1)

(a) Define a *vector quantity*.

.....

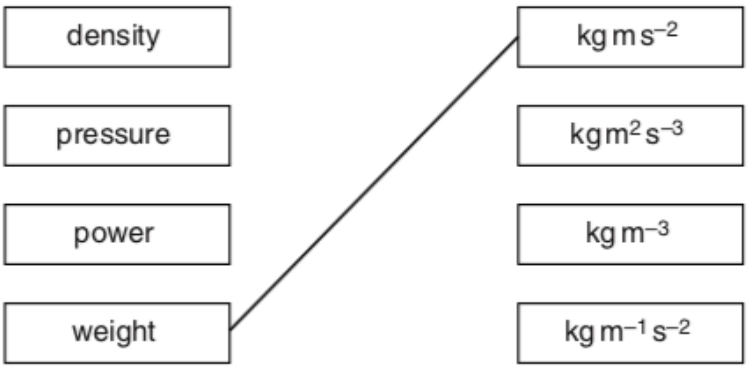
..... **[1]**

(b) Circle all the vector quantities in the list below.

acceleration speed time displacement weight **[1]**

2)

Draw a line from each quantity on the left-hand side to the correct unit on the right-hand side. One quantity (weight) has already been matched to its unit.



[2]

[Total: 2]

3)

(a) Complete the table of Fig. 1.1 by stating the value or name of each of the remaining three prefixes.

prefix	value
micro (μ)	10^{-6}
mega (M)	
	10^{-9}
tera (T)	

Fig. 1.1

[3]

(b) Circle all the scalar quantities in the list below.

density weight velocity volume acceleration

[1]

4)

(a) Draw a line from each unit on the left-hand side to the correct equivalent unit on the right-hand side.

joule (J)	$kg\ m\ s^{-2}$
watt (W)	N m
newton (N)	$J\ s^{-1}$

[2]

(b) This question is about estimating the pressure exerted by a person wearing shoes standing on a floor, see Fig. 1.1.

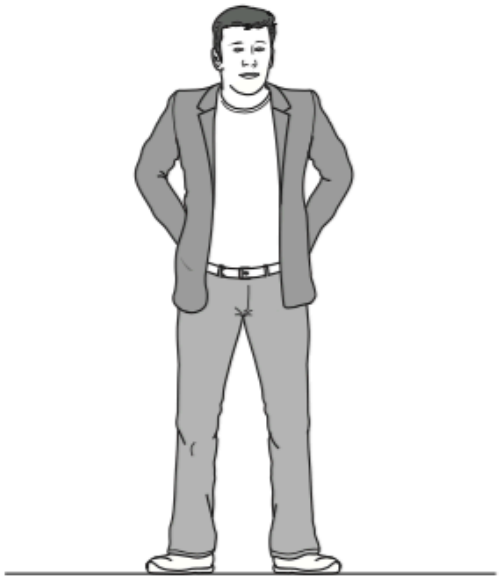


Fig. 1.1

(i) Estimate the weight in newtons of a person.

weight = ... N **[1]**

(ii) Estimate the total area of contact in square metres between the shoes of this person and the floor.

area = ... m^2 **[1]**

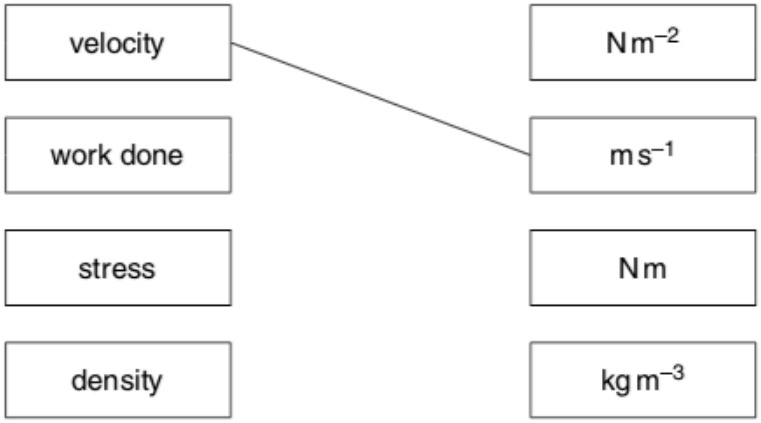
(iii) Hence estimate the pressure in pascals exerted by this person standing on the floor.

pressure = ... Pa **[1]**

[Total: 5]

5)

(a) Draw a straight line from each quantity on the left hand side to its correct unit on the right hand side; one has already been done for you.



[2]

(b) Fig. 1.1 shows a metal cube which rests on a table.

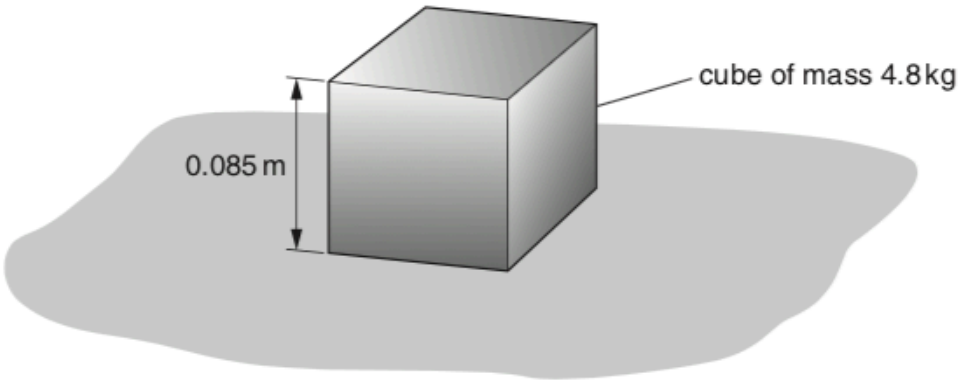


Fig. 1.1

The mass of the metal cube is 4.8 kg. Each side of the cube has length 0.085 m. The cube exerts pressure on the table.

(i) Complete the sentence below:

The force acting on the table is due to the ..... of the metal cube. **[1]**

(ii) Calculate the pressure exerted on the table by the metal cube.

pressure = ... Pa **[2]**

(iii) The metal cube shown is replaced by a second cube made of the same material but with each side of double the length of the original cube.

Complete the sentences below for the second cube when compared with the original cube.

The mass of the second cube is ..... times greater than the original cube.

The cross-sectional area of the base is ..... times greater than the original cube.

Hence, the pressure exerted by this cube is ..... times greater than the original cube.

[3]

[Total: 8]

6)

(a) The areas under the graphs below are physical quantities.

(i) Fig. 1.1 shows a force against extension graph for a rubber band.

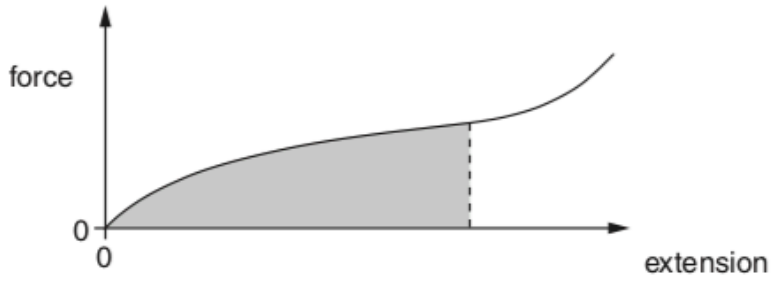


Fig. 1.1

State the quantity represented by the area under the force against extension graph.

..... **[1]**

(ii) Fig. 1.2 shows the velocity against time graph for an accelerating car.

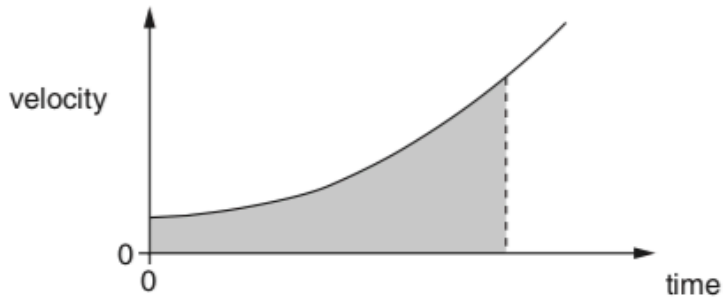


Fig. 1.2

State the quantity represented by the area under the velocity against time graph.

..... **[1]**

(b) State two quantities in physics that have the **same** unit of newton metre (Nm).

quantity 1 ..... **[1]**

quantity 2 ..... **[1]**

[Total: 4]

7)

(a) State **one** difference between a scalar quantity and a vector quantity.

.....

..... **[1]**

(b) Fig. 1.1 shows two sets of quantities listed as 'scalars' and 'vectors' by a student.

scalars	vectors
acceleration	displacement
pressure	energy
stress	power
time	velocity
volume	weight

Fig. 1.1

(i) State the one quantity that has been incorrectly listed as a scalar.

..... **[1]**

(ii) State two quantities that have been incorrectly listed as vectors.

1. .....

2. ..... **[1]**

(iii) State two quantities listed as scalars that have the same unit. Name this unit.

1. .....

2. .....

unit: ..... **[2]**

(c) Circle the correct value for the prefix tera (T) in the list below.

10^6 10^9 10^{12} 10^{15} **[1]**

(d) Rearrange the following prefixes in the order of smallest to largest.

μ c p k

..... **[1]**

[Total: 7]

8)

(a) State a similarity and a difference between *distance* and *displacement*.

(i) similarity: .....

..... **[1]**

(ii) difference: .....

..... **[1]**

(b) Fig. 1.1 shows two airports **A** and **C**.

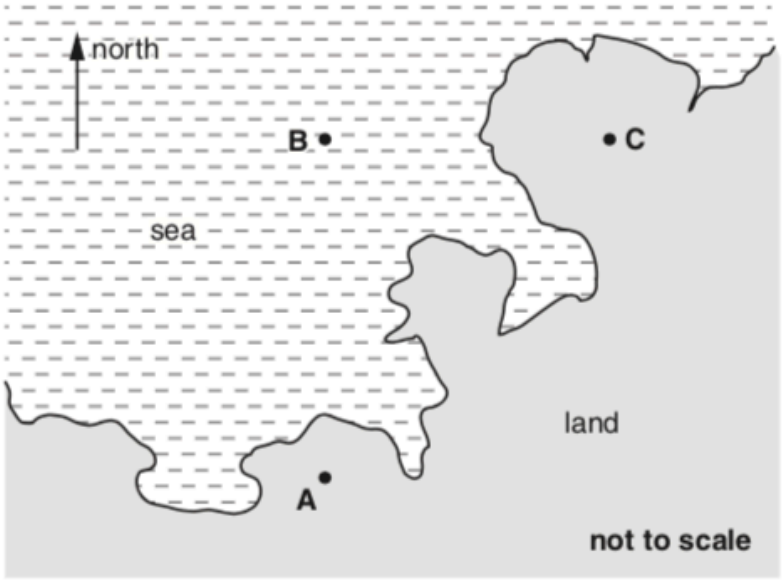


Fig. 1.1

An aircraft flies due north from **A** for a distance of 360 km (3.6×10^5 m) to point **B**.
Its average speed between **A** and **B** is 170 m s^{-1}. At **B** the aircraft is forced to change course and flies due east for a distance of 100 km to arrive at **C**.

(i) Calculate the time of the journey from **A** to **B**.

time = ... s **[1]**

(ii) Draw a labelled displacement vector triangle below. Use it to determine the magnitude of the displacement in km of the aircraft at **C** from **A**.

displacement = ... km **[3]**

[Total: 6]

9)

(a) A student writes four incorrect statements shown in the table below. The error in each statement is circled. Write the correct answer for the circled unit or number; one has already been done for you.

Incorrect statement	Correct unit or number
The weight of a person is about 700 **kg**.	N
The atmosphere exerts a pressure of about 1.0×10^5 **N m^2**.	
A force of 1 N may be written as 1 kg **m^{-1} s^{-1}**.	
1 GW is **10** times bigger than 1 MW.	

[2]

(b) Fig. 1.1 shows the apparatus used to determine the density of glass.

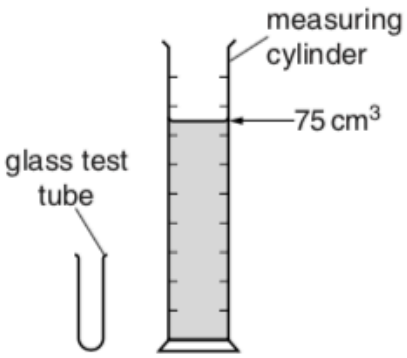


Fig. 1.1

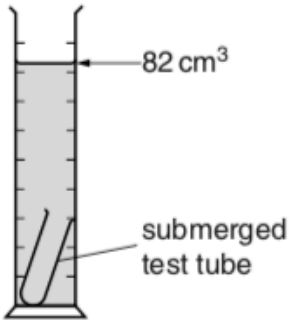


Fig. 1.2

The glass test tube has mass 1.6×10^{-2} kg. The measuring cylinder is partly filled with water. The test tube is gently pushed into the water until it is fully submerged as shown in Fig. 1.2. The level of the water inside the measuring cylinder increases from 75 cm^3 to 82 cm^3.

Calculate the density of the test tube glass in kg m^{-3}.

density = ... kg m^{-3} **[2]**

[Total: 4]

10)

In each of the following questions a description of a graph is given.

Insert the correct labels for the axes on the dotted lines in Fig. 1.1 to Fig. 1.4.

The first one has been completed for you.

The area under the graph shown in Fig. 1.1 is equal to the elastic potential energy of a spring.

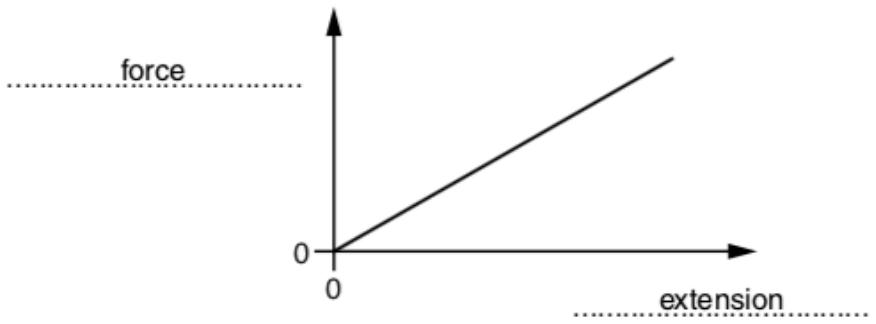


Fig. 1.1

(a) The area under the graph shown in Fig. 1.2 is equal to the displacement of a ball.

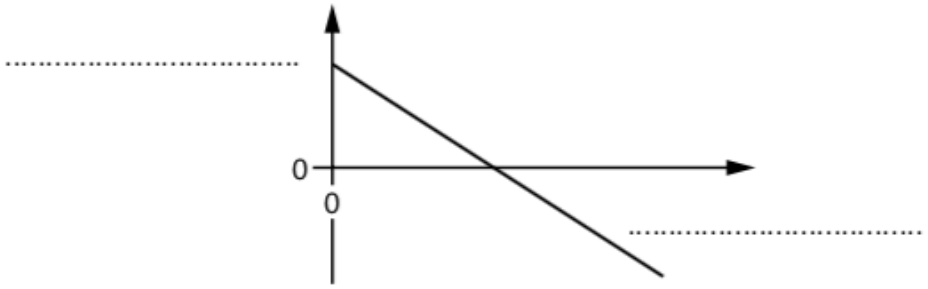


Fig. 1.2

[1]

(b) The gradient of the graph shown in Fig. 1.3 is the Young modulus of a material.

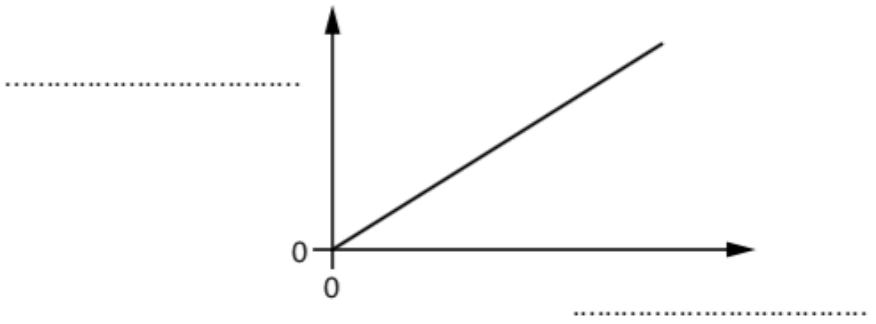


Fig. 1.3

[1]

(c) The gradient of the graph shown in Fig. 1.4 is the force constant of a wire.

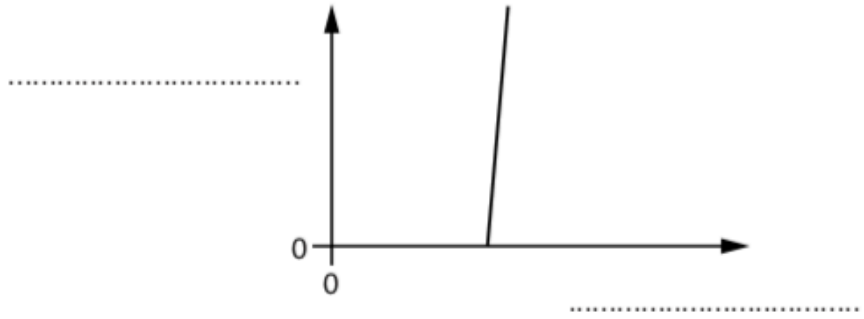


Fig. 1.4

[1]