3.5) Finding μ and σ

Worked example	Your turn
$X \sim N(\mu, 4^2)$ Given that $P(X > 30) = 0.1$, find the value of μ.	$X \sim N(\mu, 3^2)$ Given that $P(X > 20) = 0.2$, find the value of μ. $\mu = 17.5\ (3sf)$

Worked example	Your turn
A machine makes metal sheets with width, X cm, modelled as a normal distribution such that $$X \sim N(70, \sigma^2)$$ (a) Given that $P(X < 64) = 0.02275$, find the value of σ. (b) Find the 80$^{\text{th}}$ percentile of the widths.	A machine makes metal sheets with width, X cm, modelled as a normal distribution such that $$X \sim N(50, \sigma^2)$$ (a) Given that $P(X < 46) = 0.2119$, find the value of σ. (b) Find the 90$^{\text{th}}$ percentile of the widths. a) $\sigma = 5$ b) $56.4 \ cm \ (1dp)$

Worked example	Your turn
A random variable $$X \sim N(\mu, \sigma^2)$$ Given that $P(X < 13) = 0.1964$ and $P(X > 51) = 0.01$, find the values of μ and σ	A random variable $$X \sim N(\mu, \sigma^2)$$ Given that $P(X < 15) = 0.1469$ and $P(X > 35) = 0.025$, find the values of μ and σ $\sigma = 6.64, \mu = 22.0 \, (3 \text{ sf})$

Worked example	Your turn
The time taken for a journey, X, has a normal distribution with mean 200 minutes and standard deviation d minutes. Given that 30% of the journeys take longer than 230 minutes, find the standard deviation.	The time taken for a journey, X, has a normal distribution with mean 100 minutes and standard deviation d minutes. Given that 15% of the journeys take longer than 115 minutes, find the standard deviation. $$d = 14.5$$

Worked example	Your turn
The time taken for a journey, X, is normally distributed with mean μ days and standard deviation σ days. 15% of journeys are shorter than 532 days. 2.5% are longer than 682 days. Find the values between which the middle 95% of journeys lie.	The time taken for a journey, X, is normally distributed with mean μ days and standard deviation σ days. 2.5% of journeys are shorter than 235 days. 15% are longer than 286 days. Find the values between which the middle 68% of journeys lie. 251 and 285 (3 sf)

Worked example	Your turn
The mass of an animal is found to be normally distributed with mean μ and standard deviation σ. 10% of the animals have a mass less than 9 kg. 5% of the animals have a mass greater than 60 kg. 8 animals are chosen at random. Find the probability that at least two of them have a mass greater than 50 kg.	The mass of an animal is found to be normally distributed with mean μ and standard deviation σ. 5% of the animals have a mass less than 18 kg. 10% of the animals have a mass greater than 30 kg. 9 animals are chosen at random. Find the probability that at least three of them have a mass greater than 25 kg. 0.8832 (4 dp)