Sangam S.K.M College- Nadi

Lesson Notes Week: 1

Year 11

Mathematics – Life Skills

Strand: Measurement In Everyday Context

Sub-strand: Accuracy of Measurement.

Content Learning Outcomes:

- Write measurements correct to nearest unit required/ rounding off.
- Give appropriate upper and lower bounds for data given.
- Write an inequality for the actual measure.

Rounding Off Decimals

- A number can be approximated to a given number of decimal places (dp).
- When a number is written in decimal form, the digits to the right of the decimal form, the digits to the right of the decimal point are called decimal places.
- For example:

  24.5 is written to 1 decimal place.

  3.24 is written to 2 decimal place.

Steps to round-off a decimal to a certain number of decimal places:

i. Count that many digits from decimal point.
ii. Check the next digit. If the next digit is less than 5 then the answer is the digit counted in (i). If the next digit is 5 or more increase the last digit of the counted digits in part (i) by 1.

Example1: Round-off the following digits to 2 decimal places.

i. 3.9612 Ans: so in this case the 3^{rd} digit is 1 which is less than 5.

   3.9612 = 3.96

ii. 4.728 Ans: so in this case the 3^{rd} digit is 8 which is more than 5.

   4.728 = 4.73

Upper and lower bounds

- The **lower bound** is the smallest value that would round up to the estimated value.
- The **upper bound** is the smallest value that would round up to the **next** estimated value.
- **Upper** and **lower bounds** can also be represented as an **error interval** which is often given as an inequality.

Example: 2

57.7 has been rounded to 1 decimal place. Work out the **upper** and **lower** bounds of this value.

-To calculate the upper and lower bound we need to use the size of the interval which is **1 decimal place** (0.1).

Next we need to divide the size of the interval by 2 to get half the interval:

$$\frac{0.1}{2} = 0.05$$

Step 1: Calculate the lower bound.

For the lower bound, we subtract half the interval.

Lower bound $=57.7-0.05=57.65$

Step 2: Calculate the upper bound.

For the upper bound, we add half the interval.

Upper bound $=57.7+0.05=57.75$

Therefore written in inequality form : $57.65 \leq x \leq 57.75$

Note: 1 decimal place ---- 0.1

2 decimal place ----- 0.01

3 decimal place ------ 0.001

<u>Class activity</u>

1. Round – off the following decimals to the number of decimal places indicated in the brackets.

   a. 0.5831 (2)
   b. 638.569 (2)
   c. 10.6386 (3)
   d. 77.783 (1)

2. A tree grew 7.05cm in January, 6.95cm in February, 6.098cm in March and 5.99cm in April. What was the total growth in the first four months that year? Give your answer in cm to nearest whole number.

3. a. 70.7 has been rounded to 1 decimal place. Work out the **upper** and **lower** bounds.

   b. 65.6 has been rounded to 2 decimal place. Work out the **upper** and **lower** bounds.

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Lesson Notes Week: 2

Year 11

Mathematics – Life Skills

Strand 3: Linear Functions in Everyday Context

Sub-strand 3.1: Linear Modelling

Content Learning Outcomes:

- Model real life situations using linear graphs and their equations
- Solve practical situations using linear graphs and equations.

Linear Modelling

- Linear models are a way of describing a response variable in terms of a linear combination of predictor variables.
- The response should be a continuous variable and be at least approximately normally distributed.

Linear Graphs and Linear Equations

- **Linear equation** is represented as a **line graph**.
- General form the equation :

  $y = mx + c$, where m represents the gradient and c represents $y -$ intercept.
- In order to draw the **line graph** we require several pairs of coordinates.
- These coordinates represent the relationship given in the **equation**. For example, for

  $y = 3x$ the y- value is always equal to '3 lots' of the x - value.

<u>Example: 1</u>

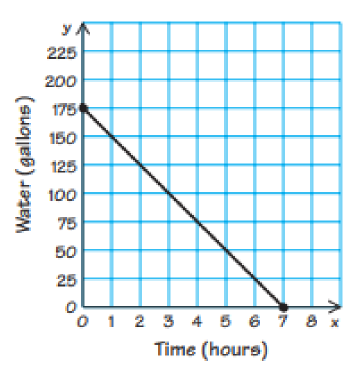
Tom works at an aquarium shop on Saturdays. One Saturday, when Tom gets to work, he is asked to clean a 175-gallon reef tank. His first job is to drain the tank. He puts a hose into the tank and starts a siphon. He measures the amount of water that is draining out and finds that 12.5 gallons drain out in 30 minutes. So, he figures that the rate is 25 gallons per hour. To see when the tank will be empty, Tom makes a table and draws a graph.

Linear equation: $\boldsymbol{y = 175 - 25x} \; - \; where$ x represnts gallons per hour

x-intercept: number of hours to empty the tank

x	0	1	2	3	4	5	6	7
y	175	150	125	100	75	50	25	0

y-intercept: amount of water in full tank



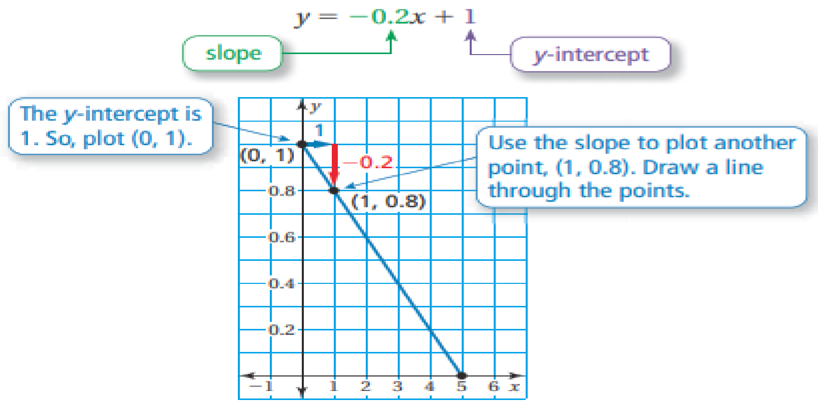
Therefore, from the table and also from the graph, Tom sees that the tank will be empty after 7 hours. This will give him 1 hour to wash the tank before going home.

Example:2

The percent y (in decimal form) of battery power remaining x hours after you turn on a laptop computer is $\mathbf{y = -0.2x + 1}$

(a) Graph the equation.

Use the slope and y-intercept to graph the equation.



(b) Interpret the x - and y-intercepts.

$x -$ intercept put $y = 0$

$y = -0.2x + 1$

$0 = -0.2x + 1$

$-1 = -0.2x$

$\underline{x = 5}$

$\underline{y - \text{intercept put } x = 0}$

$y = -0.2x + 1$

$y = -0.2(0) + 1$

$\underline{y = 1}$

Activity

1.A rental company charges a flat fee of $30 and an additional $0.25per km to rent a moving van.

a. Write a linear equation to approximate the cost y (in dollars) in terms of x, the number of km driven.
b. How much would a 75 km trip cost?

2. Mia and Hunter call a cab. The taxi driver charges $1 flag fall when they get in the car. The charge is then $2 for each kilometer they travel.

They have $23 between them.

a. Write a linear equation to approximate the cost y (in dollars) in terms of x, the number of km driven.
b. How far can they travel with $23?

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Lesson Notes Week: 3

Year 11

Mathematics – Life Skills

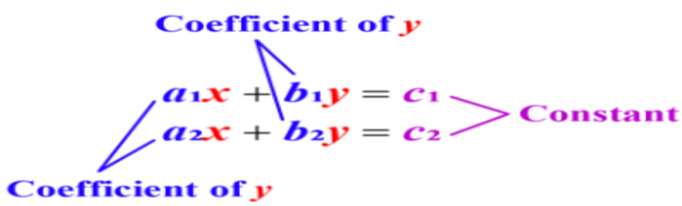
Strand 3: Linear Functions in Everyday Context

Sub-strand: Modelling using Simultaneous linear equations.

Content Learning Outcomes:

- Model real life situations using simultaneous linear equations.
- Solve practical situations by forming and solving pairs of linear equations.

<u>Simultaneous Linear Equations</u>

- Simultaneous linear equations in two variables involve two unknown quantities to represent real-life problems.
- It helps in establishing a relationship between quantities, prices, speed, time, distance, etc results in a better understanding of the problems.
- 

- Simultaneous equations can be solved using three methods. They are Graphically, Elimination and Substitution method.

<u>Example: 1</u>

The sum weights of Fabia and Valerian is 60kg and the difference is 2. Find the weights of Fabia and Valerian.

<u>Solution</u>

Step 1: Let x – be Fabia and y – be Valerian

Step 2: Formulate equation $x + y = 60$

$x - y = 2$

Step 3 : Solve equation simultaneously either using Graphical, Elimination or Substitution.

Elimination Method

$$\begin{array}{rl} & x + y = 60 \\ - & \underline{x - y = 2} \\ & 2y = 58 \\ & \underline{y = 29} \end{array}$$

Find x- value

$$x + y = 60$$
$$x + 29 = 60 - 29$$
$$x \underline{= 31}$$

Example: 2

Mr. Lenin invests some amount in deposit A and some amount in deposit B. The total money invested is \$2500. He gets 10% income on deposit A and 20% income on deposit B. If the total income earned be \$380, find the amount invested in A and B separately.

Solution

Step 1: Let x – be A   and y – be B

Step 2: Formulate 1st equation   : $x + y = 2500$

Step 3: Formulate 2nd equation : $0.1x + 0.2y = 380$ (note 10% = 0.1 and 20% = 0.2)

Step 4: Solve equation simultaneously either using Graphical, Elimination or Substitution.

Substitution Method

- $x + y = 2500$

  $\underline{y = 2500 - x}$

- Substitute $2500 - x$ in place of y in the second equation

  $0.1x + 0.2y = 380$

  $0.1x + 0.2(2500 - x) = 380$

  $0.1x + 500 - 0.2x = 380 - 500$

  $-0.1x = -120 \div -01$

  $\underline{\boldsymbol{x} = \$\mathbf{1200}}$ and y –value $y = 2500 - 1200 = \$\mathbf{1300}$

So, the amount invested in the deposit A is \$1200 and B is \$1300.

Activity

1. 1000 tickets were sold. Adult tickets cost \$8.50, children's cost \$4.50, and a total of \$7300 was collected. How many tickets of each kind were sold?
2. Mrs. B. invested \$30,000; part at 5%, and part at 8%. The total interest on the investment was \$2,100. How much did she invest at each rate?

   Hint: Equation 1: Total investment = $x + y = 30{,}000$

   Equation 2: Total interest   = $0.05x + 0.08y = 2100$
3. A park charges \$10 for adults and \$5 for kids. How many adult’s tickets and kids tickets were sold, if a total of 548 tickets were sold for a total of \$3750?