

(b) The global positioning system (GPS) is used to locate accurately the position of cars on the Earth's surface.

(i) Name the electromagnetic waves used by GPS.

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

(ii) Explain how GPS determines the distance between the car and satellite.

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

(iii) Briefly describe how the distances from two or more satellites are used to locate the position of a car.

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

[Total: 12]

- 4 (a) Fig. 2.1 shows a mass attached to the end of a spring. The mass is pulled down and then released. The mass performs vertical simple harmonic motion.

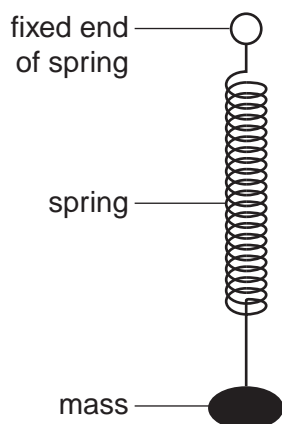


Fig. 2.1

- (i) Define *simple harmonic motion*.

.....

.....

.....

..... [2]

- (ii) Mark the following statements about the oscillating mass-spring system as *true* or *false*. [2]

statement	true/false
The period of oscillation is constant.	
The net force on the mass is equal to its weight.	
The acceleration of the mass is a maximum at the mid-point of the oscillations.	
The velocity of the mass is proportional to the displacement.	

(c) The radius of a ${}_{92}^{235}\text{U}$ nucleus is $8.8 \times 10^{-15}\text{m}$. The average mass of a nucleon is $1.7 \times 10^{-27}\text{kg}$.

(i) Estimate the average density of this nucleus.

density = kgm^{-3} [3]

(ii) State one assumption made in your calculation.

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

[Total: 14]

