1 Which description is of a scalar quantity?

A It has a direction only.

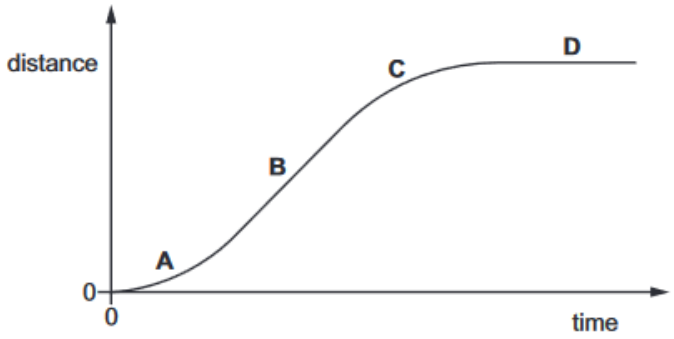
B It has direction and unit only.

C It has direction, magnitude and unit.

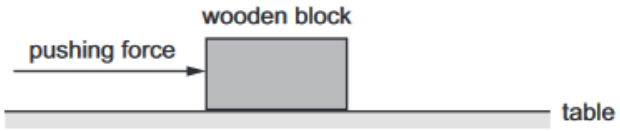
D It has magnitude and unit only.

2 The diagram shows a distance–time graph for a car travelling in a straight line.

In which region is the car decelerating?



3 A wooden block is pushed across a table at constant speed.



Which statement is correct?

A The frictional force increases as the block moves at constant speed.

B The frictional force is equal and opposite to the pushing force.

C The frictional force is greater than the pushing force.

D The frictional force is less than the pushing force.

4 A car begins to move. It speeds up until it reaches a constant speed.

What happens to the acceleration and what happens to the velocity of the car?

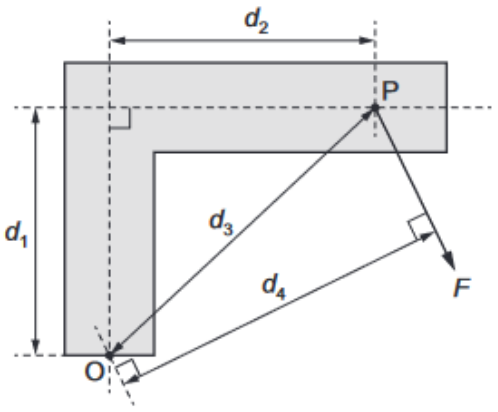
A Both the acceleration and the velocity change.

B Only the acceleration changes.

C Only the velocity changes.

D Neither the acceleration nor the velocity changes.

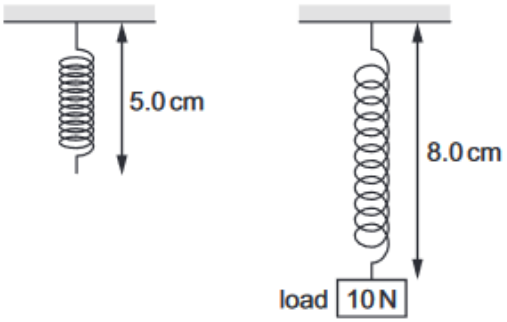
6 A force F causes a moment about point O on an L-shaped bar. The force F acts at point P.



What is the moment of F about O?

A Fd_1 **B** Fd_2 **C** Fd_3 **D** Fd_4

5 The diagram shows how the length of a spring changes when a load of 10 N is suspended from it.

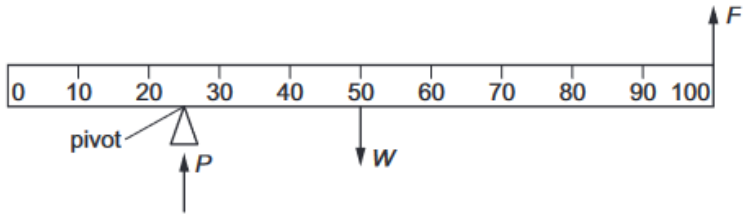


The 10 N load is replaced by a 20 N load.

What is the new length of the spring?

A 6.0 cm **B** 11 cm **C** 14 cm **D** 16 cm

7 A uniform metre rule of weight W is pivoted at the 25 cm mark and held horizontal by a force F applied upwards at the 100 cm mark. The rule is supported by a vertical force P acting at the pivot.

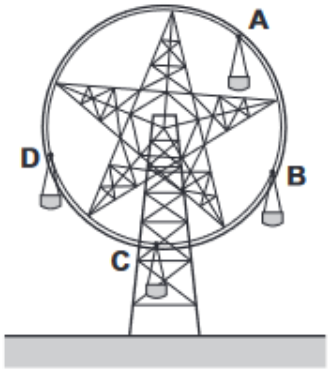


What is the magnitude of P?

A $\frac{1}{3}W$ **B** $\frac{1}{2}W$ **C** $\frac{2}{3}W$ **D** $\frac{4}{3}W$

8 The diagram shows a stationary fairground ride with four chairs of equal mass.

Which chair has the most gravitational potential energy?



9 Hydroelectric and tidal power stations generate electrical energy.

Do these use renewable sources of energy?

	hydroelectric	tidal
A	no	no
B	no	yes
C	yes	no
D	yes	yes

11 A small motor has an input power rating of 10 W and is switched on for 5.0 minutes.

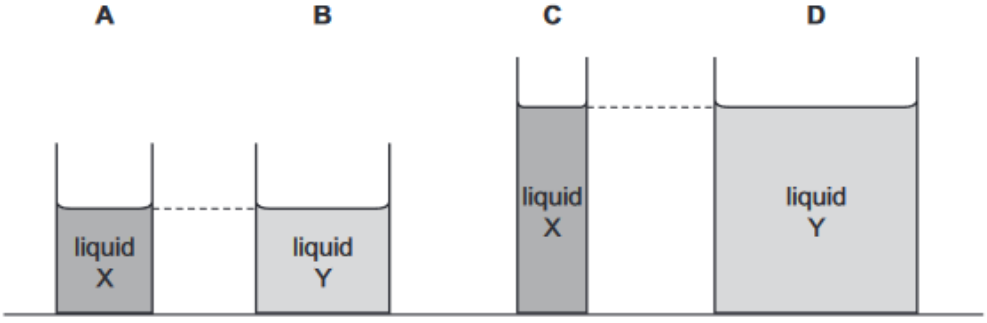
What is the electrical energy input to the motor in this time?

A 2.0 J **B** 50 J **C** 300 J **D** 3000 J

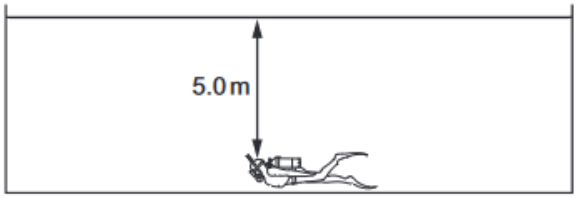
12 Two liquids, X and Y, are poured into beakers of different sizes.

Liquid X has a density of 1000 kg / m^3 and liquid Y has a density of 900 kg / m^3.

On the base of which beaker is the pressure greatest?



13 A swimmer is at the bottom of a pool. The density of the water in the pool is 1000 kg / m^3 and the gravitational field strength is 9.8 N / kg.



NOT TO SCALE

Which expression gives the pressure exerted on the swimmer due to the water?

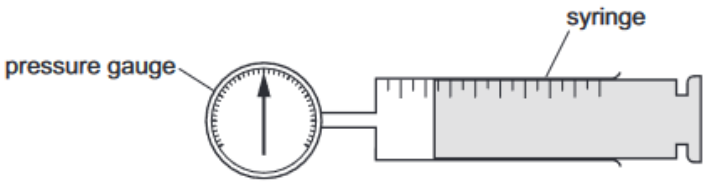
A $\frac{5.0 \times 1000}{9.8}$ Pa

B $5.0 \times 1000 \times 9.8$ Pa

C $\frac{1000}{5.0}$ Pa

D $\frac{1000 \times 9.8}{5.0}$ Pa

14 Some gas is trapped in a large syringe.



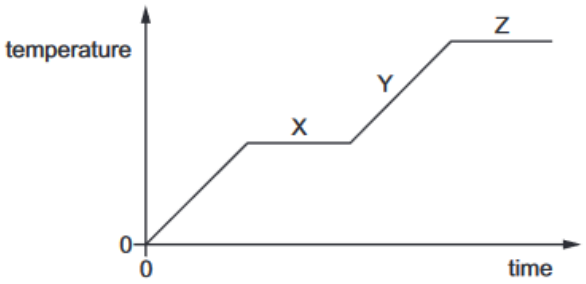
The atmospheric pressure is 100 kPa. The gas pressure is 200 kPa above atmospheric pressure.

The piston moves outwards and the volume of the trapped gas doubles. The temperature remains constant.

What is the new gas pressure?

A 100 kPa **B** 150 kPa **C** 200 kPa **D** 400 kPa

15 A graph of temperature against time is shown for a material being heated from its solid state.



Which row describes what is happening at X, Y and Z?

	X	Y	Z
A	boiling	solid becomes hotter	melting
B	liquid becomes hotter	boiling	gas becomes hotter
C	solid becomes hotter	melting	liquid becomes hotter
D	melting	liquid becomes hotter	boiling

16 A student on a camping expedition cools a sealed bottle of water which is at the same temperature as the surrounding air.

Which method cools the water at the greatest rate?

A Wrap the bottle in aluminium foil and place it in a shady place.

B Wrap the bottle in dry, white paper and put it in a sunny place.

C Wrap the bottle in foam and put it in a breeze.

D Wrap the bottle in wet paper and put it in a breeze.

17 A student suggests three factors that affect the rate of emission of thermal energy by radiation from a hot object. These are:

1 the surface temperature of the object

2 the surface area of the object

3 the surface colour of the object.

Which suggestions are correct?

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

18 A plane mirror on a vertical wall forms an image of an object placed in front of it.

Which characteristics describe the image?

A real and inverted

B real and upright

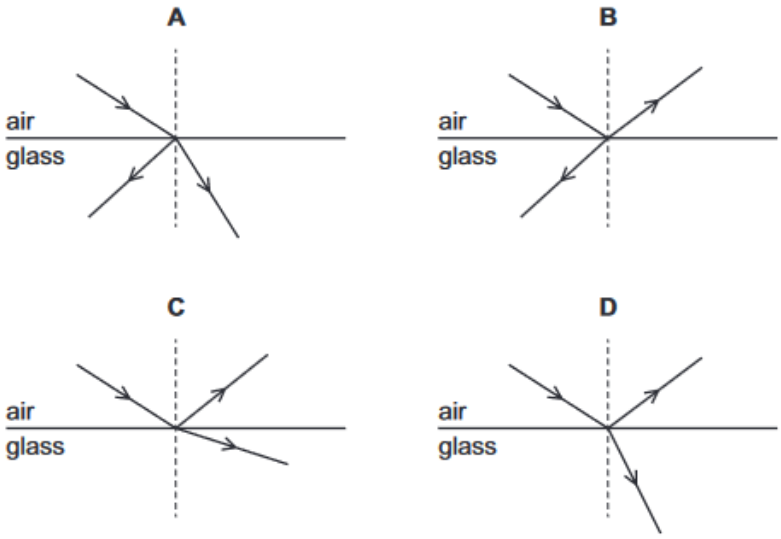
C virtual and inverted

D virtual and upright

19 The diagrams show light travelling in air incident on the surface of a glass block.

Some light is reflected and some light is refracted.

Which diagram shows the reflection and refraction of the light?



20 Which statement is correct?

A Total internal reflection only occurs when light travels from air into glass.

B The larger the refractive index of glass, the larger is the critical angle.

C When total internal reflection occurs, the angle of incidence is equal to the angle of reflection.

D When total internal reflection occurs, the angle of incidence is less than the critical angle.

22 Which range of sound frequencies includes only frequencies of sound that can be heard by a healthy human ear?

A 0.5–50 Hz **B** 5–500 Hz **C** 50–5000 Hz **D** 500–50 000 Hz