

# The normal distribution

## Question Paper 10

<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 10

**Time Allowed:** 45 minutes

**Score:** / 37

**Percentage:** /100

**Grade Boundaries:**

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

- 1 (a) The random variable  $X$  is normally distributed. The mean is twice the standard deviation. It is given that  $P(X > 5.2) = 0.9$ . Find the standard deviation. [4]
- (b) A normal distribution has mean  $\mu$  and standard deviation  $\sigma$ . If 800 observations are taken from this distribution, how many would you expect to be between  $\mu - \sigma$  and  $\mu + \sigma$ ? [3]
- 2 The lengths of fish of a certain type have a normal distribution with mean 38 cm. It is found that 5% of the fish are longer than 50 cm.
- (i) Find the standard deviation. [3]
- (ii) When fish are chosen for sale, those shorter than 30 cm are rejected. Find the proportion of fish rejected. [3]
- (iii) 9 fish are chosen at random. Find the probability that at least one of them is longer than 50 cm. [2]
- 3 Tyre pressures on a certain type of car independently follow a normal distribution with mean 1.9 bars and standard deviation 0.15 bars.
- (i) Find the probability that all four tyres on a car of this type have pressures between 1.82 bars and 1.92 bars. [5]
- (ii) Safety regulations state that the pressures must be between  $1.9 - b$  bars and  $1.9 + b$  bars. It is known that 80% of tyres are within these safety limits. Find the safety limits. [3]
- 4 Melons are sold in three sizes: small, medium and large. The weights follow a normal distribution with mean 450 grams and standard deviation 120 grams. Melons weighing less than 350 grams are classified as small.
- (i) Find the proportion of melons which are classified as small. [3]
- (ii) The rest of the melons are divided in equal proportions between medium and large. Find the weight above which melons are classified as large. [5]

- 5**
- (i) The height of sunflowers follows a normal distribution with mean 112 cm and standard deviation 17.2 cm. Find the probability that the height of a randomly chosen sunflower is greater than 120 cm. [3]
  - (ii) When a new fertiliser is used, the height of sunflowers follows a normal distribution with mean 115 cm. Given that 80% of the heights are now greater than 103 cm, find the standard deviation. [3]