3 In a certain town, the time, X hours, for which people watch television in a week has a normal distribution with mean 15.8 hours and standard deviation 4.2 hours.

(a) Find the probability that a randomly chosen person from this town watches television for less than 21 hours in a week. [2]

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(b) Find the value of k such that $P(X < k) = 0.75$. [3]

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5 Farmer Jones grows apples. The weights, in grams, of the apples grown this year are normally distributed with mean 170 and standard deviation 25. Apples that weigh between 142 grams and 205 grams are sold to a supermarket.

(a) Find the probability that a randomly chosen apple grown by Farmer Jones this year is sold to the supermarket. [4]

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Farmer Jones sells the apples to the supermarket at \$0.24 each. He sells apples that weigh more than 205 grams to a local shop at \$0.30 each. He does not sell apples that weigh less than 142 grams.

The total number of apples grown by Farmer Jones this year is 20000.

(b) Calculate an estimate for his total income from this year's apples. [3]

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Farmer Tan also grows apples. The weights, in grams, of the apples grown this year follow the distribution N(182, 20^2). 72% of these apples have a weight more than w grams.

(c) Find the value of w. [3]

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7 The times taken by Obi to walk to work each morning are normally distributed with mean 14.8 minutes and standard deviation 1.5 minutes.

(a) Find the probability that, on a randomly chosen day, Obi takes more than 15.6 minutes to walk to work. [3]

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(b) On 90% of days, Obi takes more than t minutes to walk to work.

Find the value of t. [3]

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Obi walks to work 5 days a week for 45 weeks in a year.

(c) On how many days in a year would you expect Obi to take within one minute of the mean time to walk to work? [4]

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2 The weights of large bags of pasta produced by a company are normally distributed with mean 1.5 kg and standard deviation 0.05 kg.

(a) Find the probability that a randomly chosen large bag of pasta weighs between 1.42 kg and 1.52 kg. [3]

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The weights of small bags of pasta produced by the company are normally distributed with mean 0.75 kg and standard deviation σ kg. It is found that 68% of these small bags have weight less than 0.9 kg.

(b) Find the value of σ. [3]

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7 In the region of Arka, the total number of households in the three villages Reeta, Shan and Teber is 800. Each of the households was asked about the quality of their broadband service. Their responses are summarised in the following table.

		Quality of broadband service		
		Excellent	Good	Poor
Village	Reeta	75	118	32
	Shan	223	177	40
	Teber	12	60	63

(a) **(i)** Find the probability that a randomly chosen household is in Shan and has poor broadband service. [1]

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(ii) Find the probability that a randomly chosen household has good broadband service given that the household is in Shan. [2]

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In the whole of Arka there are a large number of households. A survey showed that 35% of households in Arka have no broadband service.

(b) **(i)** 10 households in Arka are chosen at random.

Find the probability that fewer than 3 of these households have no broadband service. [3]

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(ii) 120 households in Arka are chosen at random.

Use an approximation to find the probability that more than 32 of these households have no broadband service. [5]

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