1. The lengths of apple seeds from a tree at SkyTop Orchard are approximated by a normal distribution with a mean of 8 mm and a standard deviation of 0.5 mm.

   A seed from this apple tree is chosen at random.

   (a) Calculate the probability that the length of the seed is less than 7.5 mm. (2 marks)

   It is known that 25% of the seeds have a length greater than k mm. (2 marks)

   (b) Find the value of k.

   For a seed of length d mm chosen at random,

   $$P(8 - m < d < 8 + m) = 0.4$$

   (c) Find the value of m. (2 marks)

Mark scheme:

(a) $P(S < 7.5)$ *or* $X \sim N(8, 0.5^2)$ (M1)

= 0.159 (A1)

(b) $P(X < k) = 0.75$ *or* $P(X > k) = 0.25$ (M1)

= 8.34 (A1)

(c) $P(8 - m < 8.337 < 8 + m) = 0.4$

$P(m < -0.337) = 0.30$ *or* $P(m > 0.337) = 0.70$ (M1)

$m = 0.262$ (A1)