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Chapter 7:

Normal

Distribution

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3. Hei and Tang are designing some pieces of art. They collected a large number of sticks. The random variable L represents the length of a stick in centimetres and has a normal distribution with mean μ and standard deviation σ .

They sorted the sticks into lengths and painted them.

They found that 60% of the sticks were longer than 45 cm and these were painted red, whilst 15% of the sticks were shorter than 35 cm and these were painted blue. The remaining sticks were painted yellow.

- (a) Show that μ and σ satisfy

$$45 + 0.2533\sigma = \mu \tag{2}$$

- (b) Find a second equation in μ and σ . (2)

- (c) Hence find the value of μ and the value of σ . (3)

- (d) Find
- (i) $P(L > 35 | L < 45)$
 - (ii) $P(L < 45 | L > 35)$
- (3)

Hei created her piece of art using a random selection of blue and yellow sticks.

Tang created his piece of art using a random selection of red and yellow sticks.

Hei and Tang each used the same number of sticks to create their piece of art.

George is viewing Hei's and Tang's pieces of art. He finds a yellow stick on the floor that has fallen from one of these pieces.

- (e) With reference to your answers to part (d), state, giving a reason, whether the stick is more likely to have fallen from Hei's or Tang's piece of art. (2)

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