## LESSON PLAN 3

| Name: | Dadan Rosana |
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| Title of lesson: | Linear Regression Review and Activity |
| Date of lesson: | 2012 |
| Length of lesson: | $2 \times 50$ minutes |
| Description of the class |  |
| $\quad$Name of course: <br> Grade level: | Physics Education |

## Source of the lesson:

Welkowitz, Joan, Robert B. Ewen, and Jacob Cohen. Introductory Statistics for the Behavioral Sciences. Third edition. San Diego, CA: Harcourt Brace Jovganovich Publishers, 1982

Kuehl, Rober O. Statistical Principles of Research Design and Analysis. Belmont, CA: Duxbury Press, 1994
Peck, Roxy, Chris Olsen, and Jay Devore. Introdcution to Statistics and Data Analysis. Pacific Grove, CA: Duxbury, 2001

## Duration: 2x50 minutes

## Lesson aims:

Learners to understand and use Linear Regression and correlation.

## Specific learning outcomes:

Students will be able to:

## Assessment method(s): <br> - Group activities

- The student will be able to classify graphically and analytically the correlation between two variables as either positive, negative, or zero.
- The student will explore, using both visual approximation and graphing calculator, the equation of a trend line for a scatterplot exhibiting a linear pattern.
- The student will explain the meaning of the correlation coefficient r .
- Question \& Answer during the session..
- Learner engagement during session.
- Worksheet


## Linked Functional Skills:

Speaking, listening and communicating:
Students participate in discussions during the session, how they articulate answers and communicate with other learners.

## Previous knowledge assumed:

Understand and use positive and negative numbers of any size in practical contexts.
Carry out calculations with numbers of any size in practical contexts.
Extract and interpret information

## Materials and equipment required:

## Powerpoint.

Worksheet

Title of Lesson: Lesson 3 Linear Regression Review and Activity

| Time/ <br> Stage | Subject Matter/Content | Teacher Activity | Student Activity | Resources/ <br> Notes |
| :--- | :--- | :--- | :--- | :--- |
| 5 min | Introductory Activity: <br> What chance of being <br> right? | When the class begins ask 3 learners <br> to stay outside until asked to come <br> in. <br> Ask the rest of the group to decide <br> which student they think will come <br> through the door first. <br> Ask them to think about what <br> chance they have of being right. | Discussions and agreement. <br> Identify chance of being <br> right. | This activity is designed to <br> introduce probability in <br> terms of the word 'chance'. |
| 10 min | Explanation and <br> discussion. | Discuss the concept of probability <br> and relate to numerical processes. | Ask questions. | Chance is something most <br> people use their instinct to <br> decide. This activity and <br> explanation is to establish <br> that mathematics can be used <br> to assess chance (i.e. <br> probability). |

Title of Lesson: Lesson 3 Linear Regression Review and Activity
Subject : Applied Statistics

| Time/ Stage | Subject Matter/Content | Teacher Activity | Student Activity | Resources/ Notes |
| :---: | :---: | :---: | :---: | :---: |
| 10 min | Small Group Activity: <br> Focus Group Discussion - <br> Using linear regression and correlation of physics education research. | Hand out a classify graphically and analytically the correlation between two variables as either positive, negative, or zero | Ask Questions Discussions and agreements. Feedback comments and questions. | At the first selection, the linear regression will be the same for each group, but this will change as the selection process continues. |
| $\begin{aligned} & 5-10 \\ & \min \end{aligned}$ | Explanation and discussion. | Carry out a procedure to determine an equation of a trend line for a scatterplot exhibiting a linear pattern by using visual approximation. | Ask Questions. |  |
| 25 min | Worksheet | Hand out the worksheets and guide students to showing their calculations. Introduce the need to do some problem solving. Ask them to check their answers. | Complete worksheet. |  |
| 10 min | Worksheet Answers | Provide answers and give explanations where necessary. Ask questions and discuss the checking procedures. | Ask Questions | Regression can be expressed in different ways; e.g. ' 1 in 8 chance' or ' $12.5 \%$ correlation'. |

Functional Skills: Applied Statistics
Sample Lesson Plan: Probability

Title of Lesson: Lesson 3 Linear Regression Review and Activity
Subject
: Applied Statistics

| Time/ <br> Stage | Subject Matter/Content | Teacher Activity | Student Activity | Resources/ <br> Notes |
| :--- | :--- | :--- | :--- | :--- |
| 5 min | Conclusion | Guide them to common sense <br> checking. | Ask Questions. | This will need some <br> explaining and discussions. |

Title of Lesson: Lesson 1 Probability
Subject : Applied Statistics
Number Cards: Probability

| 1 | 2 | 3 | 4 |
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| 5 | $\underline{6}$ | 7 | 8 |

Title of Lesson: Lesson 1 Probability Subject : Applied Statistics

Task 1
A charity group decided to hold a summer fair to raise money. Two possible Saturdays, one in May and the other in July were considered by the charity organisers. They wanted the fair to have the best chance of being on a sunny. One of the organisers did some research and collected data on the weather for these two Saturdays over the past 8 years.

|  | $\mathbf{2 0 0 3}$ | $\mathbf{2 0 0 4}$ | $\mathbf{2 0 0 5}$ | $\mathbf{2 0 0 6}$ | $\mathbf{2 0 0 7}$ | $\mathbf{2 0 0 8}$ | $\mathbf{2 0 0 9}$ | $\mathbf{2 0 1 0}$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| May <br> Saturday | Cloudy | Sunny | Cloudy | Rainy | Sunny | Sunny | Cloudy | Sunny |
| July <br> Saturday | Rainy | Rainy | Sunny | Sunny | Cloudy | Sunny | Cloudy | Rainy |

Use the data to estimate which Saturday has the best chance of being sunny in 2011. Show your workings.
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## Task 2

A student was raising money for charity by taking part in a 10 km cross-country run. One of the sponsors for his run offered two options:

1. $£ 150$ if the run was completed in less than 30 minutes.
2. $£ 10$ per kilometre

To help decide which option to choose the students examined his timings for cross-country runs completed over the previous three weeks. In each week he had completed two crosscountry runs.

| Week/run | Distance (km) | Time Min: sec |
| :--- | :--- | :--- |
| Week 1 Run1 | 10 | $29: 24$ |
| Week 1 Run2 | 10 | $31: 45$ |
| Week 2 Run1 | 12 | $35: 30$ |
| Week 2 Run2 | 9 | 30.20 |
| Week 3 Run1 | 10 | $28: 50$ |
| Week 3 Run2 | 9 | 26.45 |

Use this data to assess the probability of the student completing the charity 10 km crosscountry run in less than 30 minutes.
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## Task 3

The high street bank has introduced a new system to deal with appointments. The expected waiting time would be less than 6 minutes.
In the first week of the new system people attending appointments were asked to complete a survey which included a question on how long they had waited for their appointment.
The table below shows how long these people waited.

| Appointments (number of minutes waited) |  |  |  |  |  |  |  |  |  |
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|  |  | 0 | 0 | 0 | 1 | 0 |  |  |  |
| 1 | 0 | 1 | 9 | 0 | 5 | 0 | 7 | 1 |  |
| 2 | 5 | 0 | 1 | 3 | 8 | 0 | 6 | 3 | 1 |
| 5 | 2 | 0 | 0 | 7 | 0 | 3 | 4 | 3 | 2 |

The centre manager wants to follow up the survey with interviews, and will select at random one of the people who filled in the survey.
Show the chance of the person selected being someone who had waited 6 minutes or more.
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Title of Lesson: Lesson 1 Probability
Subject : Applied Statistics

## Task 4

At a restaurant customers are asked to complete a survey when they leave.
Every month there is a prize draw for customers who complete the survey and include their contact details.

| Survey results for last month |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Ratings <br> $5=$ Very Good $4=$ Good $3=$ Satisfactory $2=$ Poor $1=$ Very Poor |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Survey <br> Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Customer rating of restaurant | 5 | 4 | 5 | 3 | 4 | 2 | 5 | 3 | 2 | 4 | 5 | 5 | 3 | 4 |
| Contact details included in survey | $\checkmark$ |  | $\checkmark$ | $\sqrt{ }$ |  | $\checkmark$ |  | $\checkmark$ |  | $\checkmark$ |  |  | $\checkmark$ | $\checkmark$ |

Peter completed Survey Number 10. What is the chance of Peter getting the prize? Justify your decision.

## Task 5

A student was starting a college course and had to travel to the college by train. The train timetable had a train at 8.10 which arrived at the station by the college just before the first lesson began.
The student looked on the train company's website to see if the trains were always on time. The information stated:
"Our trains are on time for $87.5 \%$ of journeys. We apologise for the others, which are late, often due to factors outside our control."

What is the chance of the student being late for lesson on the first day of the course? State the chance as 1 in --. Show your workings.
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