The normal distribution
Question Paper 5

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	The normal distribution
Sub Topic	
Booklet	Question Paper 5

Time Allowed: **54 minutes**

Score: **/ 45**

Percentage: **/100**

Grade Boundaries:

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

1   In tests on a new type of light bulb it was found that the time they lasted followed a normal distribution with standard deviation 40.6 hours. 10% lasted longer than 5130 hours.

   (i) Find the mean lifetime, giving your answer to the nearest hour.   [3]

   (ii) Find the probability that a light bulb fails to last for 5000 hours.   [3]

   (iii) A hospital buys 600 of these light bulbs. Using a suitable approximation, fin the probability that fewer than 65 light bulbs will last longer than 5130 hours.   [4]

2   The length of Paulo's lunch break follows a normal distribution with mean μ minutes and standard deviation 5 minutes. On one day in four, on average, his lunch break lasts for more than 52 minutes.

   (i) Find the value of μ.   [3]

   (ii) Find the probability that Paulo's lunch break lasts for between 40 and 46 minutes on every one of the next four days.   [4]

3   In a normal distribution, 69% of the distribution is less than 28 and 90% is less than 35. Find the mean and standard deviation of the distribution.   [6]

4   The distance in metres that a ball can be thrown by pupils at a particular school follows a normal distribution with mean 35.0 m and standard deviation 11.6 m.

   (i) Find the probability that a randomly chosen pupil can throw a ball between 30 and 40 m.   [3]

 (ii) The school gives a certificate to the 10% of pupils who throw further than a certain dista   Find the least distance that must be thrown to qualify for a certificate. [3]

5   The lengths, in metres, of cars in a city are normally distributed with mean μ and standard deviation 0.714. The probability that a randomly chosen car has a length more than 3.2 metres and less than

   μ metres is 0.475. Find μ.   [4]

6   **(a)** Once a week Zak goes for a run. The time he takes, in minutes, has a normal distribution with mean 35.2 and standard deviation 4.7.

   (i) Find the expected number of days during a year (52 weeks) for which Zak takes less than 30 minutes for his run.   [4]

   (ii) The probability that Zak's time is between 35.2 minutes and t minutes, where $t > 35.2$, is 0.148. Find the value of t.   [3]

   (b) The random variable X has the distribution $N(\mu, \sigma^2)$. It is given that $P(X < 7) = 0.2119$ and $P(X < 10) = 0.6700$. Find the values of μ and σ.   [5]