

Question 5 continued

For your convenience Table 1 is repeated here.

λ	1.5	2	2.5	3	3.5	4
Power	0.59	0.75	0.86	r	0.96	0.97

Table 1

Figure 1 shows a graph of the power function for the scientist's test.

- (e) On the same axes draw the graph of the power function for the statistician's test. (2)

Given that it takes 20 minutes to collect and test a 20 ml sample and 15 minutes to collect and test a 10 ml sample

- (f) show that the expected time of the statistician's test is slower than the scientist's test

$$\text{for } \lambda e^{-\lambda} > \frac{1}{3} \quad (4)$$

- (g) By considering the times when $\lambda = 1$ and $\lambda = 2$ together with the power curves in part (e) suggest, giving a reason, which test you would use. (2)

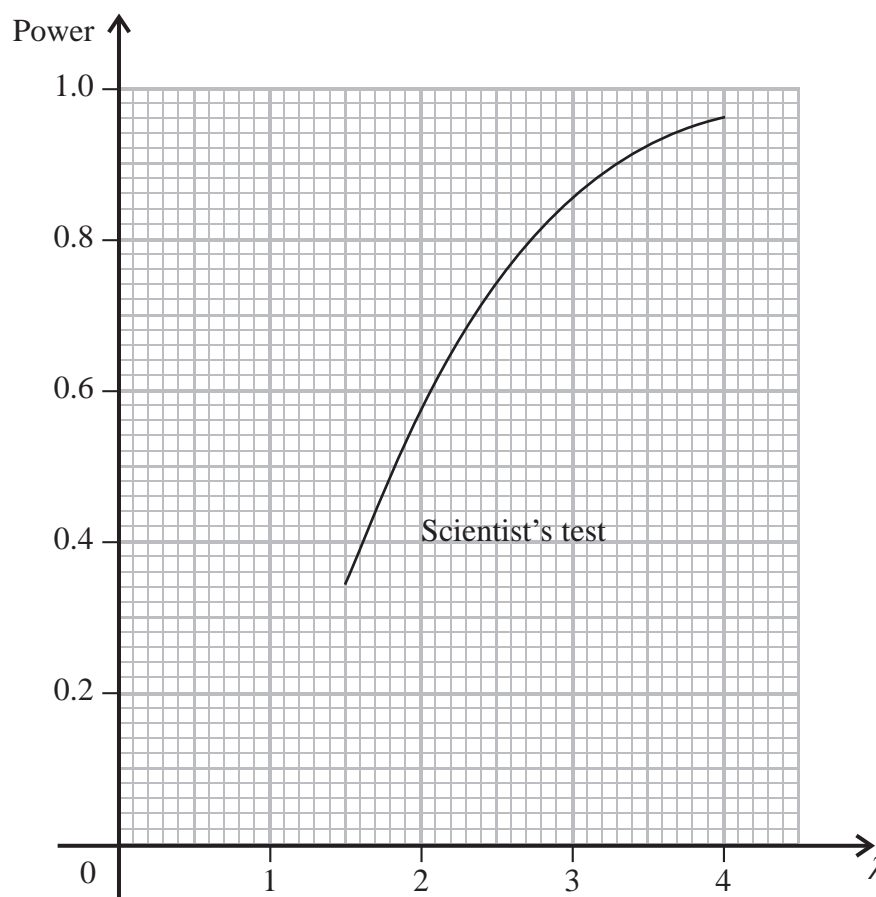


Figure 1



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6. The carbon content, measured in suitable units, of steel is normally distributed. Two independent random samples of steel were taken from a refining plant at different times and their carbon content recorded. The results are given below.

Sample A: 1.5 0.9 1.3 1.2

Sample B: 0.4 0.6 0.8 0.3 0.5 0.4

(a) Stating your hypotheses clearly, carry out a suitable test, at the 10% level of significance, to show that both samples can be assumed to have come from populations with a common variance σ^2 . (7)

(b) Showing your working clearly, find the 99% confidence interval for σ^2 based on both samples. (6)

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