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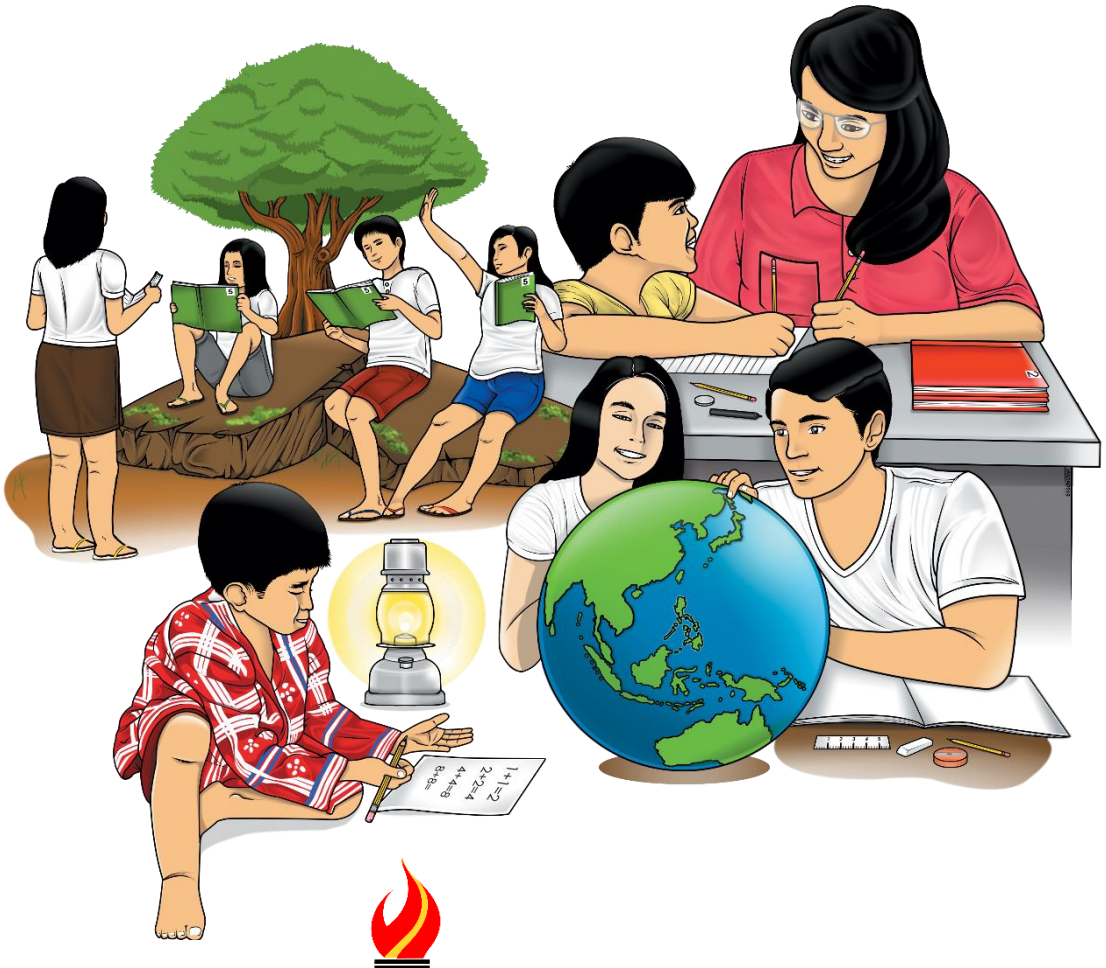
Mathematics

Quarter 4 – Module 13: Solving Routine and Non-Routine Problems Using Data Presented in a Line Graph



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Mathematics

Quarter 4 – Module 13: Solving Routine and Non-Routine Problems Using Data Presented in a Line Graph

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Good day Mathletes!

This module was designed and written to help you gain an understanding of the skills needed in solving routine and non-routine problems using data presented in a line graph. Routine problems are those that may be solved following standard procedures; and non-routine problems are problems that can be solved with some creativity and even without following standard steps or procedure.

So, what are you waiting for? Stay focused and start-up.

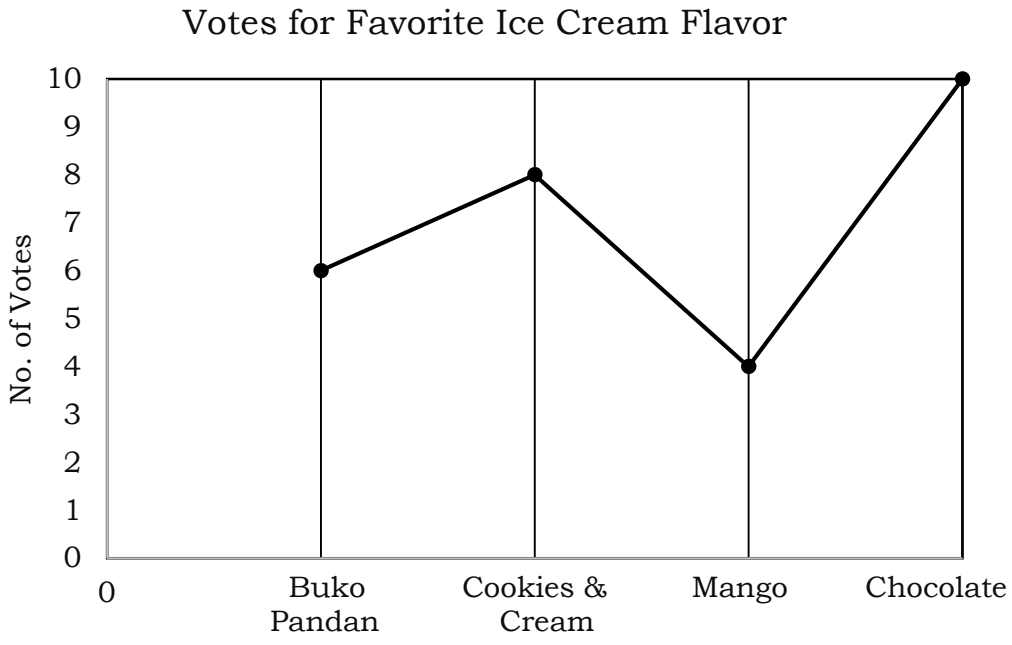
At the end of this module, you are expected to be able to solves routine and non-routine problems using data presented in a line graph. (M5SP-IVh-4.5)

Before going any further, let us check your skills in solving routine and non-routine problems using data presented in a line graph.

What I Know

Directions: Solve the problem using data presented in a line graph.

Debbie's class voted on which ice cream flavor was their favorite. The results are presented in the line graph below.



1. What is the problem about?
   a. Debbie's class
   b. Ice cream flavors
   c. The favorite ice cream flavor of Debbie and her classmates
   d. Votes for favorite flavor of ice cream

2. What is the combined number of votes for Mango and Buko Pandan?
   a. 10 b. 12 c.14 d. 16

3. What is the combined number of votes for Buko Pandan and Chocolate?
   a. 14 b. 16 c. 18 d. 20

4. What was the difference between the highest number of votes and the lowest number of votes?
   a. 12 b. 10 c. 8 d. 6

5. What is the average number of votes for the 4 ice cream flavors?
   a. 6 b. 7 c.8 d. 12

6. Which ice cream flavor got the least number of votes?
   a. Buko Pandan
   b. Cookies and Cream
   c. Mango

7. Which ice cream flavor got the most number of votes?
   a. Chocolate b. Mango c. Buko d. Pandan

8. What was the total number of votes?
   a. 28 b. 30 c. 32 d. 42

9. How many more voted Buko Pandan than Cookies and Cream?
   a. 1 b. 2 c. 3 d. 4

10. What is the difference between the number of votes for Cookies and Cream and for Mango?
   a. 4 b.6 c.8 d. 10

Lesson 1 Solving Routine and Non-Routine Problems Using Data Presented in a Line Graph

Routine problems are solved using a standard set of steps. On the other hand, non-routine problems are solved with some creativity. Whether routine or non-routine, problems are more easily solved when data are presented in a line graph.

In this module, you will learn how to solve routine and non-routine problems using data presented in a line graph. Are you ready?

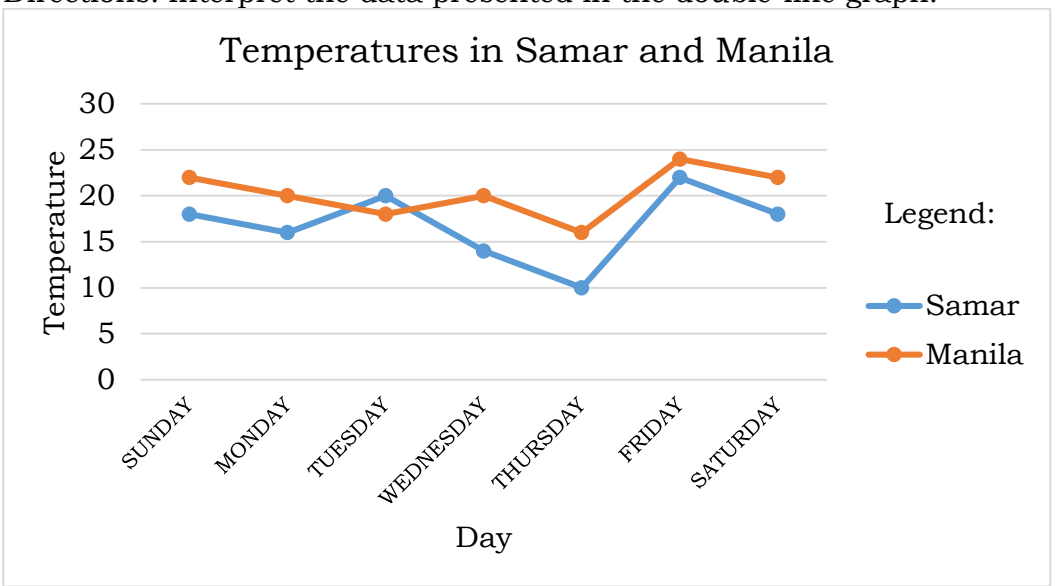
What's In

In the previous lessons, you learned to read and interpret data presented in a line graph.

The basic elements of the line graph, the title, the column and row headings, the plotted points and the line connecting the points all help us analyze and interpret data. Because line graphs are visual, changes as well as trends are also more easily seen.

Before we proceed, let us refresh your memory. Study the line graph and answer the questions that follow.

Directions: Interpret the data presented in the double-line graph.



1. What is the graph about?

   _____

2. What day had the highest temperature recorded for either Samar or Manila?

   _____

3. What was the lowest temperature recorded in either Samar or Manila?

   _____

4. What was the lowest temperature recorded in Samar?

   _____

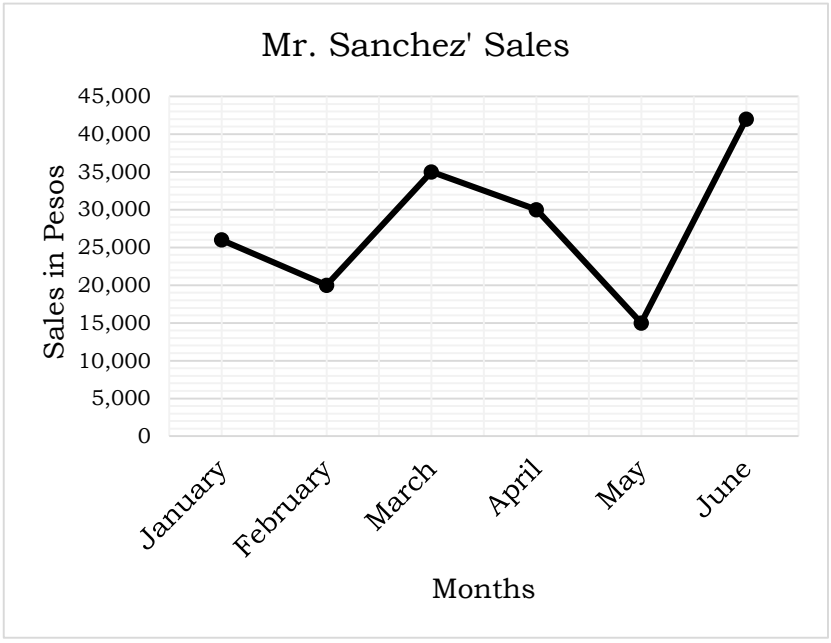
5. Which city had the highest temperature recorded for the period?

   _____

What's New

From the previous lesson, you learned how to interpret data presented in either single-line or double-line graphs. In this module, you will learn to solve-routine and non-routine problems using data presented in a line graph.

Study the line graph below.



What is It

Before answering questions about the line graph above, recall the steps in the **Four-step plan** in solving problems. These are:

1) *Understand:*** What is the problem asking? What are the given data? What is the word clue?;

2) *Plan:*** What operation is/are to be used? What is the mathematical sentence?;

3) *Solve:*** Solve the problem using the mathematical sentence; and

4) *Check and Look Back:*** Check if the answer is correct and state the final answer.

Answer the following questions using the data presented in the line graph above.

1. What was the total sales for the first three months?

Step 1. Understand:

a. What is asked?
   - Find out *the total sales for the first three*

b. What facts are needed to solve the problem?

Sales for the first 3 months:

January –	Php 26,000
February-	Php 20,000
March -	Php 35,000

After getting the data from the table,

Step 2. Plan: What strategy can we use to solve the problem? Since the data is asking for the total sales for the first 3 months, we can use *addition.* It is now easy to make the mathematical sentence. We have, Total Sales for the first three months, T,

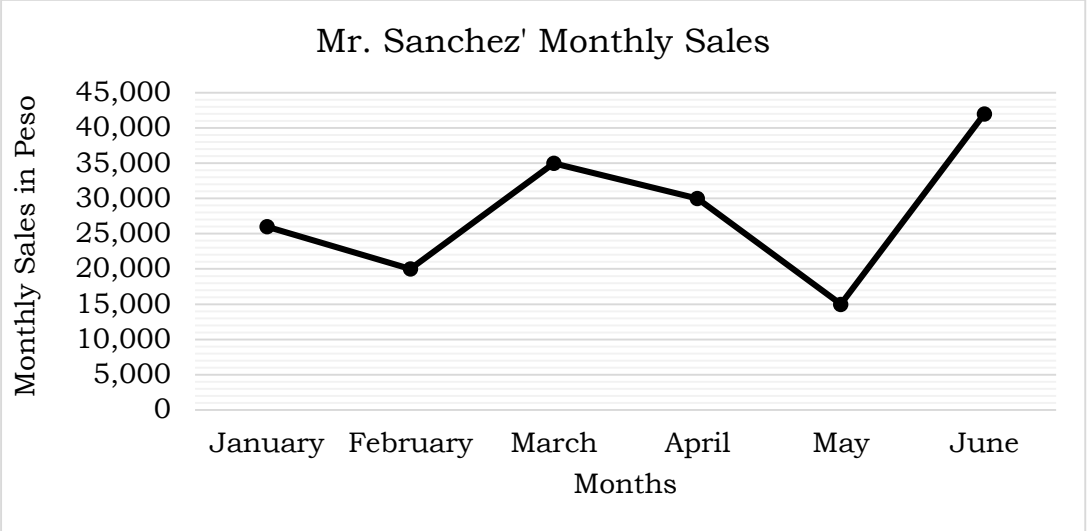
T = January sales + February sales + March sales

Step 3. Solve.

T = 26,000 + 20,000 + 35,000 = Php 81,000

Step 4. Check and Look Back.

Example 2: *Let us take a look again at the same line graph.*



Solve and answer the following questions using the 4-step plan of solving routine and non-routine problems.

1. How much more was Mr. Sanchez's sales in March than his sales in February?
   - What is asked? How much more was Mr. Sanchez's sales in March than his sales in February

   a. What facts are needed to solve the problem?
      1. *Sales for February – Php 20,000*
      2. *Sales for March – Php 35,000*

   b. What operation will be used?
      Subtraction (*word clue: how much more*)

   c. What is the number sentence?
      By how much was March Sales more than February sales (D)

      D = March Sales – February Sales = Php 35,000 – Php 20,000 = Php 15,000

   d. What is the complete answer?
      35,000 – 20,000 = 15,000

Let us have another example:

Example 3:

What was his total sales from January to June?

a. What is asked?
   - The total sales from January to June

b. What facts are needed to solve the problem?
   Sales for:

January:	26,000
February:	20,000
March:	35,000
May:	15,000
April:	30,000
June:	42,000

c. What operation will be used?
   - Addition *(word clue: total)*

d. What is the number sentence?
   - 26,000+20,000+35,000+30,000+15,000+42,000 = n

e. What is the complete answer?
   - 26,000+20,000+35,000+30,000+15,000+42,000
     = 168,000

Example 4: (Involves two operations)

What was his average sales for the six-month period?

a. What is asked?
   - The average sales for the six-month period.

b. What facts are needed to solve the problem?
   Sales for:

January:	26,000
February:	20,000
March:	35,000
May:	15,000
April:	30,000
June:	42,000

   January to June is 6 months.

c. What operation will be used?
   Addition and Division

d. What is the number sentence?
   Total Sales T:
   T = 26,000 +20,000 +35,000 + 30,000 + 15,000 + 42,000
   Average for the six months A = T/6

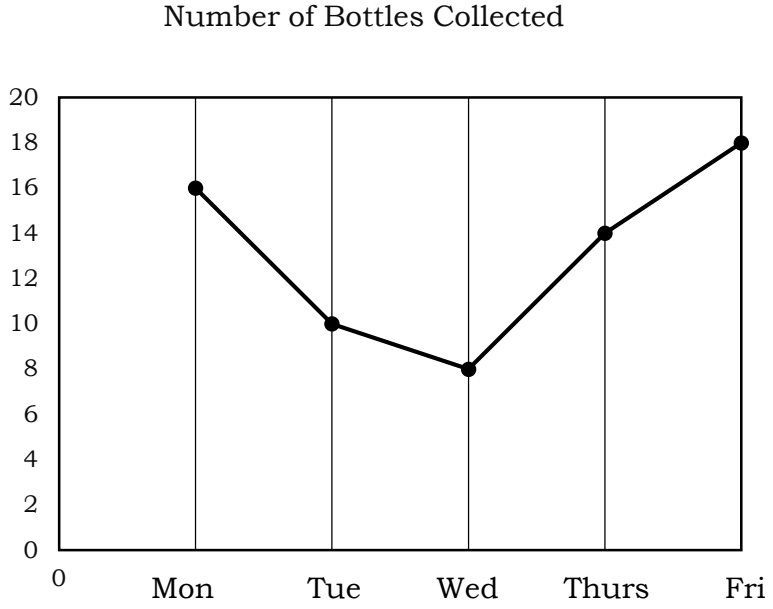
   Solve:
   T = 26,000 +20,000 +35,000 + 30,000 + 15,000 + 42,000
   T = 168,000
   A = T/6 = 168,000/6 = 28,000

What's More

Activity 1: Follow my Steps!

Directions: Use the information below to solve the problem. Follow the 4-step plan in solving the problem. The first question is done for you to start you off.

The Grade Five pupils were tasked to collect empty plastic bottles for their fund-raising project. The gathered data of collected bottles by each group for 5 days were presented in the line graph below.



1. How many more plastic bottles were collected on Monday than were collected on Tuesday?

Step 1: Understand

a. What is asked?

How many more plastic bottles were collected on Monday than were collected on Tuesday?

What are the given data?

Number of bottles collected on Monday – 17
Number of bottles collected on Tuesday – 11

What is the word clue?

How many more

Step 2: Plan

a. What operation is/are to be used?
   Subtraction
b. What is the mathematical sentence?
   n = 17 - 11

Step 3: Solve

What is the complete answer? n = 17 - 11= 6

Step 4: Check

a. Check if the answer is correct: 6 + 11 = 17

State the final answer:

The number of bottles collected on Monday was 6 more than the number of bottles collected on Tuesday

2. How many plastic bottles all in all were collected on Monday, Tuesday and Wednesday?

Step 1: **Understand**

a. What is asked? _____
b. What are the given data? _____
c. What is the word clue? _____

Step 2: Plan

a. What operation is/are to be used? _____
b. What is the mathematical sentence?_____

Step 3: Solve

What is the complete answer? _____

Step 4: Check

a. Check if the answer is correct: _____
b. State the final answer: _____

3. What is the difference between the number of plastic bottles collected on Friday and Wednesday?

Step 1: Understand

a. What is asked? _____
b. What are the given data? _____
c. What is the word clue? _____

Step 2: Plan

a. What operation is/are to be used? _____
b. What is the mathematical sentence?_____

Step 3: Solve

What is the complete answer? _____

Step 4: Check

a. Check if the answer is correct: _____
b. State the final answer: _____

What I Have Learned

A. Fill in the blanks.

Solving routine problems follows a (1) _____ procedures while non-routine problems ca be solved even (2) _____ following standard procedures.

The first step to solve a routine problem is to (3) _____ what does the problem is asking? what are the given data? what is the word clue?

The second step to solve routine problem is to (4) _____ what operation is/are to be used? What is the mathematical sentence?

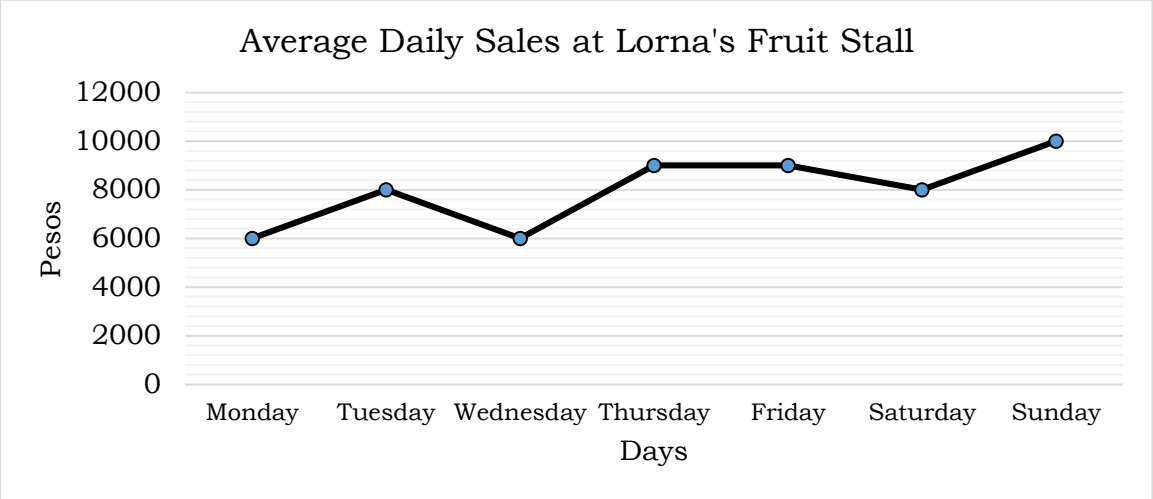
The third step to solve routine problem is to (5) _____ show how the solution is done using the operation.

And finally, you have to (6) _____ if the answer is correct and state the final answer.

What I Can Do

Congratulations for having reached this far! Let's try some real-life Data presented in a line graph allow us to more easily see changes and trends in the values of variables. There are occasions in our real lives when we have to solve problems using data presented in line graphs. Some of these may be solved using standard procedure or strategies. There are, however, instances when problems may not be solved using these standard strategies. We therefore also need to be familiar with some strategies to solve these non-routine problems.

Directions: Use the data presented in the line graph to solve and answer the questions that follow.



1. What is the total sales at Lorna's Fruit Stall for the whole week?
   a. What is asked?
      _____
   b. What facts are needed to solve the problem?
      _____
   c. What operation will you use?
      _____
   d. What is the number sentence?
      _____
   e. What is the complete answer?
      _____

2. What was the sales for the first 3 days?
   a. What is asked?

      _____

   b. What facts are needed to solve the problem?

      _____

   c. What operation will you use?

      _____

   d. What is the number sentence?

      _____

   e. What is the complete answer?

      _____

3. What was the total sales from Monday to Saturday?
   a. What is asked?

      _____

   b. What facts are needed to solve the problem?

      _____

   c. What operation will you use?

      _____

   d. What is the number sentence?

      _____

   e. What is the complete answer?

      _____

4. What was her average daily sales for 7 days?
   a. What is asked?

      _____

   b. What facts are needed to solve the problem?

      _____

   c. What operation will you use?

      _____

   d. What is the number sentence?

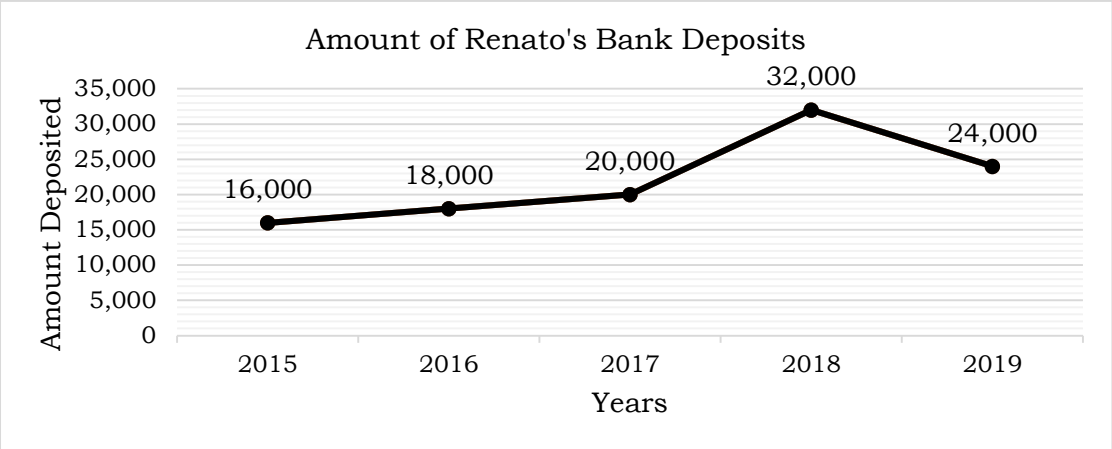
      _____

   e. What is the complete answer?

      _____

Assessment

Directions: Study carefully the line graph below and answer the questions that follow. Choose the letter that corresponds to the best answer.



1. How much did Renato deposit for the first 3 years?
   a. 20000, 32000 and 24000
   b. 16000, 18000 and 20000
   c. 16000, 20000 and 24000

2. What is the difference between the lowest and the highest amounts Renato deposited?
   a. 16000 b. 18000 c. 20000

3. How much more did Renato deposit in 2018 than he did in 2019?
   a. 4000 b. 6000 c. 8000

4. What was the total of the 2 lowest amounts Renato deposited?
   a. 32000 b. 34000 c. 36000

5. What was the total amount Renato deposited for the whole 5 years?
   a. 100,000 b. 110,000 c. 112,000

For number 6 -10: What was the average amount he deposited in 5 years?

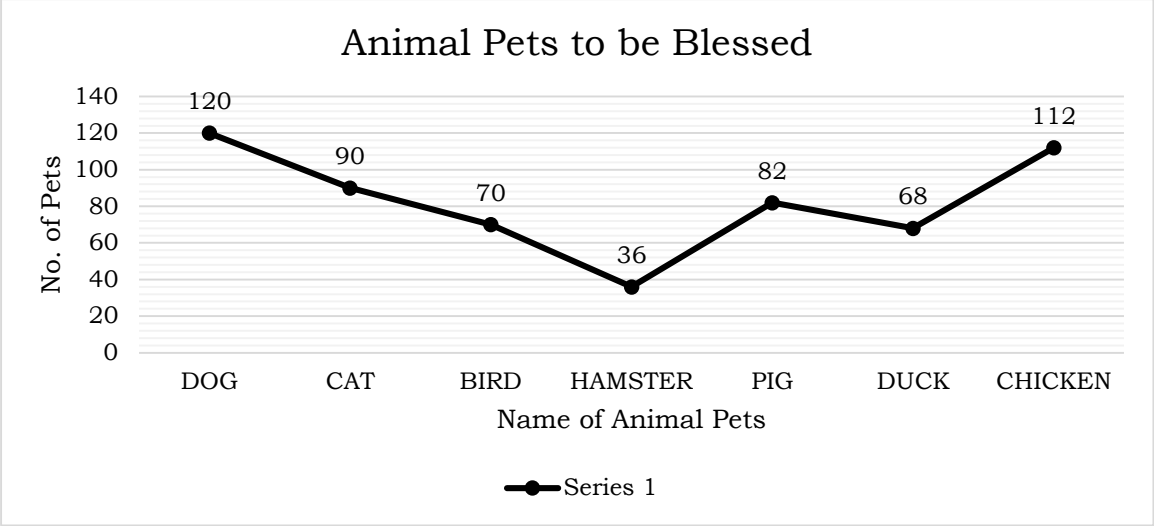
6. What is asked
   _____
7. What facts are needed to solve the problem?
   _____
8. What operation will you use?
   _____
9. What is the number sentence?
   _____
10. What is the complete answer?
    _____

Additional Activities

You made it! Finally, you're on the last activity. Answer all the questions correctly so you can climb to the top and get your trophy.

Directions: Solve the problem using the data presented in the line graph.

October 4 was the Feast day of St. Francis and the pupils of San Francisco Elementary School were asked to bring their pets to be blessed. The line graph below shows the kinds of animals as well as the number of each kind of animal the pupils brought that day.



1. How many more dogs than chickens were brought by the pupils to be blessed?
   a. What is asked?
      How many more dogs than chickens were brought by the pupils to be blessed?

      What facts are needed to solve the problem?
      The number of dogs and the number of chickens brought by the pupils.

   b. What operation will you use?
      Subtraction

   c. What is the number sentence?
      d = number of dogs – number of chickens What is the complete answer? n = 120 – 112 = 8

      The pupils brought 8 more dogs than chickens to be blessed on the Feast Day of St. Francis.

2. What is the total number of animals the pupils brought during the Feast Day?
   a. What is asked?
   _____
   b. What facts are needed to solve the problem?
   _____
   c. What operation will you use?
   _____
   d. What is the number sentence?
   _____
   e. What is the complete answer?
   _____

Answer Key

What I Can Do

1. a. The total sales at Lorna's Fruit Stall for the whole week.
b. 6000 sales on Monday
8000 sales on Tuesday
6000 sales on Wednesday
9500 sales on Thursday
9500 sales on Friday
6000 sales on Saturday
10,000 sales on Sunday
c. Addition
d. N = 6000 + 8000 + 6000 + 9500 + 9500 + 6000 + 10000
e. 6000 + 8000 + 6000 + 9500 + 9500 + 6000 + 10000 = 55000

The total sales Lorna's Fruit Stall for the whole week is 55000.

2. a. The total sales at Lorna's Fruit Stall for the first 3 days.
b. 6000 sales on Monday
8000 sales on Tuesday
6000 sales on Wednesday
c. Addition
d. N = 6000 + 8000 + 6000
e. 6000 + 8000 + 6000 = 20000

The total sales Lorna's Fruit Stall for the first 3 days is 20000.

3. a. The total sales at Lorna's Fruit Stall from Monday to Saturday.
b. 6000 sales on Monday
8000 sales on Tuesday
6000 sales on Wednesday
9500 sales on Thursday
9500 sales on Friday
6000 sales on Saturday
c. Addition
d. N = 6000 + 8000 + 6000 + 9500 + 9500 + 6000
e. 6000 + 8000 + 6000 + 9500 + 9500 + 6000 = 45000

The total sales Lorna's Fruit Stall from Monday to Saturday is 45000.

4. a. The average daily sales at Lorna's Fruit Stall for 7 days.
b. 6000 sales on Monday
8000 sales on Tuesday
6000 sales on Wednesday
9500 sales on Thursday
9500 sales on Friday
6000 sales on Saturday
10000 sales on Sunday
c. Addition and Division
d. N = 6000 + 8000 + 6000 + 9500 + 9500 + 6000 + 10000 ÷ 7
e. 6000 + 8000 + 6000 + 9500 + 9500 + 6000 + 10000 = 55000
55000 ÷ 7 = 7857.14

The average daily sales at Lorna's Fruit Stall for 7 days is 7857.14

Assessment

1. B 2. A 3. C 4. B 5.B

6. the average amount deposited in 5 years

7. Given:16000 -amount deposited in 2015
18000 - amount deposited in 2016
20000 - amount deposited in 2017
32000 - amount deposited in 2018
24000 - amount deposited in 2019

8. addition and division

9. N = 16000+18000+20000+32000+24000

10. 16000+18000+20000+32000+24000 =
110000

= The average amount deposited in 5 years is 110000.

Additional Activities

1. The total number of animals brought during Feast day.
2. Given Facts:
120- no. of dogs, 90-no. of cats, 70-no. of birds, 36- no. of hamster, 82- no. of pigs, 68--no. of ducks, 112- no. of chickens
3. Addition
4. N = 120+90+70+36+82+68+112
5. 120+90+70+36+82+68+112=578

The total number of animals brought during Feast day is 578.

What I Know

1. C
2. B
3. B
4. A
5. B
6. C
7. A
8. A
9. B
10. A

What's In

1. Daily Temperature in Samar and Manila
2. Friday
3. 10
4. 10
5. Manila

What's More

Activity 1: **Follow My Steps!**

1. UNDERSTAND:

a. The total no. of plastic bottles collected on Monday, Tuesday, and Wednesday

b. Given Facts:

17- plastic bottles on Monday
11- plastic bottles on Tuesday
9- plastic bottles on Wednesday

c. word clue: how many

PLAN:

a. Addition
b. N = 17 + 11 + 9

SOLVE: 17 + 11 + 9 = 37

State your answer: The total number of plastic bottles collected on Monday, Tuesday and Wednesday is 37.

2. UNDERSTAND:

a. The difference in the number of plastic bottles collected on Friday and Wednesday

b. Given:

19 - plastic bottles collected on Friday
9 - plastic bottles collected on Wednesday

c. difference

PLAN:

a. Subtraction
b. N = 19 - 9

SOLVE: 19-9 = 10

CHECK:

a. 10+9=19
b. The difference in the number of plastic bottles collected on Friday and Wednesday is 10 bottles.

3. UNDERSTAND:

a. The total number of plastic bottles collected in 5 days

b. Given:

17 - plastic bottles collected on Monday
11 - plastic bottles collected on Tues.
9 - plastic bottles collected on Wed.
15 - plastic bottles collected on Thurs.
19 - plastic bottles collected on Friday

c. Total number

PLAN:

a. Addition
b. N = 17+11+9+15+19

SOLVE: 17+11+9+15+19 = 71

The total number of plastic bottles collected in 5 days is 71.

What I Have Learned

A.

1. standard
2. without
3. Understand
4. Plan
5. Solve
6. Check and Look back

References

Lumbre, Angelina P., and Alvin C. Ursua. 2016. *21St Century Mathematics 5 Textbook*. Quezon City: Vibal Group, Inc.

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