

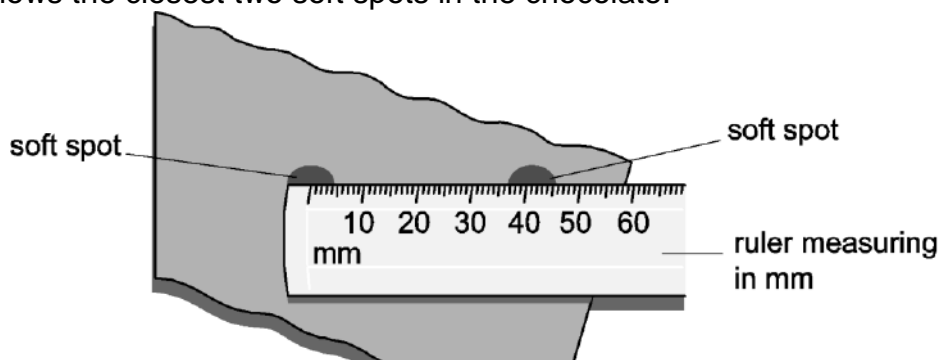
Answer **all** the questions.

1(a). The wavelength of microwaves can be measured using chocolate.

The turntable is taken out of the microwave and the chocolate is put in the microwave.

The chocolate is left on full power for 10 seconds.

The picture shows the closest two soft spots in the chocolate.



Here is the position of the soft spots on a wave diagram.



What is the wavelength of this microwave **in metres**?

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answerm

[2]

(b). The frequency of the microwave is 2 450 MHz.

Calculate the speed of this microwave.

Use the wavelength you measured from part (b).

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answerm/s

[3]

- (c). The speed of all electromagnetic waves in air is approximately 3×10^8 m/s.

How far apart should the spots have been?

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answerm

[3]

- (d). The investigation is repeated with bread dough.

Why is the wavelength measured of the microwave different than in chocolate?

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[1]

END OF QUESTION PAPER

Mark scheme

| Question | | Answer/Indicative content | Marks | Guidance |
|----------|---|---|----------|---|
| 1 | a | <p>41×2 / indication of the spots being half a wavelength apart (1)</p> <p>82 (mm) / 0.082 (m) (1)</p> | 2 | <p>ALLOW 0.08(0) / 0.081 / 0.083 / 0.084 (m) (2)</p> <p>ALLOW 80 / 81 / 83 / 84 (1)</p> |
| | b | <p>Convert frequency in MHz to Hz = 2 450 000 000 (1)</p> <p>Recall and apply wave speed = frequency \times wavelength = 2 450 000 000 \times 0.082 (1)</p> <p>Answer = 200 900 000 (m/s) (1)</p> | 3 | ALLOW ECF from part (b) |
| | c | <p>$3 \times 10^8 / 2\,450\,000\,000$ (1)</p> <p>0.12/2 (indication of spots being half a wavelength apart (1))</p> <p>0.06 m (1)</p> | 3 | |
| | d | The velocity of the wave through the bread will be different from the chocolate (1) | 1 | |
| | | Total | 9 | |