Mathematics Department Workshops

Topic: Relative Frequency

Overview

Objectives related to this topic are:

- estimate probabilities by collecting data from a simple experiment and recording it in a frequency table; compare experimental and theoretical probabilities in simple contexts (Year 7)

- compare estimated experimental probabilities with theoretical probabilities, recognising that: (i) if an experiment is repeated the outcome may, and usually will, be different, (ii) increasing the number of times an experiment is repeated generally leads to better estimates of probability (Year 8)

- compare experimental and theoretical probabilities in a range of contexts; appreciate the difference between mathematical explanation and experimental evidence (Year 9)

- understand relative frequency as an estimate of probability and use this to compare outcomes of experiments (Year 10)

- understand that if an experiment is repeated, the outcome may – and usually will – be different, and that increasing the sample size generally leads to better estimates of probability and population parameters (Year 11)

Materials required

- Resource sheet **HT1.REL.1** made up as card sets

- Resource/prompt sheets **HT1.REL.2**, **HT1.REL.3**, **HT1.REL.4** and **HT1.REL.5**

- Tarsia jigsaw software, crossword generating software (see below for download links)

Suggested activities

Activity 1: Getting Started
Using resource sheet **HT1.REL.1**, ask members of your team to sort the 5 objectives into order of difficulty. Ask questions such as:

- How did you decide this order?

- Which words/phrases helped you decide this order?

- Which pieces of vocabulary might be problematic for learners?

Discuss the meanings of key vocabulary such as: estimated probability, relative frequency, experiment, frequency table, theoretical probability, experimental probability, outcome, explanation, evidence, sample size, and population parameters. Which words have similar meanings? How do these words differ?

Activity 2: Ways of helping learners remember vocabulary
As a team, discuss how you help learners remember maths-specific vocabulary. Look at the examples below and consider which ones you think would work best with your learners.

Example 1:
Ask learners to produce leaflets/poster/powerpoints explaining the meanings of vocabulary associated with relative frequency

Example 2:
Create matching cards, a jigsaw or dominoes of vocabulary and definitions (e.g. using the Tarsia jigsaw software, free to download from
http://www.mmlsoft.com/index.php?option=com_content&task=view&id=4&Itemid=5) for learners to match up/put together

www.ncetm.org.uk

A Department for Children, Schools and Families initiative to enhance professional development across mathematics teaching

Example 3:
Crosswords e.g. using **http://www.eclipsecrossword.com/downloadfull.html** or other free software)

Example 5:
Taboo style game – learners have to describe the word or phrase for other learners to guess

Example 4:
Hangman game

Activity 3: Experiments with fun or unexpected results, and using games
As a team, share which games or situations you currently use for relative frequency. Can you think of any more unusual or more interesting situations? Read the exemplar file for 'Diffy' (resource sheet **HT1.REL.2**) and discuss why this gives learners an unexpected result. Either use the internet or collective experience to generate other ideas to make collecting data to calculate relative frequency more interesting.

Activity 4: Situations which will appeal to your cohort or link to other subjects
Ask members of your team to consider ways of using your school's situation to make the experimenting more appealing or relevant. For example:

- If your school has Specialist status you might wish to collect data linked to that specialism;

- Take the learners outside and collect data on how frequently someone throws a basketball through the hoop if they are given 'x' attempts (good for getting gradually improving estimates…);

- Use sports days as a good source of data;

- See prompt sheet **HT1.REL.3** for examples to do with languages – this maybe useful for a language school or a school with learners who speak different languages;

- Look in the local paper – are there any interesting stories your class could follow up or discuss? For example: **http://news.bbc.co.uk/1/hi/health/7366568.stm** (birth of identical triplets).

Activity 5: Interesting discussion generators (see previous activities as well!)
As well as accessing learners' areas of interest discuss at other ways of promoting discussion for example the 100 coin throws experiment
http://www.tes.co.uk/section/staffroom/thread.aspx?story_id=2438674&path=/Mathematics/ or a clip from a movie where something unlikely happens e.g. the opening from 'Rosencrantz and Guildernstern are Dead' where Rosencrantz keeps spinning a coin and getting heads (about 156 times in all…) **http://uk.youtube.com/watch?v=RjOqaD5tWB0**

Activity 5: Reflection
Decide on some action points as prompted below.

Embedding in practice

Hooks for Learning
- **http://www.stat.psu.edu/~resources/Cartoons/cartoon005.gif** silly cartoon (Dilbert)

- Prompt sheet **HT1.REL.4** – analysing statements and some more weblinks

- **http://www.simonsingh.net/The_Black_Chamber/crackingsubstitution.html** - code-breaking using frequency analysis

- Resource sheet **HT1.REL.5**: A story

Action points

At the end of the session, spend time recording some actions.
What do you need to do:
- Next day?
- Next week?
- Next year?

Further reading

http://www.simonsingh.net/The_CDROM.html - download 'The Code Book', by Simon Singh, for free