Name _____ Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

Investigation 1: Motion and Variables

Eight teams of students were experimenting with pendulums to find out how they work. Each team made a pendulum of a different length. Their teacher asked them to find out how many times their pendulum would swing. What the teacher forgot to tell the students was how long to count the swings. The table below shows the data collected by the eight teams. From this information, can you put the pendulums in order from shortest to longest?

Team	Number of cycles	Time (seconds)
1	9	20
2	11	12
3	9	15
4	36	30
5	10	10
6	10	15
7	8	20
8	10	12

Put the pendulums in order from shortest to longest by team number.

Shortest _____

_____

_____

_____

_____

_____

_____

Longest _____

Name _____ Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

Investigation 2: Balls, Ramps, and Energy

A major league baseball pitcher can throw a fastball at about 90 miles per hour, which is equal to 40 meters (m) per second. A really fast tennis serve was clocked at 73 m per second.

A standard baseball has a mass of 145 grams (g).
A standard tennis ball has a mass of 57 g.

If a major league fastball were to meet a tennis-ball serve head on, what would happen? Why do you think that would happen?

To calculate momentum, use the following formula:

momentum = mass X speed

Name _____ Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

Investigation 3: Springs and Energy

Using the FOSS website (www.FOSSweb.com), two teams of students from different states decided to collaborate on a project to test variables. They designed a controlled experiment to investigate how far a skateboard would roll across flat ground when released from the top of a 2 meter slope. The angle of the slope could be changed incrementally to conduct additional trials. This is what the experimental setup looked like.

The two classes conducted the same sets of experiments and compared results. The Texas class conducted four trials at each angle; the Massachusetts class conducted three trials. Help them analyze the results of their experiments. The two tables show the data they recorded.

Texas

Angle	10°	20°	40°	50°
Distance	105 cm	270 cm	530 cm	610 cm
	370 cm	310 cm	490 cm	550 cm
	210 cm	250 cm	540 cm	630 cm
	185 cm	340 cm	460 cm	580 cm

Massachusetts

Angle	10°	20°	40°	50°
Distance	75 cm	280 cm	480 cm	625 cm
	240 cm	360 cm	570 cm	710 cm
	230 cm	310 cm	490 cm	600 cm

- What is the average distance the Texas team's board traveled at each angle? Plot the results of the Texas team's experiments on a two-coordinate graph.
- Add together both teams' results and average the distances. Graph the averages. What happens to the graph?
- If your class did the same experiment but launched your skateboard at a 30° angle, predict how far the board would travel.

Name _____ Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

Investigation 4: Models and Design

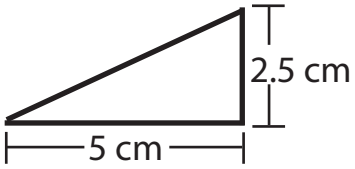
A class wanted to make their own black boxes, using small cereal boxes and cardboard shapes, to send to another class. They plan to make 24 boxes.

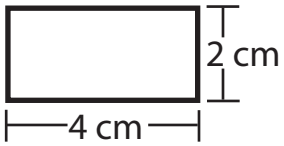
- One-half of the boxes will have one triangle inside.
- One-third of the boxes will have two rectangles inside.
- The rest of the boxes will have one triangle and one rectangle inside.

How many of each shape will they need? How do you know?

The dimensions of the triangles and rectangles are shown below. Use the centimeter grid to make a drawing to show how you would cut all the shapes from one piece of cardboard. (The shapes and grid are smaller than reality but are drawn to scale.)

What is the smallest piece of cardboard that all the triangles and rectangles can be cut from?





Centimeter graph paper