YEAR 12 PROBABILITY

The mean life for a certain brand of light bulb is 1800 hours with a standard deviation of 150 hours.

1. Between what two values is the life of a bulb likely to lie ? $1650 < X < 1950$

2. Of a sample of 1000 bulbs, how many can be expected to have lifetimes between these two values ? 682 bulbs.

3. What is the probability that a bulb will last longer than 2100 hours ? 0.02275

On a sequence of test runs of the same distance, the petrol consumption for a new car is found to have a mean of 7.4L and a standard deviation of 0.2L.

4. Within what two amounts does the consumption very probably lie ? $P(7 < X < 7.8)$ 95% (2sd)

5. For 40 test runs, how many would be expected to have a consumption of less than 7L ? 39 test runs

6. If a test run is chosen at random, what is the probability that the consumption will be more than 7L ? 0.97724

The mean length of a leaf is 4.5cm with a standard deviation of 1.2cm.

7. What is the probability that a leaf, chosen at random, will measure more than 4.5cm ? 0.5

8. In a sample of 1500 leaves, how many would you expect to have a length less than 2.1cm ? 34 leaves

9. What percentage of leaves would you expect to measure between 3.3cm and 8.1cm ? 83.99%.

The arrival time of a train at a major station is based on a mean of 5 p.m. and a standard deviation of 2 minutes.

99% (3sd)

10. If Mary wants to be almost certain of being at a station when the train arrives at what time should she be there ? 4.54pm < X < 5.06pm

11. The train is classified as late if it arrives after 5.04 p.m. What is the probability that a train will be late ? 0.025

12. What is the probability that the train will be late, but will arrive before 5.06p.m. ? 0.02

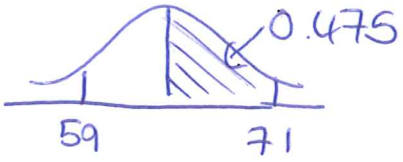
(Don't forget to turn the page !)

Rods produced by a machine have a mean length of 65mm and a standard deviation of 3mm.

13. Find acceptable limits of length if 2½ % are rejected for being oversize and 2½ % are rejected for being undersized. $59 < X < 71$

14. Rejects cost the company 85 cents per rod in wastage. Calculate the cost in wastage in a batch of 1000 rods. $0.05 \times 1000 \times 0.85 = \$42.50$

15. The machine is to be reset so that only ½ % will be rejected for being oversized and ½ % will be rejected for being undersized. If the mean remains the same, what will the new standard deviation be ?



$$P(65 < X < 71) = 0.475$$

$$\frac{71-65}{\sigma} = 1.96$$

$$= 3.1 \text{ mm}$$