o signa

	erio ms	ea o tage
A	2	4
B	2	12
C		4
D		12

37 A a is re ease rom rest a o e a ori onta sur ace an ounces se era times 97 2 12 9/Q5

e gra s o s o or t is a a uantit aries it time



at is t e uantit

A acce eration

B is acement

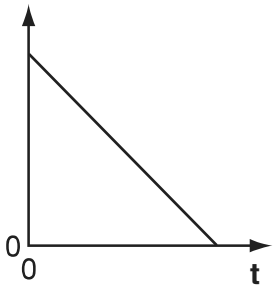
C inetic energ

D e ocit

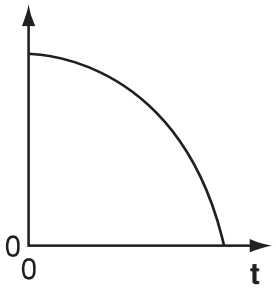
38 A sma stee a a s ree un er gra it a ter eing re ease rom rest 97 2 12 1 /Q8

ic gra est re resents t e ariation o t e eig t o t e a it time t

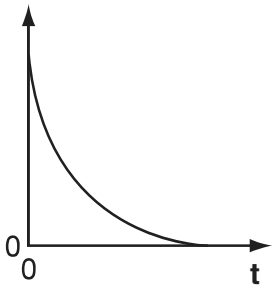
A



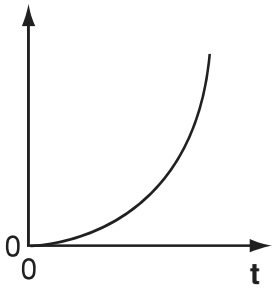
B



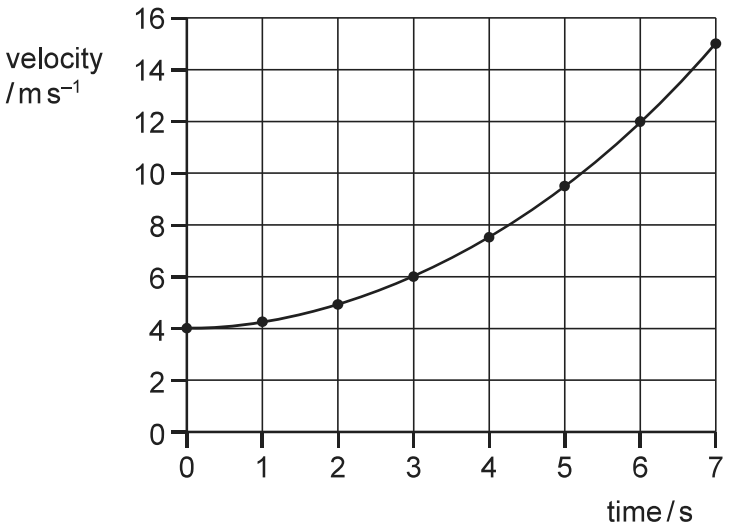
C



D



39 e iagram s o s a e ocit time gra or a e ice 97 2 12 1 /Q9



e e ice mo ing at 4 ms 1 egins to acce erate at time

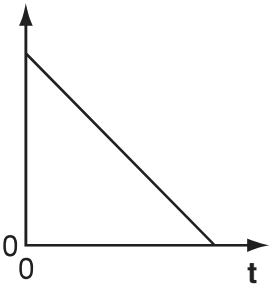
at is t e e ice s acce eration at time s

A 7 ms 2 B 1 ms 2 C 1 ms 2 D 2 ms 2

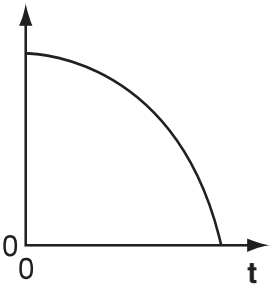
40 A sma stee a a s ree un er gra it a ter eing re ease rom rest 97 2 11 1 /Q9

ic gra est re resents t e ariation o t e eig t o t e a it time t

A



B



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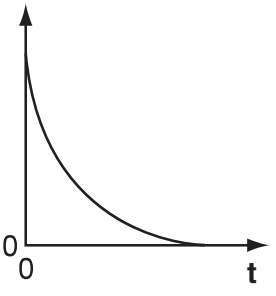
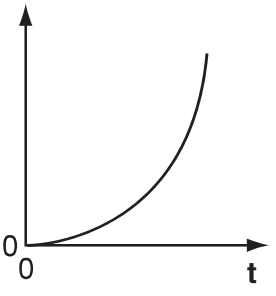
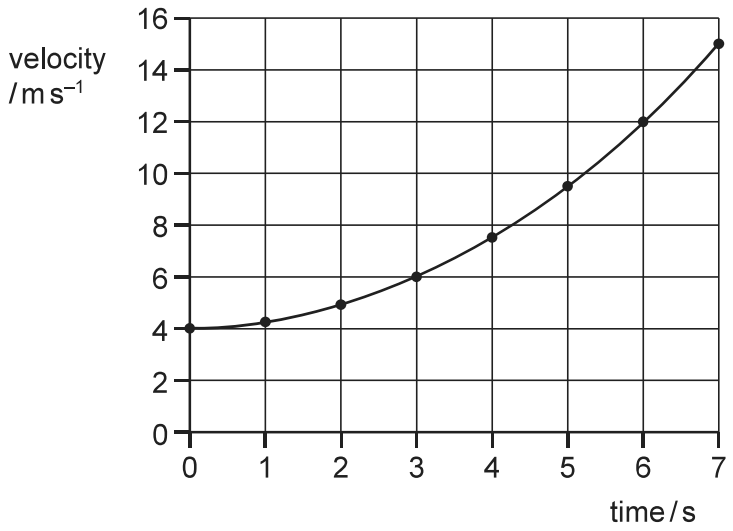


D



41 e iagram s o s a e ocit time gra or a e ic e 97 2 1 1 /Q14

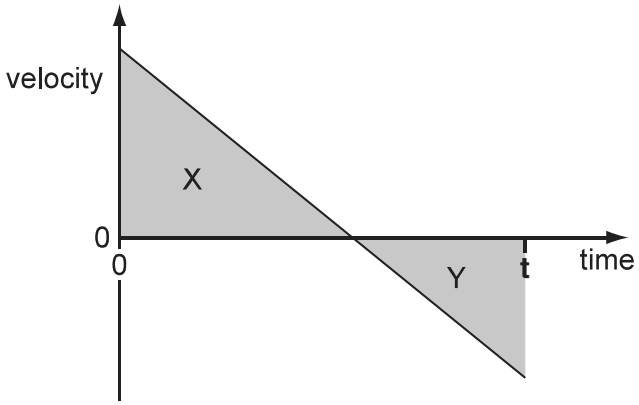


e e ic e mo ing at 4 ms 1 egins to acce erate at time

at is t e e ic e s acce eration at time s

A 7 ms 2 B 1 ms 2 C 1 ms 2 D 2 ms 2

42 e e ocit time gra e o is or a stone t ro n ertica u into t e air Air resistance is neg igi e 97 2 1 1 /Q8



e stone is t ro n u at time ero

Area re resents a istance o m Area re resents a istance o m

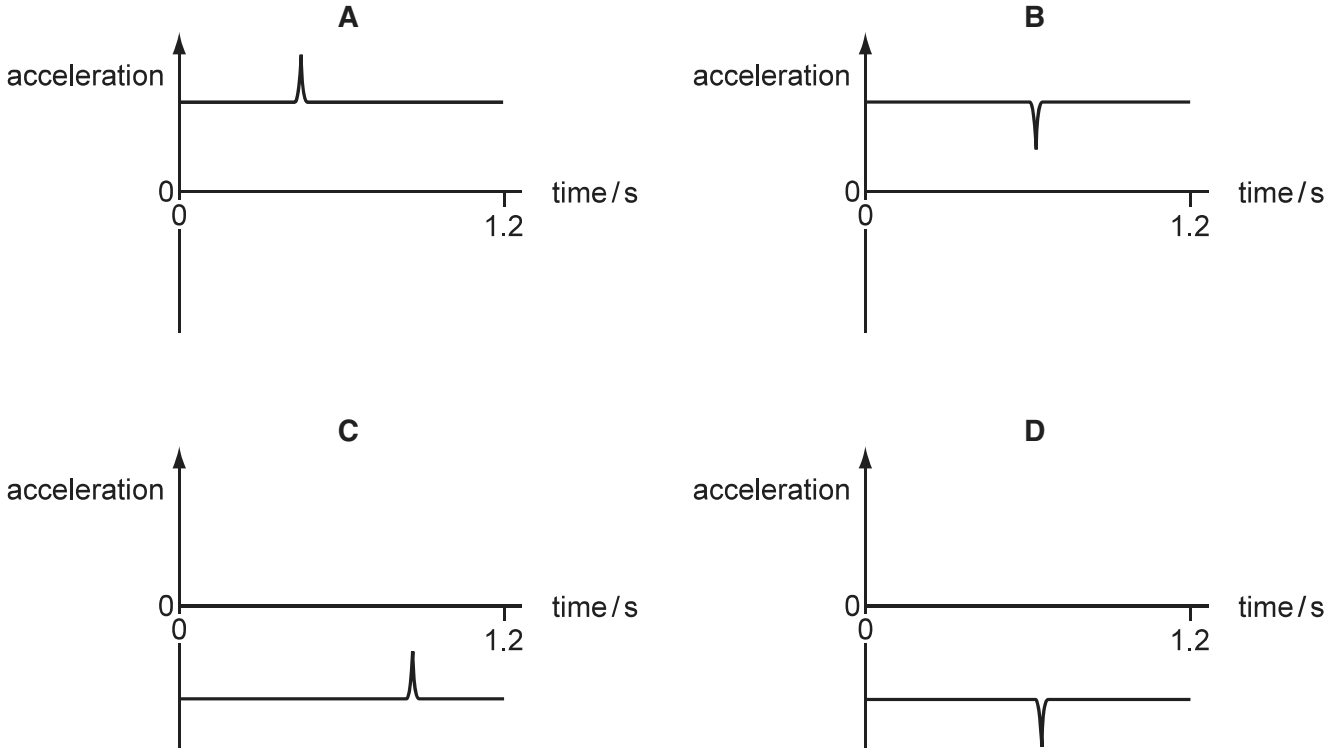
at is t e is acement o t e stone rom its initia osition at time t

A 2 m B m C m D 8 m

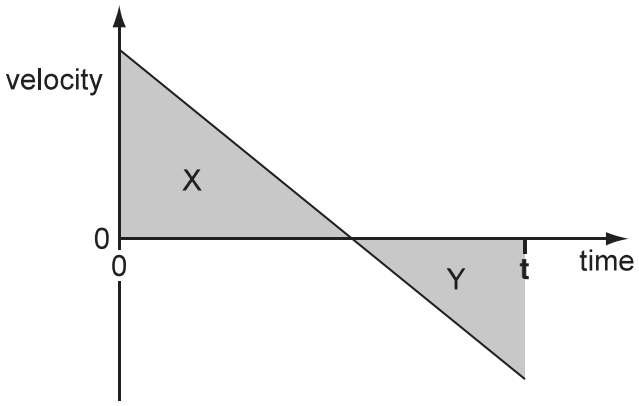
43 **A stu ent t ro s a a in t e ositi e irection ertica u ar s**

e a ma es an e astic co ision it t e cei ing re oun s an acce erates ac to t e stu ent s an in a time o 1 2 s **97 2 12 1 /Q7**

ic gra est re resents t e acce eration o t e a rom t e moment it ea es t e an to t e instant ust e ore it returns to t e an



44 **e e ocit time gra e o is or a stone t ro n ertica u into t e air Air resistance is neg igi e** **97 2 1 1 /Q6**



e stone is t ro n u at time ero

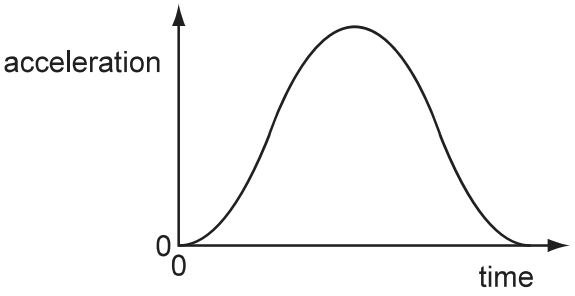
Area re resents a istance o m Area re resents a istance o m

at is t e is acement o t e stone rom its initia osition at time t

A 2 m B m C m D 8 m

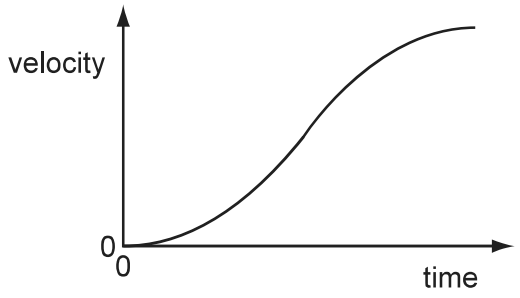
45 **e gra s o s o t e acce eration o an o ect mo ing in a straig t ine aries it time**

97 2 11 11/Q6

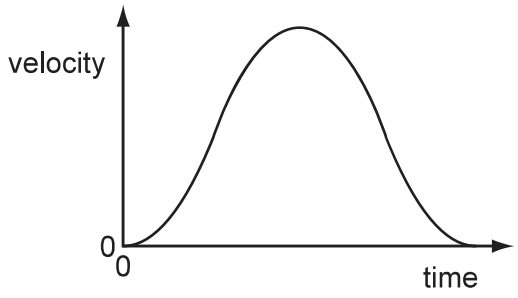


ic gra s o s t e ariation it time o t e e ocit o t e o ect

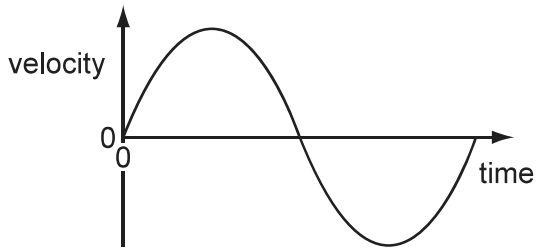
A



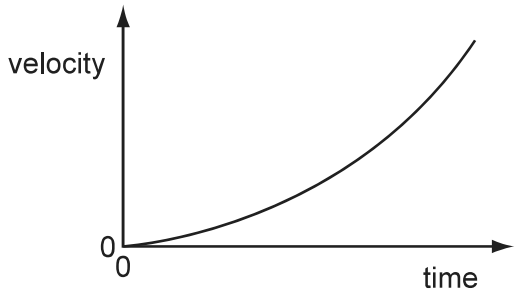
B



C



D



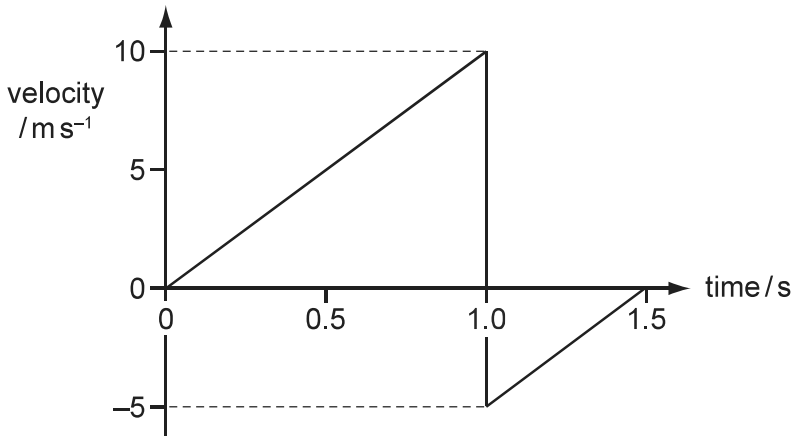
46 **A o t ro s a a ertica u ar s t rises to a ma imum eig t ere it is momentari at rest an t en a s ac to is an s**

97 2 11 11/Q8

ic ro gi es t e acce eration o t e a at arious stages in its motion a e ertica u ar s as ositi e gnore air resistance

	rising	at ma imum eig t	a ing
A	**9 81 ms ^{2}**		**9 81 ms ^{2}**
B	**9 81 ms ^{2}**	**9 81 ms ^{2}**	**9 81 ms ^{2}**
C	**9 81 ms ^{2}**	**9 81 ms ^{2}**	**9 81 ms ^{2}**
D	**9 81 ms ^{2}**		**9 81 ms ^{2}**

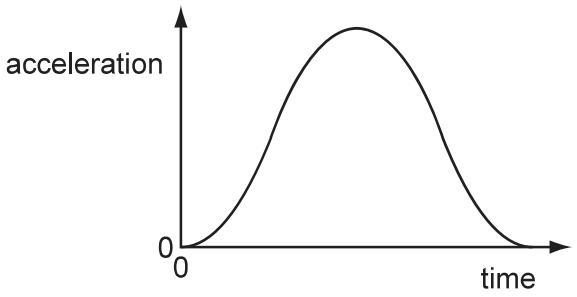
47 A a is re ease rom rest at time ero A ter 1 s it ounces ine astica rom a ori onta sur ace an re oun s reac ing t e to o its irst ounce a ter 1 s 97 2 11 11/Q7



at is t e tota is acement o t e a rom its origina osition a ter 1 s

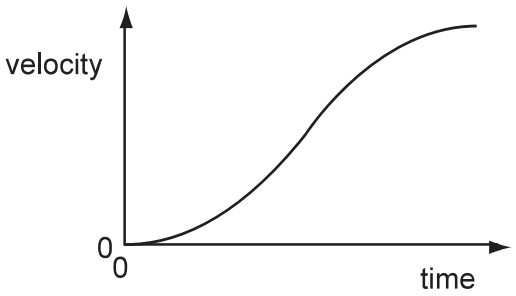
A 1 2 m B 7 m C m D 2 m

48 e gra s o s o t e acce eration o an o ect mo ing in a straig t ine aries it time 97 2 1 11/Q7

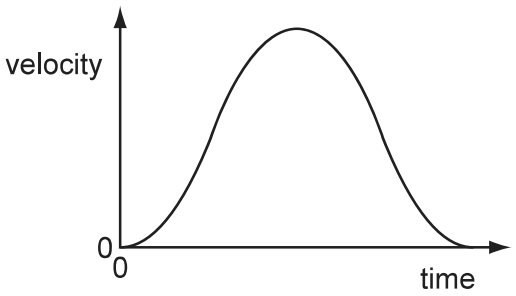


ic gra s o s t e ariation it time o t e e ocit o t e o ect

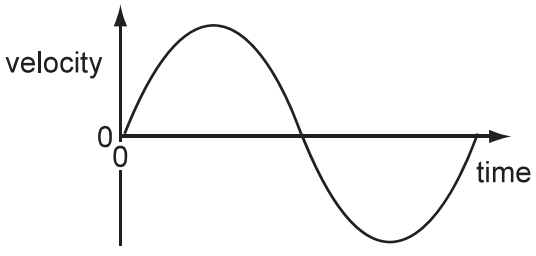
A



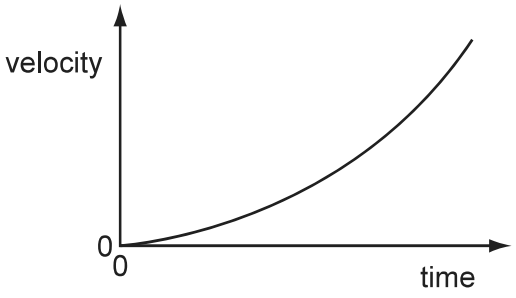
B



C

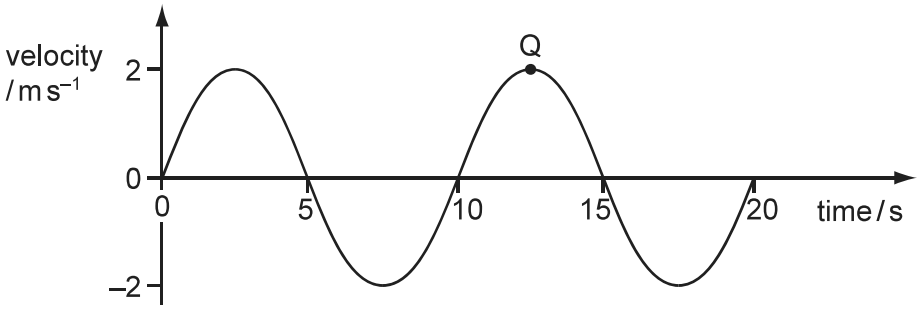


D



49 A artic e mo es in t e manner s o n t e e ocit time gra 97 2 12 11/Q7

e is acement o t e artic e as een measure so t at it is ero at t oint re ers to a oint in its motion



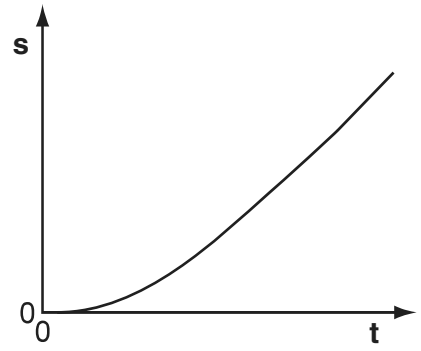
ic ro o t e ta e is correct

	times or ma imum is acement s		acce eration at oint m s 2
A	2	12	2
B		1	2
C	2	12	
D		1	

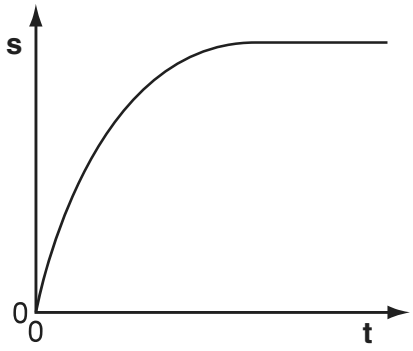
50 A tennis a a s ree in air rom t e to o a ta ui ing 97 2 12 11/Q8

ic gra est re resents t e ariation o istance s a en it time t

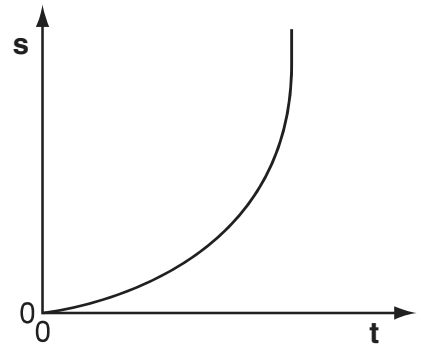
A



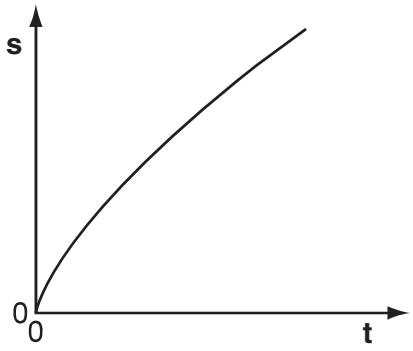
B



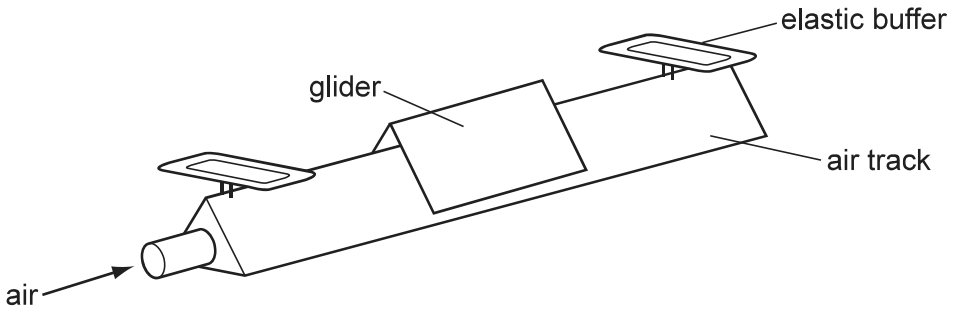
C



D



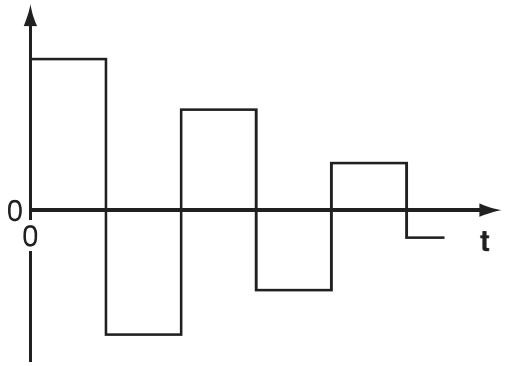
51 **A sma g i er mo es a ong a riction ree ori onta air trac as s o n e o** **97 2 12 11/Q9**



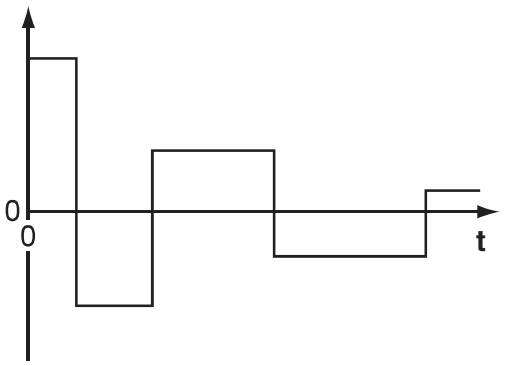
At eac en o t e air trac t ere is a er ect e astic u er

ic gra re resents t e ariation it time t o t e e ocit o t e gi er as it mo es et een t e t o u ers

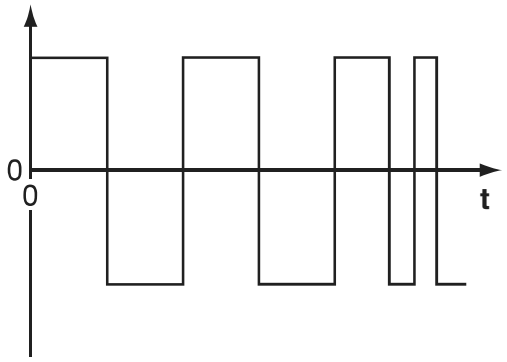
A



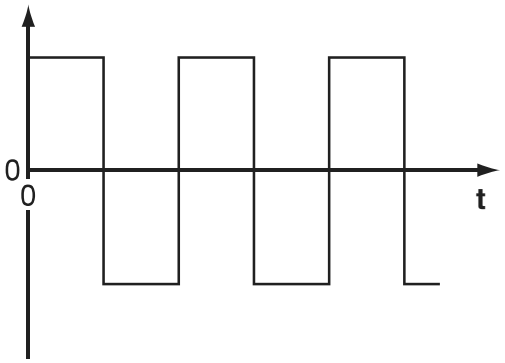
B



C



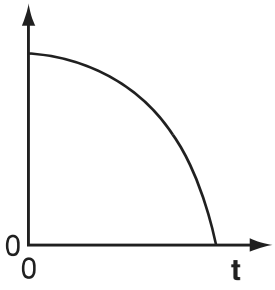
D



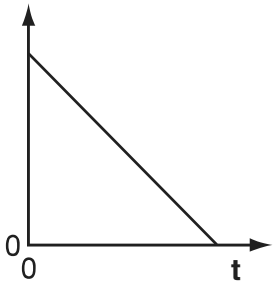
52 **A ric is iso ge rom a ui ing an a s ertica un er gra it** **97 2 12 12/Q9**

ic gra est re resents t e ariation o its eig t a o e t e groun it time t i air resistance is neg igi e

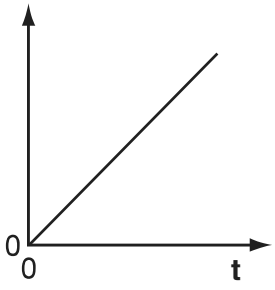
A



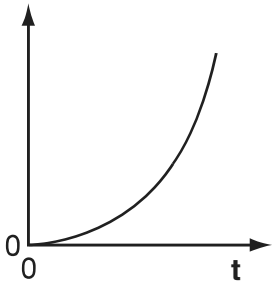
B



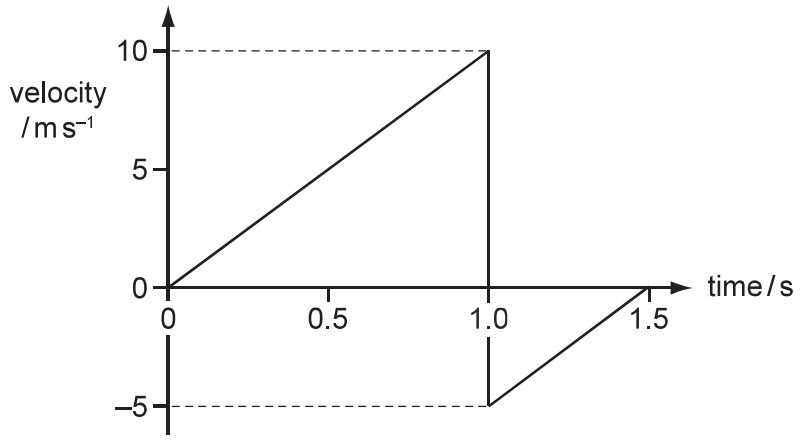
C



D



53 **A a is re ease rom rest at time ero A ter 1 s it ounces ine astica rom a ori onta sur ace an re oun s reac ing t e to o its irst ounce a ter 1 s** **97 2 1 11/Q8**

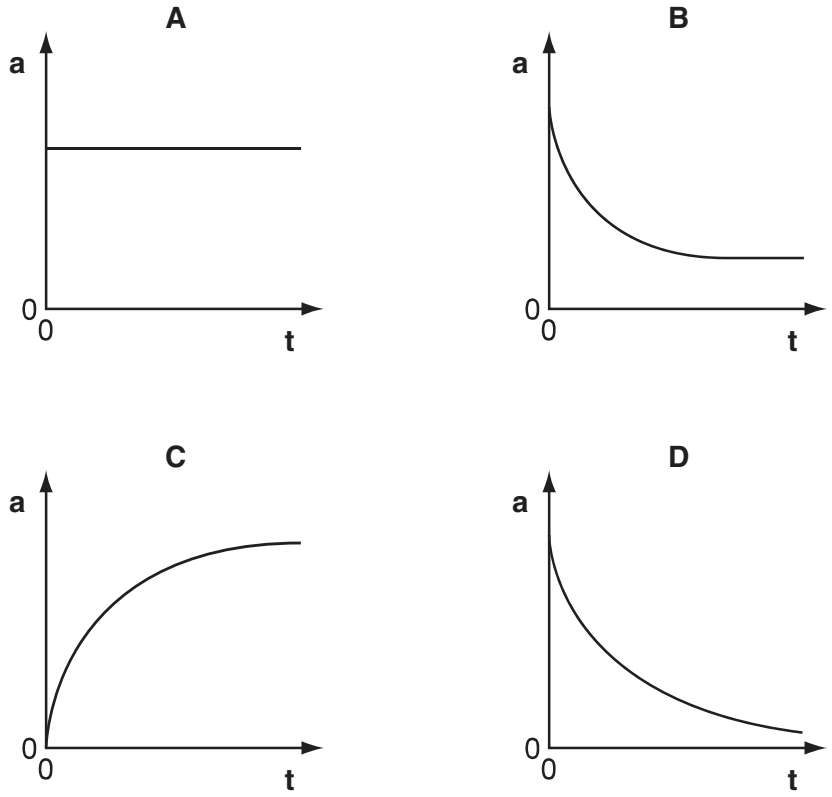


at is t e tota is acement o t e a rom its origina osition a ter 1 s

A 1 2 m B 7 m C m D 2 m

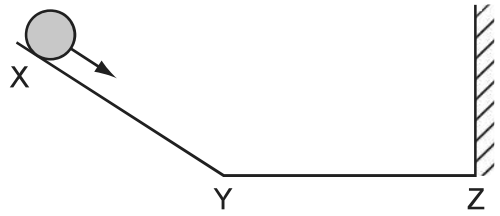
54 **A tennis a is re ease rom rest at t e to o a ta ui ing** **97 2 11 11/Q7**

ic gra est re resents t e ariation it time t o t e acce eration a o t e a as it a s assuming t at t e e ect o air resistance is not neg igi e



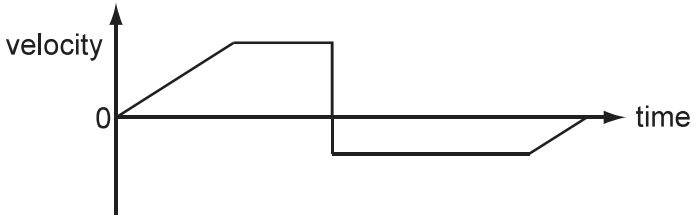
55 **A a is re ease rom rest on a smoot s o e** **97 2 11 11**/Q6

t mo es o n t e so e a ong a smoot ori onta sur ace an re oun s ine astica at en it mo es ac to an comes to rest momentari some ere on

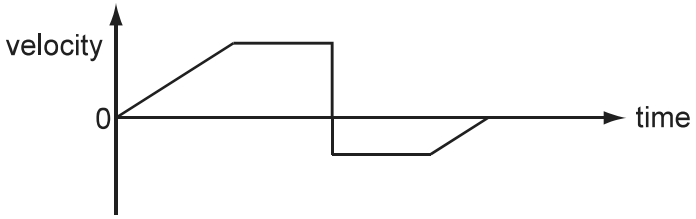


ic e ocit time gra re resents t e motion o t e a

A



B



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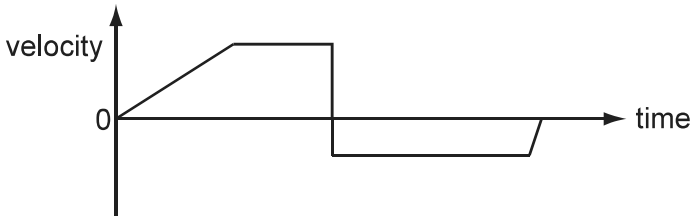
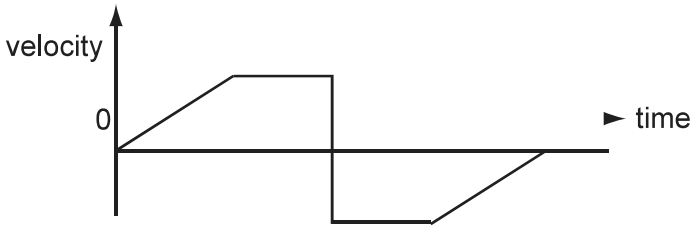


D



56 **ic eature o a gra a o s acce eration to e etermine** **97 2 1 12**/Q6

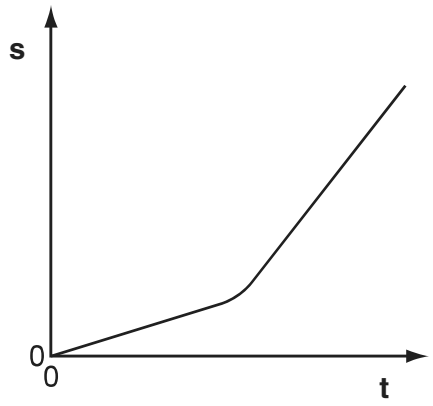
A t e area un er a is acement time gra

B t e area un er a e ocit time gra

C t e so e o a is acement time gra

D t e so e o a e ocit time gra

57 e ariation it time t o t e istance s mo e a o is s o n e o 97 2 12 11/Q8



at can e e uce rom t e gra a out t e motion o t e o

A t acce erates continuous

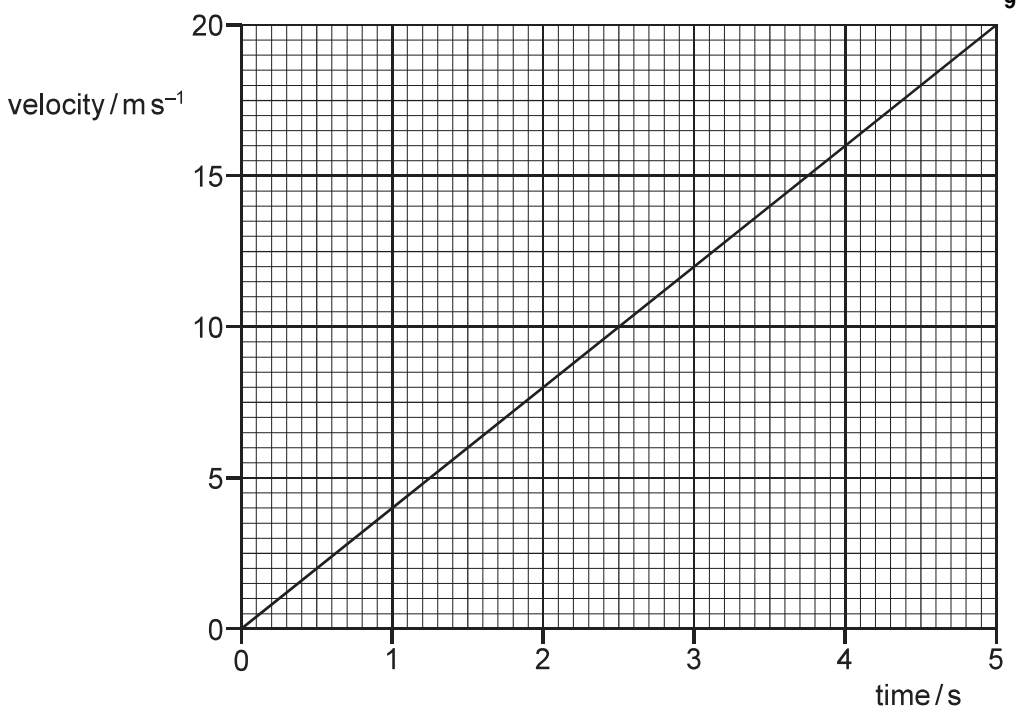
B t starts rom rest

C e istance is ro ortiona to time

D e s ee c anges

58 e e ocit o an o ect uring t e irst i e secon s o its motion is s o n on t e gra

97 2 12 11/Q6

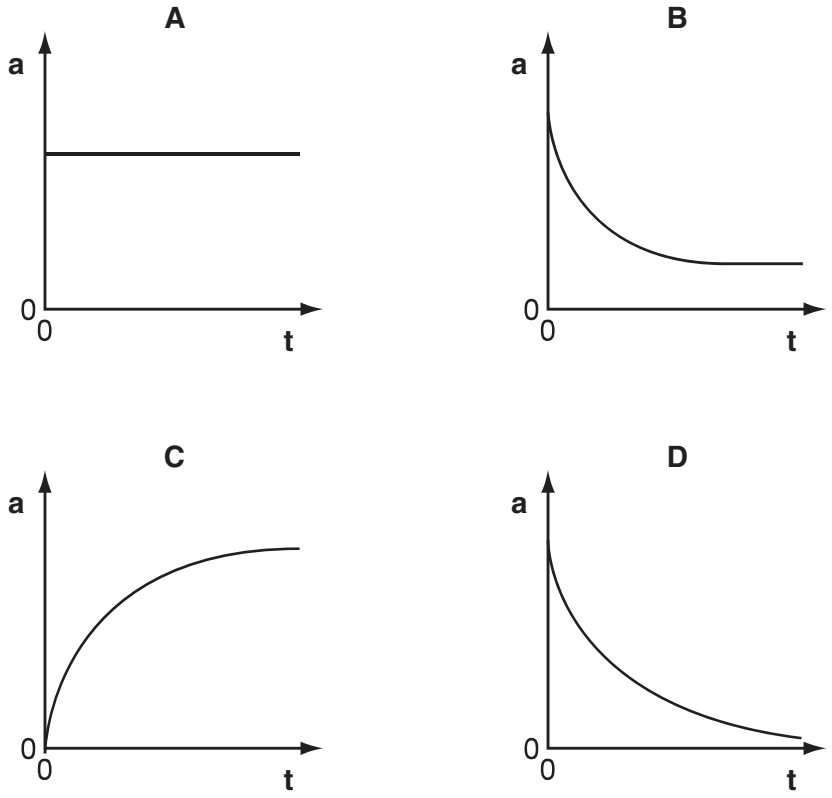


at is t e istance tra e e t e o ect in t is time

A 4 m B 2 m C m D 1 m

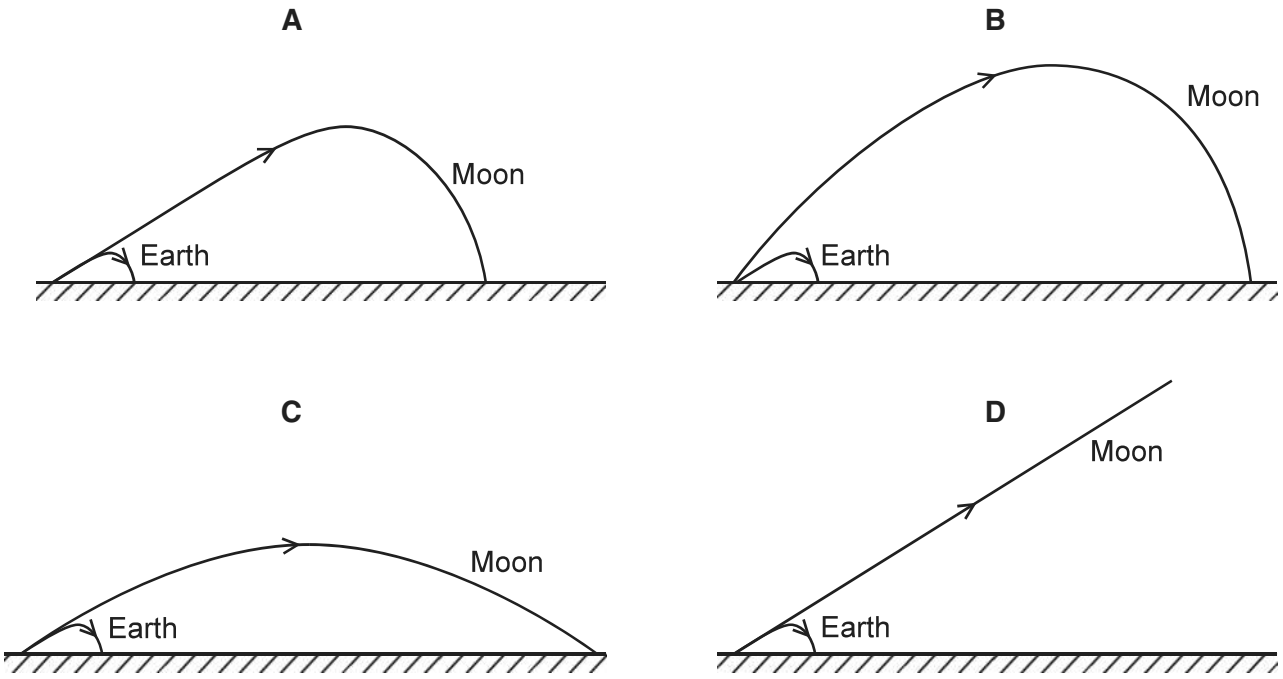
59 **A tennis a is re ease rom rest at t e to o a ta ui ing** **97 2 1 11/Q6**

ic gra est re resents t e ariation it time t o t e acce eration a o t e a as it a s assuming t at t e e ect o air resistance is not neg igi e



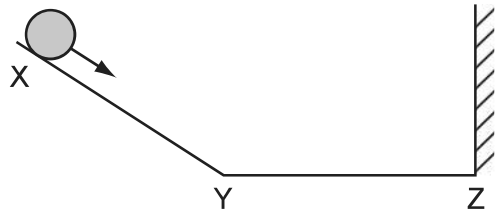
60 **A go a is it it t e same orce an irection on t e art an on t e oon** **97 2 12 12/Q10**

ic iagram est re resents t e s a es o t e at s ta en t e go a



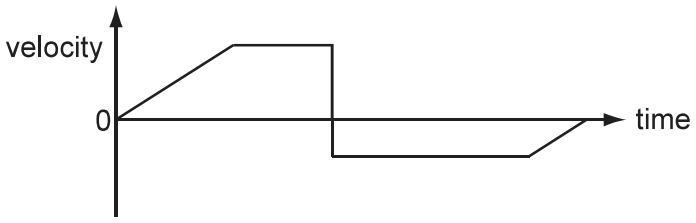
61 **A a is re ease rom rest on a smoot s o e** **97 2 1 11**/Q7

t mo es o n t e s o e a ong a smoot ori onta sur ace an re oun s ine astica at en it mo es ac to an comes to rest momentari some ere on

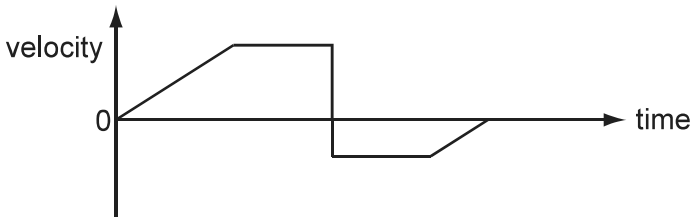


ic e ocit time gra re resents t e motion o t e a

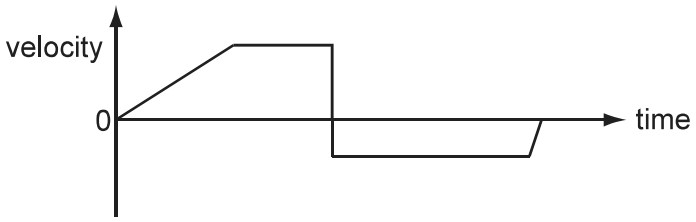
A



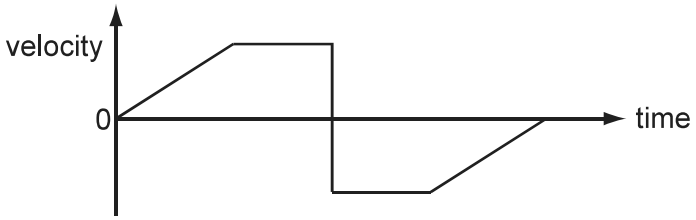
B



C



D

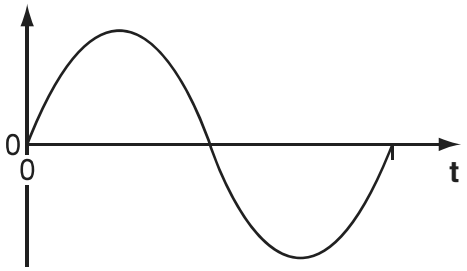


62 **A o t ro s a a ertica u ar s t rises to a ma imum eig t ere it is momentari at rest an t en a s ac to is an s** 97 2 1 11/Q9

ic ro gi es t e acce eration o t e a at arious stages in its motion a e ertica u ar s as ositi e gnore air resistance

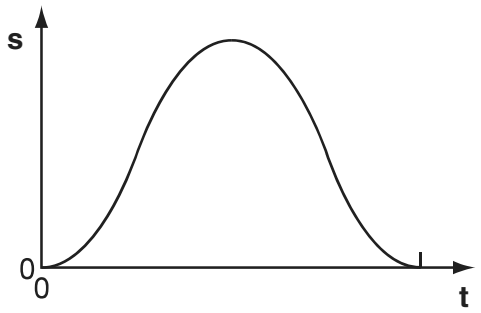
	rising	at ma imum eig t	a ing
A	9 81 ms ^{2}		9 81 ms ^{2}
B	9 81 ms ^{2}	9 81 ms ^{2}	9 81 ms ^{2}
C	9 81 ms ^{2}	9 81 ms ^{2}	9 81 ms ^{2}
D	9 81 ms ^{2}		9 81 ms ^{2}

63 **e gra s o s o t e e ocit o an o ect mo ing in a straig t ine aries o er time t to t** 97 2 12 12/Q7

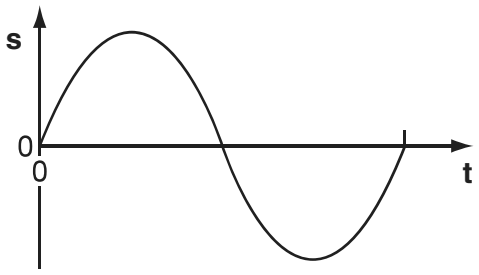


ic gra re resents t e is acement s o t e o ect in t e time t to t

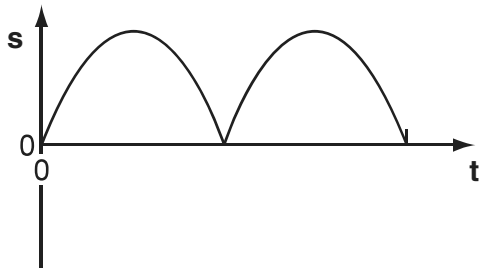
A



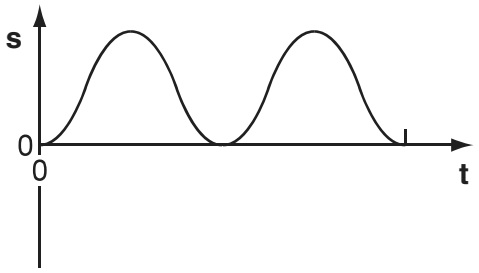
B



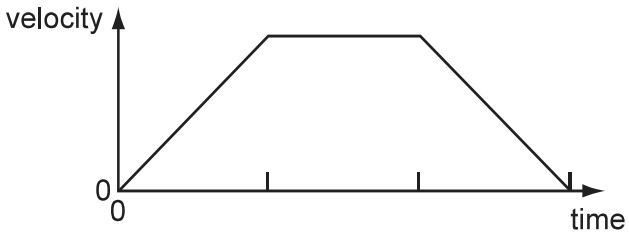
C



D

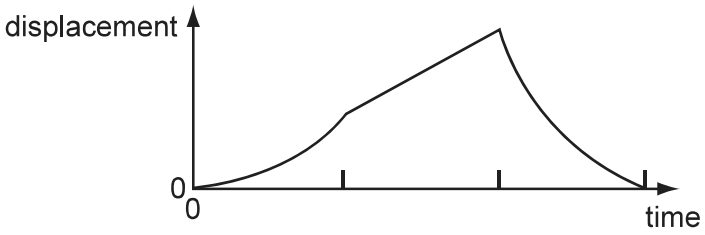


64 **e gra o e ocit against time or an o ect mo ing in a straig t ine is s o n** 97 2 12 12/Q9

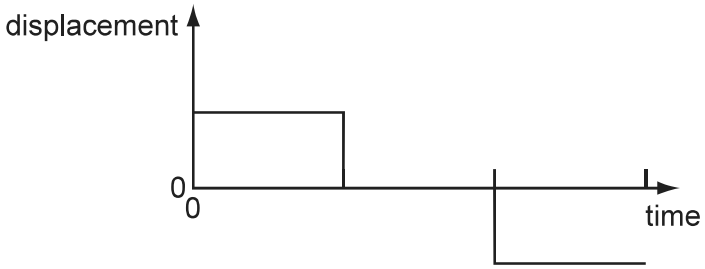


at is t e corres on ing gra o is acement against time

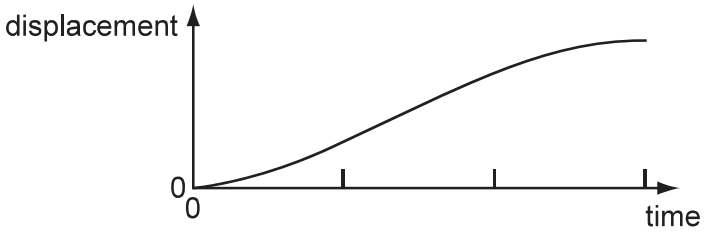
A



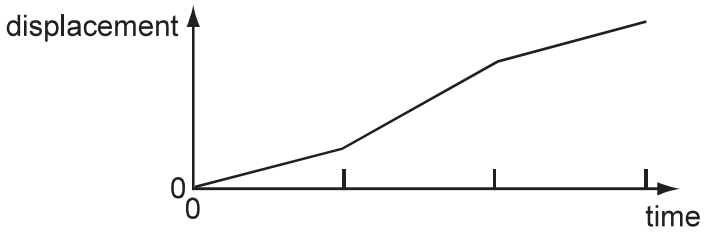
B



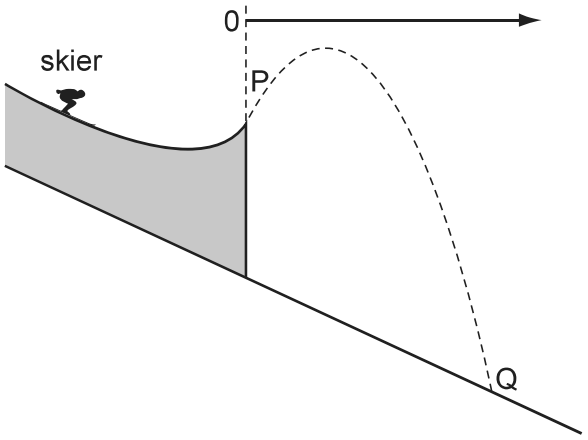
C



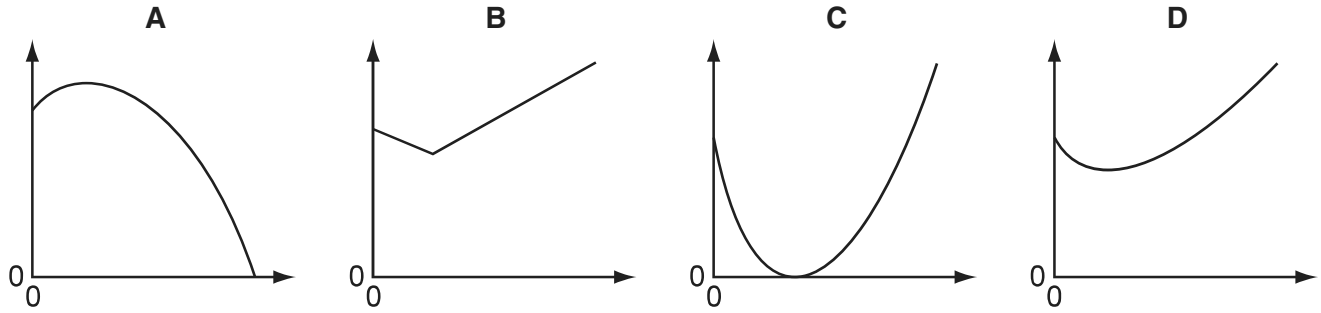
D



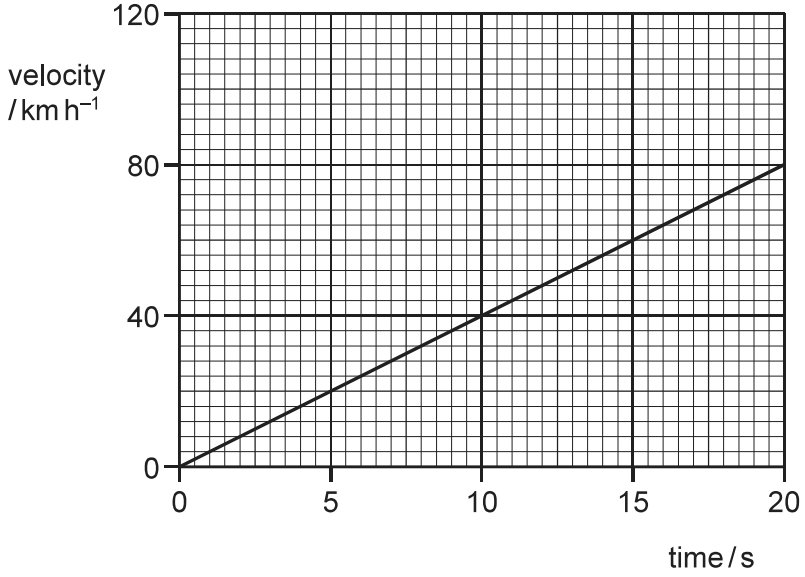
65 e otte ine s o s t e at o a com etitor in a s i um ing com etition 97 2 12 12/Q10



gnoring air resistance ic gra est re resents t e ariation o is s ee it t e ori onta istance co ere rom t e start o is um at e ore an ing at



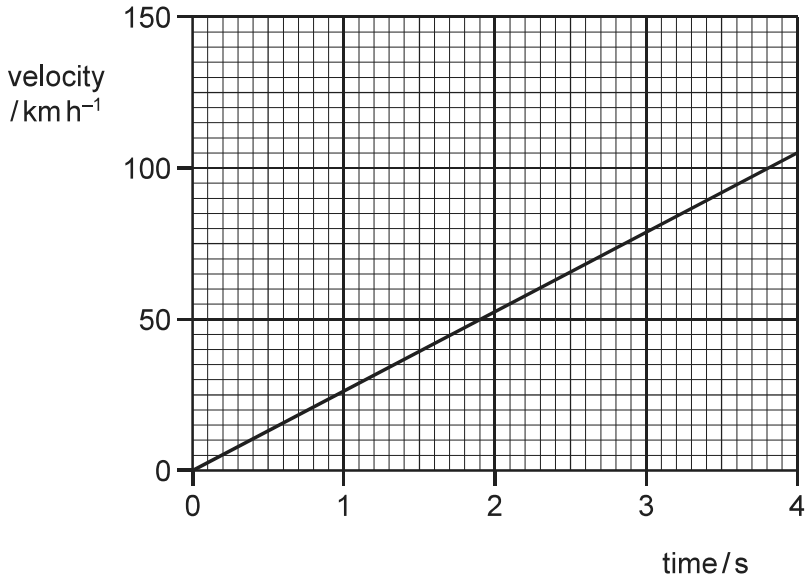
66 e e ocit o a car c anges as s o n 97 2 12 12/Q11



at is t e acce eration o t e car

A 1 1 ms ^{2} B 4 ms ^{2} C 224 ms ^{2} D 8 ms ^{2}

67 **e e ocit o an e ectric car c anges as s o n** **97 2 11 12**/Q8



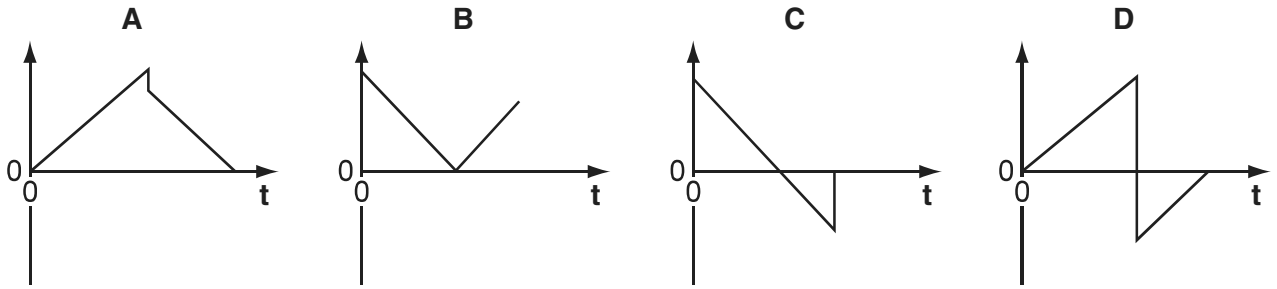
at is t e acce eration o t e car

A 19 ms 2 **B ms 2** **C 2 ms 2** **D 7 ms 2**

68 **A a is re ease rom rest a o e a ori onta sur ace t ounces once an is caug t** **97 2 1 12**

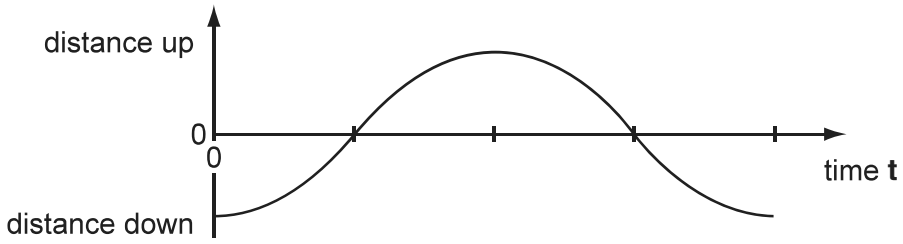
97 2 1 12/Q9

ic gra re resents t e ariation it time t o t e e ocit o t e a



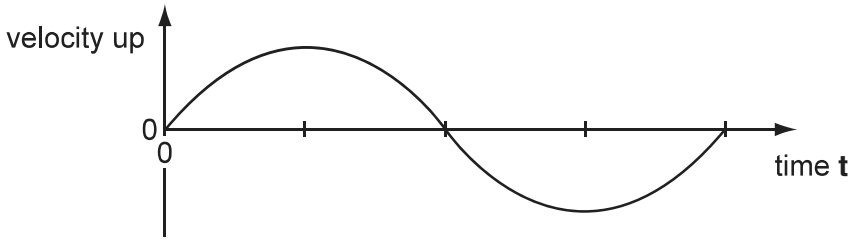
69 **A mass on t e en o a s ring ounces u an o n as s o n a ter eing re ease at time t**

97 2 1 **12**/Q10

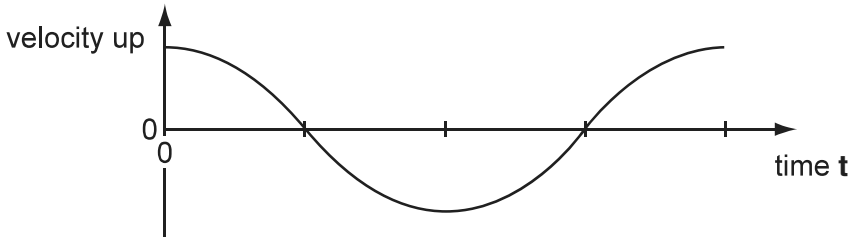


ic gra s o s o t e e ocit aries it time

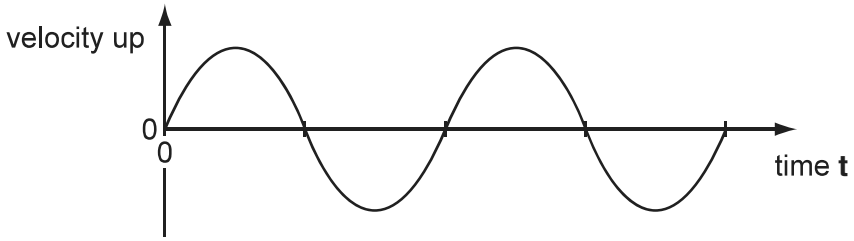
A



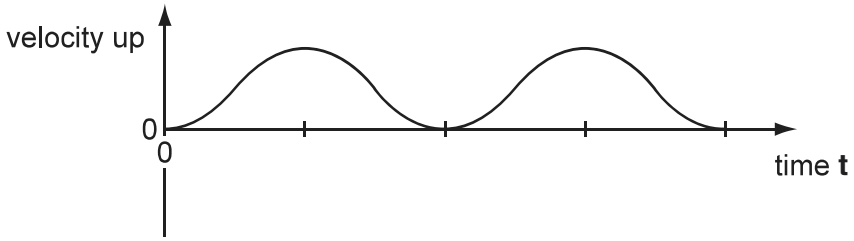
B



C

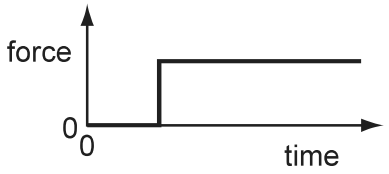


D



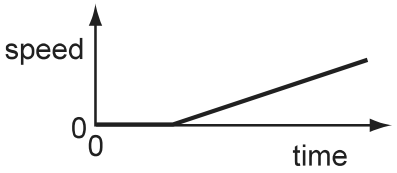
70 **A car is stationar at tra ic ig ts en t e tra ic ig ts go green t e ri er resses o n s ar on t e acce erator e resu tant ori onta orce acting on t e car aries it time as s o n**

97 2 11 1 /Q9

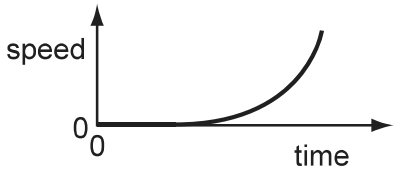


ic gra s o s t e ariation it time o t e s ee o t e car

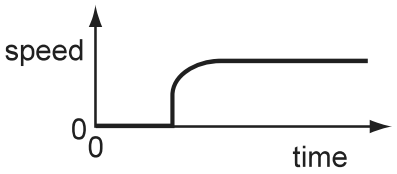
A



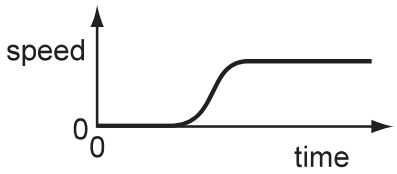
B



C



D

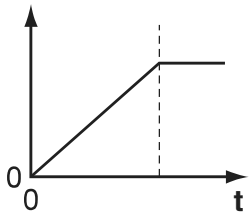


71 **A s i er a s ertica rom a stationar a oon e ea es t e a oon at time t At time t s e reac es termina e ocit Be on t e time s o n in t e gra s s e o ens er arac ute**

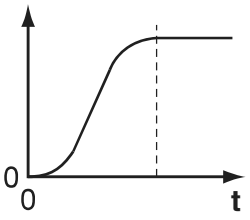
97 2 12 1 /Q6

ic gra s o s t e ariation it time t o t e orce ue to air resistance

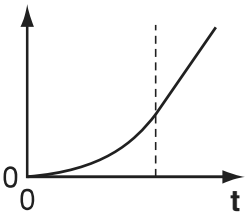
A



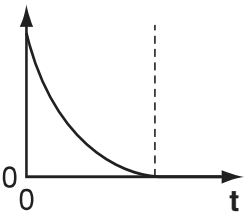
B



C

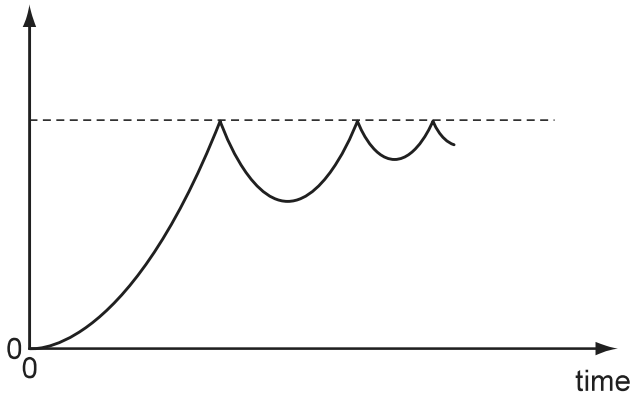


D



72 A a is re ease rom rest a o e a ori onta sur ace an ounces se era times 97 2 12 1 /Q8

e gra s o s o or t is a a uantit aries it time



at is t e uantit

A acce eration

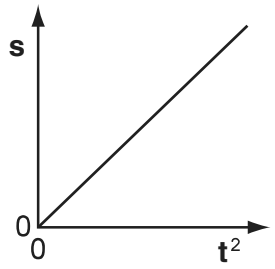
B is acement

C inetic energ

D e ocit

73 At time t a o mo es rom rest it constant acce eration in a straig t ine At time t t e o is istance s rom its rest osition 97 2 1 1 /Q8

A gra is ra n o s against t^2 as s o n



ic statement escri es t e acce eration o t e o

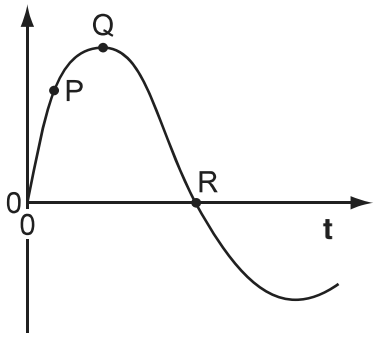
A t is e ua to a t e a ue o t e gra ient o t e gra

B t is e ua to t e a ue o t e gra ient o t e gra

C t is e ua to t ice t e a ue o t e gra ient o t e gra

D t is e ua to t e reci roca o t e gra ient o t e gra

74 e gra s o s o e ocit aries it time t or a ungee um er 97 2 11 1 /Q7

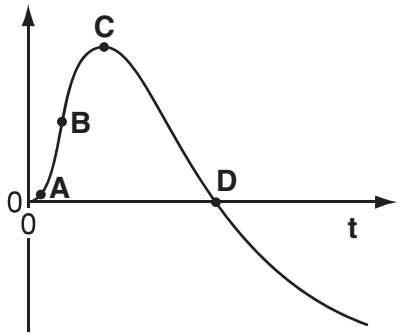


At ic oint is t e ungee um er momentari at rest an at ic oint oes s e a e ero acce eration

	um er at rest	um er it ero acce eration
A		
B		
C		
D		

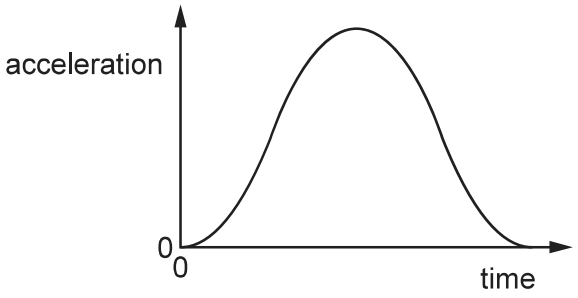
75 e gra s o s o t e e ocit o a ire or roc et c anges it time t 97 2 1 1 /Q7

At ic oint on t e gra oes t e roc et a e t e greatest acce eration



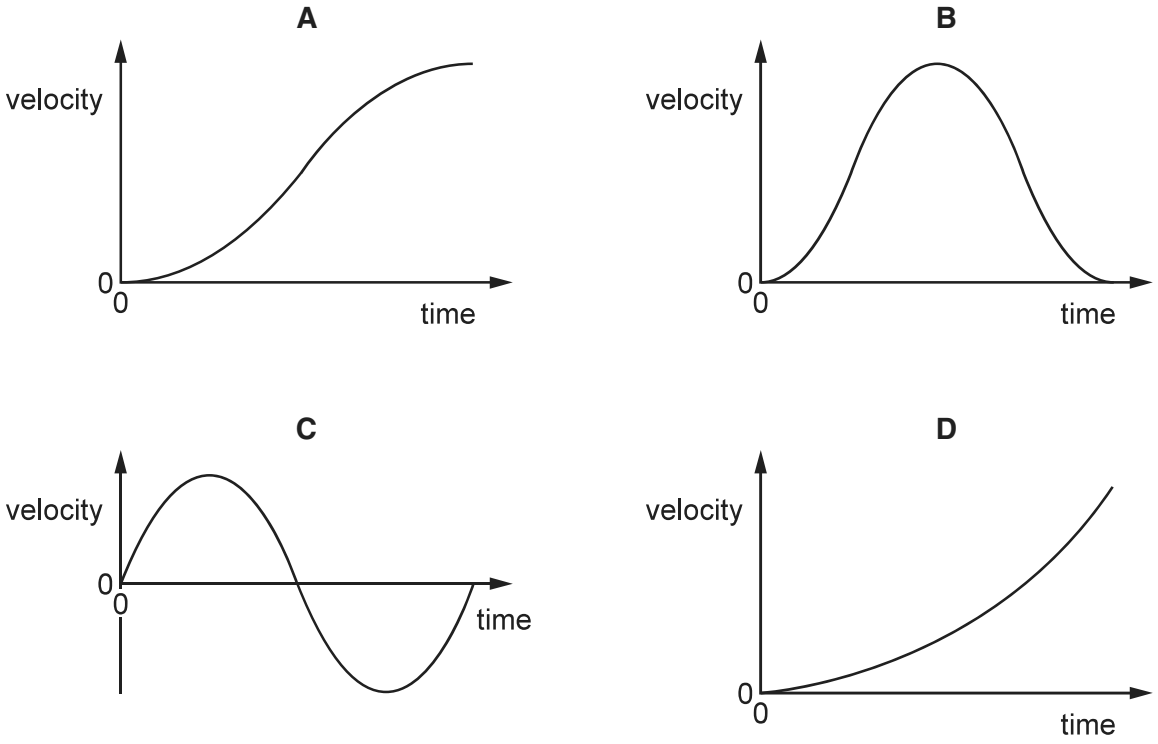
76 e gra s o s o t e acce eration o an o ect mo ing in a straig t ine aries it time

97 2 11 14/Q8



e o ect starts rom rest

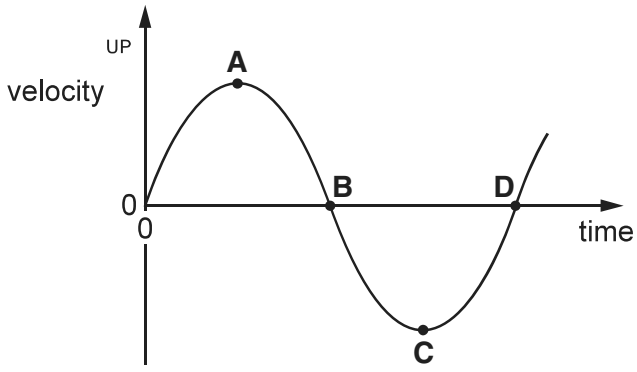
ic gra s o s t e ariation it time o t e e ocit o t e o ect o er t e same time inter a



77 e iagram s o s a e ocit time gra or a mass mo ing u an o n on t e en o a s ring

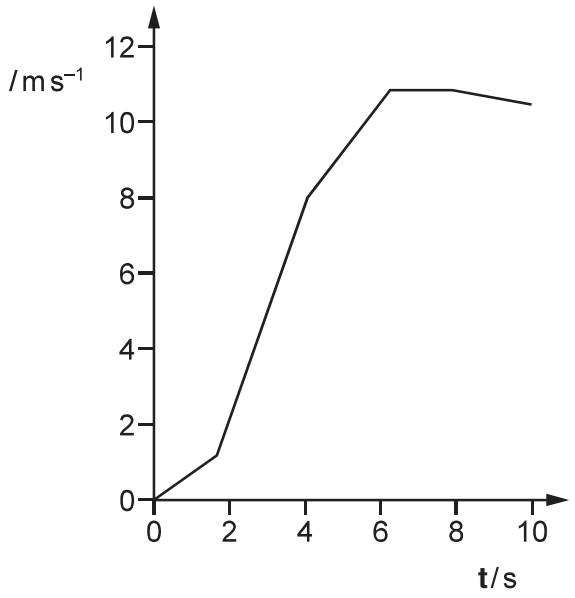
ic oint re resents t e e ocit o t e mass en at t e o est oint o its motion

97 2 1 14/Q7



78 **e gra s o s o t e s ee o a s rinter c anges it time t uring a 1 m race**

97 2 1 14/Q9

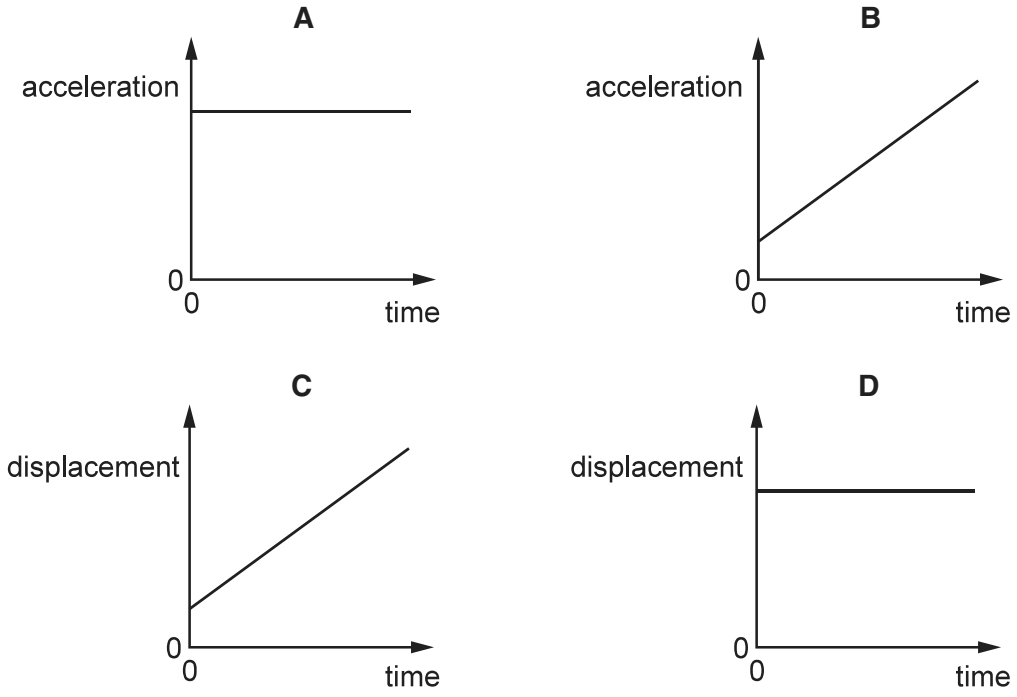


at is t e est estimate o t e ma imum acce eration o t e s rinter

A ms² B 1ms² C ms² D 1 ms²

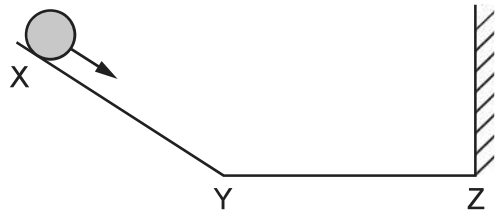
79 **ic gra re resents t e motion o a car t at is tra e ing a ong a straig t roa it a s ee t at increases uni orm it time**

97 2 11 14/Q6

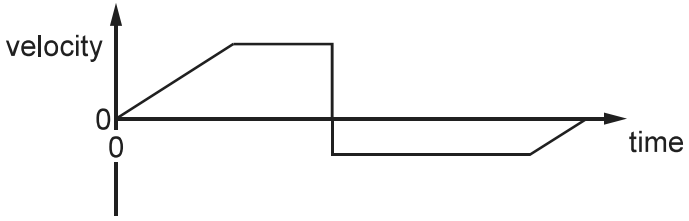


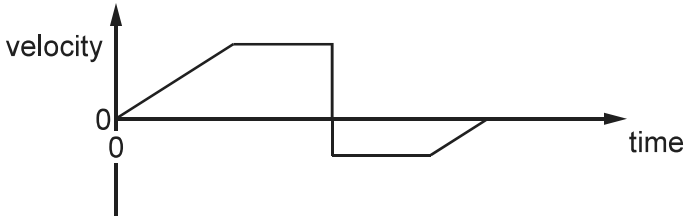
80 A a is re ease rom rest on a smoot s o e 97 2 1 14/Q8

t mo es o n t e so e a ong a smoot ori onta sur ace an re oun s ine astica at en it mo es ac to an comes to rest momentari some ere on



ic e ocit time gra re resents t e motion o t e a

A


B


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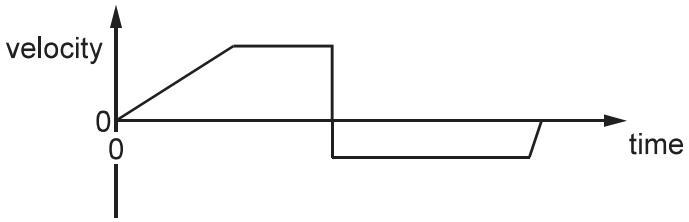

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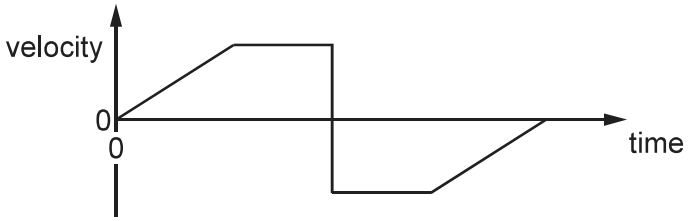
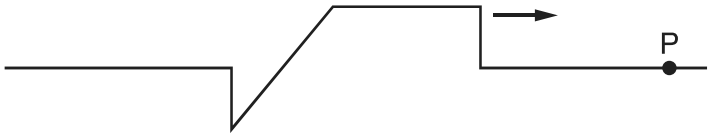
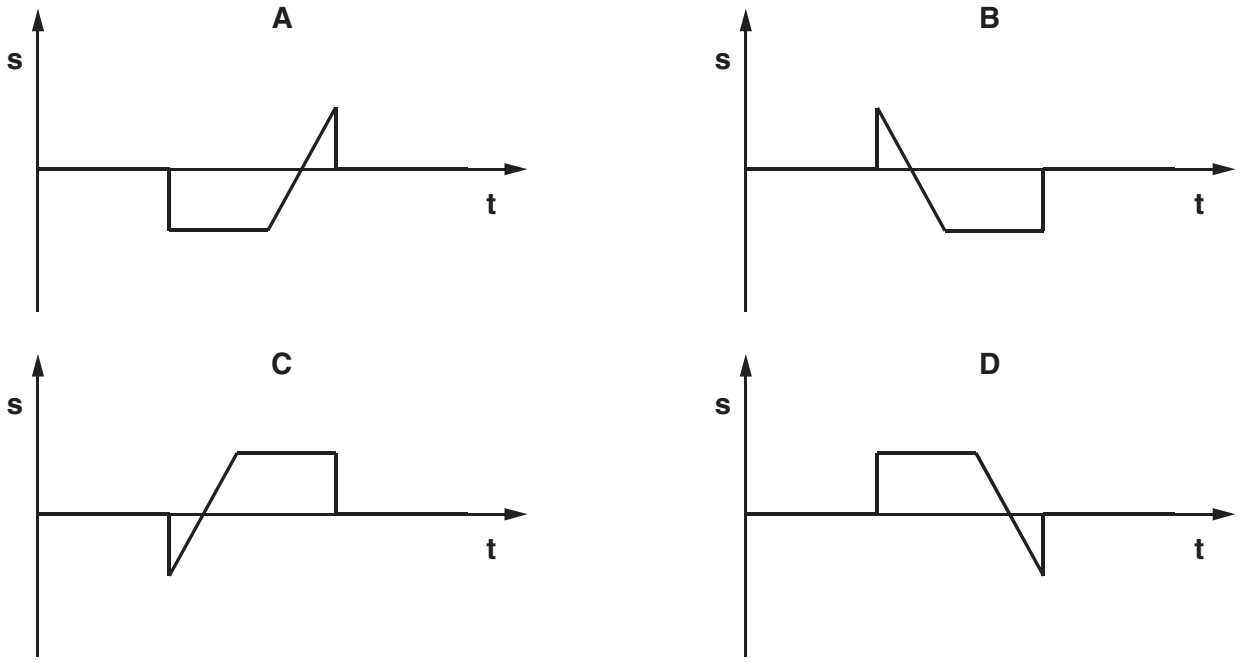


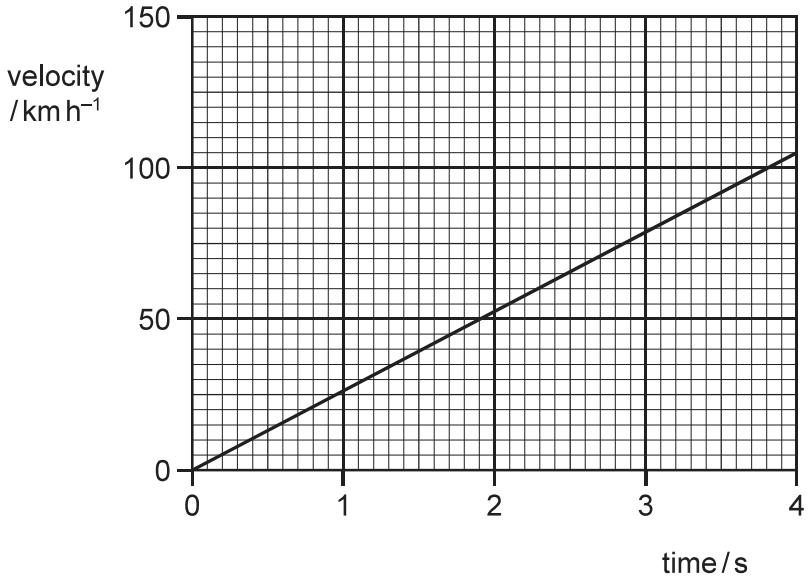
81 **A a e use mo es a ong a stretc e ro e in t e irection s o n** **97 2 1** **1** /Q26



ic iagram correct s o s t e ariation it time t o t e is acement s o t e artic e in t e ro e



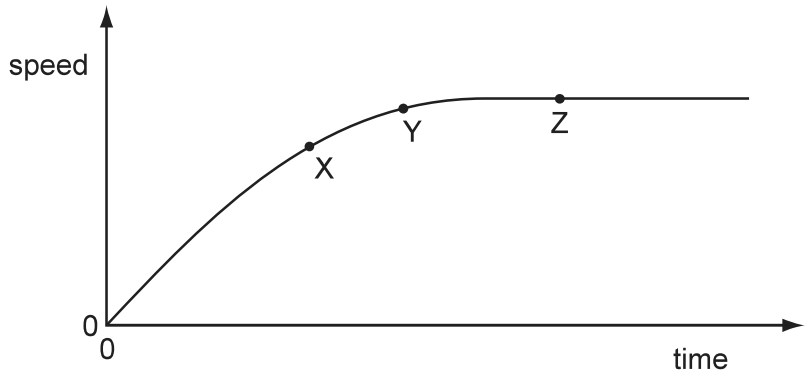
82 **e e ocit o an e ectric car c anges as s o n** **97 2 1** **1** /Q8



at is t e acce eration o t e car

A 21 ms 2 **B 8 ms 2** **C 2 ms 2** **D 7 ms 2**

83 **A rain ro a s ertica rom rest in air e ariation it time o t e s ee o t e rain ro is s o n in t e gra** 97 2 1 1 /Q7



ic statement a out t e rain ro is correct

A At oint t e rain ro as an acce eration o 9 81 ms ^{2}

B At oint t e orce on t e rain ro ue to air resistance as reac e its ma imum a ue an so t e acce eration o t e rain ro as a so reac e its ma imum a ue

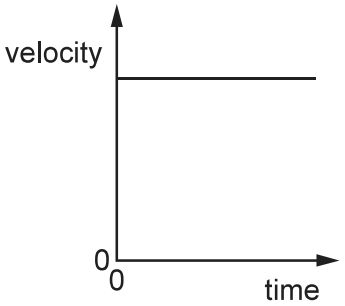
C At oint t e orce ue to air resistance is e ua an o osite to t e eig t o t e rain ro an so t e s ee o t e rain ro is ero

D e resu tant orce on t e rain ro at oint is ess t an t e resu tant orce on t e rain ro at oint

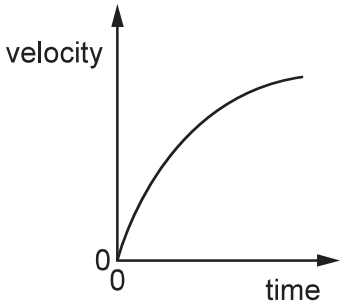
84 **A stone is t ro n ori onta rom t e to o a c i Air resistance is neg igi e** 97 2 12 1 /Q8

ic gra s o s t e ariation it time o t e ertica com onent o t e stone s e ocit

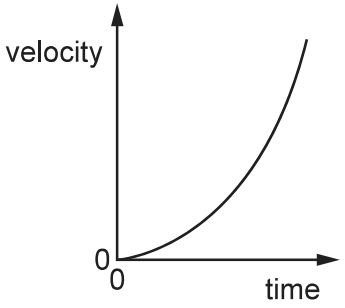
A



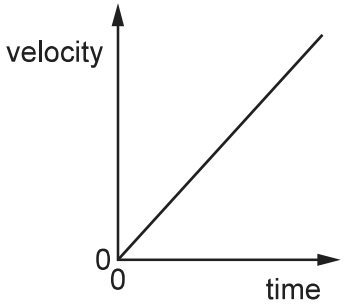
B



C



D



85 **An astronaut t ro s a stone it a ori onta e ocit near to t e oon s sur ace** 97 2 12 1 /Q12

ic ro escri es t e ori onta an ertica orces acting on t e stone a ter re ease

	ori onta orce	ertica orce
A	constant	constant
B	constant	ecreasing
C	ero	constant
D	ero	ecreasing

86 **A s ere is re ease an a s ts initia acce eration re uces unti it e entua egins to tra e at constant termina e ocit ic is acement time gra est re resents t e motion o t e s ere**

97 2 11 1 /Q7