Question 12 **(19 marks)**

The manager of the mail distribution centre in an organisation estimates that the weight, x (kg), of parcels that are posted is normally distributed, with mean 3 kg and standard deviation 1 kg.

(a) What percentage of parcels weigh more than 3.7 kg? (2 marks)

(b) Twenty parcels are received for posting. What is the probability that at least half of them weigh more than 3.7 kg? (3 marks)

The cost of postage, (\$) y, depends on the weight of a parcel as follows:

- a cost of \$5 for parcels 1 kg or less
- an additional variable cost of \$1.50 for every kilogram or part thereof above 1 kg to a maximum of 4 kg
- a cost of \$12 for parcels above 4 kg.

(c) Complete the probability distribution table for Y. (4 marks)

x	≤ 1	$1 < x \leq 2$	$2 < x \leq 3$	$3 < x \leq 4$	$x > 4$
y	\$5				
$P(Y = y)$					

(d) Calculate the mean cost of postage per parcel. (2 marks)

(e) Calculate the standard deviation of the cost of postage per parcel. (3 marks)

(f) If the cost of postage is increased by 20% and a surcharge of $1 is added for all parcels, what will be the mean and standard deviation of the new cost? (3 marks)

(g) Show one reason why the given normal distribution is not a good model for the weight of the parcels. (2 marks)