The normal distribution

Gold

The weight, in grams, of the contents of tins of sardines is normally distributed with mean μ and standard deviation 1.5. The value of μ can change as required.

a Find the proportion of tins with contents weighing between 120.0 grams and 125.0 grams when $\mu = 122$.

b **(i)** State the value of μ that would maximise the proportion of tins with contents weighing between 120.0 grams and 125.0 grams.

(ii) Find the proportion of tins with contents weighing between 120 grams and125 grams where μ is equal to the value you specified in part **b(i)**.

c Find the value of μ such that 99% of the tins have contents weighing more than 120.0 grams. Give your answer to one decimal place.

Silver

A machine cuts wood with width, X cm, modelled as a normal distribution such that $X \sim \mathrm{N}(60, \sigma^2)$.

a Given that $P(X < 57) = 0.2266$, find the value of σ.

b Find the 90th percentile of the widths.

Bronze

The random variable $X \sim \mathrm{N}(40, 3^2)$. Write the following probabilities in terms of $\Phi(z)$ for some value z:

a $\mathrm{P}(X < 45)$

b $\mathrm{P}(X \geq 36)$