**9:** The amount of an antibiotic, $x$ milligrams, in the bloodstream of a horse, $t$ hours after the antibiotic had been administered, is given by the formula

$$x = D\,e^{-0.2t}$$

where $D$ milligrams is the dose of the antibiotic given to the horse.

A dose of 30 mg of the antibiotic is given to the horse.

(a) Find the amount of the antibiotic in the bloodstream of the horse 8 hours after the dose is given. Give your answer in mg to 2 decimal places.

**(2)**

A second dose of 20 mg is given to the horse 8 hours after the first dose.

(b) Show that the amount of the antibiotic in the bloodstream of the horse, 2 hours after the second dose is given, is 17.5 mg to one decimal place.

**(1)**

No more doses of the antibiotic are given. At time $T$ hours after the second dose is given, the amount of the antibiotic in the bloodstream is 10 mg.

(c) Find the value of $T$, giving your answer to 2 decimal places.

(*Solutions relying entirely on calculator technology are not acceptable.*)

**(4)**

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**Question 9 continued**

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**(Total for Question 9 is 7 marks)**

**TOTAL FOR PAPER IS 75 MARKS**

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