Do not write outside the box

0 3 X-rays and gamma rays are types of electromagnetic waves.

X-rays are used for medical imaging.

0 3 . 1 Which substance will **not** absorb X-rays?

[1 mark]

Tick (✓) **one** box.

Bone ☐ Metal ☐ Skin ☐

Table 1 shows the effect of exposure to different doses of radiation.

Table 1

Dose in mSv	Effect on the human body
100	slightly increased risk of cancer
1000	5% increased risk of cancer
5000	high risk of death

0 3 . 2 During one X-ray a person receives a dose of 0.100 mSv

Why is this dose unlikely to harm the person?

[1 mark]

0 3 . 3 A doctor takes an X-ray photograph of a person.

When taking the X-ray photograph, the doctor stands behind a screen.

Suggest why.

[1 mark]

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0 3 . 4 Which of the following are gamma rays used for?

[1 mark]

Tick (✓) **one** box.

Cooking food ☐

Energy-efficient lamps ☐

Sterilising medical equipment ☐

0 3 . 5 Why are gamma rays and X-rays harmful to humans?

[1 mark]

Tick (✓) **one** box.

They are ionising ☐

They are radioactive ☐

They travel at the speed of light ☐

0 3 . 6 Electromagnetic waves are also used in communications.

Describe how microwaves and visible light are used in communications.

[4 marks]

Microwaves _____

_____

_____

_____

Visible light _____

_____

_____

_____

9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	skin		1	AO1 6.6.2.4
03.2	dose is much lower than even slight increased risk of cancer dose	allow much less than 100 mSv	1	AO3 6.6.2.3
03.3	to reduce the dose of radiation (they are exposed to)	allow reduce the risk	1	AO3 6.6.2.3
03.4	sterilising medical equipment		1	AO1 6.6.2.3
03.5	they are ionising		1	AO1 6.6.2.3
03.6	**microwaves** data is transmitted / detected by (mobile) phone / WiFi / satellite **visible light** example of device / system description of how light is used	 allow signal / information for data allow bluetooth e.g. the internet transfers information via visible light in fibre optics e.g. image produced / seen on a TV / mobile phone	 1 1 1 1	AO1 6.6.2.4

		allow any sensible suggestion for visible light, but the two marks must be linked		
Total			**9**	