Name _____ Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

Investigation 1: Systems

1. A class has decided to use a worm bin to vermicompost lunch scraps. One student is in charge of figuring out the size of the worm bin. She found out that they need a surface area of 900 square centimeters (cm) for every 500 grams (g) of food scraps per week. The class produces about 1.5 kilograms (kg) of food scraps a week.

   Design a worm bin that would have a large enough surface area to vermicompost the class lunch scraps. Show your work, including a drawing that shows the length and width of the bin. (The height of the bin can be 20 cm.)

2. Another student is in charge of figuring out how many redworms the class needs to put in the worm bin. This is what he knows about the food habits of redworms and his classmates.
   - Redworms can eat about half of their weight in food every day.
   - One thousand (1,000) worms weigh about 0.5 kg.
   - Each student produces about 25 g of lunch scraps a day.
   - There are 30 students in the class.

   What is the smallest number of worms they need for the worm bin? Show your work.

3. The class worm bin is 3 months old. There are so many more worms now! One science group wants to know how fast redworms reproduce. This is what they know about the redworm life cycle.
   - Redworms have both eggs and sperm and can produce cocoons.
   - Redworms can produce cocoons at 3 months old.
   - Redworms produce 3 cocoons per week.
   - It takes 11 weeks for the cocoons to hatch.
   - Each cocoon produces an average of 3 baby redworms.

   The group puts 2 worms in a worm bin and observes them for 3 months.

   How many cocoons might the group find in the worm bin after 11 weeks? How many baby worms? Show your work.

   How many cocoons would there be after 12 weeks? How many baby worms? Show your work.

   If the class worm bin started with 1,000 worms, how many baby worms might they have after 3 months?

Name _____ Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

Investigation 2: Nutrient Systems

You get energy from food.

Three classes of nutrients provide energy: carbohydrate, protein, and fat.

Food energy is measured in calories. You get calories from carbohydrate, protein, and fat.

You get different numbers of calories from different nutrients.

1 gram of carbohydrate = 4 calories (Cal)

1 gram of protein = 4 calories (Cal)

1 gram of fat = 9 calories (Cal)

If you know how much carbohydrate, protein, and fat is in a piece of food, you can calculate how many calories it has. For instance, if a baked potato has 50 g of carbohydrate, 1 g of protein, and 1 g of fat, you can calculate the total calories.

50 g carbohydrate × 4 Cal/g = 200 Cal

1 g protein × 4 Cal/g = 4 Cal

1 g fat × 9 Cal/g = 9 Cal

Total = 213 Cal

Problem

A boy went to a baseball game. During the game, he ate a hot dog, a bag of chips, and a soft drink. When he got home, he wondered how many calories he got from his fast-food meal. He looked up the average calories for the items he ate. The data are shown in the table.

Food item	Protein (g) (4 Cal/g)	Carbohydrate (g) (4 Cal/g)	Fat (g) (9 Cal/g)
Hot dog	8	20	16
Potato chips	4	31	20
Soft drink	0	36	0

How many calories was the boy's meal?

He was happy with the total calories in his meal. But he wants to have only 30 percent of his calories from fat. Does fat provide more than 30 percent of the calories of his meal?

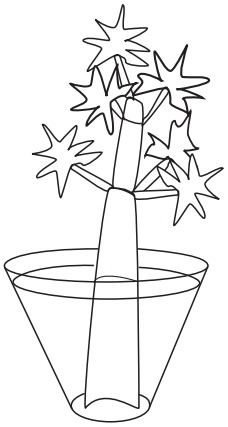
If the boy has too much fat in his meal, how many grams of fat will he have to remove? How many grams of carbohydrate and/or protein will he have to add?

Name _____ Date _____

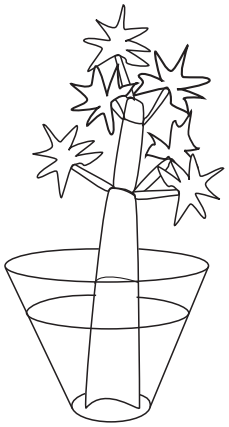
MATH EXTENSION—PROBLEM OF THE WEEK

Investigation 3: Transport Systems

A student (Student A) put a stalk of celery with six leaves in 100 milliliters (mL) of water. The celery leaves were all about the same size. One day later, there was only 70 mL of water left in the cup.

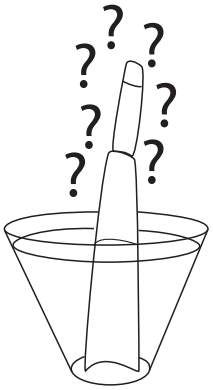


Student A setup at starting time

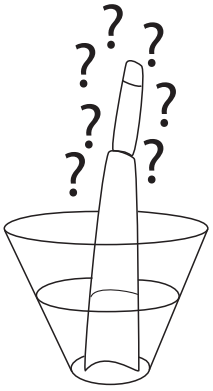


Student A setup 1 day later

Another student (Student B) put a stalk of celery in 100 mL of water. One day later, only 50 mL of water was left in the cup.



Student B setup at starting time



Student B setup 1 day later

How many leaves were on Students B's celery stalk?

Name _____ Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

Investigation 4: Sensory Systems

Students in a class were testing their arm/shoulder muscle strength by doing chair push-ups. Each student did as many push-ups as he or she could without resting. Here are the results.

Boy A 11	Boy C 15	Boy F 17	Girl H 14
Girl A 16	Boy D 15	Boy G 14	Boy I 16
Girl B 15	Girl D 12	Boy H 14	Girl I 10
Boy B 19	Boy E 20	Girl F 16	Girl J 17
Girl C 14	Girl E 18	Girl G 15	Boy J 13

Graph the results.

What was the total number of push-ups done by the class? _____

What questions do you have that can be answered by analyzing these data?