HSC Physics 9.6 Medical Physics Example Questions

Example Question 1

(2013 HSC Physics exam) Question 33

f) The data set gives information about a variety of radioactive isotopes, some of which can be used in diagnostic tools for medicine.

Radioactive isotope	*Radiation emitted*	*Half life*
Fluorine-18	β^+	109.77 minutes
Strontium-90	β	28.8 years
Carbon-14	β	5730 years
Technetium-99m	γ	6 hours
Cobalt-60	γ	5.27 years

Using the information in the table, justify which radioactive isotopes are suitable for use in diagnostic imaging techniques. (6 marks).

Example Question 2

(2012 HSC Physics exam) Question 32

c) Describe the properties that make a radioactive isotope useful for medical imaging. Include a specific example of a radioactive isotope in your answer.

(3 marks).

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Example Question 3

(2011 HSC Physics exam) Question 32

e) *An increased understanding of the properties of radioactive isotopes has been important in the development of medical technologies used to analyse bodily processes.*

Justify this statement. (6 marks).

Example Question 4

(2010 HSC Physics exam) Question 34

b) i) What is ONE advantage and ONE disadvantage of using a radioisotope with a 6 hour half-life for medical imaging? (2 marks)

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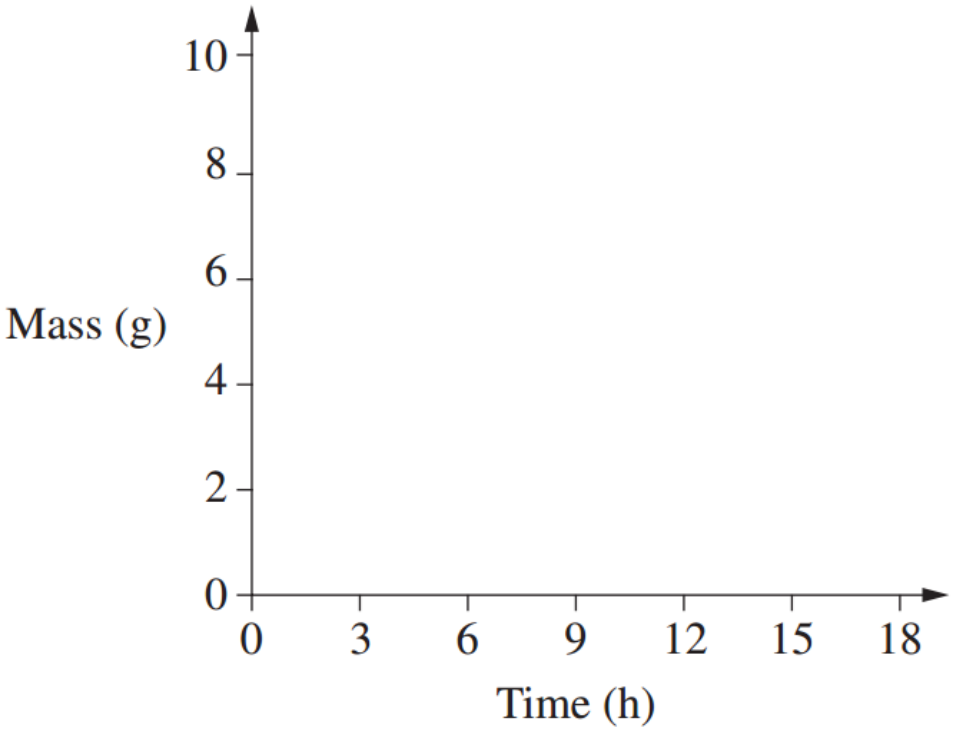
ii) The half-life of Tc-99m is 6 hours.

Copy the following set of axes into your writing booklet, and draw a graph to show how the mass of a 10g sample of Tc-99m changes over 18 hours.

(2 marks)



Example Question 5

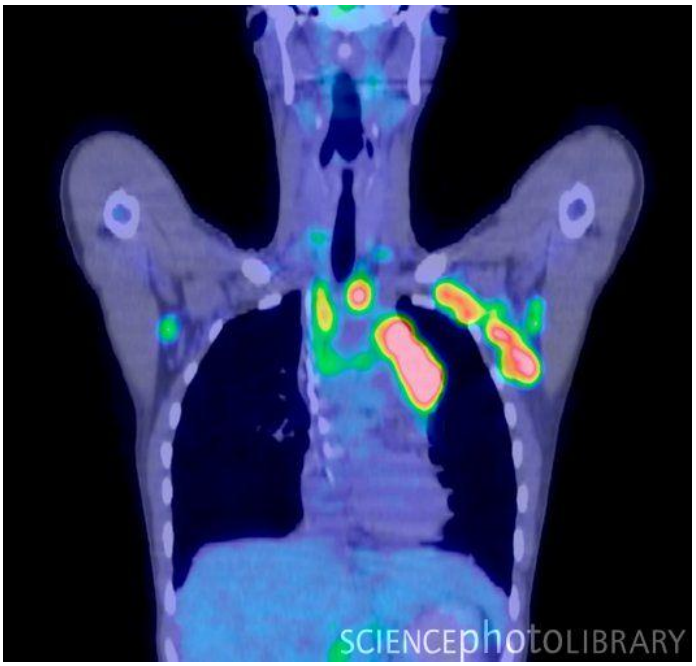
(2010 HSC Physics exam) Question 34

e) A cancer specialist has access to ultrasound, CAT and PET scanners. Which of these technologies is the most appropriate to detect a 3 mm brain tumour? Justify your choice. (6 marks).

Example Question 6

(2009 HSC Physics exam) Question 29 (Please note that the PET scan image has been changed)

c) ii) In this PET image a chemical tracer has been used to measure glucose metabolism in a patient.



Explain how this image has been produced, including the physics involved.

(3 marks).

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