 To be sure!

Aim:

To make an informed decision regarding purchases using Normal Distribution statistics

Explanation:

When items are produced or packed there is always a margin of error. For example when you buy 1kg of flour, you may actually get 1004g or 992g of flour in the packet. In some cases such as brick manufacturing, a certain amount of waste product is built into the calculations because with mass production the item can be defect in some way or broken in packing and transport. In most cases the customer would feel cheated if they paid for a certain amount and received less or faulty goods, thus not a good situation for creating happy customers.

Some businesses try to minimise the ‘error’ component to ensure that the customer has enough quality product to complete their task. They can do this by adjusting the mean or minimising the variance between products.

Tasks:

1. A machine packs lollies in 50g packets with a standard deviation of 2g. What average weight should they set the machine at to guarantee 99.85% of the product has over 50g?
2. A company makes parts for a car. The lengths of the parts must be within certain limits or they will not fit. A large number of parts were measured and the mean was calculated to be 6cm and standard deviation was 0.05cm. Assuming this data is normally distributed and 99.7% of the parts were accepted, what are the limits?
3. A machine produces wire fencing in 100m rolls. 99.7% of the rolls have lengths between 103m and 121m. Assuming this data is normally distributed, what are the mean and standard deviation?
4. A machine is set for the production of cylinders of mean diameter 5.00 cm, with standard deviation 0.020 cm. By assuming the diameter of the cylinders are normally distributed, between which values will 95% of the diameters lie? If a cylinder, randomly selected from this production, has a diameter of 5.060 cm, what conclusion could be drawn?
5. Your tiling company needs 1000 tiles to complete a living space and they are sold with 20 in a box. Company A quotes you $75 a box but recommends you purchase more as 4% are chipped or cracked in transit. Company B quotes you $80 per box and states that only 1% of the tiles are damaged in transit. If you will only accept a 2.5% margin of error, wish to purchase the mean amount in each case and want the cheapest option:
   1. How many tiles do you buy?
   2. What do you pay?
   3. Which supplier do you pick?