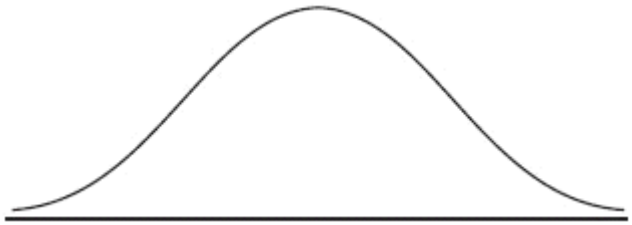
1. The weights of a group of children are normally distributed with a mean of 22.5 kg and a standard deviation of 2.2 kg.

(a) Write down the probability that a child selected at random has a weight more than 25.8 kg.

(b) Of the group 95% weigh less than k kilograms. Find the value of k.

(c) The diagram below shows a normal curve.



On the diagram, shade the region that represents the following information:

87% of the children weigh less than 25 kg

(Total 6 marks)

2. The heights of a group of students are normally distributed with a mean of 160 cm and a standard deviation of 20 cm.

(a) A student is chosen at random. Find the probability that the student's height is greater than 180 cm.

(b) In this group of students, 11.9% have heights less than d cm. Find the value of d.

(Total 6 marks)

3. A random variable X is distributed normally with mean 450 and standard deviation 20.

(a) Find $P(X \leq 475)$.

(2)

(b) Given that $P(X > a) = 0.27$, find a.

(4)

(Total 6 marks)

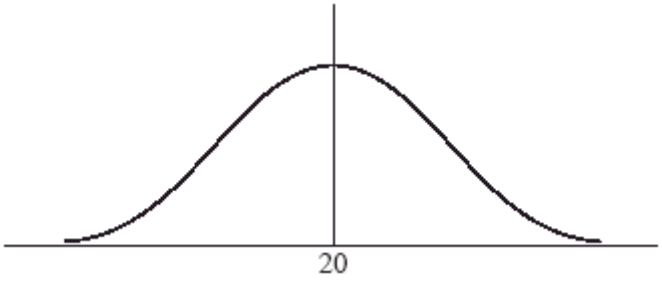
4. A random variable X is distributed normally with a mean of 20 and variance 9.

(a) Find $P(X \leq 24.5)$.

(3)

(b) Let $P(X \leq k) = 0.85$.

(i) Represent this information on the following diagram.



(ii) Find the value of k.

(5)
(Total 8 marks)

5. Let X be normally distributed with mean 100 cm and standard deviation 5 cm.

(a) On the diagram below, shade the region representing $P(X > 105)$.

(2)

(b) Given that $P(X < d) = P(X > 105)$, find the value of d.

(2)

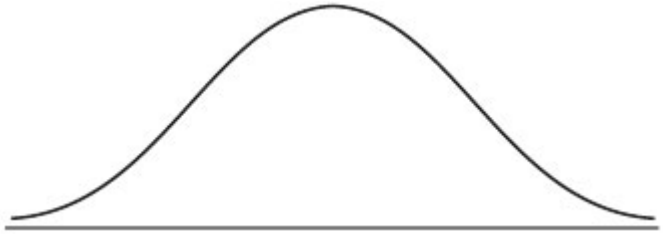
(c) Given that $P(X > 105) = 0.16$ (correct to two significant figures), find $P(d < X < 105)$.

(2)
(Total 6 marks)

6. The heights of certain plants are normally distributed. The plants are classified into three categories.

The shortest 12.92% are in category A.
The tallest 10.38% are in category C.
All the other plants are in category B with heights between r cm and t cm.

(a) Complete the following diagram to represent this information.



(2)

(b) Given that the mean height is 6.84 cm and the standard deviation 0.25 cm, find the value of r and of t.

(5)
(Total 7 marks)

7. Residents of a small town have savings which are normally distributed with a mean of \$3000 and a standard deviation of \$500.

(i) What percentage of townspeople have savings greater than \$3200?

(ii) Two townspeople are chosen at random. What is the probability that **both** of them have savings between \$2300 and \$3300?

(iii) The percentage of townspeople with savings less than d dollars is 74.22%.
Find the value of d.

(Total 8 marks)

8. The heights, H, of the people in a certain town are normally distributed with mean 170 cm and standard deviation 20 cm.

(a) A person is selected at random. Find the probability that his height is less than 185 cm.

(3)

(b) Given that P ($H > d$) = 0.6808, find the value of d.

(3)
(Total 6 marks)

9. A company manufactures television sets. They claim that the lifetime of a set is normally distributed with a mean of 80 months and standard deviation of 8 months.

(a) What proportion of television sets break down in less than 72 months?

(2)

(b) (i) Calculate the proportion of sets which have a lifetime between 72 months and 90 months.

(ii) Illustrate this proportion by appropriate shading in a sketch of a normal distribution curve.

(5)

(c) If a set breaks down in less than x months, the company replace it free of charge. They replace 4% of the sets. Find the value of x.

(3)

(Total 10 marks)