

Name of the Student: _____

Max. Marks : 19 Marks

Time : 19 Minutes

Q1.

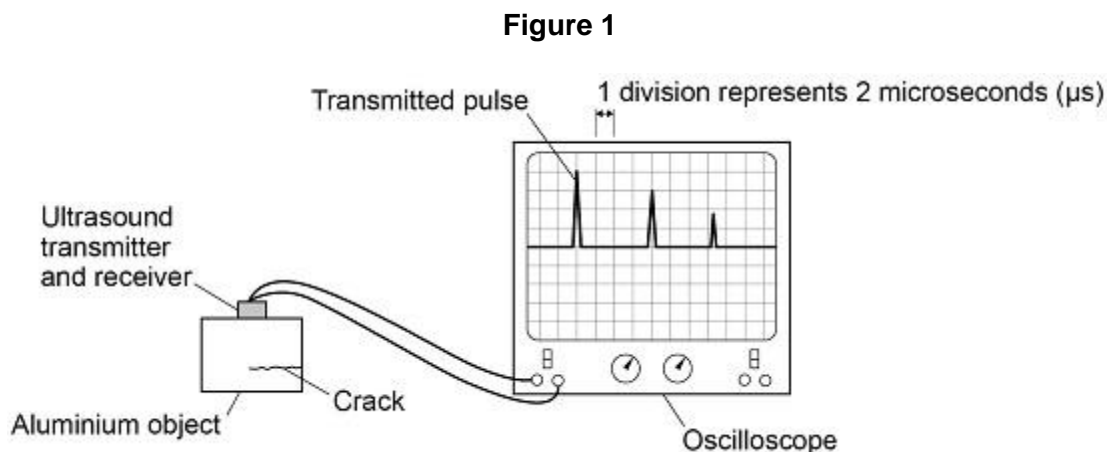
(a) The table below gives the frequencies in the hearing ranges of five different animals.

Animal	Frequencies of hearing range
Cat	55 Hz to 77 kHz
Chicken	125 Hz to 2 kHz
Dog	20 Hz to 30 kHz
Gerbil	56 Hz to 60 kHz
Horse	55 Hz to 33 kHz

Which **one** of the animals from the table would not be able to hear ultrasound?

(1)

Figure 1 shows ultrasound being used to detect a hidden crack in a solid aluminium object. The transmitted and reflected pulses of ultrasound are shown on the screen.



(b) Which of the following is the same as 2 microseconds?

Tick (✓) **one** box.

$2 \times 10^3 \text{ s}$

- $2 \times 10^{-3} \text{ s}$
- $2 \times 10^{-6} \text{ s}$
- $2 \times 10^{-9} \text{ s}$

(1)

(c) Ultrasound travels at 6300 m/s in aluminium.

Determine the depth of the crack below the top surface of the aluminium.

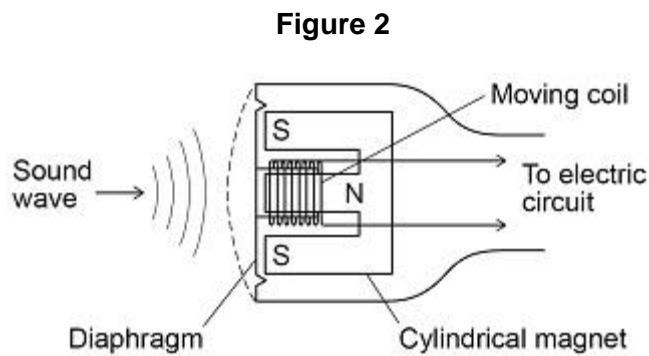
Use information from **Figure 1**.

Give your answer to two significant figures.

Depth = _____ m

(4)

Figure 2 shows the parts of a moving-coil microphone.



(d) What is the function of a microphone?

(1)

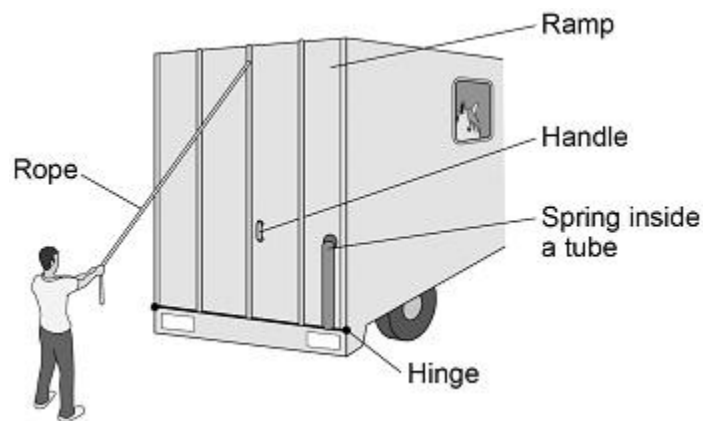
(e) Explain how a moving-coil microphone works.

(4)
(Total 11 marks)

Q2.

Figure 1 shows the back of a lorry. The lorry is used to carry horses.

Figure 1



The ramp is lowered by pulling on the rope or by pulling on the handle.

The hinge acts as a pivot.

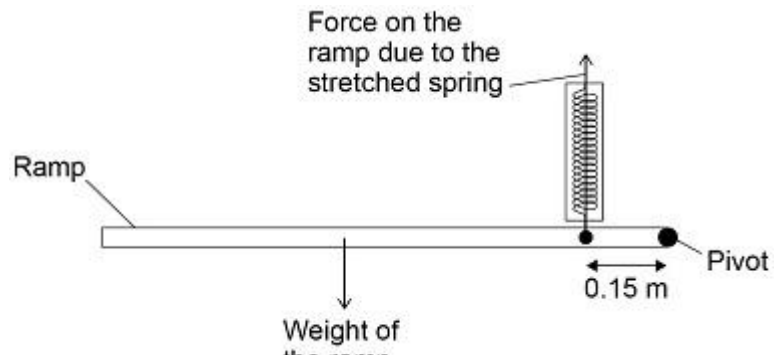
- (a) Explain why it is easier to lower the ramp by pulling on the rope rather than pulling on the handle.

(2)

When the ramp is lowered, work is done to stretch a spring on the side of the ramp. Elastic potential energy is stored in the stretched spring.

Figure 2 shows the ramp part way down in a balanced horizontal position.

Figure 2



(b) With the ramp horizontal:

the moment caused by the weight of the ramp = 924 Nm

the spring is stretched by 0.250 m

Calculate the elastic potential energy stored in the stretched spring.

Use data from **Figure 2**.

Elastic potential energy = _____ J

(6)

(Total 8 marks)