

Deformation

Question Paper

Level	O Level
Subject	Physics
Exam Board	Cambridge International Examinations
Unit	Newtonian Mechanics
Topic	Deformation
Booklet	Question Paper

Time Allowed: 29 minutes

Score: /24

Percentage: /100

Grade Boundaries:

1 A force acts on a body.

Which list contains only quantities that can be changed by the force?

- A mass, shape, velocity
- B mass, shape, volume
- C mass, velocity, volume
- D shape, velocity, volume

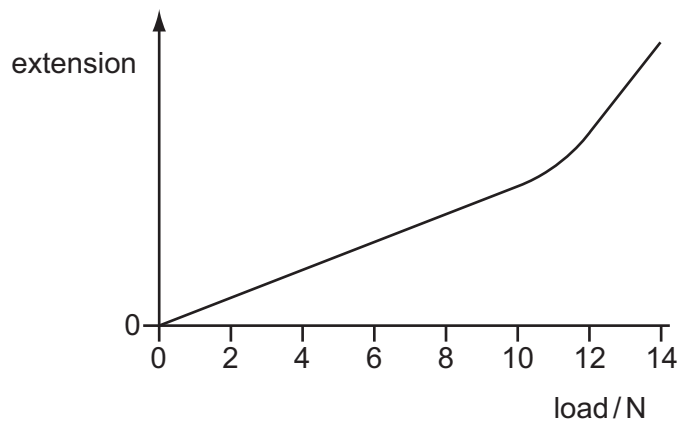
2 A force acts on a body.

Which properties of the body may all be changed by the force?

- A mass, shape and size
- B mass, shape and velocity
- C mass, size and velocity
- D shape, size and velocity

3 Some students plan to use a spring to make a spring balance with a linear scale.

The graph shows how the extension of their spring changes with the load on it.



What is the total range of a balance with a linear scale using this spring?

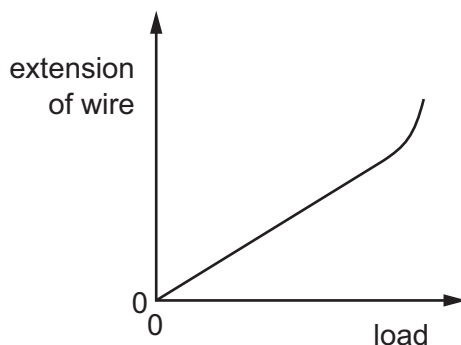
- A 0 N to 10 N
- B 0 N to 12 N
- C 10 N to 12 N
- D 10 N to 14 N

4 A force is applied to a body.

Which property of the body **cannot** be changed by the force?

- A its mass
- B its shape
- C its size
- D its velocity

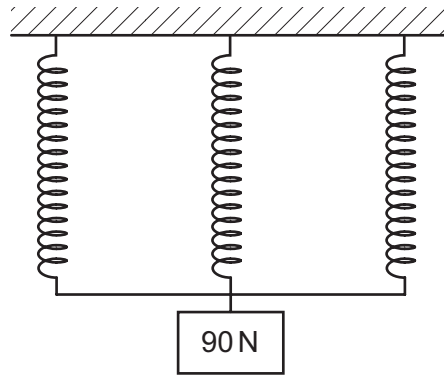
5 The graph shows the extension of a piece of copper wire as the load on it is increased.



What does the graph show?

- A At a certain load the wire becomes easier to extend.
 - B At a certain load the wire becomes harder to extend.
 - C The load and extension are directly proportional for all loads.
 - D The load and extension are inversely proportional for all loads.
- 6 Which object behaves as an elastic solid as it deforms?
- A a bullet as it hits a solid metal wall
 - B a car damaged in a collision
 - C a piece of metal cut by a saw
 - D a football as it is kicked

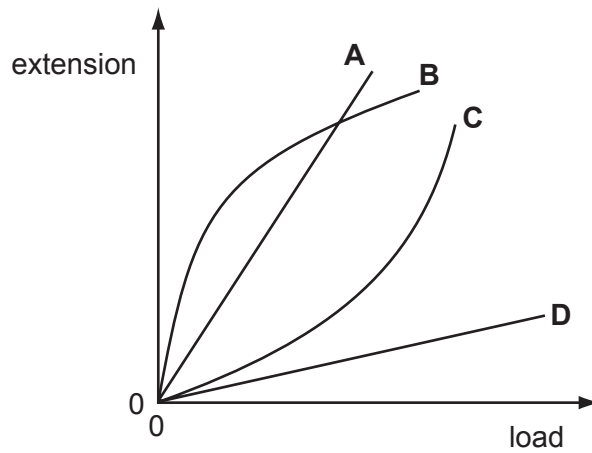
- 7 A spring extends by 6.0 cm when a 15 N weight is suspended from its lower end.
Three of these springs are used as shown to support a 90 N weight.



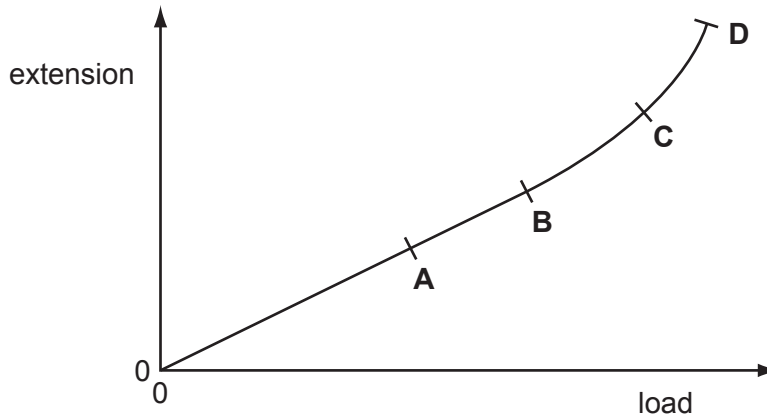
What is the extension of each spring?

- A 2.0 cm B 12 cm C 36 cm D 110 cm
- 8 The graph shows extension-load curves for four fibres.

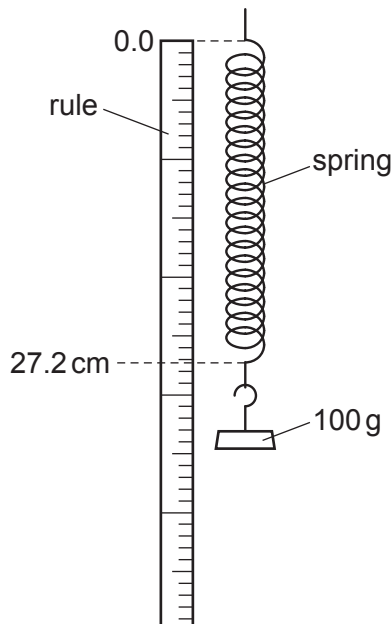
Which fibre is the hardest to stretch over the range of loads shown?



- 9 An extension-load graph is plotted to show the result of increasing the load on a spring. Which point marks the limit of proportionality for this spring?



- 10 A 100g mass is suspended from a spring next to a vertical metre rule. The top of the spring is level with the 0.0 cm mark. The bottom of the spring is level with the 27.2 cm mark.



The 100g mass is replaced with a 600g mass. The length of the spring is now 89.7 cm. The spring has not reached the limit of proportionality.

The 600g mass is replaced with a 200g mass. What is the length of the spring?

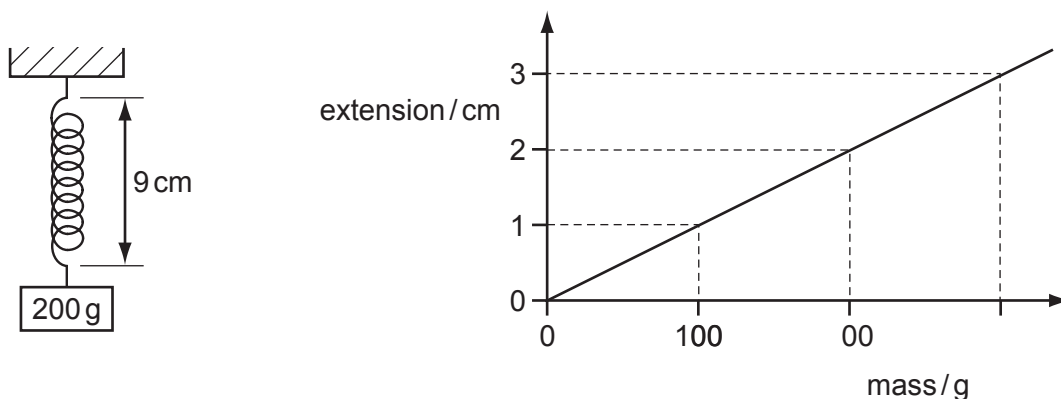
- A** 29.9 cm **B** 33.4 cm **C** 39.7 cm **D** 54.4 cm

11 A metal wire, of initial length 1000 mm, extends by 4 mm when a load of 2 N is added to it.

What is the length of the wire when a further 3 N is added, assuming that the wire does not extend beyond the limit of proportionality?

- A 1006 mm
- B 1008 mm
- C 1010 mm
- D 1012 mm

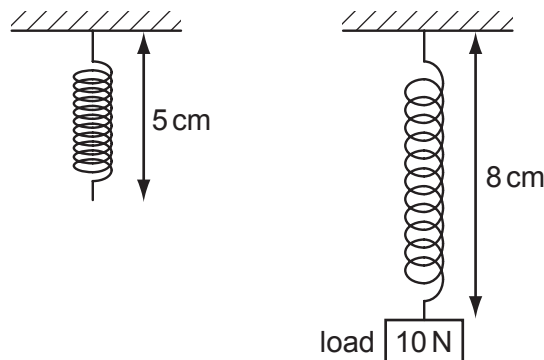
12 A spring has a length of 9 cm when loaded with a 200 g mass. The extension-mass graph for the spring is shown.



The 200 g mass is replaced with a 100 g mass. What is the new length of the spring?

- A 7 cm
- B 8 cm
- C 9 cm
- D 10 cm

13 The diagram shows how the length of a spring changes when a load of 10 N is hung on it.

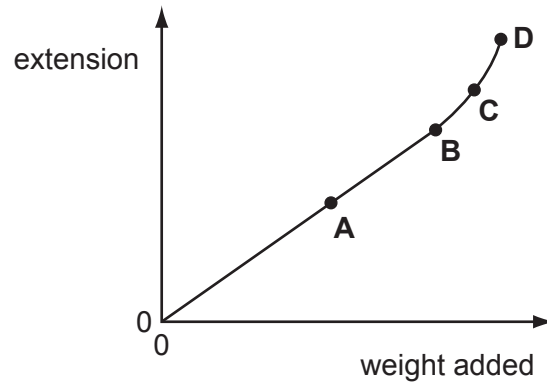


The 10 N load is replaced by a 20 N load. What is the new length of the spring?

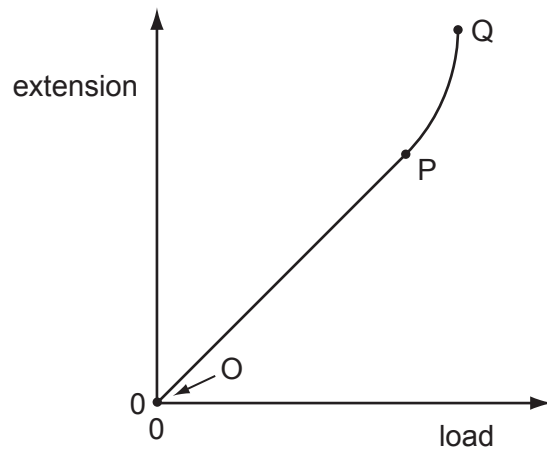
- A 6 cm
- B 11 cm
- C 14 cm
- D 16 cm

14 The extension of a spring is measured as weights are added. The graph shows the results.

Which point is the spring's limit of proportionality?



15 Which part of the graph shows the limit of proportionality for an elastic solid?



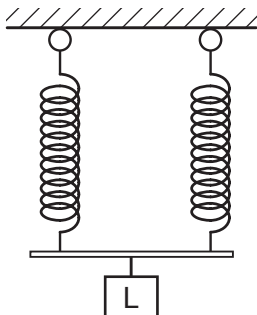
A O

B OP

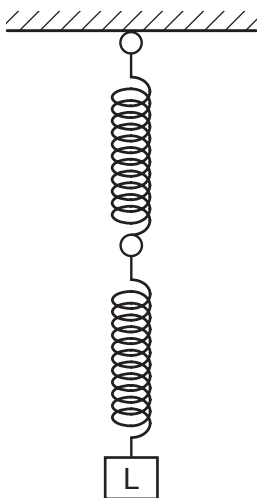
C P

D PQ

- 16 A load L is suspended from two springs that are in parallel. The extension of each spring is x .



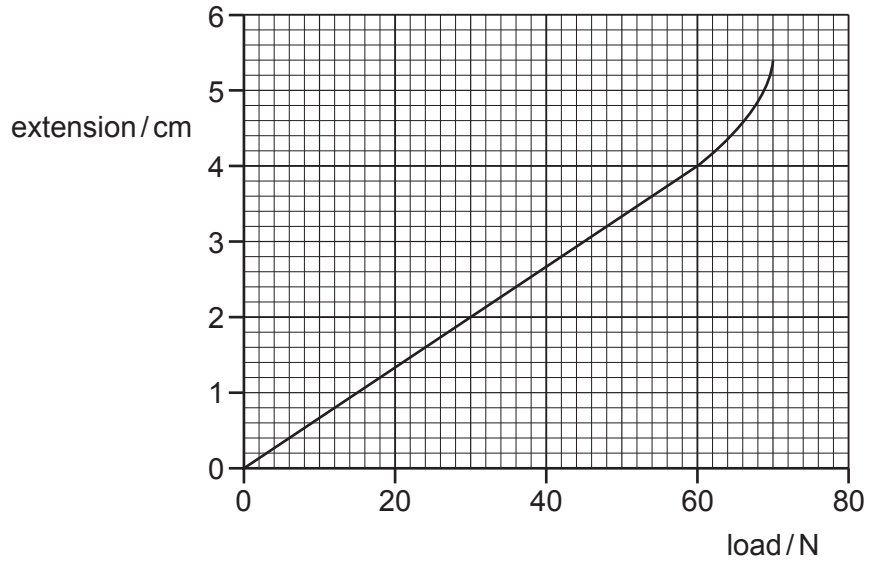
The springs are then arranged to hang vertically, one below the other.



In this new arrangement, what is the total extension of the two springs?

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

17 An extension-load graph for a wire is shown.

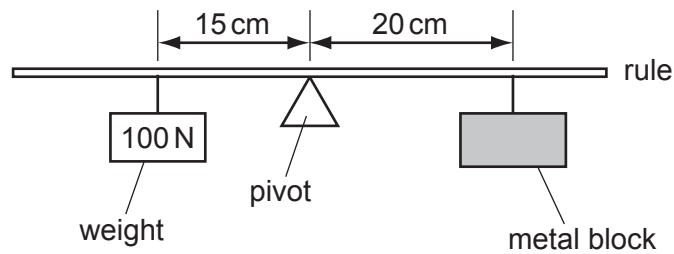


What is the load at the limit of proportionality for the wire?

- A 4 N
- B 15 N
- C 60 N
- D 70 N

5

18 The diagram shows a uniform half-metre rule balanced at its mid-point.



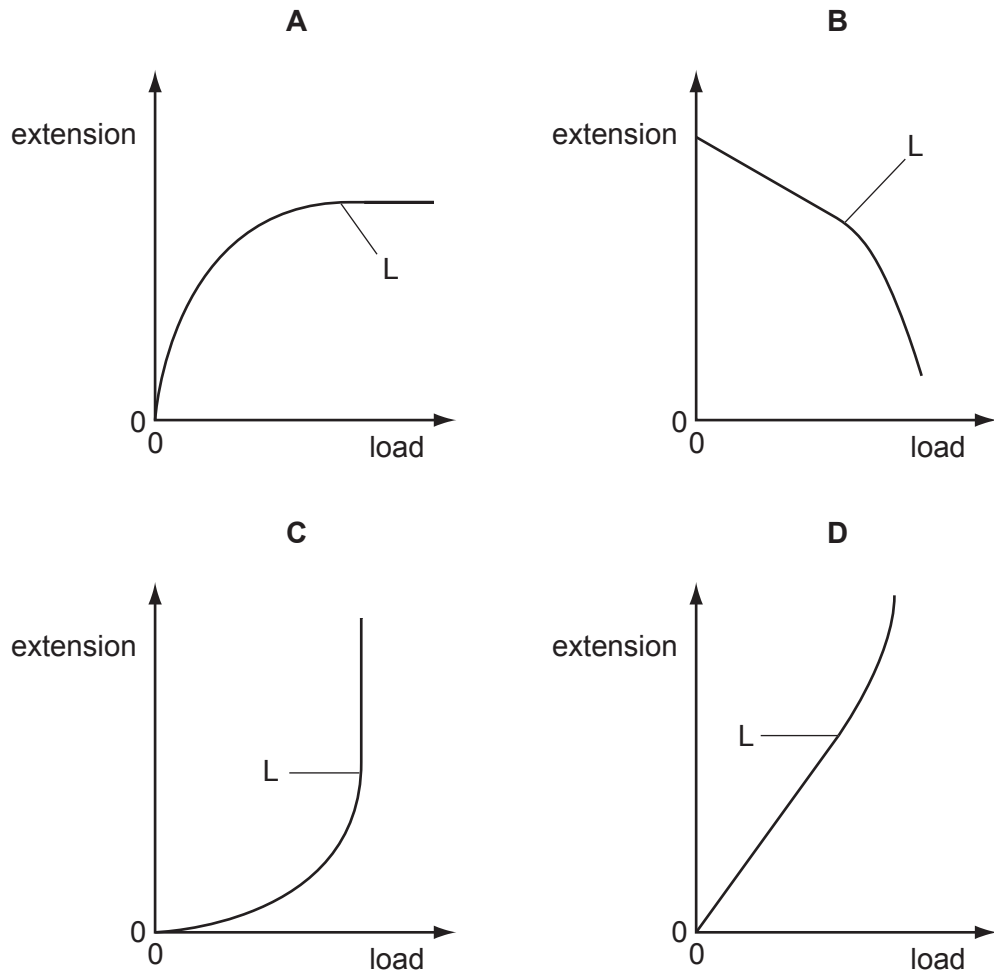
What is the weight of the metal block?

- A 50 N
- B 75 N
- C 100 N
- D 150 N

19 A steel spring is stretched by a load. The load is increased.

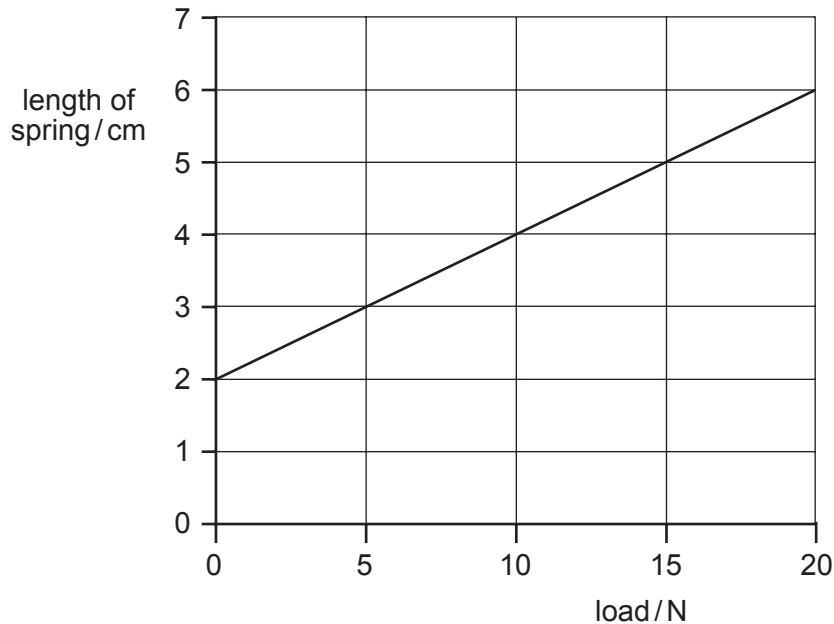
At first the extension is proportional to the load. The spring reaches its limit of proportionality at L.

Which is the correct graph of the extension against load for the spring?



20 A spring balance is calibrated to give readings in newtons.

The graph shows how the length of the spring varies with the load.



A load causes the spring of the balance to extend by 3 cm.

What is the balance reading?

- A** 3 N **B** 5 N **C** 10 N **D** 15 N

5

21 A metal wire, initially 1.000 m long, extends by 4 mm when a load of 2 N is added to it.

What will the length of the wire be if a further 3 N is added, assuming it does not extend beyond its limit of proportionality?

- A** 1.060 m **B** 1.080 m **C** 1.010 m **D** 1.012 m

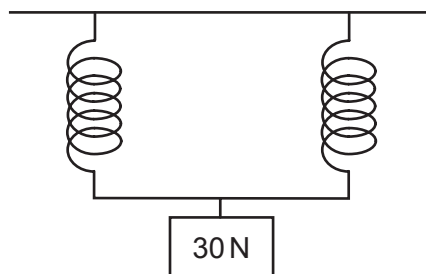
22 The table shows how the extension of a spring varies with load.

load / N	0	2	4	6	8	10	12	14	16
extension / cm	0	3	6	9	12	1			

Between which two loads would you find the limit of proportionality?

- A 0 N and 2 N
- B 8 N and 10 N
- C 10 N and 12 N
- D 14 N and 16 N

23 A spring extends by 4 cm when 10 N is suspended from it. Two of these springs are used as shown to carry a 30 N load.



What is the extension of each spring?

- A 4 cm
 - B 6 cm
 - C 8 cm
 - D 12 cm
- 24 Which property of a body **cannot** be changed if a force is applied to it?
- A its mass
 - B its shape
 - C its size
 - D its velocity