1 Which of the following correctly defines the terms *stress*, *strain* and *Young modulus*? 9702/1/M/J/02/Q22

	stress	strain	Young modulus
A	(force) x (area)	(extension) x (original length)	(stress) / (strain)
B	(force) x (area)	(extension) / (original length)	(stress) x (strain)
C	(force) / (area)	(extension) / (original length)	(stress) / (strain)
D	(force) / (area)	(extension) x (original length)	(stress) x (strain)

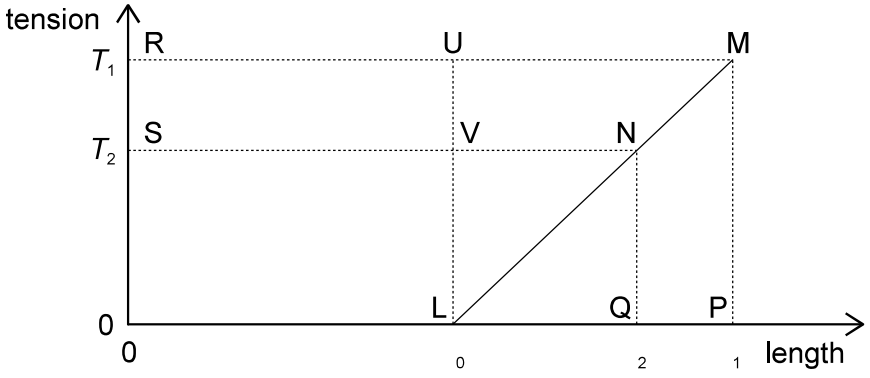
2 A wire is stretched by 8 mm when a load of 60 N is applied. 9702/1/M/J/02/Q23

What will be the extension of a wire of the same material having four times the cross-sectional area and twice the original length, when the same load is applied?

A 2 mm **B** 4 mm **C** 8 mm **D** 16 mm

3 The tension in a spring of natural length l_0 is first increased from zero to T_1 , causing the length to increase to l_1. The tension is then reduced to T_2, causing the length to decrease to l_2 (as shown).

9702/1/M/J/02/Q24



Which area of the graph represents the work done by the spring during this reduction in length?

A MLP **B** MNQP **C** MNSR **D** MPLU

4 Two springs P and Q both obey Hooke's law. They have spring constants $2k$ and k respectively.

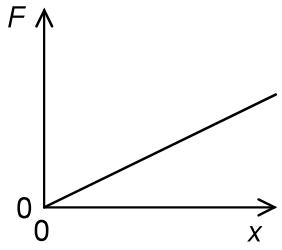
The springs are stretched, separately, by a force that is gradually increased from zero up to a certain maximum value, the same for each spring. The work done in stretching spring P is W_P, and the work done in stretching spring Q is W_Q.

9702/1/O/N/02/Q24

How is W_P related to W_Q?

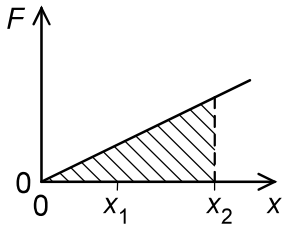
A $W_P = \frac{1}{4}W_Q$ **B** $W_P = \frac{1}{2}W_Q$ **C** $W_P = 2W_Q$ **D** $W_P = 4W_Q$

5 The variation of the extension x of a spring with applied force F is shown. 9702/1/O/N/02/Q23

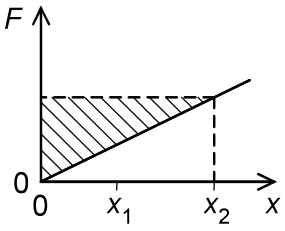


Which shaded area represents the work done when the extension is increased from x_1 to x_2?

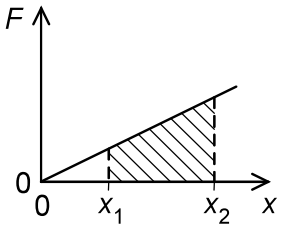
A



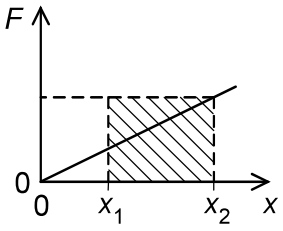
B



C



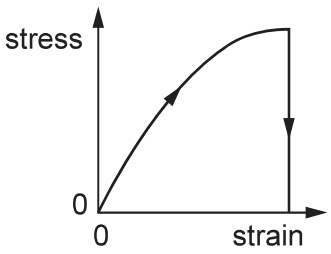
D



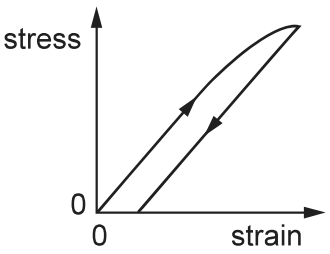
6 A suspended copper wire is gradually loaded until it is stretched just beyond the elastic limit, and it is then gradually unloaded. 9702/01/M/J/03/Q19

Which graph (with arrows indicating the sequence) best illustrates the variation of the tensile stress with longitudinal strain?

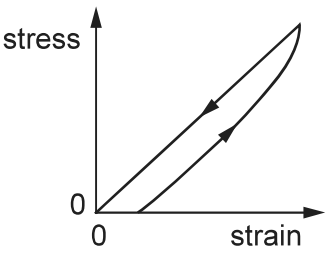
A



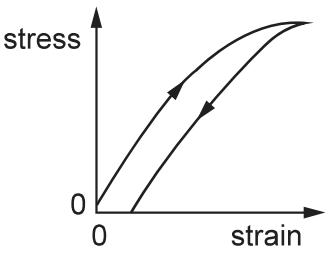
B



C



D



7 What is the ultimate tensile stress of a material? 9702/01/M/J/03/Q21

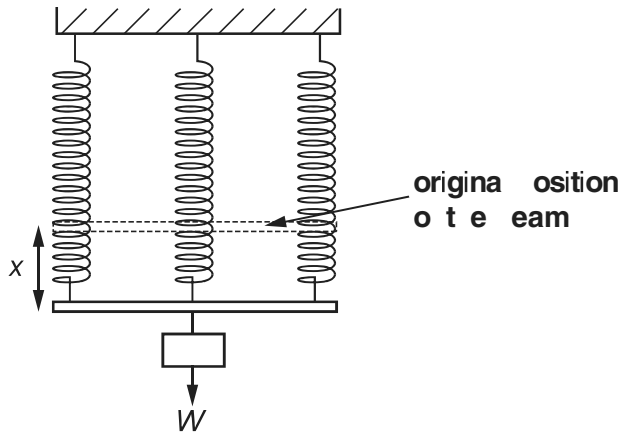
A the stress at which the material becomes ductile

B the stress at which the material breaks

C the stress at which the material deforms plastically

D the stress at which the material reaches its elastic limit

8 A eam t e eig t o ic ma e neg ecte is su orte t ree i entica s rings. en a eig t *W* is ung rom t e mi e o t e eam t e e tension o eac s ring is *x*. 97 2 1 3/Q22



e mi e s ring an t e eig t are remo e .

at is t e e tension en a eig t o 2*W* is ung rom t e mi e o t e eam?

A $\frac{3x}{2}$ B $\frac{4x}{3}$ C 2*x* D 3*x*

9 at is t e oung mo u us o a meta ? 97 2 1 3/Q21

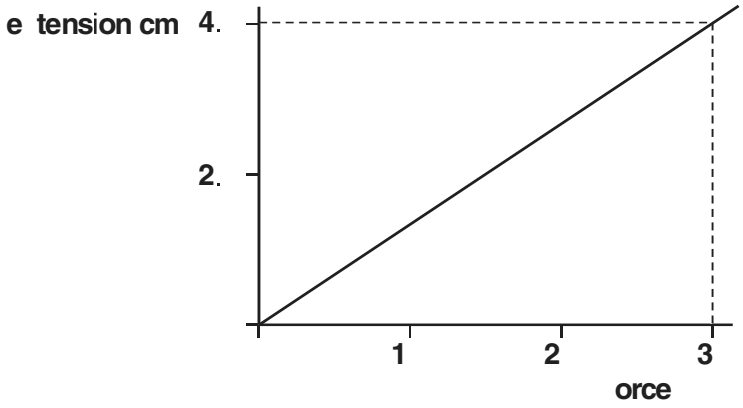
A e tension orce

B orce e tension

C strain stress

D stress strain

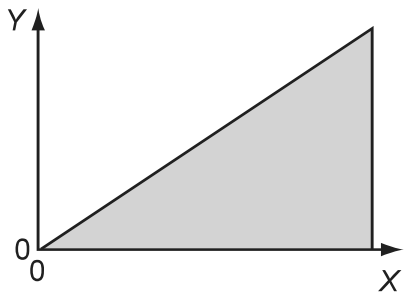
10 e gra s o s o t e e tension o a s ring aries it t e orce use to stretc it. 97 2 1 3/Q22



at is t e strain energ store in t e s ring en t e e tension is 4. cm?

A B 12 C D 12

11 e gra s o n as otte in an e eriment on a meta ire 97 2 1 4/Q22



e s a e area re resents t e tota strain energ store in stretc ing t e ire

o s ou t e a es e a e e

A	orce	e tension
B	mass	e tension
C	strain	energ
D	stress	strain

12 on rea s en t e stress it in it reac es 1 1 ^{9} a 97 2 1 4/Q23

ic range inc u es t e ea iest oa t at cou e i te a n on t rea o iameter 1 mm

A 2 to 2

B 2 to 2

C 2 to 2

D 2 to 2

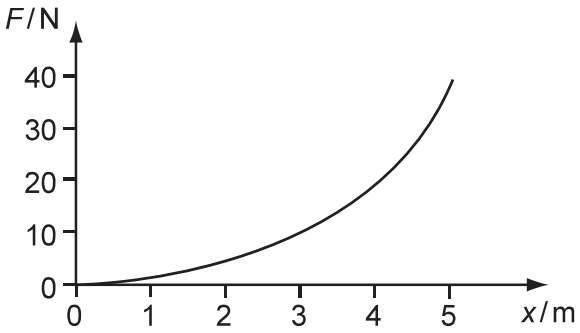
13 e ta e s o s a oa a ie to our ires an t e cross sectiona area o eac 97 2 1 4/Q22

ic o t e ires is su ecte to t e greatest stress

	oa	cross sectiona area mm^2
A	1	2
B	2	1
C	3	
D		2 3

14 e orce re uire to e ten a sam e o ru er a istance is oun to ar ass o n

97 2 1 4/Q23



e energ store in t e ru er or an e tension o m is

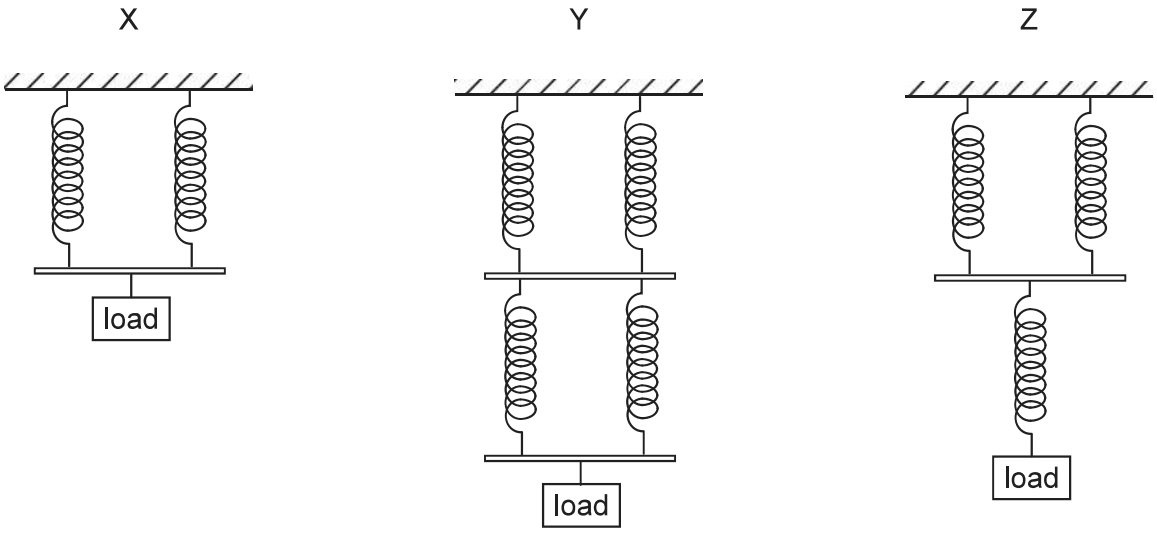
A ess t an 1

B 1

C et een 1 an 2

D more t an 2

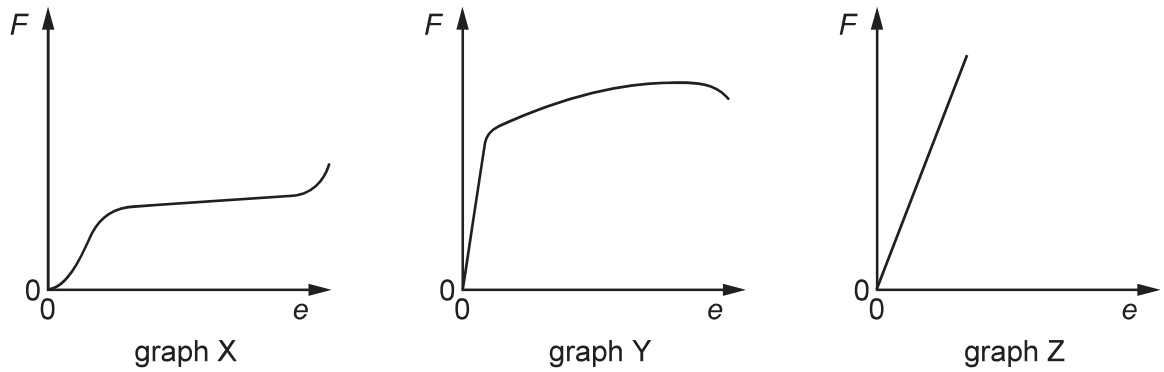
15 A num er o simi ar s rings eac a ing t e same s ring constant are oine in t ree arrangements an e same oa is a ie to eac 97 2 1 /Q20



at is t e or er o increasing e tension or t ese arrangements

	sma est ⟶		argest
A			
B			
C			
D			

16 C in rica sam es o stee g ass an ru er are eac su ecte to a gra ua increasing tensi e orce e e tensions e are measure an gra s are otte as s o n e o 97 2 1 /Q21



ic ro correct re ates t e gra s to t e materia s

	stee	g ass	ru er
A			
B			
C			
D			

17 o stee ires an a e engt s an 2 res ecti e an cross sectiona areas A an $\frac{A}{2}$ res ecti e Bot ires o e oo e s a 97 2 1 /Q22

at is t e ratio $\frac{\text{tension in}}{\text{tension in}}$ en ot ires are stretc e to t e same e tension

A $\frac{1}{4}$ B $\frac{1}{2}$ C $\frac{2}{1}$ D $\frac{4}{1}$

18 n escri ing t e e a iour o a s ring t e s ring constant is use 97 2 1 /Q21

Di erent oa s are use to e ten t e s ring i erent amounts

o in t e s ring constant ic uantities are re uire

A t e e astic imit an t e oa s

B t e e astic imit e tensions an t e engt o t e s ring

C t e oa s an t e e tensions o t e s ring

D t e oa s an t e engt o t e s ring

19 at is t e unit o t e oung mo u us 97 2 1 /Q23

A m^{-1} B m C m^{2} D m^{2}

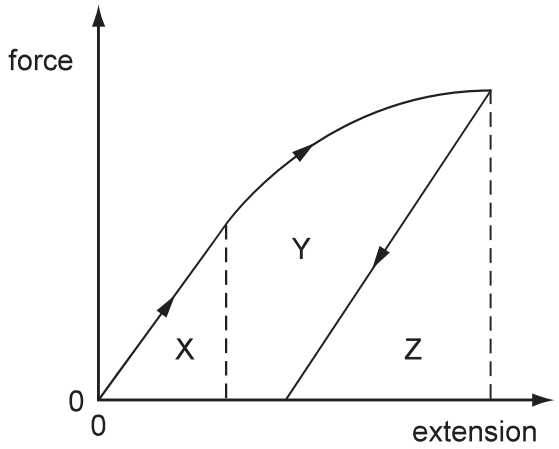
20 A ire stretc es 8 mm un er a oa o 97 2 1 /Q21

A secon ire o t e same materia it a t e iameter an a uarter o t e origina engt o t e irst ire is stretc e t e same oa

Assuming t at oo e s a is o e e at is t e e tension o t is ire

A 1 mm B 4 mm C 8 mm D 1 mm

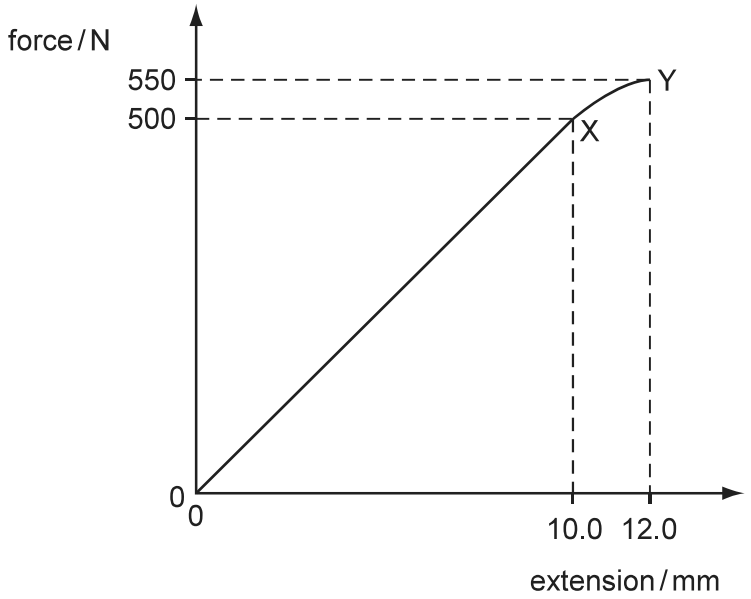
21 A ucti e materia is stretc e a tensi e orce to a oint e on its e astic imit e tensi e orce is t en re uce to ero e gra o orce against e tension is s o n e o 97 2 1 /Q20



ic area re resents t e net or one on t e sam e

A B C D

22 e gra s o s t e e a iour o a sam e o a meta en it is stretc e unti it starts to un ergo astic e ormation 97 2 1 /Q22



at is t e tota or one in stretc ing t e sam e rom ero e tension to 12 mm im i t e ca cu ation treating t e region as a straig t ine

A 3 3 B 3 C 3 D

23 at is re resente t e gra ient o a gra o orce ertica a is against e tension ori onta a is 97 2 1 /Q22

A e astic imit

B s ring constant

C stress

D t e oung mo u us

24 A iece o co er is ra n into a continuous ire 97 2 1 7/Q17

at e a iour is t e co er e i iting

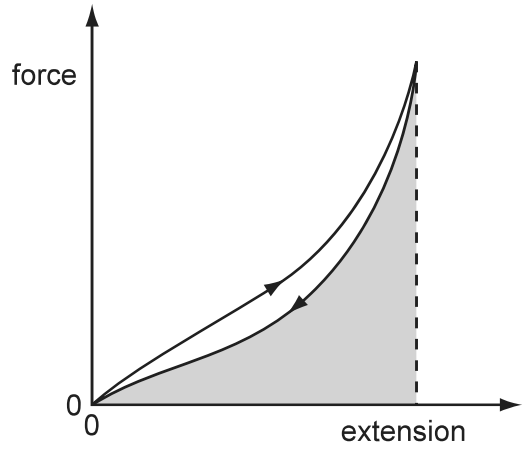
A ritt e on

B e astic on

C astic on

D ot ritt e an e astic

25 e orce e tension gra o a articu ar sam e o ru er as a oa is a ie an t en remo e is s o n 97 2 1 7/Q18



at oes t e s a e area re resent

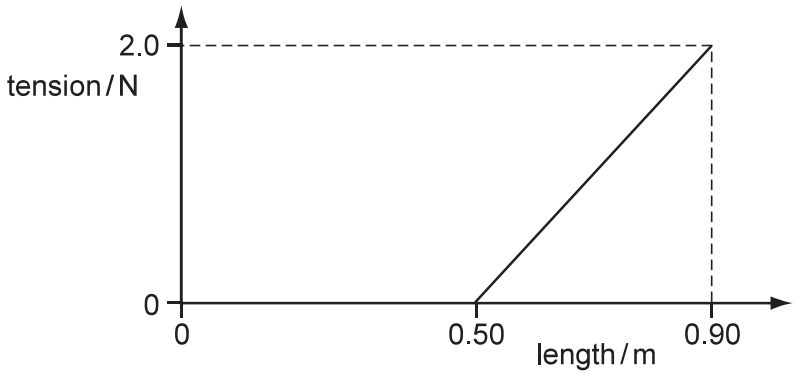
A t e energ trans orme into eat uring t e com ete c c e

B t e reco era e e astic otentia energ store at ma imum e tension

C t e or one on t e sam e i e oa ing

D t e or one on t e sam e i e un oa ing

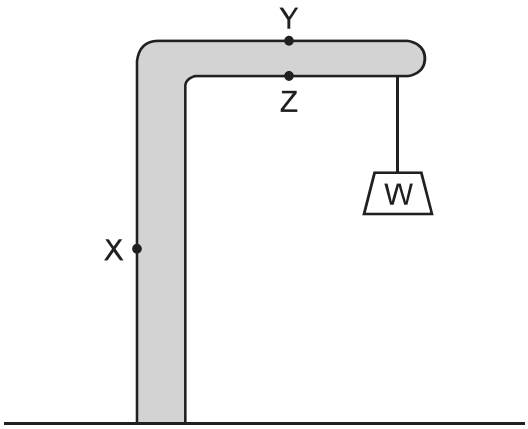
26 A s ring o une ten e engt m is stretc e a orce o 2 to a ne engt o 9 m e ariation o its engt it tension is as s o n 97 2 1 7/Q19



o muc strain energ is store in t e s ring

A 4 B 8 C 9 D 1 8

27 A sim e crane consists o a rigi ertica i ar su orting a ori onta eam 97 2 1 7/Q20



A eig t is i te a ro e at t e en o t e eam

at are t e orces at oints an ue to t e eig t

	orce at	orce at	orce at
A	tension	com ression	tension
B	tension	tension	com ression
C	com ression	tension	com ression
D	com ression	com ression	com ression

28 at is astic e ormation 97 2 1 7/Q19

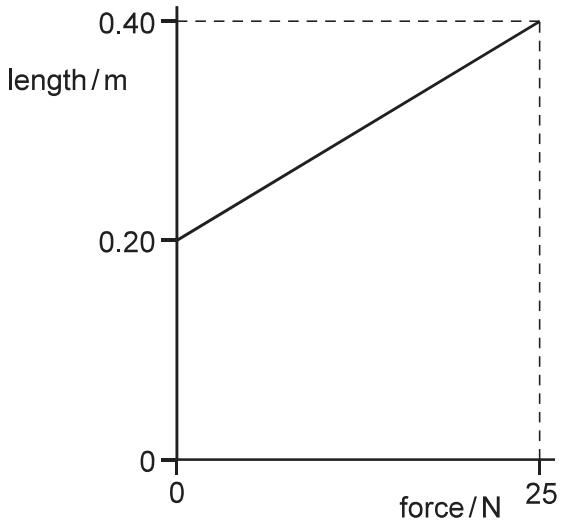
A astic e ormation occurs en strain is not ro ortiona to stress ut en t e oa is remo e t e materia returns to its origina engt

B astic e ormation occurs i en t e oa is remo e t e materia contracts ut a ermanent stretc ing as occurre

C astic e ormation occurs unti t e e tension is no onger ro ortiona to t e oa

D astic e ormation occurs en t e materia e ten s so t at strain is irect ro ortiona to stress

29 e gra s o s o t e engt o a articu ar ru er cor aries as orce is a ie 97 2 1 7/Q20



at is t e ma imum strain energ in t is e orme ru er cor

A 2 B C 7 D 1

30 e oung mo u us o stee is etermine using a engt o stee ire an is oun to a e t e a ue

Anot er e eriment is carrie out using a ire o t e same stee ut o t ice t e engt an a t e iameter

at a ue is o taine or t e oung mo u us in t e secon e eriment 97 2 1 8/Q24

A $\frac{1}{4}$ B $\frac{1}{2}$ C D 2

31 ic ro erties est escri e mo e ing c a 97 2 1 8/Q19

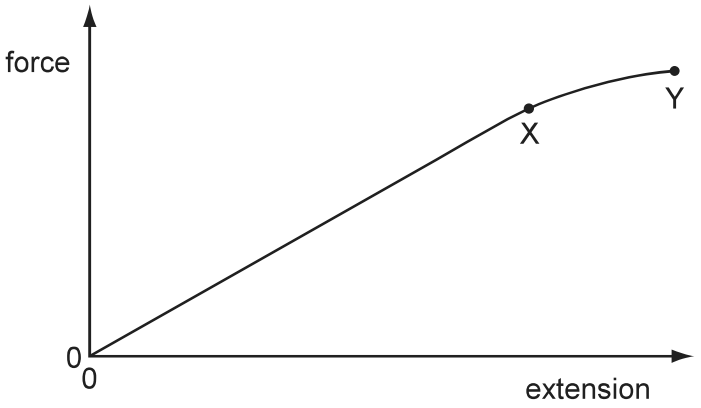
A ritt e an ucti e

B ucti e an e astic

C e astic an astic

D astic an ucti e

32 **A sam e o meta is su ecte to a orce ic increases to a ma imum a ue an t en ecreases ac to ero A orce e tension gra or t e sam e is s o n** 97 2 1 8/Q22



en t e sam e contracts it o o s t e same orce e tension cur e as en it as eing stretc e

at is t e e a iour o t e meta et een an

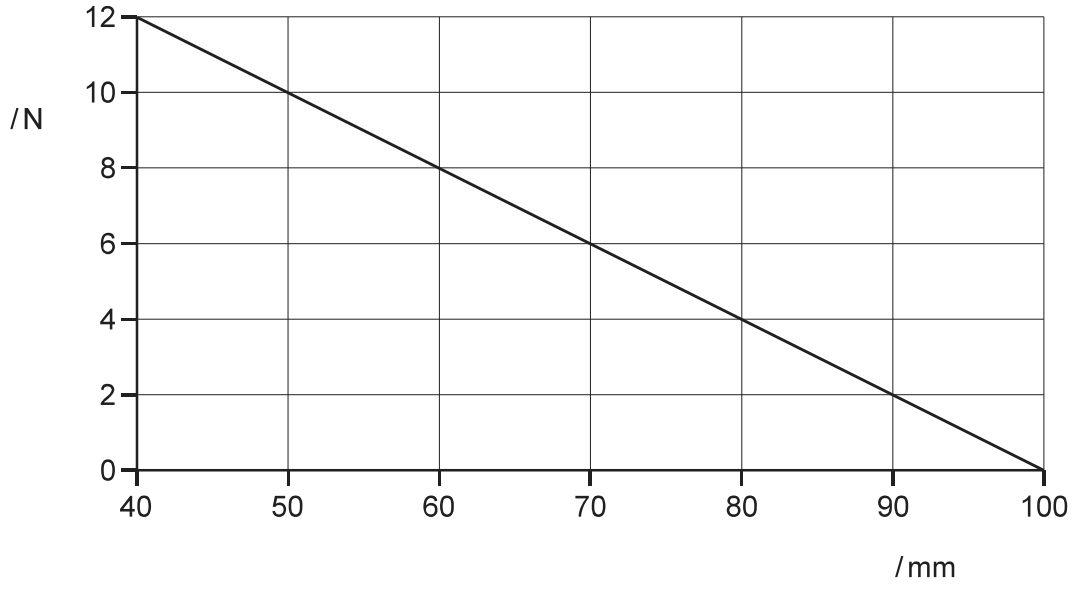
A ot e astic an astic

B e astic ut not astic

C astic ut not e astic

D not e astic an not astic

33 **A s ring o origina engt 1 mm is com resse a orce e gra s o s t e ariation o t e engt o t e s ring it t e com ressing orce** 97 2 1 8/Q23



at is t e energ store in t e s ring en t e engt is 7 mm

A 9 B 21 C 27 D 3

34 oes t e ressure o a gas increase en t e gas is com resse at constant tem erature

A e gas mo ecu es co i e more o ten it eac ot er

B e gas mo ecu es e an un er ressure

C e gas mo ecu es it t e a s o t e container more re uent

D e gas mo ecu es tra e aster

35 our materia s are orme into ro s o t e same imensions 97 2 1 9/Q19

At room tem erature ic can sustain t e argest astic e ormation

A t e ucti e materia a uminium

B t e ritt e materia car on

C t e ritt e materia g ass

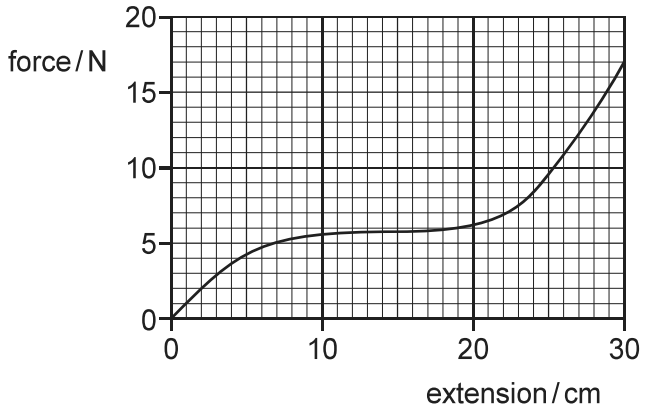
D t e ucti e materia stee

36 o stee ires an a e engt s an 2 res ecti e an cross sectiona areas A an $\frac{A}{2}$ res ecti e Bot ires o e oo e s a 97 2 1 9/Q20

at is t e ratio $\frac{\text{tension in}}{\text{tension in}}$ en ot ires are stretc e to t e same e tension

A $\frac{1}{4}$ B $\frac{1}{2}$ C $\frac{2}{1}$ D $\frac{4}{1}$

37 A ru er an is stretc e anging eig ts on it an t e orce e tension gra is otte rom t e resu ts 97 2 1 9/Q21



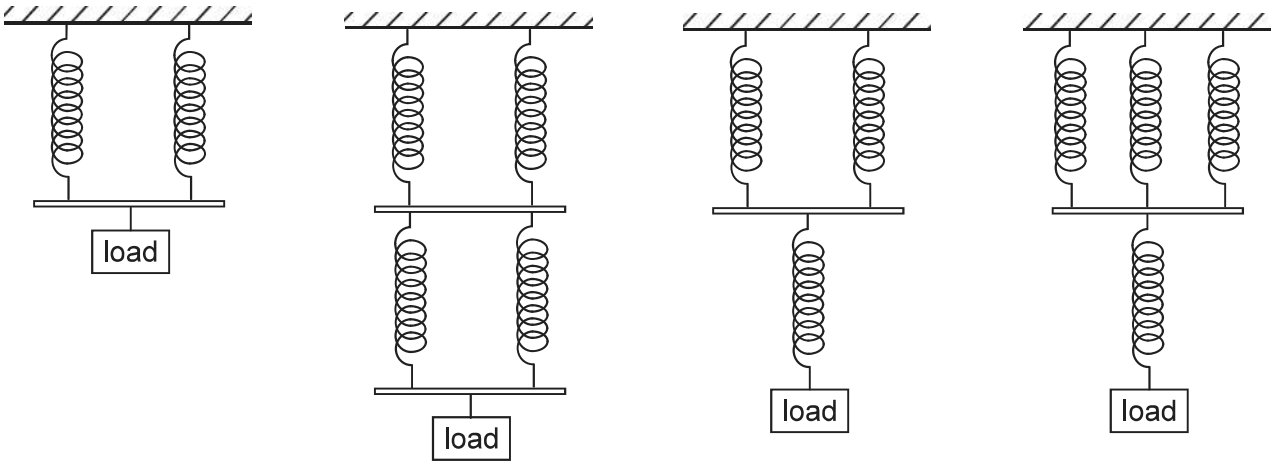
at is t e est estimate o t e strain energ store in t e ru er an en it is e ten e 3 cm

A 2 B 2 C 1 D 2

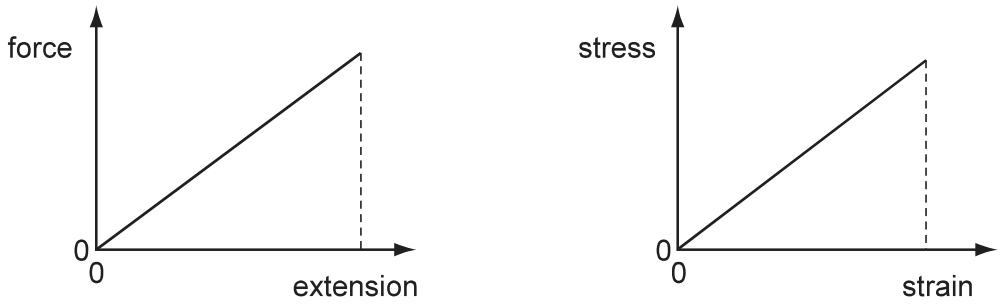
38 **A num er o simi ar s rings eac a ing t e same s ring constant are oine in our arrangements e same oa is a ie to eac**

ic arrangement gi es t e greatest e tension

A **B** **C** **D**



39 **e gra s s o o orce aries it e tension an stress aries it strain or t e oa ing o a meta ire** 97 2 1 8/Q22



e oung mo u us or t is ire is e ua to

A t e gra ient o t e orce e tension gra

B t e area et een t e orce e tension gra an t e e tension a is

C t e gra ient o t e stress strain gra

D t e area et een t e stress strain gra an t e strain a is

40 **or a ire oo e s a is o e e or a tension an e tension e oung mo u us or t e materia o t e ire is**

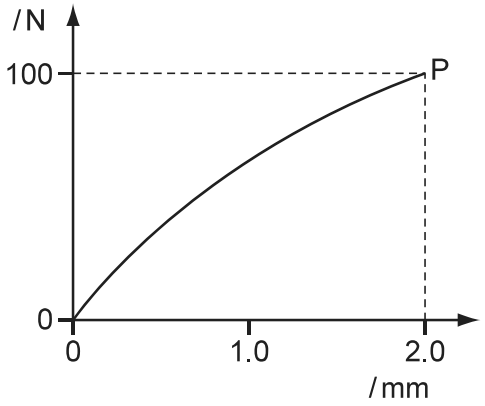
ic e ression re resents t e e astic strain energ store in t e ire

A $\frac{1}{2}$ **B** **C** $\frac{1}{2}$ **D**

41 ic ro est e ines e astic an astic e a iour o a materia 97 2 11 9/Q20

	e astic e a iour o a materia	astic e a iour o a materia
A	e ten s on it in t e imit o ro ortiona it	e ten s e on t e imit o ro ortiona it
B	as a inear orce e tension cur e	as a ori onta orce e tension cur e
C	o e s oo e s a	e ten s continuous un er a stea oa
D	returns to its origina s a e an si e	su ers ermanent e ormation

42 e gra s o s t e non inear orce e tension cur e or a ire ma e rom a ne com osite materia 97 2 11 9/Q21



at cou e t e a ue o t e strain energ store in t e ire en it is stretc e to oint

A 9 B 1 C 11 D 2

43 A stee string on an e ectric guitar as t e o o ing ro erties 97 2 11 9/Q22

iameter 1 ^{4}m

oung mo u us 2 1 ^{11} a

tension 2

e string sna s an contracts e astica

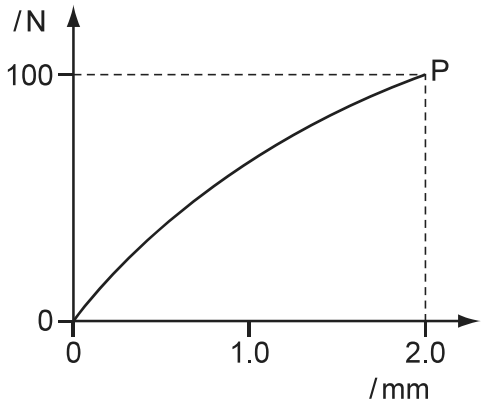
B at ercentage oes a engt o a iece o t e string contract

A 1 1 ^{4} B 1 1 ^{2} C 1 3 1 ^{4} D 1 3 1 ^{2}

44 ic ro est e ines e astic an astic e a iour o a materia 97 2 12 9/Q19

	e astic e a iour o a materia	astic e a iour o a materia
A	e ten s on it in t e imit o ro ortiona it	e ten s e on t e imit o ro ortiona it
B	as a inear orce e tension cur e	as a ori onta orce e tension cur e
C	o e s oo e s a	e ten s continuous un er a stea oa
D	returns to its origina s a e an si e	su ers ermanent e ormation

45 e gra s o s t e non inear orce e tension cur e or a ire ma e rom a ne com osite materia 97 2 12 9/Q20



at cou e t e a ue o t e strain energ store in t e ire en it is stretc e to oint

A 9 B 1 C 11 D 2

46 A stee string on an e ectric guitar as t e o o ing ro erties 97 2 12 9/Q21

iameter 1 ^{4}m

oung mo u us 2 1 ^{11} a

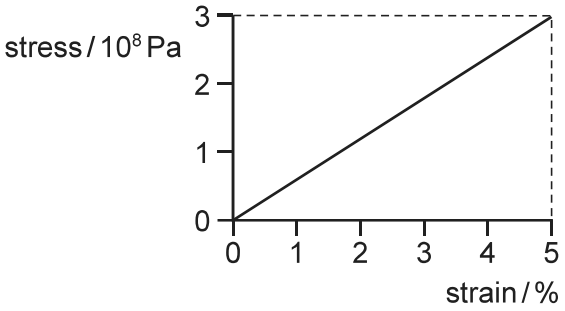
tension 2

e string sna s an contracts e astica

B at ercentage oes a engt o a iece o t e string contract

A 1 1 ^{4} B 1 1 ^{2} C 1 3 1 ^{4} D 1 3 1 ^{2}

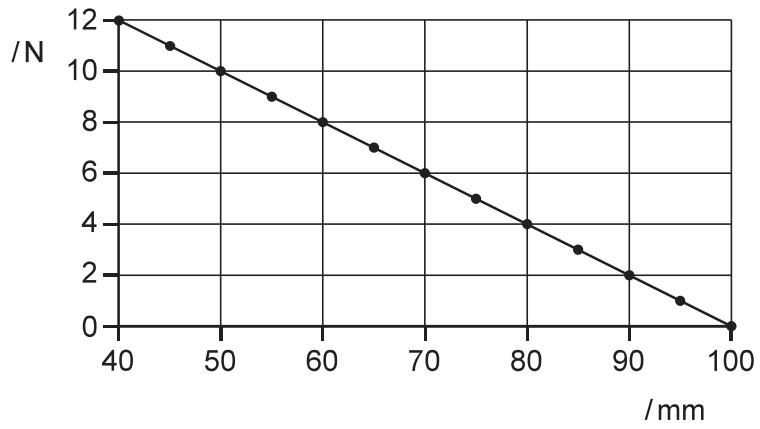
47 n stress strain e eriments on meta ires t e stress a is is o ten mar e in units o 1 ^{8} a an t e strain a is is mar e as a ercentage is is s o n or a articu ar ire in t e iagram 97 2 11 1 /Q19



at is t e a ue o t e oung mo u us or t e materia o t e ire

A 1 ^{7} a B 7 1 ^{8} a C 1 1 ^{9} a D 1 ^{9} a

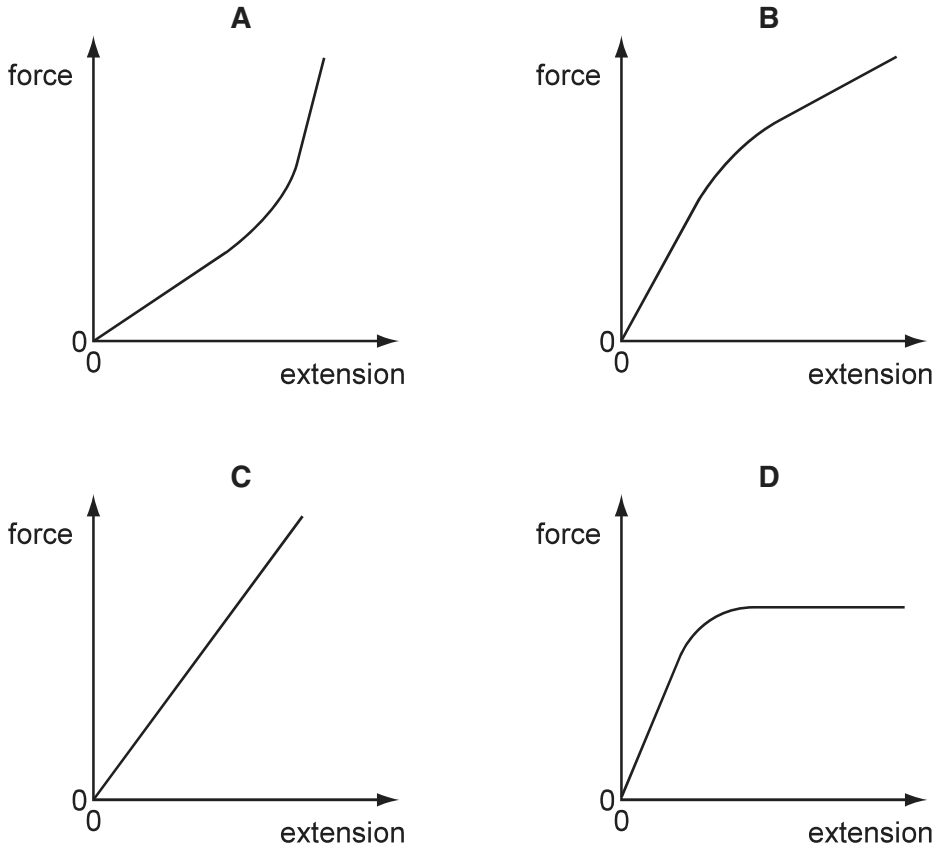
48 A s ring is com resse a orce e gra s o s t e com ressing orce otte against t e engt o t e s ring 97 2 11 1 /Q20



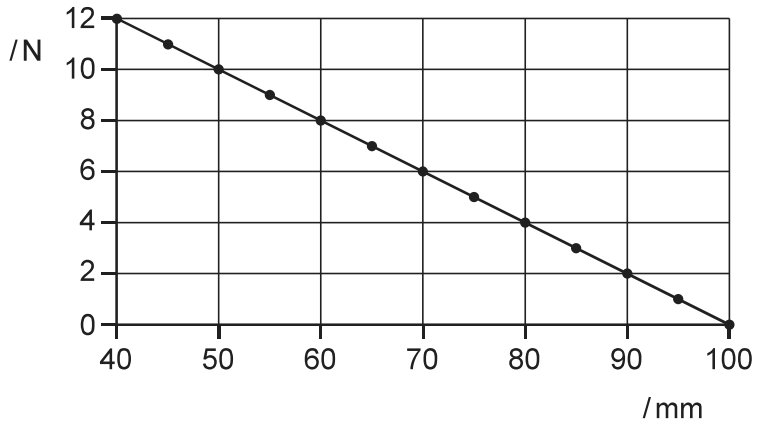
at is t e s ring constant o t is s ring

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

49 ic gra re resents t e orce e tension re ations i o a ru er an t at is stretc e a most to its rea ing oint 97 2 11 1 /Q21



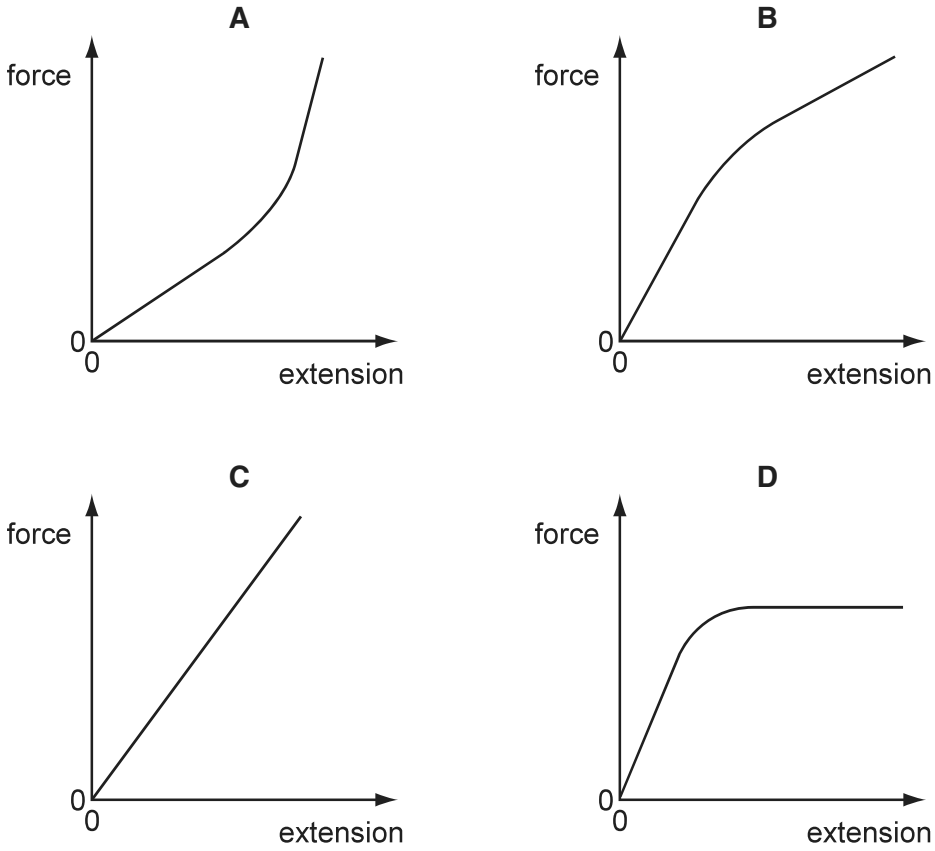
50 **A s ring is com resse a orce e gra s o s t e com ressing orce otte against t e engt o t e s ring** 97 2 12 1 /Q19



at is t e s ring constant o t is s ring

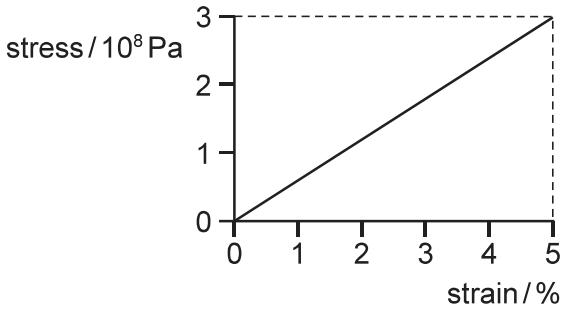
A 2 m 1 B m 1 C 1 m 1 D 2 m 1

51 **ic gra re resents t e orce e tension re ations i o a ru er an t at is stretc e a most to its rea ing oint** 97 2 12 1 /Q20



52 n stress strain e eriments on meta ires t e stress a is is o ten mar e in units o 1 ^{8} a an t e strain a is is mar e as a ercentage is is s o n or a articu ar ire in t e iagram

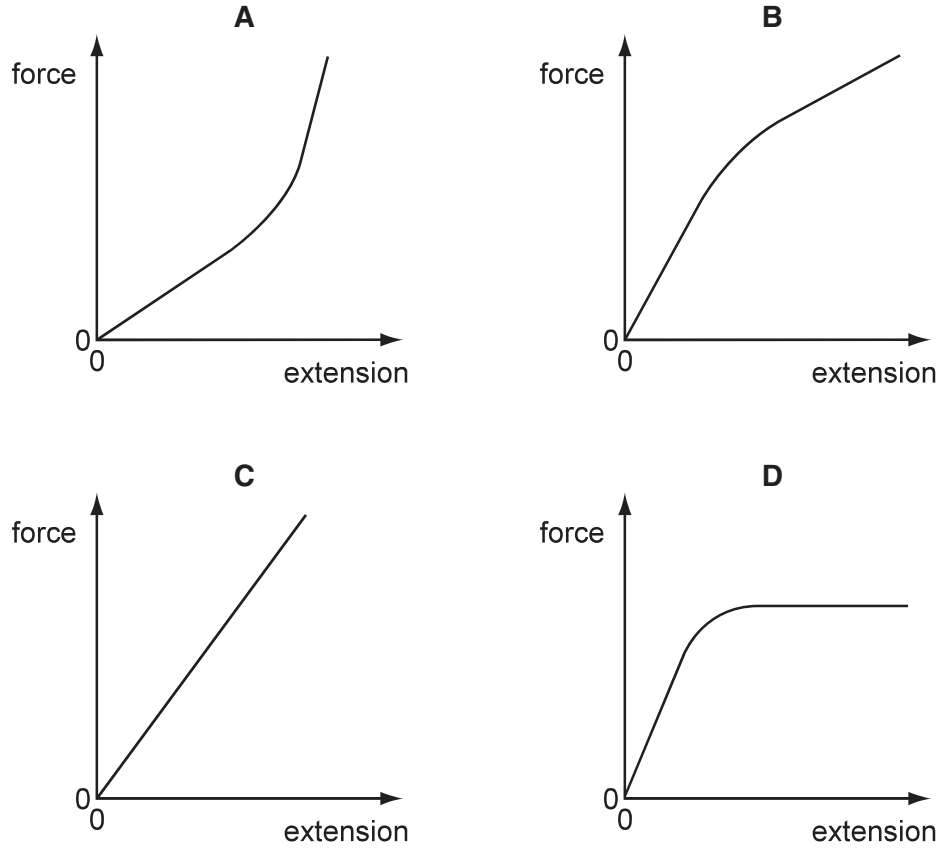
97 2 12 1 /Q21



at is t e a ue o t e oung mo u us or t e materia o t e ire

A 1 ^{7} a B 7 1 ^{8} a C 1 1 ^{9} a D 1 ^{9} a

53 ic gra re resents t e orce e tension re ations i o a ru er an t at is stretc e a most to its rea ing oint 97 2 13 1 /Q19

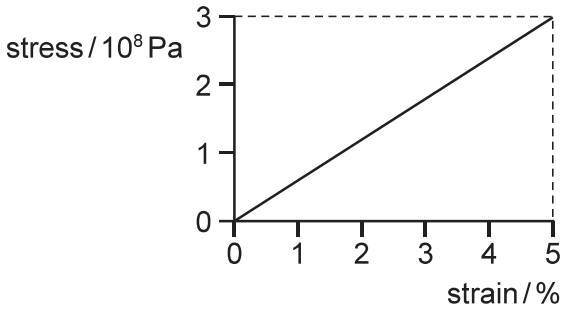


54 n ic or er o magnitu e are t e re uencies o e ectromagnetic a es in t e isi e s ectrum 97 2 12 11/Q25

A 1 ^{12} B 1 ^{13} C 1 ^{14} D 1 ^{1}

55 n stress strain e eriments on meta ires t e stress a is is o ten mar e in units o 1 ^{8} a an t e strain a is is mar e as a ercentage is is s o n or a articu ar ire in t e iagram

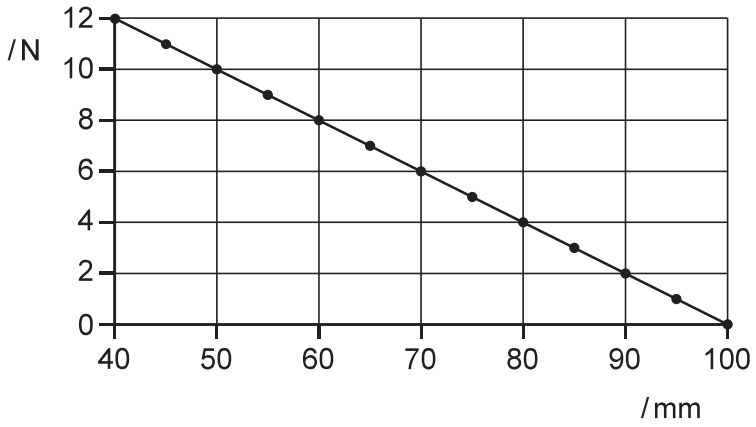
97 2 13 1 /Q20



at is t e a ue o t e oung mo u us or t e materia o t e ire

A 1 ^{7} a B 7 1 ^{8} a C 1 1 ^{9} a D 1 ^{9} a

56 A s ring is com resse a orce e gra s o s t e com ressing orce otte against t e engt o t e s ring 97 2 13 1 /Q21



at is t e s ring constant o t is s ring

A 2 m ^{1} B m ^{1} C 1 m ^{1} D 2 m ^{1}

57 sing monoc romatic ig t inter erence ringes are ro uce on a screen ace a istance D rom a air o s its o se aration a e se aration o t e ringes is 97 2 13 1 /Q22

Bot a an D are no ou e

at is t e ne ringe se aration

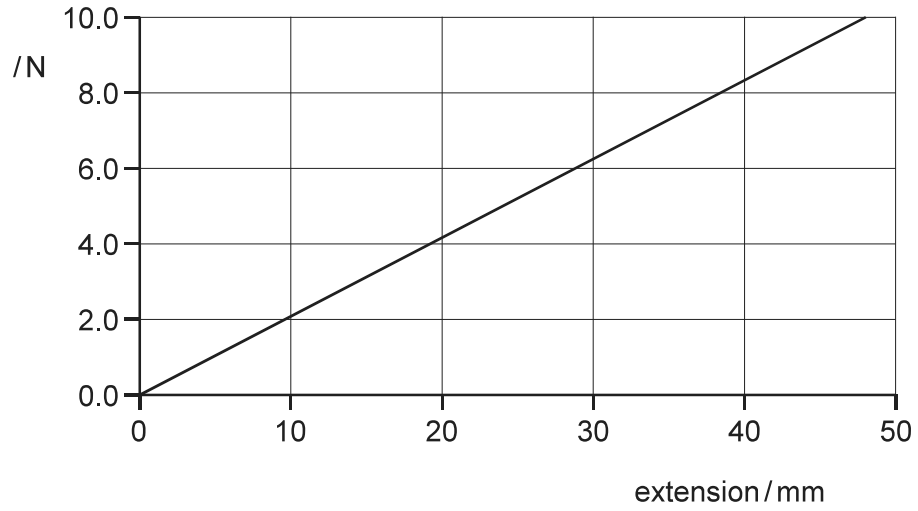
A $\frac{}{2}$ B C 2 D 4

58 e ressure at sea e e is a ro imate 1 a e ensit o sea ater is 1 3 gm ^{3}

at is t e a ro imate ressure 8 m e o t e sur ace o t e sea 97 2 12 1 /Q20

A 1 a B 18 a C 8 a D 9 a

59 e gra s o s o orce e en s on e tension or a certain s ring 97 2 11 1 /Q21

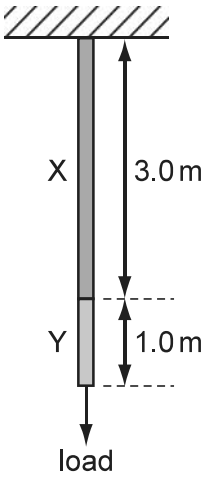


at is t e energ store in t e s ring en t e e tension is 3 mm

A 9 B 19 C 2 D 9

60 A ire consists o a 3 m engt o meta oine to a 1 m engt o meta 97 2 11 1 /Q22

e cross sectiona area o t e ire is uni orm



A oa ung rom t e ire causes meta to stretc 1 mm an meta to stretc 1 mm

e same oa is t en ung rom a secon ire o t e same cross section consisting o 1 m o meta an 3 m o meta

at is t e tota e tension o t is secon ire

A 2 mm B 3 mm C 4 8 mm D mm

61 o ires an are ma e rom t e same materia 97 2 12 1 /Q21

ire is initia t ice t e iameter an t ice t e engt o ire e same orce a ie to eac ire causes t e ires to e ten e astica

at is t e ratio o t e e tension in to t at in

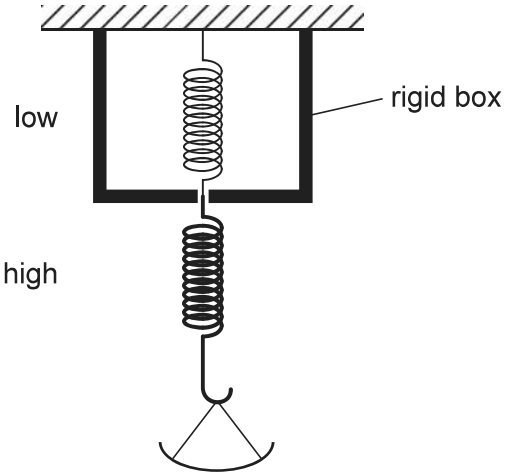
A $\frac{1}{2}$ B 1 C 2 D 4

62 o etermine t e mass o oo in a an a sca e is use t at as ig sensiti it or sma masses ut o sensiti it or arge masses 97 2 12 1 /Q22

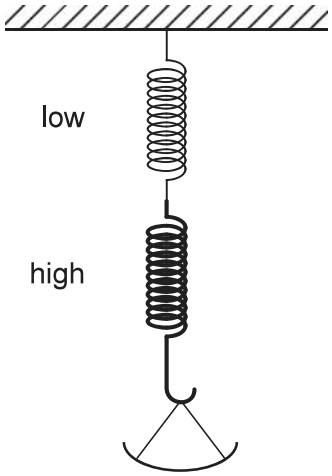
o o t is t o s rings are use eac it a i erent s ring constant ne o t e s rings as a o s ring constant an t e ot er as a ig s ring constant

ic arrangement o s rings ou e suita e

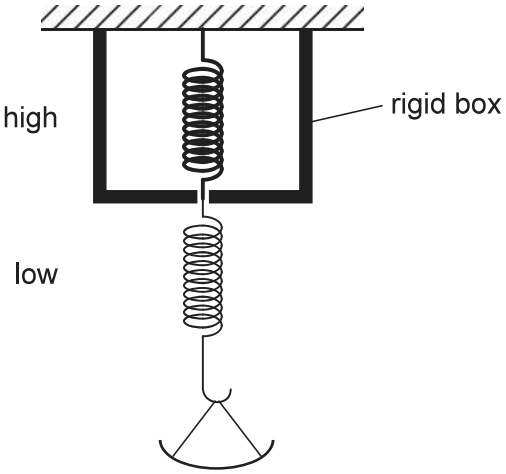
A



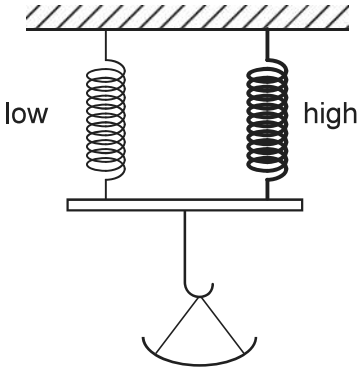
B



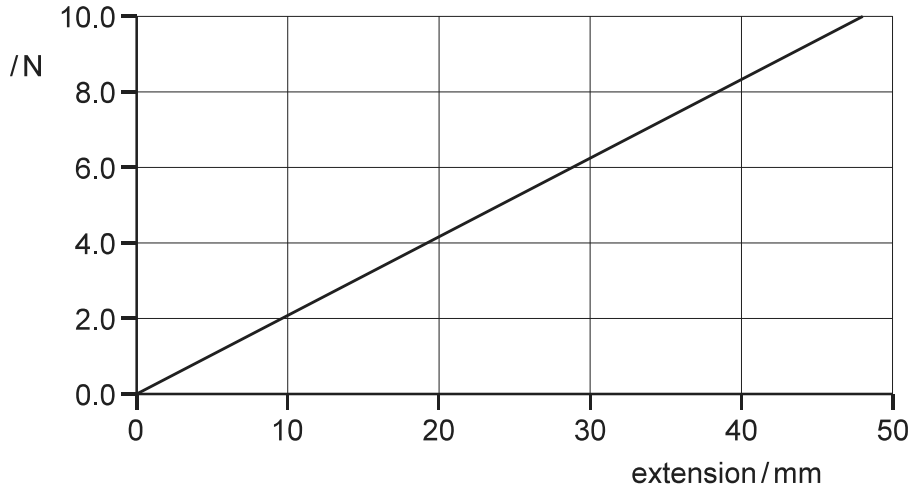
C



D



63 e gra s o s o orce e en s on e tension or a certain s ring 97 2 13 1 /Q19



at is t e energ store in t e s ring en t e e tension is 3 mm

A 9 B 19 C 2 D 9

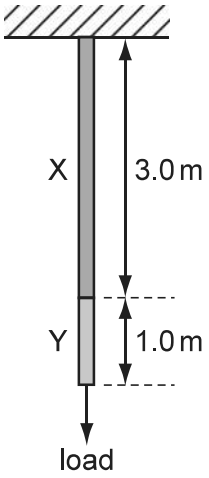
64 e ariana renc in t e aci ic cean as a e t o a out 1 m 97 2 13 1 /Q20

Assuming t at sea ater is incom ressi e an as a ensit o a out 1 2 g m ^{3} at ou e t e a ro imate ressure at t at e t

A 1 a B 1 a C 1 ^{7} a D 1 ^{8} a

65 A ire consists o a 3 m engt o meta oine to a 1 m engt o meta 97 2 13 1 /Q21

e cross sectiona area o t e ire is uni orm



A oa ung rom t e ire causes meta to stretc 1 mm an meta to stretc 1 mm

e same oa is t en ung rom a secon ire o t e same cross section consisting o 1 m o meta an 3 m o meta

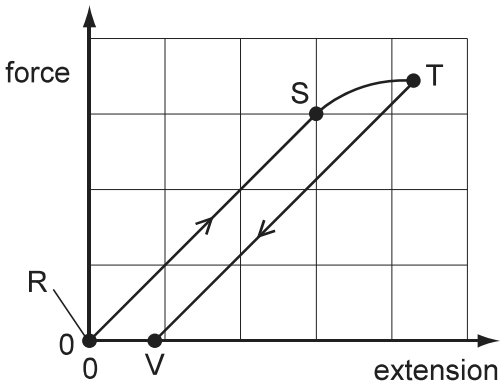
at is t e tota e tension o t is secon ire

A 2 mm B 3 mm C 4 8 mm D mm

66 A ong t in meta ire is sus en e rom a i e su ort an angs ertica asses are sus en e rom its o er en 97 2 11 11/Q20

e oa on t e o er en is increase rom ero an t en ecrease again ac to ero

e iagram s o s t e orce e tension gra ro uce



ere on t e gra ou t e e astic imit e oun

A an ere et een oint an oint

B e on oint ut e ore oint

C e act at oint

D e act at oint

67 e oung mo u us can e etermine rom measurements ma e en a ire is stretc e ic uantities ou e measure in or er to etermine 97 2 11 11/Q21

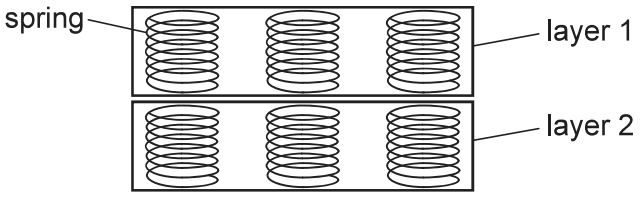
A	mass o stretc ing oa	origina engt o ire	iameter o ire	e tension o ire
B	mass o stretc ing oa	ne engt o ire	cross sectiona area o ire	iameter o ire
C	mass o ire	origina engt o ire	cross sectiona area o ire	ne engt o ire
D	mass o ire	ne engt o ire	iameter o ire	e tension o ire

68 e e a iour o a ire un er tensi e stress ma e escri e in terms o t e oung mo u us o t e materia o t e ire an o t e orce er unit e tension o t e ire 97 2 12 11/Q23

or a ire o engt an cross sectiona area A at is t e re ation et een an

A $\frac{A}{}$ B $\frac{A}{}$ C $\frac{}{A}$ D $\frac{}{A}$

69 e iagram s o s t e structure o art o a mattress 97 2 12 11/Q24



e manu acturer ants to esign a so ter mattress one ic i com ress more or t e same oa

ic c ange i not a e t e esire e ect

A using more a ers o s rings

B using more s rings er unit area

C using s rings it a sma er s ring constant

D using s rings ma e rom ire it a sma er oung mo u us

70 e oung mo u us can e etermine rom measurements ma e en a ire is stretc e

ic uantities ou e measure in or er to etermine 97 2 13 11/Q20

A	mass o stretc ing oa	origina engt o ire	iameter o ire	e tension o ire
B	mass o stretc ing oa	ne engt o ire	cross sectiona area o ire	iameter o ire
C	mass o ire	origina engt o ire	cross sectiona area o ire	ne engt o ire
D	mass o ire	ne engt o ire	iameter o ire	e tension o ire

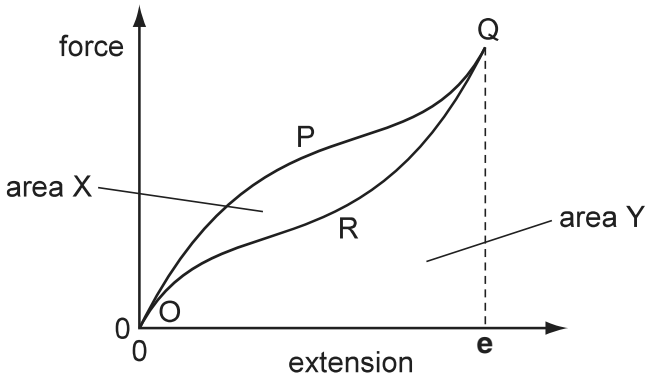
71 e oung mo u us o stee is etermine using a engt o stee ire an is oun to a e t e a ue 97 2 11 11/Q23

Anot er e eriment is carrie out using a ire o t e same stee ut o a t e engt an a t e iameter

at a ue is o taine or t e oung mo u us in t e secon e eriment

A $\frac{1}{2}$ B C 2 D 4

72 **A ru er an is stretc e an t en re a e to its origina engt e iagram s o s t e orce e tension gra or t is rocess** 97 2 11 11/Q24



As t e orce is increase t e cur e o o s t e at to e tension e As t e orce is re uce t e cur e o o s t e at to return to ero e tension

e area a e e is et een t e cur es an e area a e e is oun e t e cur e an t e ori onta a is

ic statement a out t e rocess is correct

A Area is t e energ ic eats t e an as it is stretc e to e

B Area area is t e minimum energ re uire to stretc t e an to e

C Area is t e e astic otentia energ store in t e an en it is stretc e to e

D Area area is t e net or one on t e an uring t e rocess

73 **en escri ing t e e a iour o a s ring t e s ring constant is use** 97 2 11 11/Q25

Di erent oa s are use to e ten t e s ring i erent amounts

o in t e s ring constant ic uantities are re uire

A t e e astic imit an t e oa s

B t e e astic imit e tensions an t e engt o t e s ring

C t e oa s an t e e tensions o t e s ring

D t e oa s an t e engt o t e s ring

74 **e oung mo u us o stee is etermine using a engt o stee ire an is oun to a e t e a ue**

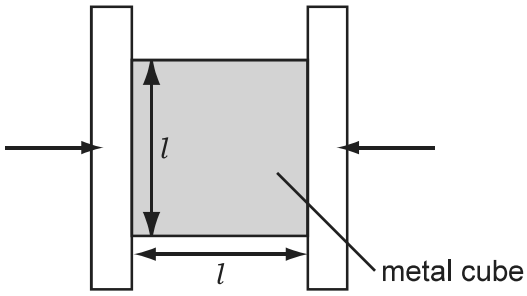
Anot er e eriment is carrie out using a ire o t e same stee ut o a t e engt an a t e iameter

at a ue is o taine or t e oung mo u us in t e secon e eriment 97 2 13 11/Q21

A $\frac{1}{2}$ **B C 2 D 4**

75 A meta cu e o si e is ace in a ice an com resse e astica t o o osing orces

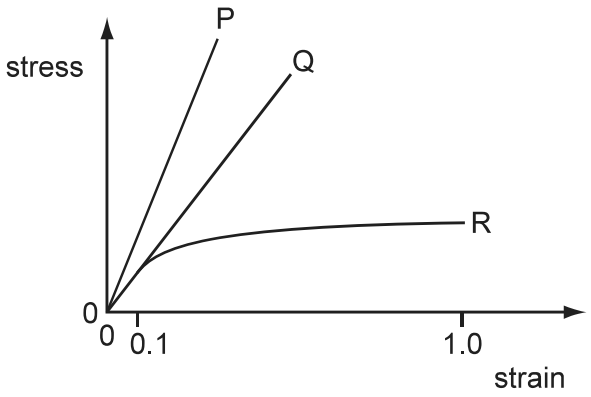
97 2 11 11/Q26



o i Δ t e amount o com ression re ate to

A $\Delta \propto \frac{1}{2}$ B $\Delta \propto \frac{1}{}$ C $\Delta \propto$ D $\Delta \propto {}^{2}$

76 e gra s o s t e re ations i et een stress an strain or t ree ires o t e same inear imensions ut ma e rom i erent materia s 97 2 12 11/Q21



ic statements are correct

1 e e tension o is a ro imate t ice t at o or t e same stress

2 e ratio o t e oung mo u us or to t at o is a ro imate t o

3 or strain ess t an 1 o e s oo e s a

A 1 2 an 3 B 1 an 3 on C 2 an 3 on D 2 on

77 ic ro ert o a meta ire e en s on its oung mo u us

97 2 13 12/Q22

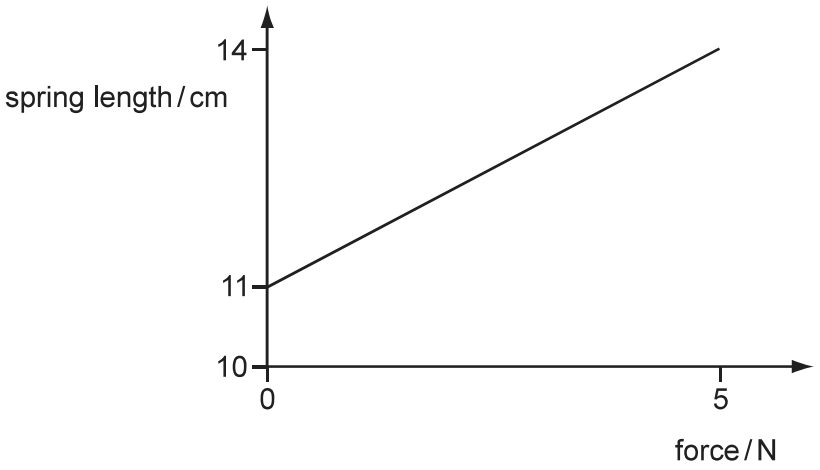
A ucti it

B e astic imit

C s ring constant

D u timate tensi e stress

78 e gra s o s t e e ect o a ing a orce o u to to a s ring 97 2 12 11/Q22



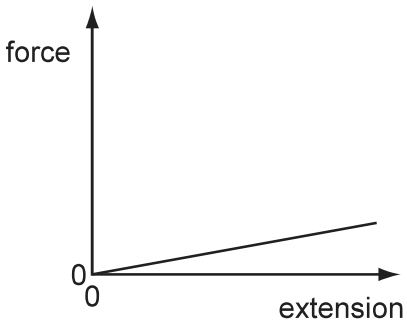
at is t e tota increase in engt ro uce a 7 orce assuming t e s ring o e s oo e s a

A 4 2 cm B cm C 1 2 cm D 19 cm

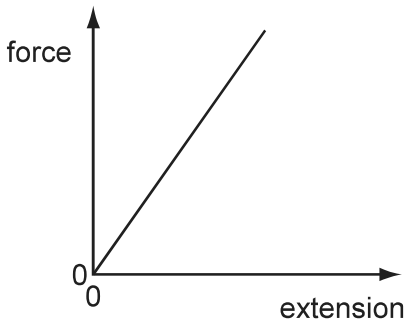
79 e o o ing orce e tension gra s are ra n to t e same sca e 97 2 12 11/Q23

ic gra re resents t e e orme o ect it t e greatest amount o e astic otentia energ

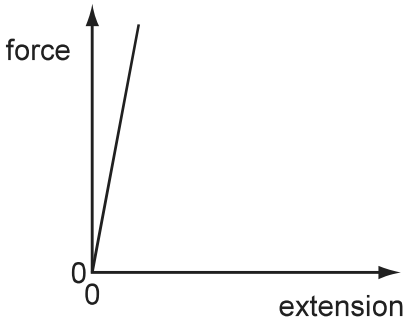
A



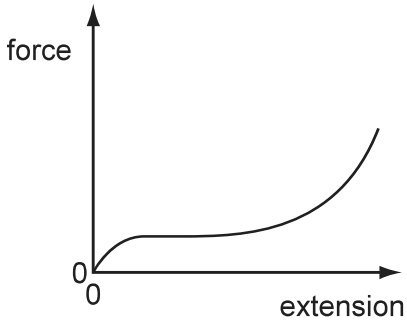
B



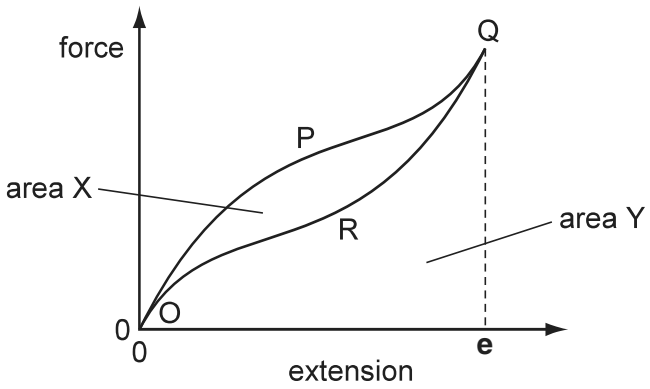
C



D



80 A ru er an is stretc e an t en re a e to its origina engt e iagram s o s t e orce e tension gra or t is rocess 97 2 13 11/Q22



As t e orce is increase t e cur e o o s t e at to e tension e As t e orce is re uce t e cur e o o s t e at to return to ero e tension

e area a e e is et een t e cur es an e area a e e is oun e t e cur e an t e ori onta a is

ic statement a out t e rocess is correct

A Area is t e energ ic eats t e an as it is stretc e to e

B Area area is t e minimum energ re uire to stretc t e an to e

C Area is t e e astic otentia energ store in t e an en it is stretc e to e

D Area area is t e net or one on t e an uring t e rocess

81 ic ro ert o a meta ire e en s on its oung mo u us 97 2 11 12/Q23

A ucti it

B e astic imit

C s ring constant

D u timate tensi e stress

82 at is re resente t e gra ient o a gra o orce ertica a is against e tension ori onta a is 97 2 11 12/Q25

A e astic imit

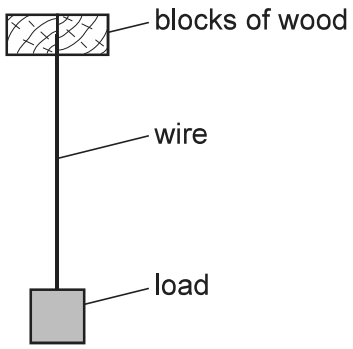
B s ring constant

C stress

D oung mo u us

83 e iagram s o s a ire o iameter D an engt t at is irm c am e at one en et een t o oc s o oo A oa is a ie to t e ire ic causes it to e ten an amount

97 2 11 12/Q24

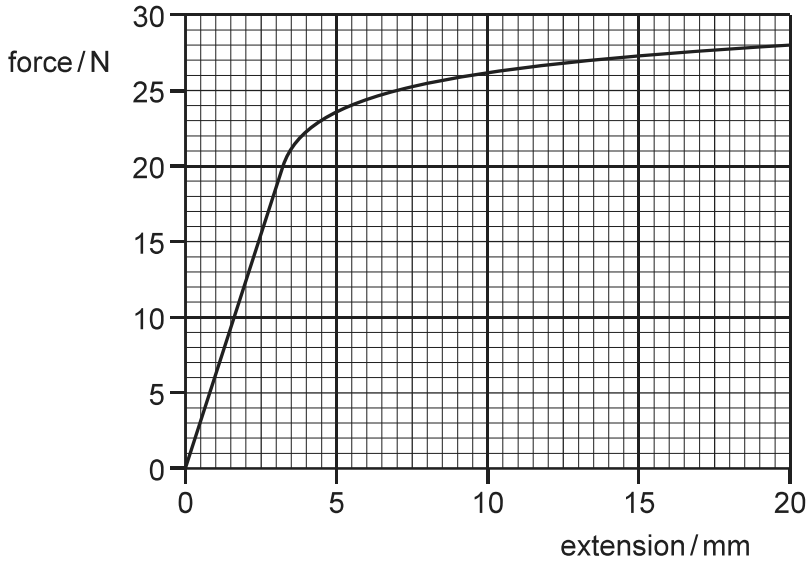


B o muc ou a ire o t e same materia ut o iameter 2D an engt 3 e ten en t e same oa is a ie

A $\frac{2}{3}$ B $\frac{3}{4}$ C $\frac{4}{3}$ D $\frac{3}{2}$

84 e gra is a orce e tension gra or a ire t at is eing stretc e

97 2 12 12/Q24



o muc or nee s to e one t e tensi e orce to t o signi icant igures to cause an e tension o 7 mm

A 88 B 12 C 3 D 12

85 A ire stretc es 8 mm un er a oa o

97 2 12 12/Q25

A secon ire o t e same materia it a t e iameter an a uarter o t e origina engt o t e irst ire is stretc e t e same oa

Assuming t at oo e s a is o e e at is t e e tension o t is ire

A 1 mm B 4 mm C 8 mm D 1 mm

86 at is re resente t e gra ient o a gra o orce ertica a is against e tension ori onta a is

97 2 13 12/Q20

A e astic imit

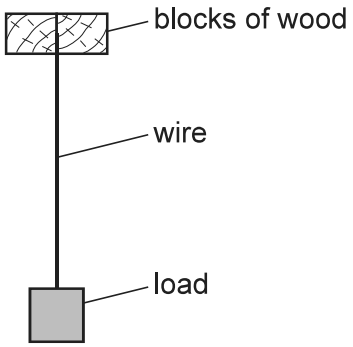
B s ring constant

C stress

D oung mo u us

87 e iagram s o s a ire o iameter D an engt t at is irm c am e at one en et een t o oc s o oo A oa is a ie to t e ire ic causes it to e ten an amount

97 2 13 12/Q21

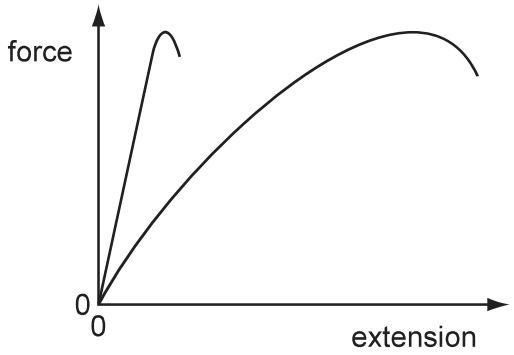


B o muc ou a ire o t e same materia ut o iameter 2D an engt 3 e ten en t e same oa is a ie

A $\frac{2}{3}$ **B** $\frac{3}{4}$ **C** $\frac{4}{3}$ **D** $\frac{3}{2}$

88 e iagram s o s t e orce e tension gra s or t o materia s o t e same imensions oa e to racture

97 2 12 12/Q26



at escri es t e e a iour o t e materia s

A Bot materia s are ritt e

B Bot materia s o e oo e s a

C Bot materia s are astic

D Bot materia s a e t e same u timate tensi e stress

89 at ea s to t e conc usion t at t e mo ement o mo ecu es is ran om 97 2 12 12/Q25

A e a oration o ater at room tem erature

B con uction o e ectricit in ater

C con ection currents in air

D motion o ust artic es in air

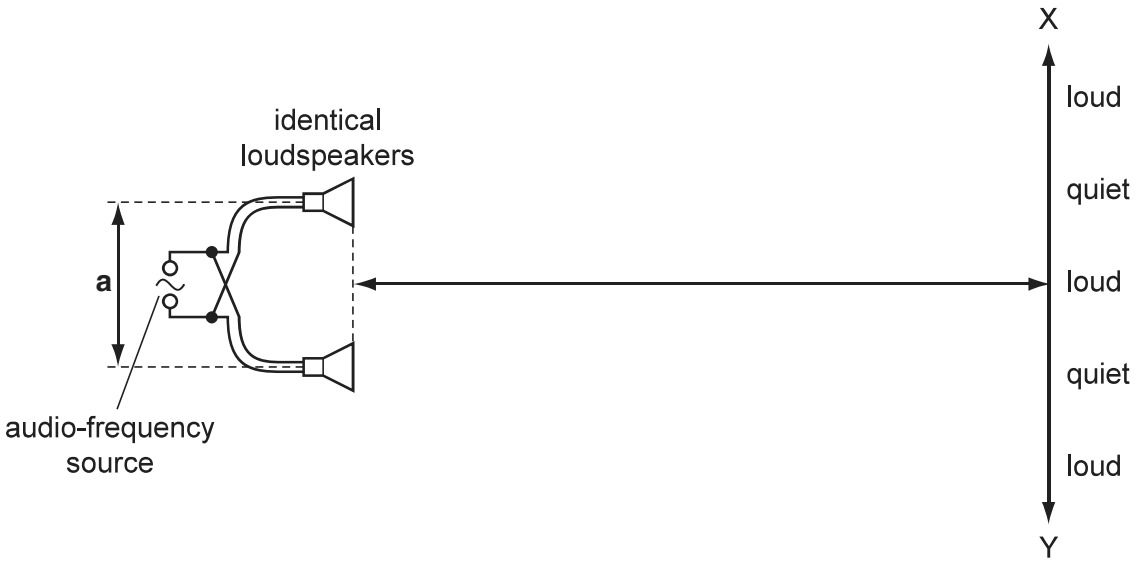
90 o ires an are ma e rom i erent meta s an a e i erent imensions e oung mo u us o ire is t ice t at o ire e iameter o ire is a t at o ire 97 2 12 12/Q27

Bot ires are e ten e it e ua strain an o e oo e s a

at is t e ratio $\frac{\text{tension in ire}}{\text{tension in ire}}$

A $\frac{1}{8}$ B $\frac{1}{2}$ C 1 D 8

91 e iagram s o s t o i entica ou s ea ers ri en in ase a common au io re uenc source 97 2 12 12/Q28



en a stu ent mo es a ong ine s e notices t at t ere are ariations in t e ou ness o t e soun e regions in ic t e soun is ear are a ternate ou an uiet as in icate on t e iagram

o ma t e istance et een ou regions e re uce

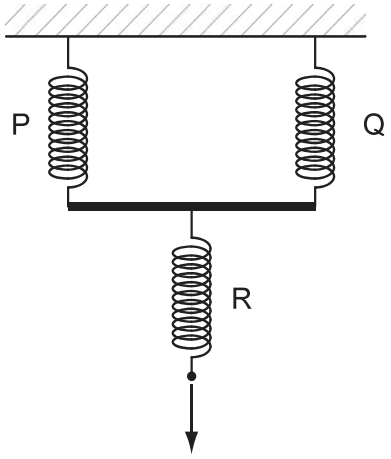
A ecreasing t e istance a et een t e s ea ers

B increasing istance

C increasing t e re uenc o t e au io re uenc source

D increasing t e o er out ut rom t e au io re uenc source

92 ree s rings are arrange ertica as s o n 97 2 11 12/Q23

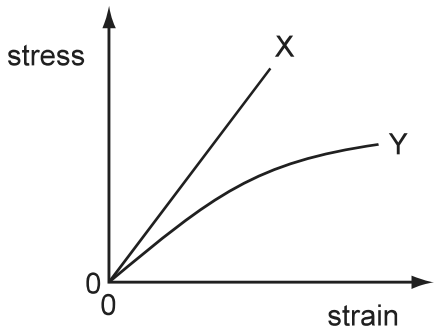


rings an are i entica an a e s ring constant ring as s ring constant 3

at is t e increase in t e o era engt o t e arrangement en a orce is a ie as s o n

A —— B $\frac{4}{3}$— C $\frac{7}{2}$ D 4

93 e iagram s o s t e stress strain gra or t o ires an o i erent materia s u to t eir rea ing oints Bot ires a e t e same initia imensions 97 2 11 12/Q24



ic statement is not correct

A ateria e ten s e astica

B ateria e ten s more t an materia en oa e it t e same orce

C ateria as a arger u timate tensi e stress

D ateria is ritt e

94 A stee ire an a rass ire are oine en to en an are ung ertica it t e stee ire attac e to a oint on t e cei ing e stee ire is t ice as ong as t e rass ire an as a t e iameter

97 2 11 12/Q25

A arge mass is ung rom t e en o t e rass ire so t at ot ires are stretc e e astica

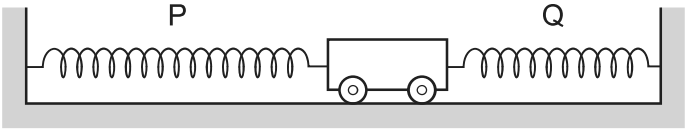
e oung mo u us or stee is 2 1 ^{11} a an or rass is 1 1 ^{11} a

at is t e ratio o t e e tension o t e stee to t e e tension o t e rass

A 2 B 4 C 8 D 1

95 A tro e is e at rest et een t o stee s rings

97 2 13 12/Q24



ac s ring as an unstretc e engt o 1 m

ring as s ring constant m ^{1}
ring as s ring constant 12 m ^{1}

ring as an e tension o 4 m

at is t e e tension o s ring

A 1 m B 2 m C 3 m D 8 m

96 A i t is su orte t o stee ca es eac o engt 1 m an iameter cm

97 2 13 12/Q25

e i t ro s 1 mm en a man o mass 8 g ste s into t e i t

at is t e est estimate o t e a ue o t e oung mo u us o t e stee

A 2 1 ^{1} m ^{2}

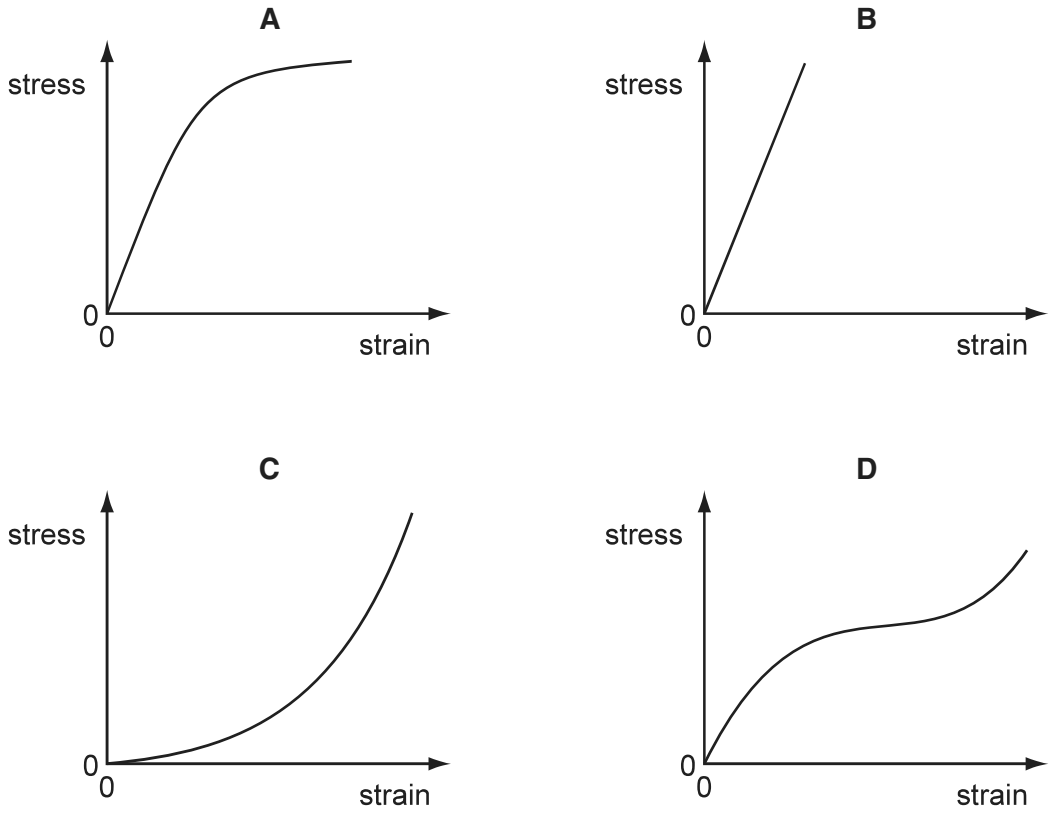
B 4 1 ^{1} m ^{2}

C 2 1 ^{11} m ^{2}

D 4 1 ^{11} m ^{2}

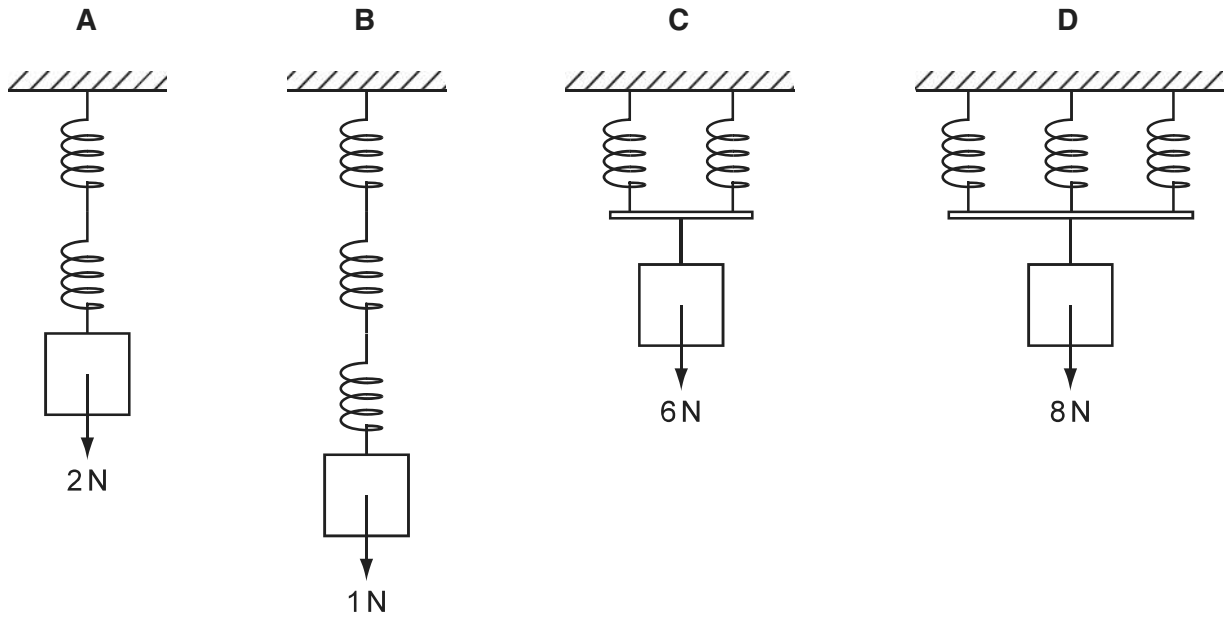
97 **e stress strain gra s or our i erent materia s are s o n e o** 97 2 11 13/Q22

ic iagram s o s t e stress strain gra or a ucti e meta



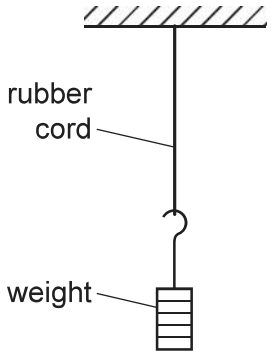
98 **A num er o i entica s rings eac a ing t e same s ring constant are oine in our arrangements A i erent oa is a ie to eac arrangement** 97 2 11 13/Q23

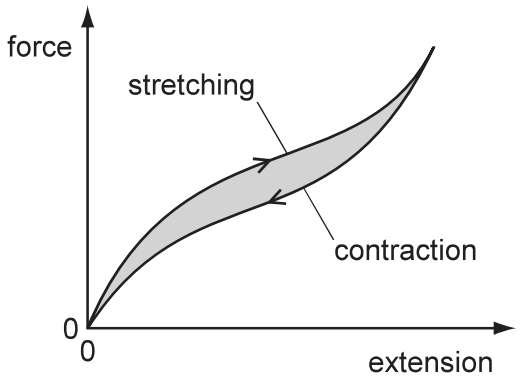
ic arrangement as t e argest e tension



99 **A ru er cor angs rom a rigi su ort A eig t attac e to its o er en is gra ua increase rom ero an t en gra ua re uce to ero**

97 2 12 13/Q22





e orce e tension cur e or contraction is e o t e orce e tension cur e or stretc ing

at oes t e s a e area et een t e cur es re resent

A t e amount o e astic energ store in t e ru er

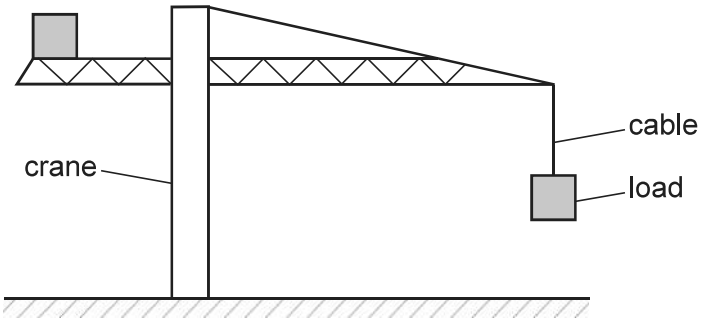
B t e amount o t erma energ issi ate in t e ru er

C t e or one on t e ru er cor uring stretc ing

D t e or one t e ru er cor uring contraction

100 **e iagram s o s a arge crane on a construction site i ting a cu e s a e oa**

97 2 12 13/Q23



A mo e is ma e o t e crane its oa an t e ca e su orting t e oa

e materia use or eac art o t e mo e is t e same as t at in t e u si e crane ca e an oa e mo e is one tent u si e in a inear imensions

at is t e ratio $\frac{\text{stress in t e ca e on t e u si e crane}}{\text{stress in t e ca e on t e mo e crane}}$

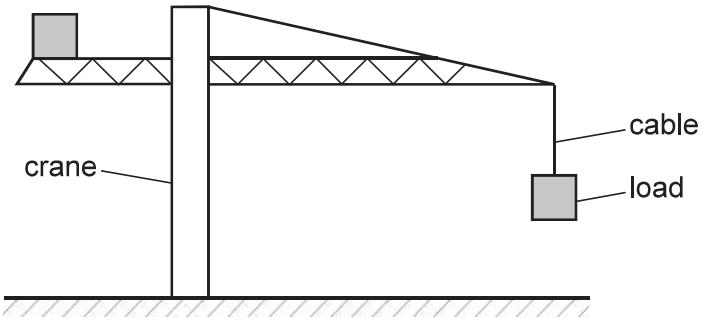
A 1 B 1 1 C 1 2 D 1 3

101 **at is t e unit o t e oung mo u us**

97 2 12 13/Q21

A m 1 B m C m 2 D m 2

102 e iagram s o s a arge crane on a construction site i ting a cu e s a e oa 97 2 13 13/Q19



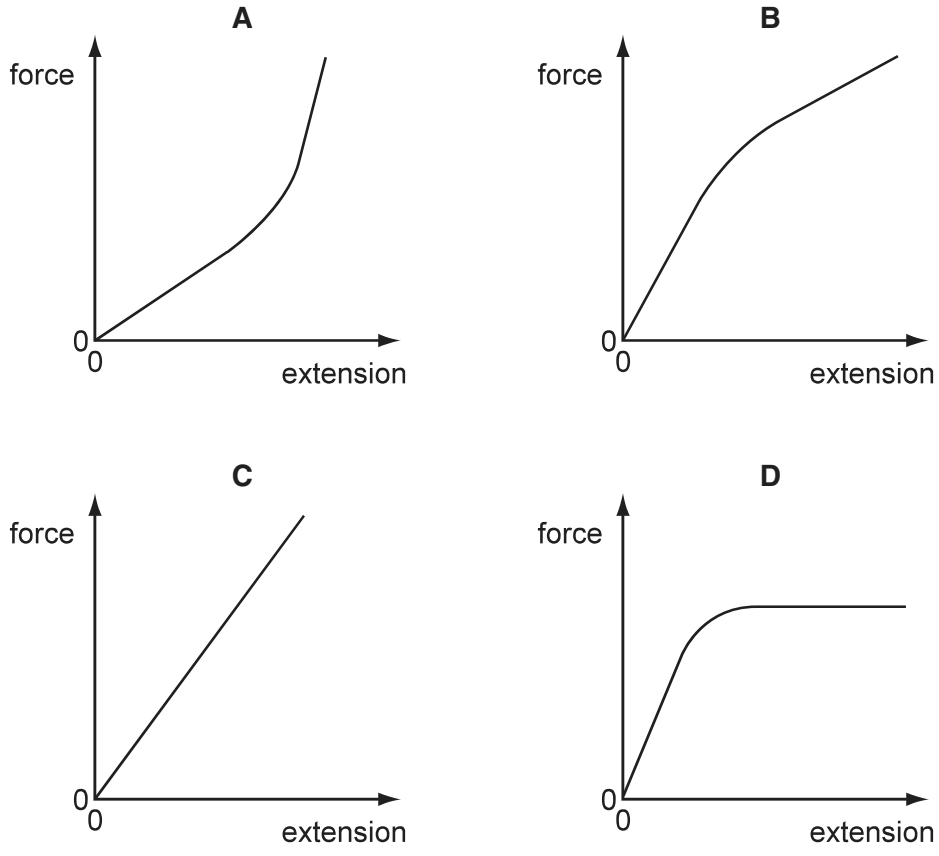
A mo e is ma e o t e crane its oa an t e ca e su orting t e oa

e materia use or eac art o t e mo e is t e same as t at in t e u si e crane ca e an oa e mo e is one tent u si e in a inear imensions

at is t e ratio $\frac{\text{e tension o t e ca e on t e u si e crane}}{\text{e tension o t e ca e on t e mo e crane}}$

A 1 B 1 ^{1} C 1 ^{2} D 1 ^{3}

103 ic gra re resents t e orce e tension re ations i o a ru er an t at is stretc e a most to its rea ing oint 97 2 13 13/Q20



104 A s ring is stretc e o er a range it in ic e astic e ormation occurs ts s ring constant is 3 cm ^{1} 97 2 13 13/Q21

ic ro or t e state a ie orce gi es t e correct e tension an strain energ

	orce	e tension cm	strain energ m
A	3	1	1
B		2	12
C	12	3	18
D	24	8	9

105 A s ring o une ten e engt 4 mm is sus en e rom a i e oint A oa o 1 is a ie to t e ree en o t e s ring is causes t e s ring to e ten so t at its ina engt is i e times its origina engt e s ring o e s oo e s a 97 2 13 13/Q15

at is t e energ store in t e s ring ue to t is e tension

A 1 3 B 1 C 2 D 3 2

106 ic ro erties est escri e mo e ing c a 97 2 11 13/Q23

A ritt e an ucti e

B ucti e an e astic

C e astic an astic

D astic an ucti e

107 A stee s ring as a s ring constant o 1 m ^{1} en a 2 eig t is ung rom t e s ring it as a stretc e engt o cm 97 2 11 13/Q24

at as t e origina engt o t e s ring

A 38 m B 49 m C 1 m D 72 m

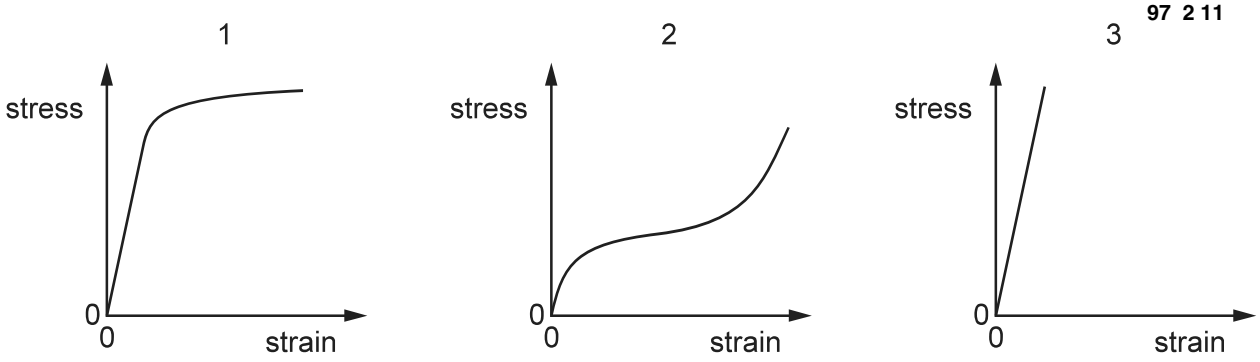
108 A i t is su orte t o stee ca es eac o engt 2 m 97 2 13 13/Q22

ac o t e ca es consists o 1 ara e stee ires eac ire o cross sectiona area 3 2 1 m^{2} e oung mo u us o stee is 2 1 1 ^{11} m ^{2}

ic istance oes t e i t mo e o n ar en a man o mass 7 g ste s into it

A 1 mm B 2 mm C 1 mm D 2 mm

109 **e stress strain gra s or t ree i erent materia s are s o n not ra n to t e same sca es** **97 2 11** **14**/Q20

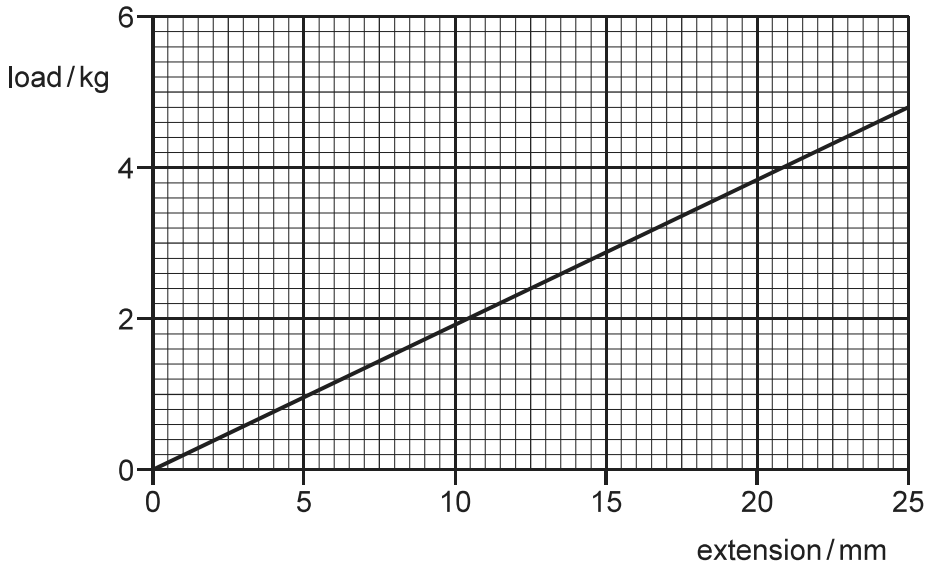


e t ree materia s are co er ru er an g ass

ic materia s are re resente t e gra s

	1	2	3
A	**co er**	**g ass**	**ru er**
B	**co er**	**ru er**	**g ass**
C	**g ass**	**co er**	**ru er**
D	**g ass**	**ru er**	**co er**

110 **e gra is a oa e tension gra or a ire un ergoing e astic e ormation** **97 2 11** **14**/Q21



o muc or is one on t e ire to increase t e e tension rom 1 mm to 2 mm

A 28 **B** 184 **C** 28 **D** 37

111 at is e ua to t e oung mo u us o a materia t at is e ten e e astica it in t e imit o ro ortiona it

97 2 13 13/Q23

A area un er t e orce e tension gra

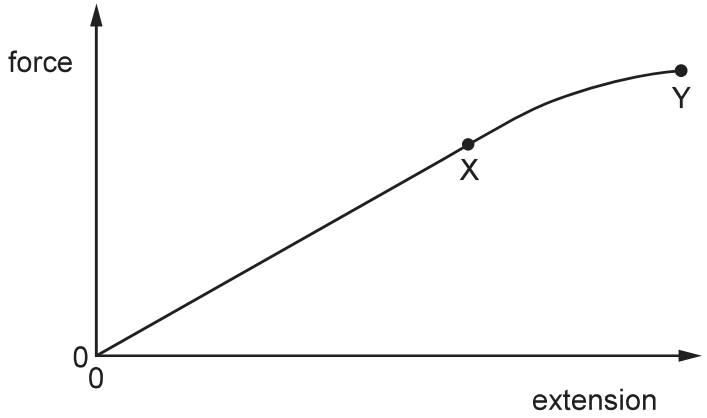
B area un er t e stress strain gra

C gra ient o t e orce e tension gra

D gra ient o t e stress strain gra

112 A sam e o meta is su ecte to a orce ic increases to a ma imum a ue an t en ecreases ac to ero A orce e tension gra or t e sam e is s o n

97 2 12 14/Q19



en t e sam e contracts it o o s t e same orce e tension cur e as en it as eing stretc e

at is t e e a iour o t e meta et een an

A ot e astic an astic

B not e astic an not astic

C astic ut not e astic

D e astic ut not astic

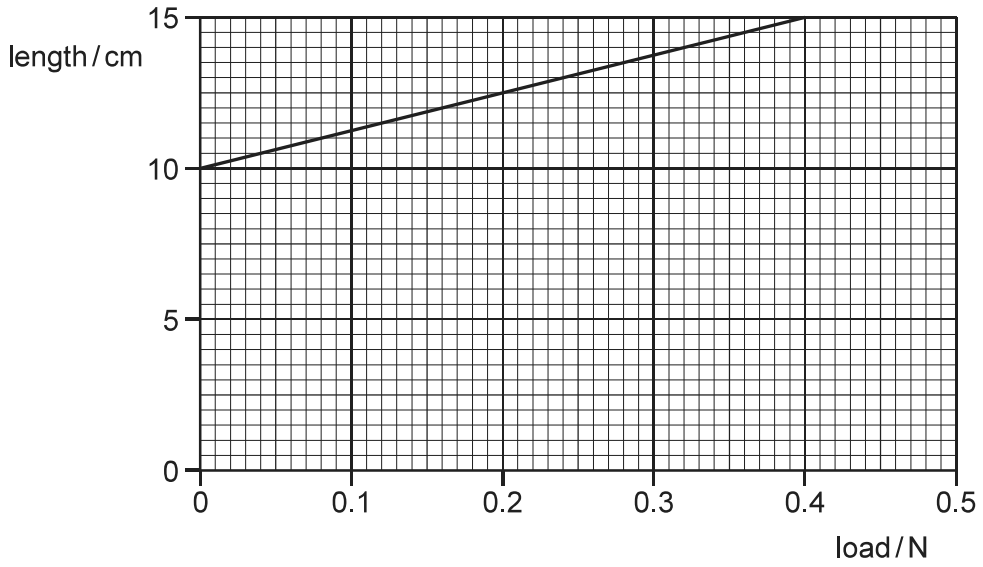
113 An e astic materia it a oung mo u us is su ecte to a tensi e stress oo e s a is o e e

97 2 13 14/Q23

at is t e e ression or t e e astic energ store er unit o ume o t e materia

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

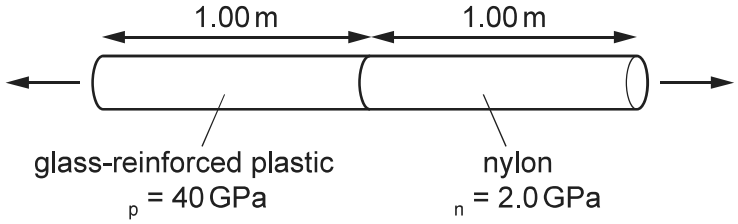
114 e gra s o s t e engt o a s ring as it is stretc e an increasing oa 97 2 12 14/Q20



at is t e s ring constant

A 8 m 1 B 2 7 m 1 C 13 m 1 D 8 m 1

115 A com osite ro is ma e attac ing a g ass rein orce astic ro an a n on ro en to en as s o n 97 2 12 14/Q21



e ro s a e t e same cross sectiona area an eac ro is 1 m in engt e oung mo u us o t e astic is 4 a an t e oung mo u us n o t e n on is 2 a

e com osite ro i rea en its tota e tension reac es 3 mm

at is t e greatest tensi e stress t at can e a ie to t e com osite ro e ore it rea s

A 7 1 1 14 a

B 7 1 1 2 a

C 7 1 a

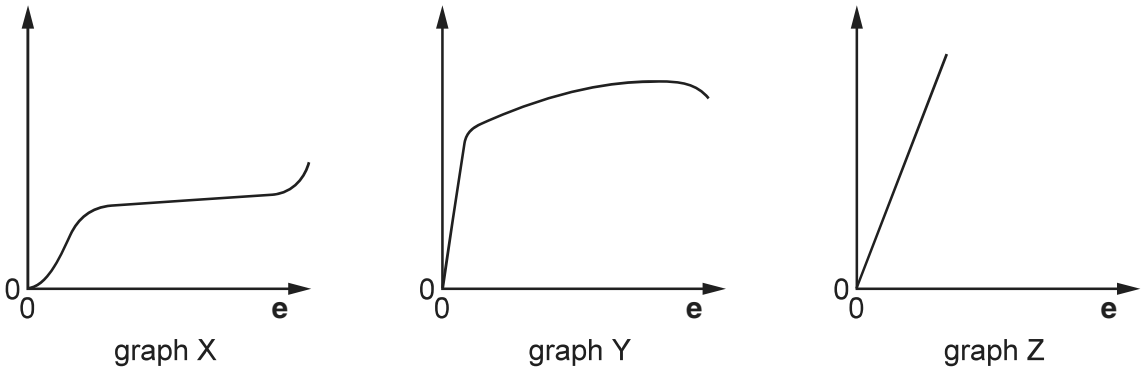
D 7 1 9 a

116 e ariana renc in t e aci ic cean as a e t o a out 1 m 97 2 13 14/Q22

Assuming t at sea ater is incom ressi e an as a ensit o a out 1 2 g m 3 at ou e t e a ro imate ressure at t at e t

A 1 a B 1 a C 1 7 a D 1 8 a

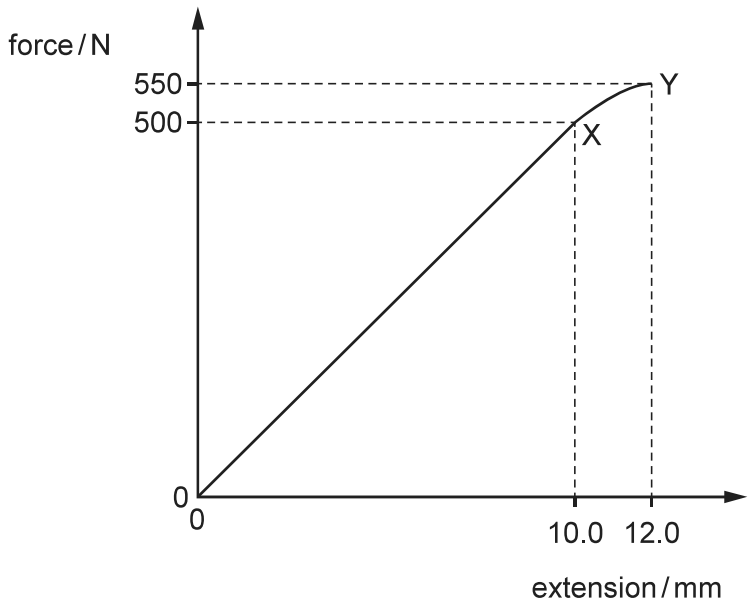
117 C in rica sam es o stee g ass an ru er are eac su ecte to a gra ua increasing tensi e orce e e tensions e are measure an gra s are otte as s o n e o 97 2 13 14/Q24



ic ro correct re ates t e gra s to t e materia s

	stee	g ass	ru er
A			
B			
C			
D			

118 e gra s o s t e e a iour o a sam e o a meta en it is stretc e unti it starts to un ergo astic e ormation 97 2 13 14/Q24



at is t e tota or one in stretc ing t e sam e rom ero to 12 mm e tension im i t e ca cu ation treating t e cur e as a straig t ine

A 3 3 B 3 C 3 D

119 at is meant t e u timate tensi e stress o a materia 97 2 13 14/Q23

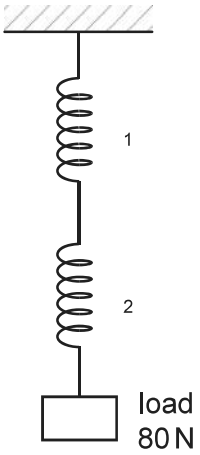
A t e ma imum orce t at can e a ie to a ar o t e materia e ore it en s

B t e ma imum inter atomic orce e ore t e atomic on s o t e materia rea

C t e ma imum stretc ing orce er unit cross sectiona area e ore t e materia rea s

D t e ma imum tensi e orce in a ire o t e materia e ore it rea s

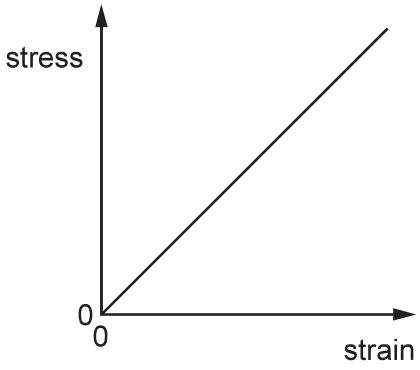
120 o s rings one it s ring constant $_1$ 4 m^{-1} an t e ot er it s ring constant $_2$ 2 m^{-1} are connecte as s o n 97 2 13 14/Q25



at is t e tota e tension o t e s rings en su orting a oa o 8

A 1 3 cm B 4 cm C cm D cm

121 e stress strain gra or a g ass ro u to t e oint at ic it rea s iss o n e o 97 2 11 14/Q20



ic statement a out t e g ass ro is correct

A oo e s a is o e e or a a ues o stress u to t e rea ing oint

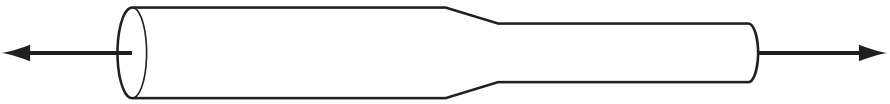
B e g ass is ucti e

C e g ass s o s astic e ormation

D en t e cross sectiona area o t e ro is ou e t e u timate tensi e stress o t e ro is a e

122 A stee ar o circu ar cross section is un er tension as s o n 97 2 13 1 /Q22

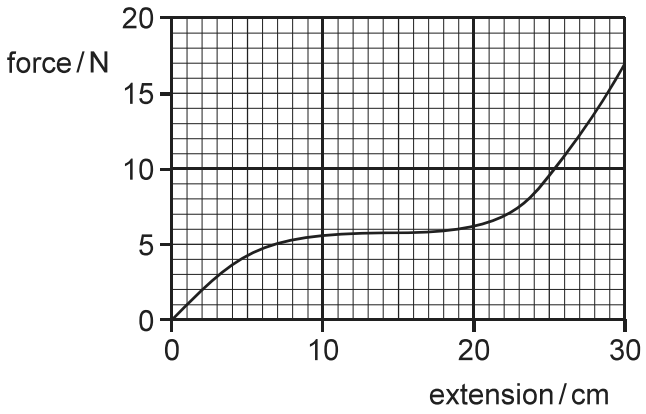
e iameter o t e i e ortion is ou e t e iameter o t e narro ortion



at is t e a ue o $\frac{\text{stress in t e i e ortion}}{\text{stress in t e narro ortion}}$

A 2 B C 2 D 4

123 A ru er an is stretc e anging eig ts on it an t e orce e tension gra is otte rom t e resu ts 97 2 11 14/Q21



at is t e est estimate o t e strain energ store in t e ru er an en it is e ten e 3 cm

A 1 8 B 2 C 1 D 2

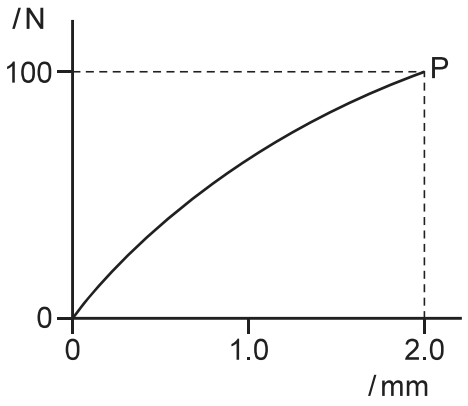
124 o etermine t e oung mo u us o a ire se era measurements are ta en 97 2 12 1 /Q21

n ic ro can t e measurement not e ta en irect it t e state a aratus

	measurement	a aratus
A	area o cross section o ire	micrometer scre gauge
B	e tension o ire	ernier sca e
C	mass o oa a ie to ire	e ectronic a ance
D	origina engt o ire	metre ru e

125 e gra s o s t e non inear orce e tension cur e or a ire ma e rom a ne com osite materia

97 2 13 1 /Q23

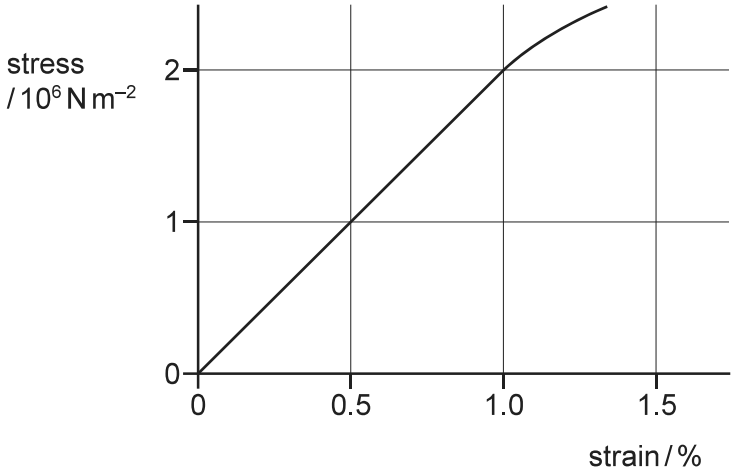


at cou e t e a ue o t e strain energ store in t e ire en it is stretc e e astica to oint

A 9 B 1 C 11 D 2

126 e iagram s o s t e stress strain gra or one

97 2 13 1 /Q24



at is t e oung mo u us o one

A 1 1 m 2

B 2 1 m 2

C 1 1 8 m 2

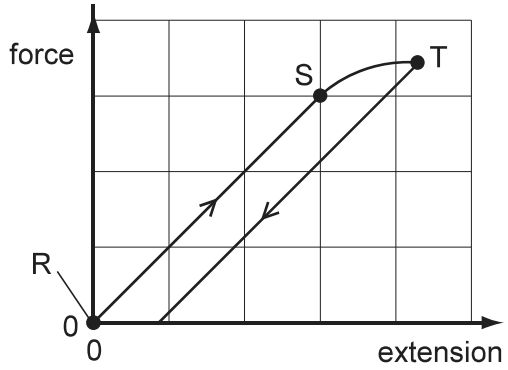
D 2 1 8 m 2

127 **A ong t in meta ire is sus en e rom a i e su ort an angs ertica asses are sus en e rom its o er en**

97 2 12 1 /Q22

e oa on t e o er en is increase rom ero an t en ecrease again ac to ero

e iagram s o s t e orce e tension gra ro uce



ere on t e gra ou t e e astic imit e oun

A an ere et een oint an oint

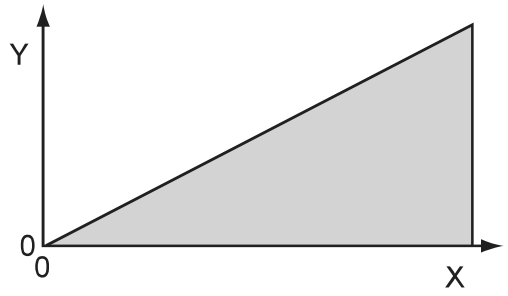
B ust e on oint

C e act at oint

D e act at oint

128 **e gra s o n as otte in an e eriment on a meta ire**

97 2 11 1 /Q22



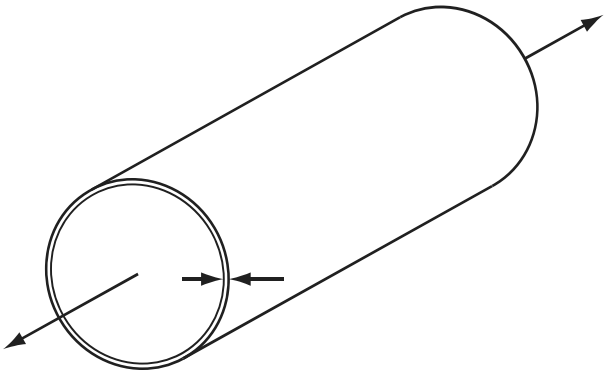
e s a e area re resents t e tota strain energ store in stretc ing t e ire

o s ou t e a es e a e e

A	**orce**	**e tension**
B	**mass**	**e tension**
C	**strain**	**energ**
D	**stress**	**strain**

129 e iagram re resents a stee tu e it a t ic ness ic is sma in com arison it t e iameter o t e tu e

97 2 12 1 /Q23



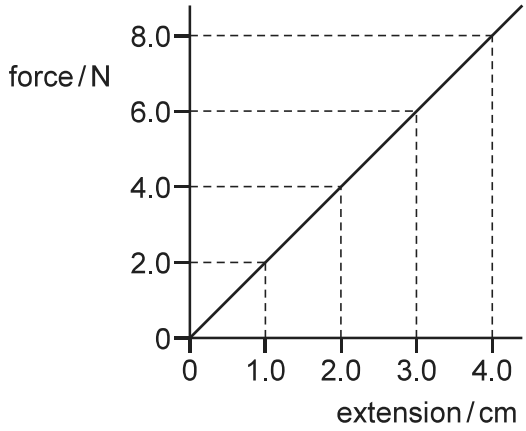
e tu e is un er tension cause a orce ara e to t e a is o t e tu e o re uce t e stress in t e materia o t e tu e it is ro ose to t ic en t e a

e tu e iameter an t e tension eing constant ic a t ic ness gi es a t e stress

A $\frac{}{2}$ B $\sqrt{2}$ C 2 D 4

130 e ariation it a ie orce o t e e tension o a s ring is s o n in t e gra

97 2 11 1 /Q23



en t ere is no orce a ie to t e s ring it as a engt o 1 cm

at is t e increase in t e strain energ store in t e s ring en its engt is increase rom 2 cm to 3 cm

A 2 B 3 C 4 D