Question 2

(a) A random variable X follows a normal distribution with mean 60 and standard deviation 5.
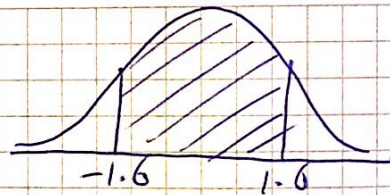
(i) Find $P(X \leq 68)$.

$$Z = \frac{x - \mu}{\sigma} = \frac{68 - 60}{5} = 1.6$$

$$P(Z \leq 1.6) = \boxed{0.9452}$$

(ii) Find $P(52 \leq X \leq 68)$.

$$Z = \frac{52 - 60}{5} = -1.6$$

$$P(-1.6 \leq Z \leq 1.6)$$

$$= 0.9452 - (1 - 0.9452)$$

$$= \boxed{0.8904}$$

(b) The heights of a certain type of plant, when ready to harvest, are known to be normally distributed, with a mean of μ. A company tests the effects of three different growth hormones on this type of plant. The three hormones were used on a different large sample of the crop. After applying each hormone, it was found that the heights of the plants in the samples were still normally distributed at harvest time.

The diagrams A, B and C, on the next page, show the expected distribution of the heights of the plants, at harvest time, without the use of the hormones.

The effect, on plant growth, of each of the hormones is described on the next page. Sketch, on each diagram, a new distribution to show the effect of the hormone.
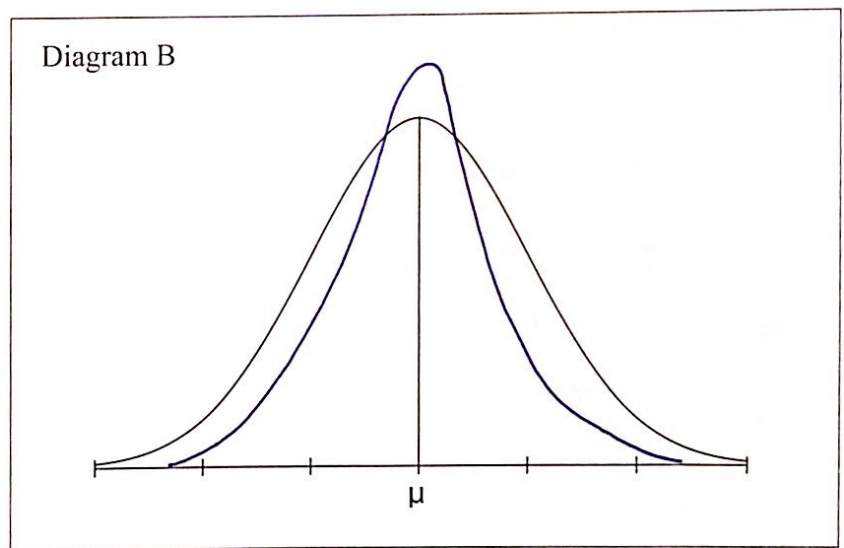
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Hormone A

The effect of hormone A was to increase the height of all of the plants.

Diagram A

μ
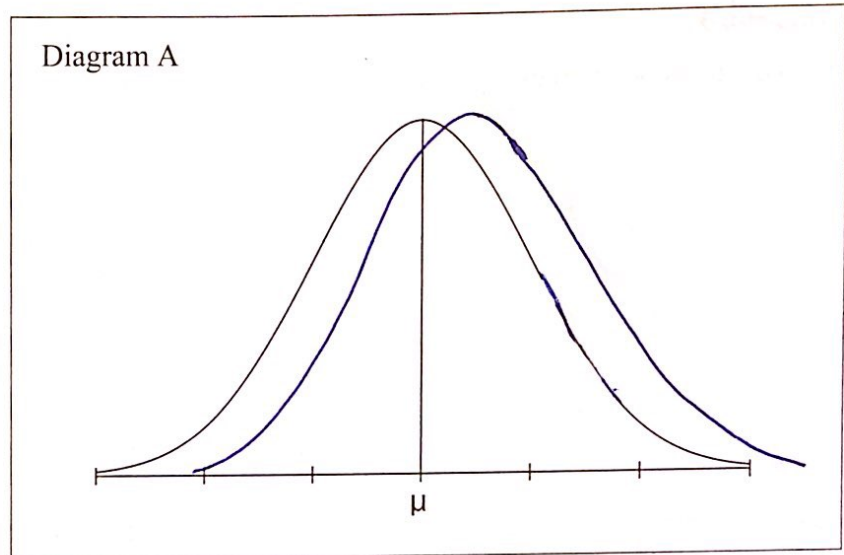
Hormone B

The effect of hormone B was to reduce the number of really small plants and the number of really tall plants. The mean was unchanged.

Diagram B

μ

Hormone C

The effect of hormone C was to increase the number of small plants and the number of tall plants. The mean was unchanged.

Diagram C

μ