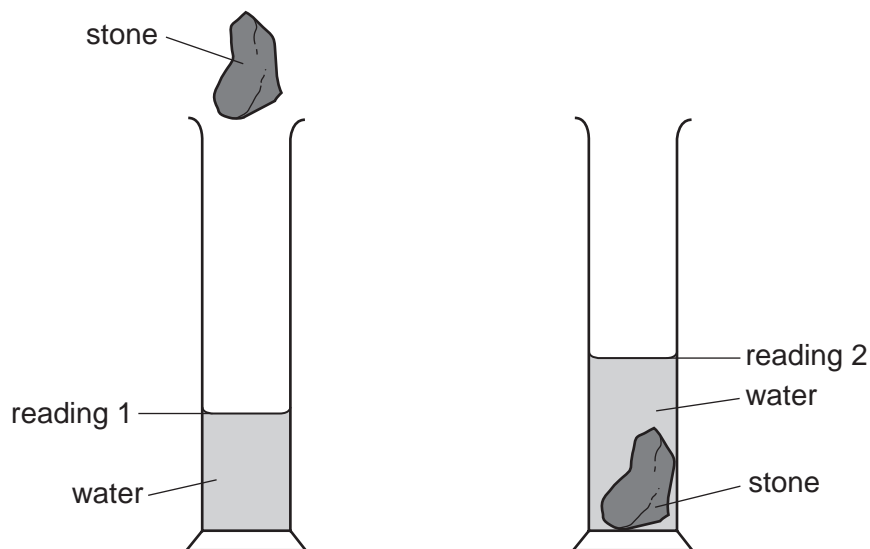


- 1 A student wishes to determine the density of an irregularly-shaped stone.

First he finds the mass of the stone. Next he lowers the stone into a measuring cylinder containing water.

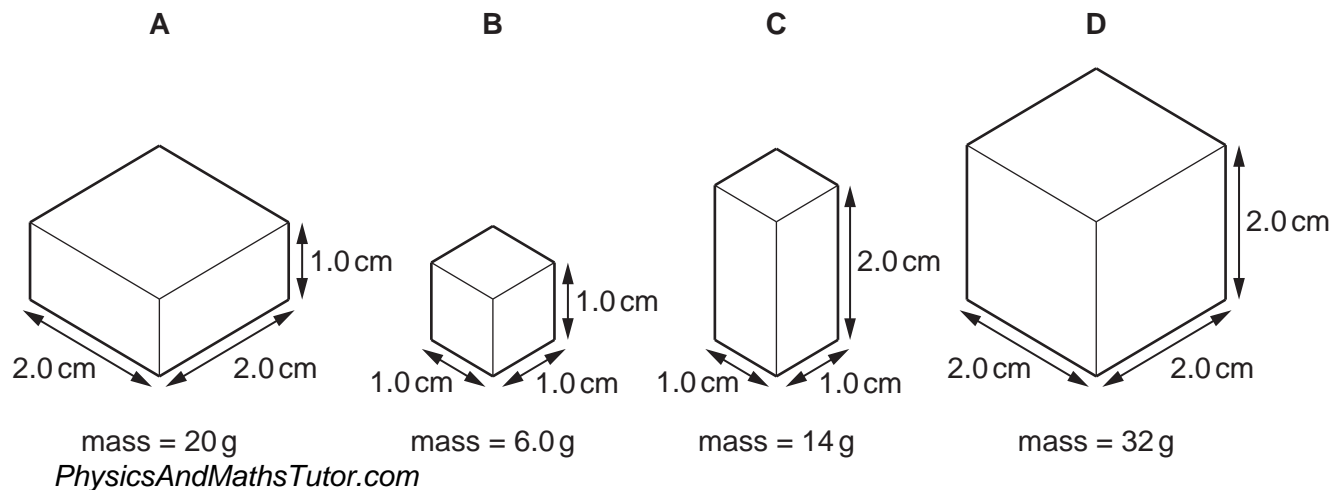
The diagrams show the measuring cylinder before and after the stone is lowered into it.



How should the student calculate the density of the stone?

- A** mass of stone  $\times$  reading 2
  - B** mass of stone  $\times$  (reading 2 – reading 1)
  - C** mass of stone  $\div$  reading 2
  - D** mass of stone  $\div$  (reading 2 – reading 1)
- 2 The diagrams show the dimensions and masses of four regular solid objects. The objects are made from different metals.

Which metal has the greatest density?



- 3 Diagram 1 shows a measuring cylinder containing water.

Diagram 2 shows the same measuring cylinder and water after 10 identical solid glass spheres have been added.

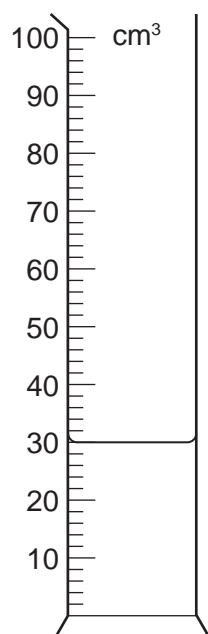


diagram 1

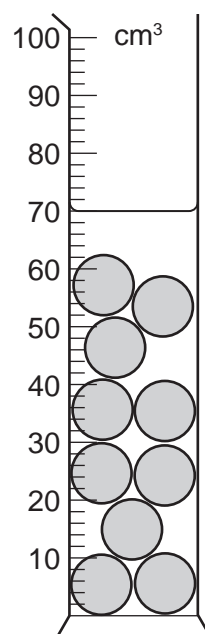


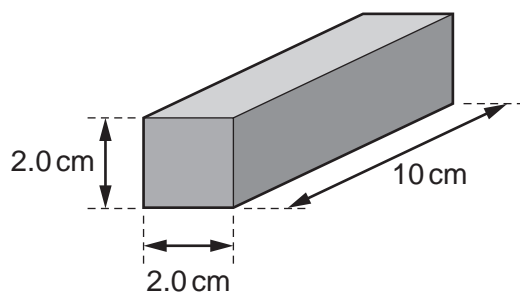
diagram 2

The mass of one of the spheres is 10 g.

What is the density of the glass from which the spheres are made?

- A**  $0.25 \text{ g/cm}^3$     **B**  $0.40 \text{ g/cm}^3$     **C**  $2.5 \text{ g/cm}^3$     **D**  $4.0 \text{ g/cm}^3$

- 4 The diagram shows a cuboid block made from a metal of density  $2.5 \text{ g/cm}^3$ .

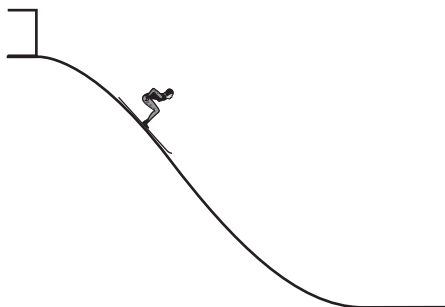


What is the mass of the block?

- A** 8.0 g    **B** 16 g    **C** 50 g    **D** 100 g

- 1 A skier walks from the bottom of a ski slope to the top and gains 10 000 J of gravitational potential energy.

She skis down the slope. At the bottom of the slope, her kinetic energy is 2000 J.



How much energy is dissipated in overcoming friction and air resistance as the skier moves down the slope?

- A** 2000 J      **B** 8000 J      **C** 10 000 J      **D** 12 000 J

- 2 A coal-fired power station generates electricity. Coal is burnt and the energy released is used to boil water. The steam from the water makes the generator move and this produces electricity.

Which words are used to describe the energy stored in the coal and the energy of the moving generator?

	coal	generator
<b>A</b>	chemical	hydroelectric
<b>B</b>	chemical	kinetic
<b>C</b>	geothermal	hydroelectric
<b>D</b>	geothermal	kinetic

- 3 Four different children run up the same set of stairs.

For which child is the useful power to climb the stairs the greatest?

	mass of child / kg	time taken / s
<b>A</b>	40	15
<b>B</b>	50	25
<b>C</b>	60	25
<b>D</b>	70	15

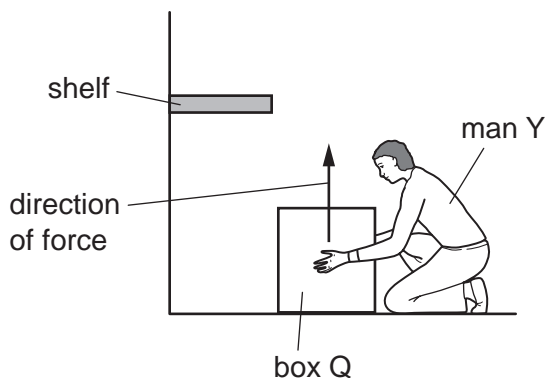
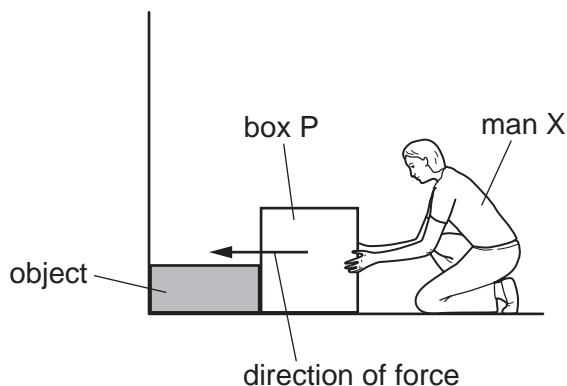
4 Which energy source is one that is used to boil water to make steam in power stations?

- A** energy from tides
- B** energy from waves
- C** hydroelectric energy
- D** nuclear energy

5 In a factory, two men X and Y try to move identical heavy boxes P and Q.

Man X tries to push box P along the floor. The box does not move because an object is in the way.

Man Y lifts box Q from the floor onto a shelf.



Which man does the most work on the box, and which box gains the most energy?

	man doing most work	box gaining most energy
<b>A</b>	X	P
<b>B</b>	X	Q
<b>C</b>	Y	P
<b>D</b>	Y	Q

6 Which energy source is renewable and reliably available at all times?

- A** coal
- B** geothermal
- C** nuclear
- D** wind

- 1 An experiment is carried out to measure the extension of a rubber band for different loads.

The results are shown below.

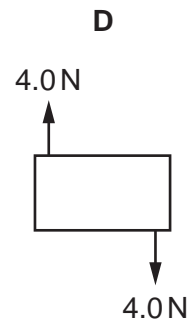
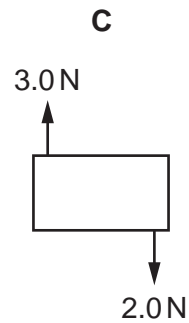
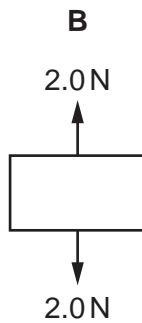
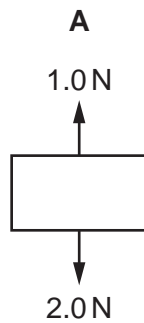
load/N	0	1.0	2.0	3.0
length/cm	15.2	16.2		18.6
extension/cm	0	1.0	2.1	3.4

Which figure is missing from the table?

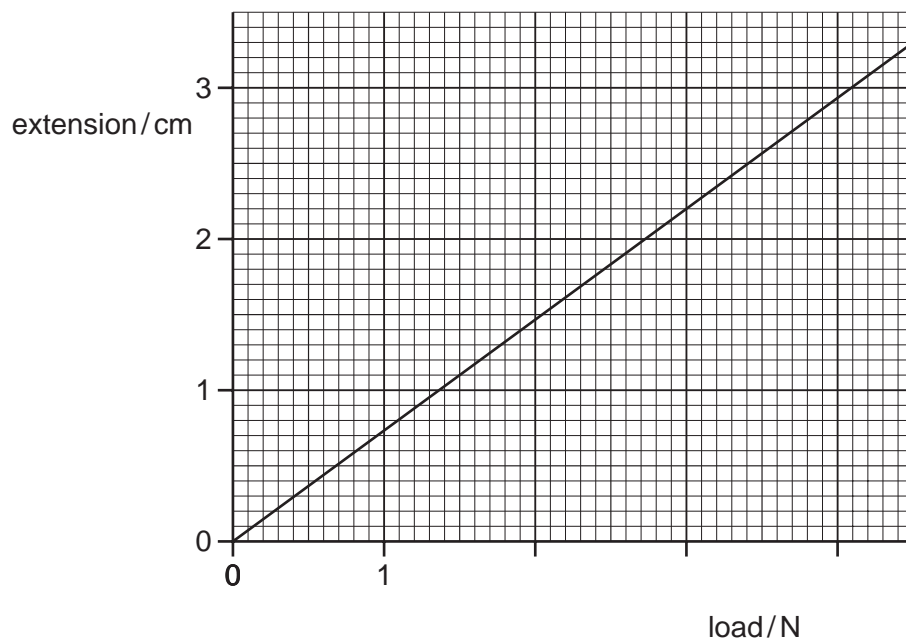
- A** 17.2                      **B** 17.3                      **C** 17.4                      **D** 17.6

- 2 Four objects are each acted on by only two forces, as shown.

Which object is in equilibrium?



- 3 The extension-load graph for a spring is shown. The unstretched length of the spring is 17.0 cm.



When an object is hung from the spring, the length of the spring is 19.2 cm.

What is the weight of the object?

- A** 1.4 N      **B** 1.6 N      **C** 2.6 N      **D** 3.0 N

- 1 An object has a mass of 50 kg.

The gravitational field strength on Earth is  $10.0 \text{ N/kg}$ .

The gravitational field strength on a distant planet is  $4.0 \text{ N/kg}$ .

What is the weight of the object on Earth, and what is its weight on the distant planet?

	on Earth	on the distant planet
<b>A</b>	5.0 kg	12.5 kg
<b>B</b>	5.0 N	12.5 N
<b>C</b>	500 kg	200 kg
<b>D</b>	500 N	200 N

- 2 An astronaut in an orbiting spacecraft experiences a force due to gravity. This force is less than when she is on the Earth's surface.

Compared with being on the Earth's surface, how do her mass and her weight change when she goes into orbit?

	mass in orbit	weight in orbit
<b>A</b>	decreases	decreases
<b>B</b>	decreases	unchanged
<b>C</b>	unchanged	decreases
<b>D</b>	unchanged	unchanged

- 3 A car travels 100 km. The journey takes two hours. The highest speed of the car is  $80 \text{ km/h}$ , and the lowest speed is  $40 \text{ km/h}$ .

What is the average speed for the journey?

**A**  $40 \text{ km/h}$       **B**  $50 \text{ km/h}$       **C**  $60 \text{ km/h}$       **D**  $120 \text{ km/h}$

4 Weight is an example of which quantity?

- A acceleration
- B force
- C mass
- D pressure

5 The mass of an object is measured on Earth. The mass is 5.0 kg.

The object is taken to the Moon. The mass of the object is measured on the Moon.

What is the mass of the object on the Moon?

- A 0 kg
- B more than 0 kg, but less than 5.0 kg
- C 5.0 kg
- D more than 5.0 kg

6 Which statement about mass or weight is correct?

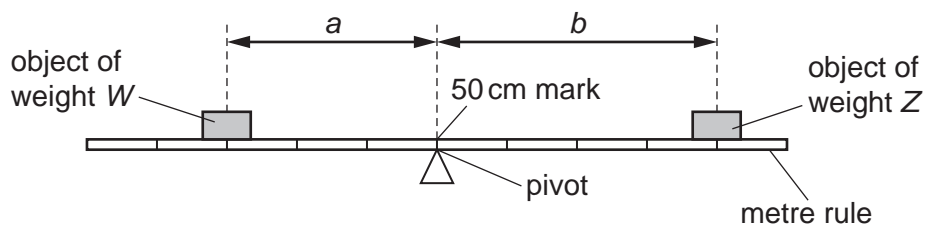
- A Mass is a force.
- B Mass is measured in newtons.
- C Weight is a force.
- D Weight is measured in kilograms.

7 What is the weight of an object?

- A the force of gravity on the object
- B the gravitational potential energy of the object
- C the internal energy of the object
- D the mass of the object



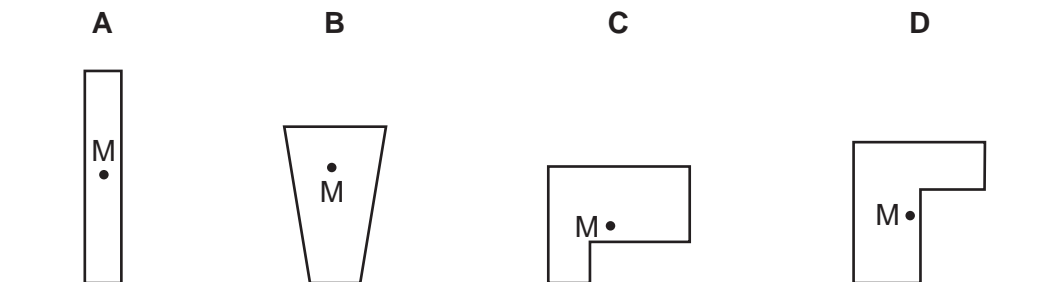
- 1 The diagram shows an object of weight  $W$  and an object of weight  $Z$  balanced on a uniform metre rule.



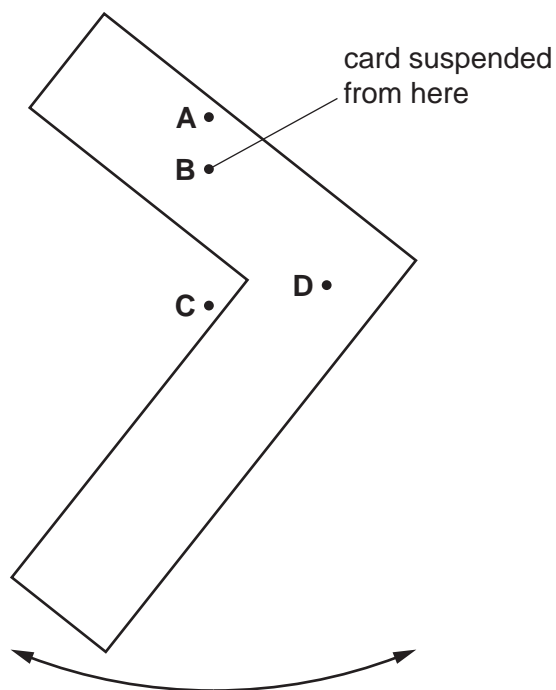
Which equation relating to  $W$ ,  $Z$ ,  $a$  and  $b$  is correct?

- A**  $\frac{W}{a} = \frac{Z}{b}$
- B**  $W \times Z = a \times b$
- C**  $W \times a = Z \times b$
- D**  $W \times (a + b) = Z$
- 2 The diagrams show four objects **A**, **B**, **C** and **D**. The centre of mass  $M$  of each object is marked on the diagrams.

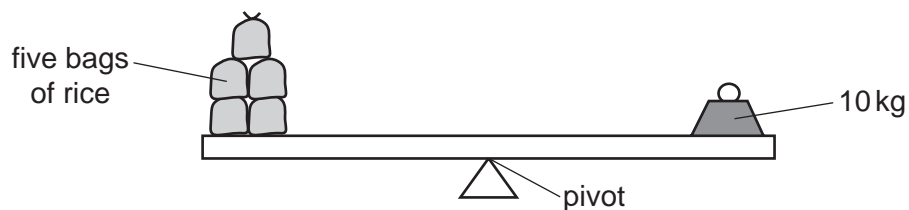
Which object is **not** in equilibrium?



- 3 The diagram shows an L-shaped piece of card suspended freely from a pin at **B**.  
When the card is pushed, it swings and then comes to a stop in the position shown.  
At which labelled point is the centre of mass of the card?



- 4 Five identical bags of rice are balanced on a uniform beam by an object of mass 10 kg.



Two more identical bags of rice are added to the other five. The average position of the bags on the beam does not change.

What mass now balances the bags?

- A** 3.5 kg      **B** 7.0 kg      **C** 12 kg      **D** 14 kg

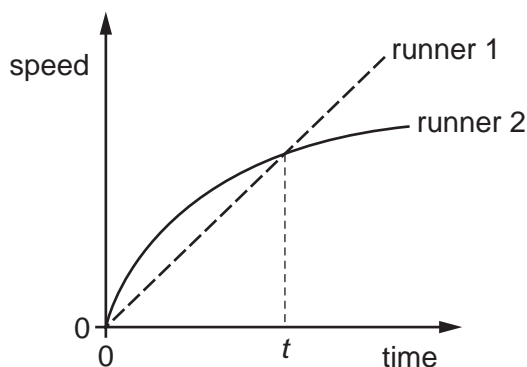
- 1 A train begins a journey from a station and travels 60 km in a time of 20 minutes.

What is the average speed of the train?

**A** 3.0 m/s      **B** 5.0 m/s      **C** 50 m/s      **D** 60 m/s

- 2 Two runners take part in a race.

The graph shows how the speed of each runner changes with time.

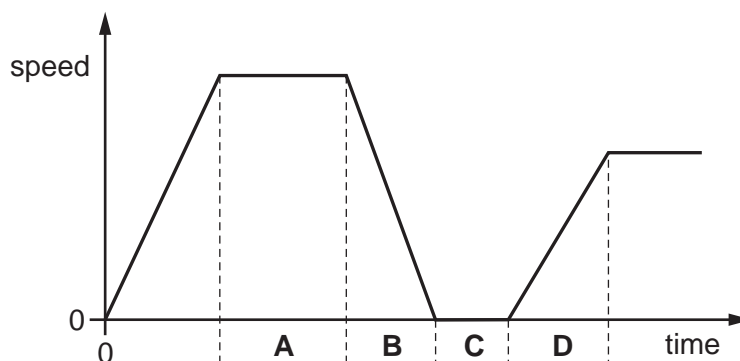


What does the graph show about the runners at time  $t$ ?

- A** Both runners are moving at the same speed.  
**B** Runner 1 has zero acceleration.  
**C** Runner 1 is overtaking runner 2.  
**D** Runner 2 is slowing down.

- 3 The graph shows how the speed of a van changes with time for part of its journey.

In which labelled section is the van decelerating?



- 4 A large stone is dropped from a bridge into a river. Air resistance can be ignored.

Which row describes the acceleration and the speed of the stone as it falls?

	acceleration of the stone	speed of the stone
<b>A</b>	constant	constant
<b>B</b>	constant	increasing
<b>C</b>	increasing	constant
<b>D</b>	increasing	increasing

- 5 A car travels along a straight road.

The speed-time graph for this journey is shown.

During which labelled part of the journey is the resultant force on the car zero?

