

Part 4.4: Mean and Standard Deviation

Again, just like with the rectangular distribution, sometimes it is helpful to work out the mean and the standard deviation for the triangular distribution.

The formula for the mean is $\frac{a+b+c}{3}$ and the formula for the standard deviation is $\sqrt{\frac{a^2+b^2+c^2-ab-ac-bc}{18}}$.

Example

The time it takes to fly from the Gold Coast to Auckland is always between 2.5 and 3.5 hours, with the normal time being 2.7 hours. What is the mean and standard deviation of the trip time?

Answer

The first thing we need to do is identify a, b and c... a = 2.5, b = 3.5 and c = 2.7. We then just substitute into the formula.

$$\text{Mean} = \frac{a+b+c}{3} = \frac{2.5+3.5+2.7}{3} = 2.9 \text{ hours.}$$

$$\text{Standard deviation} = \sqrt{\frac{a^2+b^2+c^2-ab-ac-bc}{18}} = \sqrt{\frac{2.5^2+3.5^2+2.7^2-2.5 \times 3.5-2.5 \times 2.7-3.5 \times 2.7}{18}} = 0.216 \text{ hours (3sf).}$$

Exercise 4.4

The following questions require you to calculate the mean and the standard deviation.

1. A company knows that the time spent on a project will be between 300 and 800 hours, with the expected time being 500 hours. Calculate the mean and the standard deviation for the time spent on a project.
2. The time the cookies spent in the oven is between 20 and 22 minutes with the most likely time being 21.5 minutes. Calculate the mean and the standard deviation of the time the cookies spend in the oven.
3. The minimum time it takes to milk a cow is 4 minutes and the maximum time is 6 minutes. The most common time is 4.5 minutes. Calculate the mean and the standard deviation of the amount of time it takes to milk a cow.
4. A business knows that it will have a tax bill between \$3 million and \$8 million next year, with the most likely tax bill being \$4 million. Calculate the mean and the standard deviation of the tax bill.

The following questions require you to work backwards to find either the minimum, maximum or most common value.

5. The amount spent on advertising is somewhere between \$1 million and \$10 million. The mean amount spent is \$6 million. Calculate the amount that is most likely to be spent, and then the standard deviation for the amount being spent.
6. The weight of lollies taken from the pick and mix on average is 600 grams with a maximum of 810 grams. The most likely amount to be taken is 680 grams. What is the minimum amount that is taken and the standard deviation for the amount taken?
7. The minimum amount of time taken for a project is 24 days, and the most likely time is 50 days. The average time is 47 days. Calculate the maximum amount of time the project is likely to take, and then the standard deviation of the time of the project.
8. The amount of water in a 100 L tank is always between 0 L and 100 L. What is the mean amount of water in the tank if the standard deviation for the amount of water is 21 L?

Hint: work out the mode first.