PDST
Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí
Post-Primary Maths Team

Inferential Statistics

Name:_____

Schedule:

Session 1	Welcome & Introduction Visual representation of z-scores
Break	
Session 2	Understanding Sampling Variability Confidence Intervals
Lunch	
Session 3	Hypothesis Testing Reflection & Conclusion

Learning Outcomes:

By the end of this seminar, participants will:

- Have a clear understanding of the key messages for this workshop and understand how the workshop aligns with senior cycle key skills.
- Understand the importance of using **real world data** so that students will see the power and the need for statistics.
- Understand the importance of using **visual representations** as a tool to help to interpret and analyse data.
- Understand the importance of **reflecting** on their practice, the value of effective collaboration and the long term benefits of engaging with continual professional development.

Strand 1: Statistics and Probability – Ordinary level and Higher level

Students learn about	Students working at OL should be able to	In addition, students working at HL should be able to
1.3 Outcomes of random processes	– find the probability that two independent events both occur – apply an understanding of Bernoulli trials* – solve problems involving up to 3 Bernoulli trials – calculate the probability that the 1st success occurs on the n^{th} Bernoulli trial where n is specified	– solve problems involving calculating the probability of k successes in n repeated Bernoulli trials (normal approximation not required) – calculate the probability that the k^{th} success occurs on the n^{th} Bernoulli trial – use simulations to explore the variability of sample statistics from a known population, to construct sampling distributions and to draw conclusions about the sampling distribution of the mean – solve problems involving reading probabilities from the normal distribution tables

Students learn about	Students working at OL should be able to	In addition, students working at HL should be able to
1.7 Analysing, interpreting and drawing inferences from data	– recognise how sampling variability influences the use of sample information to make statements about the population – use appropriate tools to describe variability drawing inferences about the population from the sample – interpret the analysis and relate the interpretation to the original question – interpret a histogram in terms of distribution of data – make decisions based on the empirical rule – recognise the concept of a hypothesis test – calculate the margin of error ($\frac{1}{\sqrt{n}}$) for a population proportion* – conduct a hypothesis test on a population proportion using the margin of error	– build on the concept of margin of error and understand that increased confidence level implies wider intervals – construct 95% confidence intervals for the population mean from a large sample and for the population proportion, in both cases using z tables – use sampling distributions as the basis for informal inference – perform univariate large sample tests of the population mean (two-tailed z-test only) – use and interpret p-values

Section 1:

Activity 1

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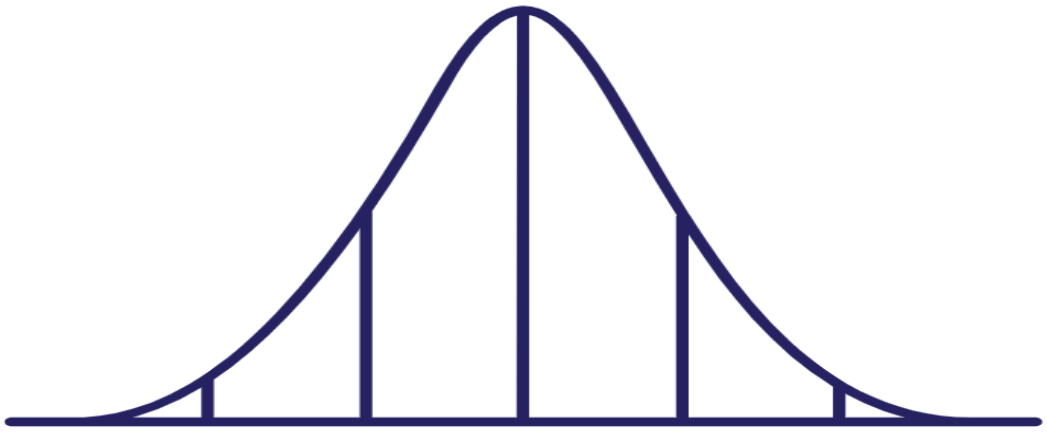

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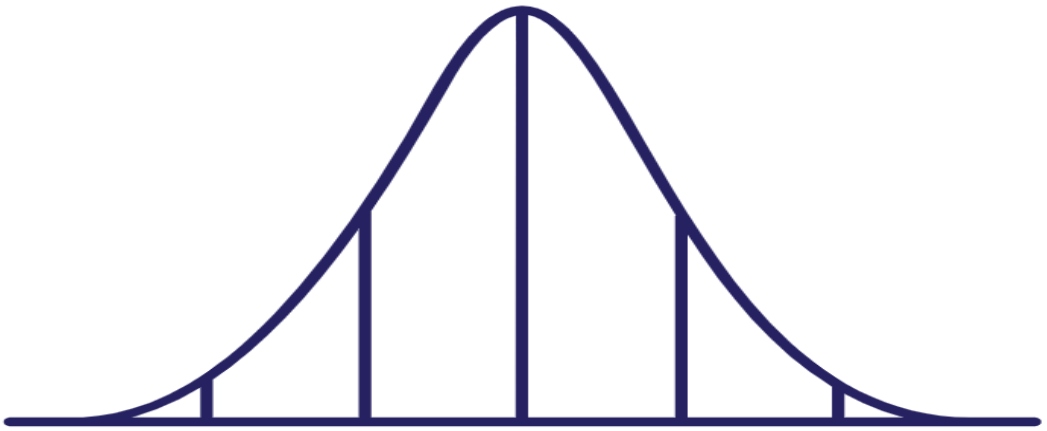

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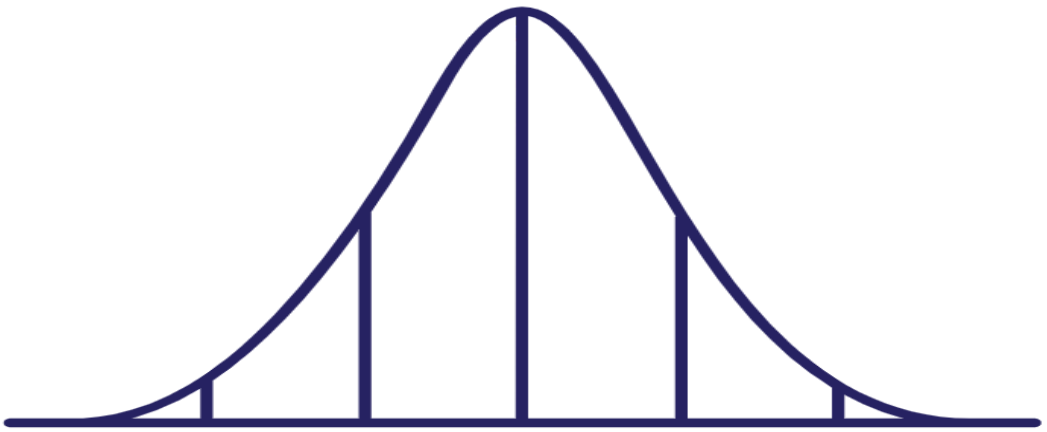

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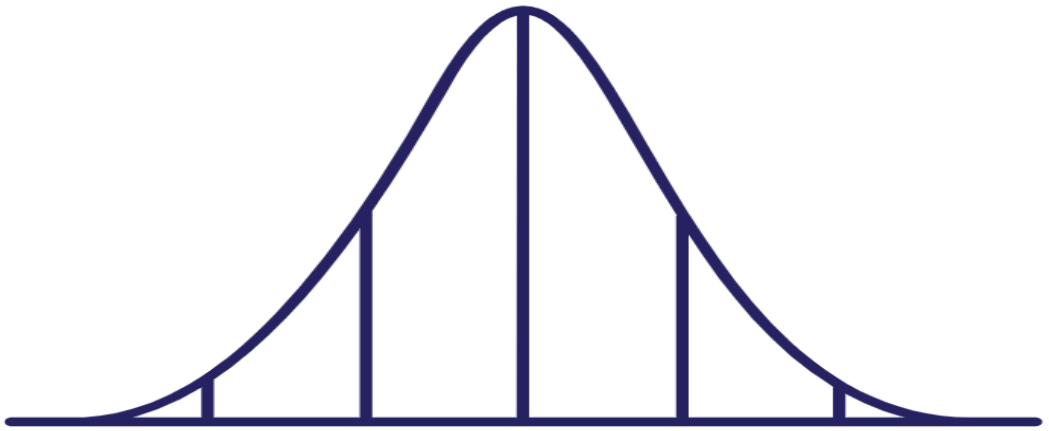

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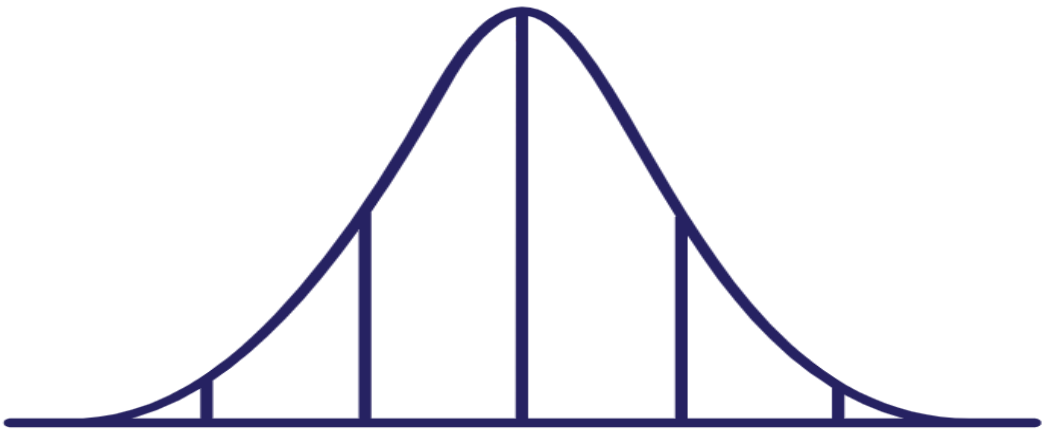
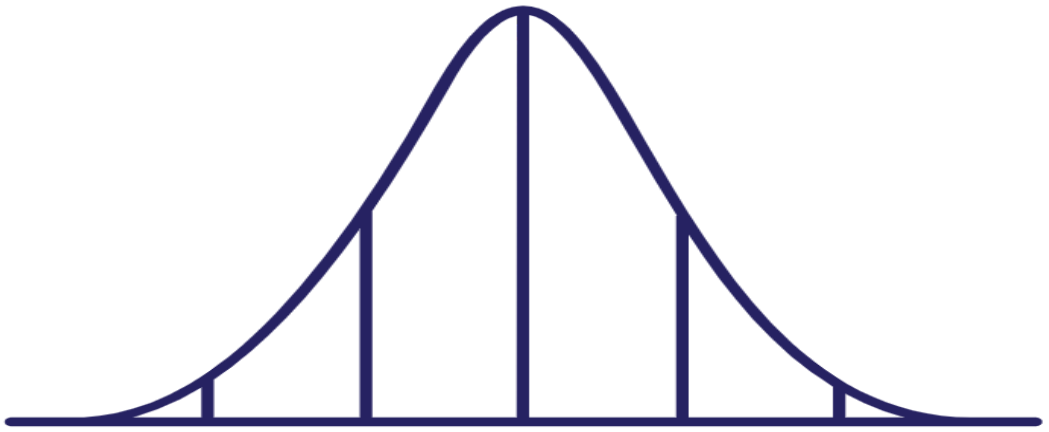


Activity 2



Section 2:

Activity - Create a Poster

In groups, choose one of the following questions to answer. Create a poster to demonstrate your findings. (Questions taken from LCHL Maths 2018 Paper 2, Q8)

Acme Confectionery has launched a new bar called *Chocolate Crunch*. The weights of these new bars are normally distributed with a mean of 4·64 g and a standard deviation of 0·12 g. A sample of 10 bars is selected at random and the mean weight of the sample is found.
Find the probability that the mean weight of the sample is between 4·6 g and 4·7 g.

A company surveyed 400 people, chosen from the population of people who had bought at least one *Chocolate Crunch* bar.
Of those surveyed, 324 of them said they liked the new bar.
Create the 95% confidence interval for the population proportion who liked the new bar.
Give your answer correct to 2 decimal places.

Section 3:

Activity - Language of Inferential Statistics

With your group, discuss the meaning of the following terms and place them on the appropriate place on the scale.

Read the following eight statements and pair them with the words whose meaning they most closely match.

(a) Hypothesis; (b) Theory; (c) Conjecture; (d) Scientific use of Theorem; (e) Null Hypothesis; (f) Alternative Hypothesis; (g) Educated guess; (h) Colloquial use of Theorem.

- ☐ A general proposition not self-evident but proved by a chain of reasoning; a truth established by means of accepted truths.
- ☐ A swift conclusion made from data directly at hand, and held as probable or tentative.
- ☐ A concise and coherent set of concepts, claims, and laws (which is necessarily falsifiable) that can be used to precisely and accurately explain and predict natural phenomena.
- ☐ A proposed explanation made on the basis of limited evidence as a starting point for further investigation/testing.
- ☐ A conclusion or a proposition which is suspected to be true because of limited supporting evidence, but for which no proof or disproof has yet been found
- ☐ An idea or collection of ideas proposed to be true for which no proof or evidence exists.
- ☐ A statement that a study will find no meaningful differences between the groups under investigation.
- ☐ A statement that proposes meaningful differences between the variables under investigation.

Conclusion:

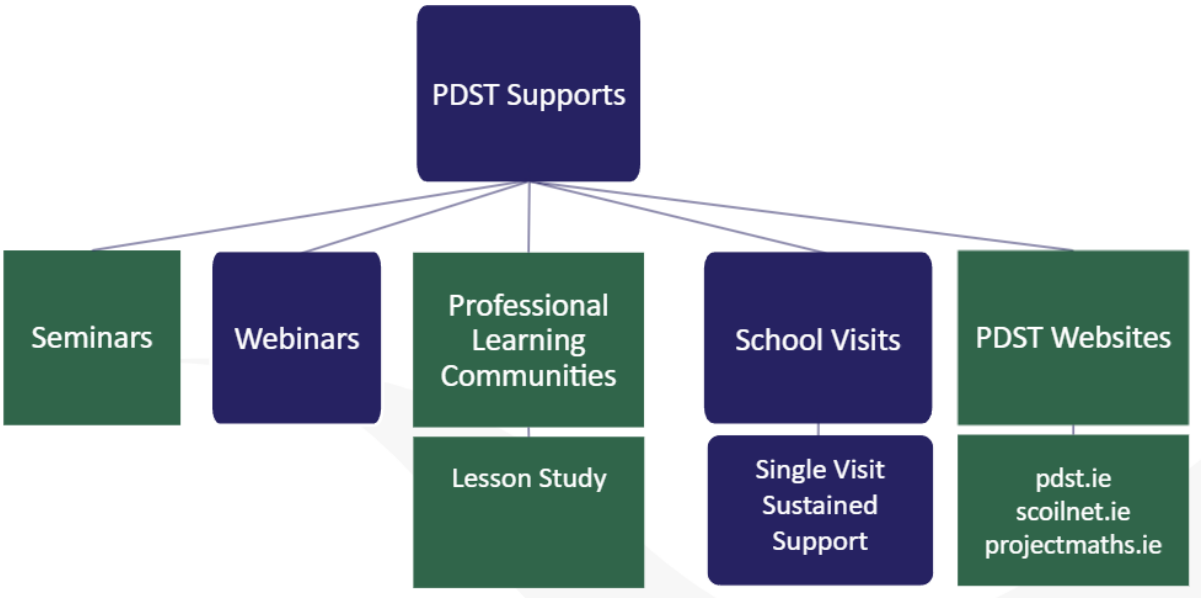
What benefits are there for students when teaching Inferential Statistics using the constructivist approach?

What do you see as the challenges and opportunities of using multiple representations to teach Inferential Statistics?

How would using real life contexts when teaching Inferential Statistics benefit teachers/students?

Other notes/observations

Supports & Contacts:



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Learning Log: