

# The normal distribution

## Question Paper 6

<b>Level</b>	International A Level
<b>Subject</b>	Maths
<b>Exam Board</b>	CIE
<b>Topic</b>	The normal distribution
<b>Sub Topic</b>	
<b>Booklet</b>	Question Paper 6

**Time Allowed:** 56 minutes

**Score:** / 46

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

- 1 The weights, in grams, of onions in a supermarket have a normal distribution with mean  $\mu$  and standard deviation 22. The probability that a randomly chosen onion weighs more than 195 grams is 0.128. Find the value of  $\mu$ . [3]
- 2 The heights of books in a library, in cm, have a normal distribution with mean 21.7 and standard deviation 6.5. A book with a height of more than 29 cm is classified as 'large'.
- (i) Find the probability that, of 8 books chosen at random, fewer than 2 books are classified as large. [6]
- (ii)  $n$  books are chosen at random. The probability of there being at least 1 large book is more than 0.98. Find the least possible value of  $n$ . [3]
- 3 The petrol consumption of a certain type of car has a normal distribution with mean 24 kilometres per litre and standard deviation 4.7 kilometres per litre. Find the probability that the petrol consumption of a randomly chosen car of this type is between 21.6 kilometres per litre and 28.7 kilometres per litre. [4]
- 4 Lengths of a certain type of white radish are normally distributed with mean  $\mu$  cm and standard deviation  $\sigma$  cm. 4% of these radishes are longer than 12 cm and 32% are longer than 9 cm. Find  $\mu$  and  $\sigma$ . [5]

- 5 The time Rafa spends on his homework each day in term-time has a normal distribution with mean 1.9 hours and standard deviation  $\sigma$  hours. On 80% of these days he spends more than 1.35 hours on his homework.
- (i) Find the value of  $\sigma$ . [3]
  - (ii) Find the probability that, on a randomly chosen day in term-time, Rafa spends less than 2 hours on his homework. [2]
  - (iii) A random sample of 200 days in term-time is taken. Use an approximation to find the probability that the number of days on which Rafa spends more than 1.35 hours on his homework is between 163 and 173 inclusive. [6]
- 6 There is a probability of  $\frac{1}{7}$  that Wenjie goes out with her friends on any particular day. 252 days are chosen at random.
- (i) Use a normal approximation to find the probability that the number of days on which Wenjie goes out with her friends is less than 30 or more than 44. [5]
  - (ii) Give a reason why the use of a normal approximation is justified. [1]
- 7 When Moses makes a phone call, the amount of time that the call takes has a normal distribution with mean 6.5 minutes and standard deviation 1.76 minutes.
- (i) 90% of Moses's phone calls take longer than  $t$  minutes. Find the value of  $t$ . [3]
  - (ii) Find the probability that, in a random sample of 9 phone calls made by Moses, more than 7 take a time which is within 1 standard deviation of the mean. [5]