Finding probabilities from the normal distribution

Question Paper 1

Level	A LEVEL
Exam Board	Edexcel
Subject	Mathematics
Module	Mechanics and Statistics
Topic	Normal distribution
Sub-Topic	Finding probabilities from the normal distribution
Booklet	Question Paper 1

Time Allowed: **36 minutes**

Score: **/31**

Percentage: **/100**

Grade Boundaries:

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

1 The random variable X is normally distributed with mean 177.0 and standard deviation 6.4.

(a) Find P($166 < X < 185$). **(4)**

It is suggested that X might be a suitable random variable to model the height, in cm, of adult males.

(b) Give two reasons why this is a sensible suggestion. **(2)**

(Total 6 marks)

2 The random variable X is normally distributed with mean μ and variance σ^2.

(a) Write down 3 properties of the distribution of X.

(3)

Given that $\mu = 27$ and $\sigma = 10$

(*b*) find $P(26 < X < 28)$.

(4)

(Total 7 marks)

3 (a) Give an example of a random variable that could be modelled by

(i) a normal distribution,

(ii) a discrete uniform distribution. **(2)**

(Total 2 marks)

4 The heights of a group of athletes are modelled by a normal distribution with mean 180 cm and a standard deviation 5.2 cm. The weights of this group of athletes are modelled by a normal distribution with mean 85 kg and standard deviation 7.1 kg.
Find the probability that a randomly chosen athlete

(a) is taller than 188 cm, **(3)**

(*b*) weighs less than 97 kg. **(2)**

(*c*) Assuming that for these athletes height and weight are independent, find the probability that a randomly chosen athlete is taller than 188 cm and weighs more than 97 kg. **(3)**

(*d*) Comment on the assumption that height and weight are independent. **(1)**

(Total 9 marks)

5 The measure of intelligence, IQ, of a group of students is assumed to be Normally distributed with mean 100 and standard deviation 15. **(4)**

Find the probability that a student selected at random has an IQ less than 91.

(Total 4 marks)

6 The weight, X grams, of soup put in a tin by machine A is normally distributed with a mean of 160 g and a standard deviation of 5 g.
A tin is selected at random.

Find the probability that this tin contains more than 168 g. **(3)**

(Total 3 marks)