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Agriculture in Education: an educational resource for the Year 9 Maths Curriculum
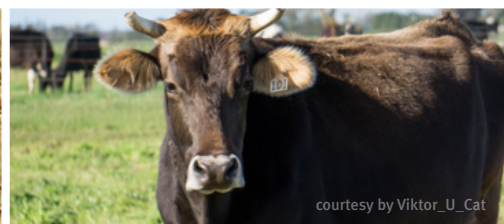
Statistics and Probability – Data representation and interpretation

courtesy by Honolulu Media

courtesy by Tim J Keegan

courtesy by Viktor_U_Cat

AGRIFOOD
SKILLS AUSTRALIA

Resource 1:

	Content Descriptor:	
Maths	Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including 'skewed', 'symmetric' and 'bi modal'	ACMSP282

learn

Learning Outcome/s

- Students calculate relative frequencies to estimate probabilities, list outcomes for two-step experiments and assign probabilities for those outcomes.
- They construct histograms and back-to-back stem-and-leaf plots.

Description

This resource aims to give students a context in which they can apply and demonstrate an understanding of statistical theory in a real life agricultural scenario. The scenario involves estimating probability and calculating frequencies of crop success rate and evaluating data from an experiment that tests this. Students will be required to comment upon results in mathematical terms such as 'skewed', 'symmetric' and 'bi modal' and provide advice to the fictional farmer in the scenario.

discuss

Setting the scene

A worksheet is provided with this resource which is self-explanatory and sets the scene for students to engage with the topic. However it does not include explanations of the skills and understandings required to complete the work. It assumes that the teacher will use other resources to introduce concepts and skills as necessary. A related resource available in Scootle that can be used to familiarize or teach students some of the basic terms and concepts for these learning outcomes is:

web

https://www.scootle.edu.au/ec/resolve/view/R12072?accContentId=ACMSP282

The worksheet included with this resource will also serve as very good evidence for assessment of the learning outcomes.

work task

### Work Task: Part A – Evaluating data in a two step experiment

See the worksheet attached

A farmer is planning to plant out a new crop of kale. He has two varieties that he wants to try to see which is the most profitable. He has 10 kg of seed for Variety A and 15kg of Variety B. He plans to mix the seeds together and then sew them over two paddocks. One paddock is twice the area of the other. The plants which grow from seed are different colours so that the farmer can easily distinguish between them.
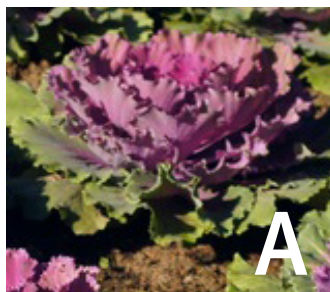
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Courtesy by Pixabay (no attribution required)

The farmer also wants to know if he can increase the crop yield by applying fertilizer, but because of the cost of fertilizer he wants to test how successful it is before committing to it. He decides to just use fertilizer on the small paddock. After three weeks the plants have sprouted and the farmer does a survey of the two paddocks to discover if there is any difference in the success rate of the two seed types that have managed to progress to successful plants.

work task

1. Use a tree diagram to list all probable results of the crop yield producing successful plants of the two varieties both fertilized and not fertilized.
2. If there are 300 plants in the smaller paddock how many would you expect there to be in the larger paddock?
3. What percentage of the crop do you expect to be fertilized Variety B?
4. What percentage of the crop do you expect to be unfertilized Variety A?
5. If after harvest the yield from the small paddock was 250 kg and 350 kg from the large one, what can you say about the effectiveness of the addition of fertilizer?

A further breakdown of the crop yield into varieties provided the results in the table below.

Crop Yield	Fertilized		Unfertilized	
	Plants	Mass (kg)	Plants	Mass (kg)
Variety A	140	125	200	150
Variety B	160	125	340	250

6. Use this data to evaluate the success of the crop. How do these results compare with the predictions you made from the statistics?
7. What would you advise the farmer to do in future with regards to planting a particular variety of kale and using fertilizer?

work task

Work Task: Part B – Histograms and Stem and Leaf Plots

The farmer decided to consult the local market retailers about what customers preferred to buy before he committed to the variety you have suggested. At the market the farmer was told that customers seemed to prefer the tall leafy kale and would consider mass as a secondary factor.

Variety A

Height – cms	26	29	27	28	26	28	29	30	27	28	25	27	29	31	29	30	27	28	28	26
Mass – gms	750	790	680	740	720	750	680	810	730	760	690	750	630	740	770	780	710	800	700	670

Variety B

Height – cms	35	39	38	40	38	40	39	38	39	41	39	37	38	40	37	36	34	37	41	42
Mass – gms	670	710	700	730	710	740	730	700	720	750	700	670	690	740	680	700	690	700	760	770

The farmer decides that more data is needed. Below is a random sample of the harvested crop displaying height and mass of the plants taken from the unfertilized paddock.

1. Construct a histogram to visualize the frequency of the height data of both varieties. How would you describe the resulting graph? What implications are there for the farmer?
2. Construct a back to back stem and leaf diagram to represent the mass of each plant variety. What does this data representation indicate about the two varieties? How is this data skewed?
3. What further information do you think the farmer would need to make a fully informed decision about which variety to go with in future?

Work Task: Part B – Histograms and Stem and Leaf Plots

work task

	560	570	580	590	600	610	620	630	640	650	660	670	680	690	700	710	720	730	740	750	760	770	780	790	800	810
24																										
25																										
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Height

Mass

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