Mathematics Assessment Program ***MS - 5***

Middle School Mathematics

Time Allowed

Section A - 40 minutes; Section B - 40 minutes

These tasks give you a chance to show what you know and how you reason, and to solve mathematical problems.

Please show your work and reasoning in the spaces provided. Explain any assumptions you make.

Try as many tasks as you can in the time given.
If you get stuck on a task, move on to the next task.

Name: _____ Male Female

School: _____ City: _____

Teacher: _____ Grade: _____

Date: _____

Do not write in the box below:

MS-5	Short Tasks	Division	Shelves	Aaron's Designs	Card Game	Ice Cream	Counting Trees	Total

These tests were developed with support from the Bill and Melinda Gates Foundation

Section A - 40 minutes

Short Tasks

1. Hugh uses 13 grams of coffee powder to each liter of water.
   He has a cup that holds 0.3 liters of water.
   How much coffee powder should he use?

_____

2. What number is half way between **–3** and **4** ?

_____

3. Use the formula
   $P = \frac{V^2}{R}$ to calculate the value of P when $V = 6 \times 10^6$ and $R = 7.2 \times 10^8$

_____

4. Jeff takes 20 minutes to jog around the race course one time, and 25 minutes to jog around a second time. What is his average speed in miles per hour for the whole jog if the course is 3 miles long?

_____

5. Find the number of degrees that the hour hand of a clock moves through between noon and 2.30 in the afternoon of the same day.

_____

Division

When you calculate 100 ÷ 6 using a calculator, the result is 16.6666667.

This result can be used to give a **sensible** answer to all the following questions except one.

1. Write down the sensible answers and find the question that cannot be answered using this result.

   a. How much does each person pay when 6 people share the cost of a meal costing $100?

   _____

   b. 100 children each need a pencil. Pencils are sold in packs of 6. How many packs are needed?

   _____

   c. What is the cost per gram of shampoo costing $6 for 100 grams?

   _____

   d. How many CDs costing $6 each can be bought for $100?

   _____

   e. What is the average distance per day, to the nearest mile, traveled by a hiker on the Appalachian Trail, who covers 100 miles in 6 days?

   _____

2. Write another question, together with its sensible answer, that can be answered using 100 ÷ 6.

   _____

   _____

Shelves

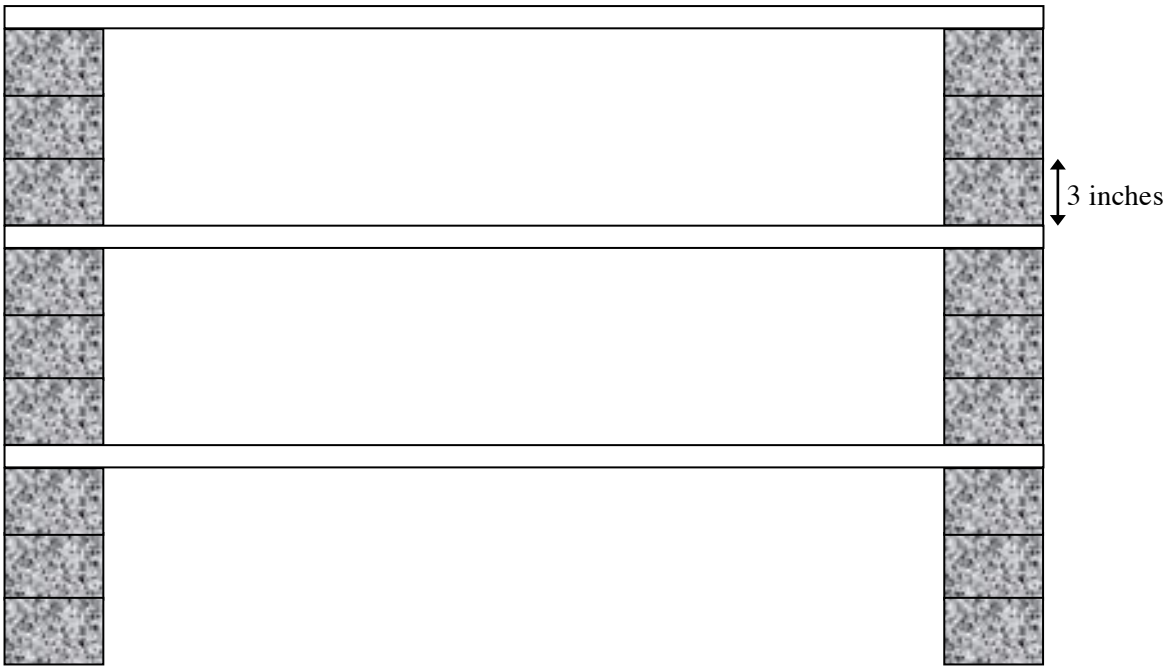
Pete is making a bookcase for his books and other stuff.

He already has plenty of bricks and can get planks of wood for $2.50 each.

Each plank of wood measures 1 inch by 9 inches by 48 inches.

Each brick measures 3 inches by 4.5 inches by 9 inches.

For each shelf, Pete will put three bricks at each end then put a plank of wood on top.
The diagram shows three shelves.



1. Pete wants five shelves in his bookcase.

   a. How many planks of wood does he need? _____

   b. How many bricks does he need? _____

   c. How high will the shelves be? _____

   d. How much will the bookcase cost? _____

The diagram below shows graphs with the following descriptions:

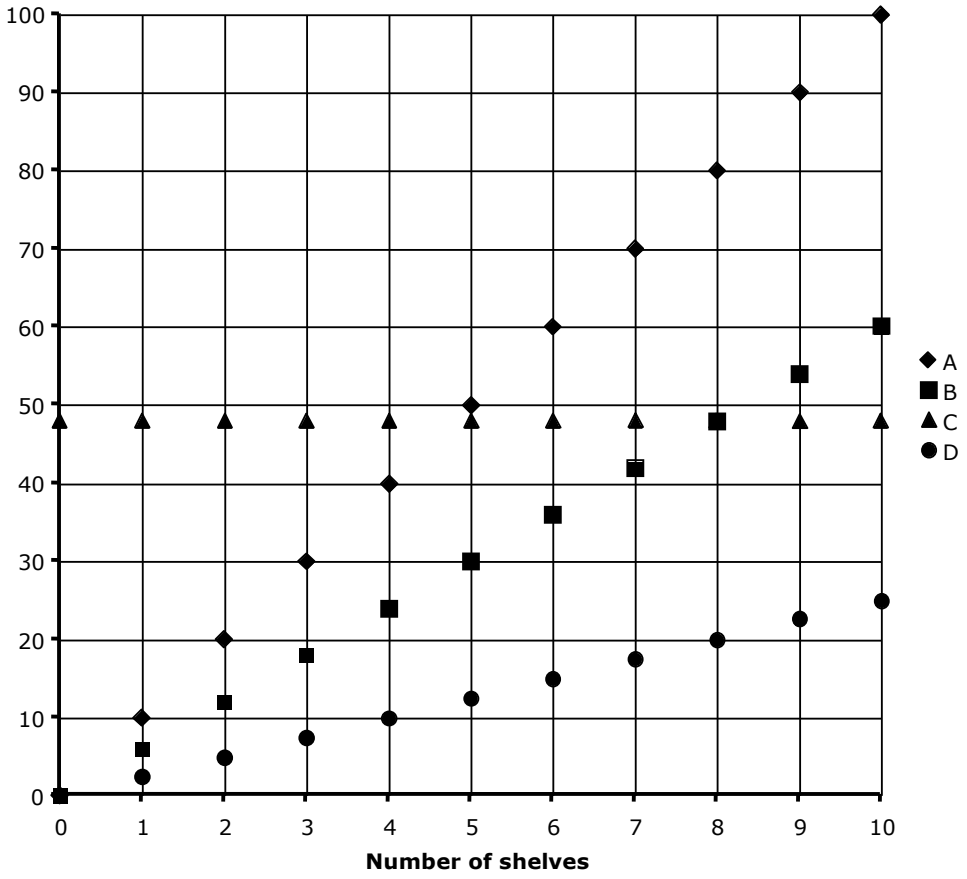
Description One: The cost of the bookcase against the number of shelves.

Description Two: The number of bricks against the number of shelves.

Description Three: The height of the bookcase against the number of shelves.

Description Four: The width of the bookcase against the number of shelves.
The equations of the graphs are

$y = 48$, $y = 10x$, $y = 6x$, $y = 2.5x$



2. Complete this table to match each graph with its description and its equation.

Graph letter	Description number	Equation
A		
B		
C		
D		

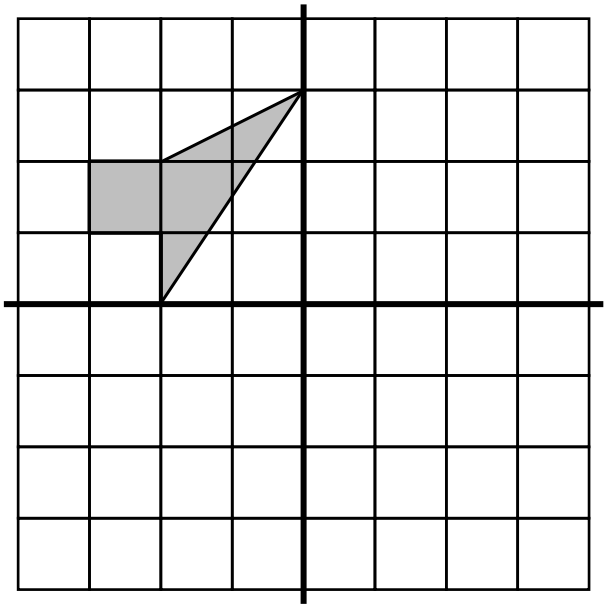
Aaron's Designs

Aaron is drawing some designs for greetings cards.
He divides a grid into 4 quadrants and starts by drawing a shape in one quadrant.
He then reflects, rotates or translates the shape into the other three quadrants.

1. Finish Aaron's first design by reflecting the gray shape over the vertical line.

   Then reflect both of the shapes over the horizontal line.

   This will make a design in all four quadrants.

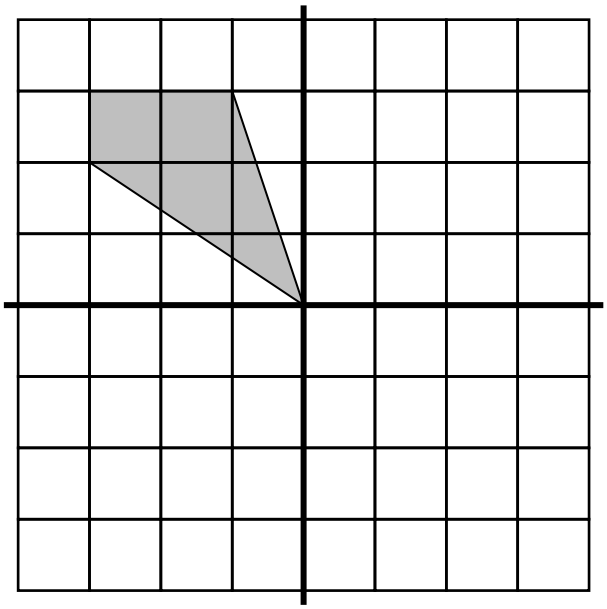


2. To finish drawing Aaron's second design, rotate the gray shape 1/4 of a turn in a clockwise direction about the origin. Then draw the second shape.

   Rotate the second shape 1/4 of a turn in a clockwise direction about the origin. Then draw the third shape.

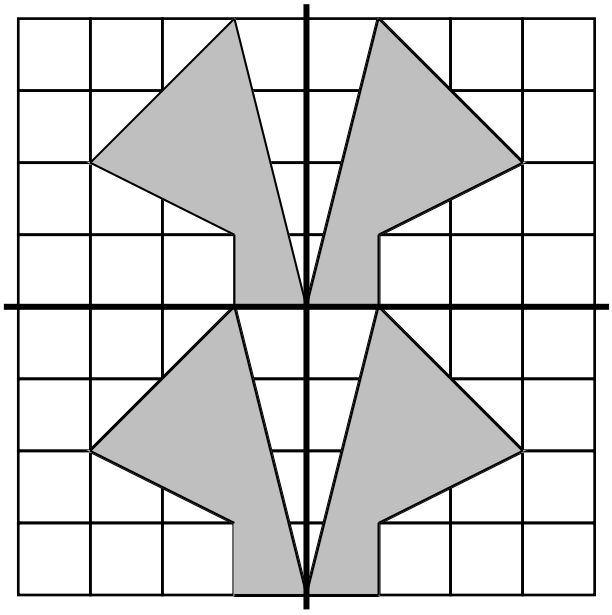
   Rotate the third shape 1/4 of a turn in a clockwise direction about the origin. Then draw the fourth shape.

   This will make a design in all four quadrants.



3. This is Aaron's third design.

   He started with one gray shape in the top left hand quadrant of the grid and transformed it to make the design.

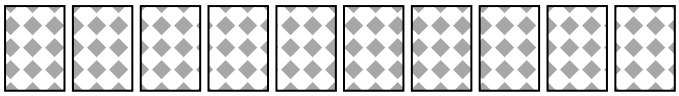


Describe the transformations that Aaron may have used to draw this design.

Card Game

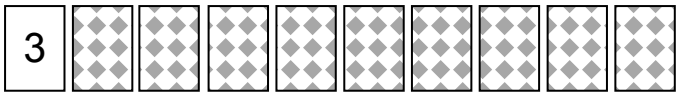
Mrs Jakeman is teaching her class about probability.

She has ten cards, numbered 1 to 10, which she mixes up and stands on a shelf turned so that the numbers do not show.



Mrs Jakeman turns the cards round on at a time.
The class has to guess whether the next card will have a higher number than the last one turned or a lower number.

The first card turned is the 3.



1. Would you expect the next number to be higher than 3 or lower?

_____

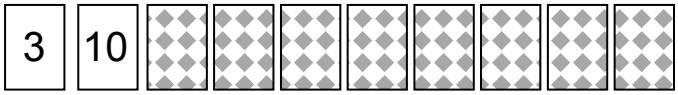
Explain why you made this decision.

_____.

_____

_____

The next card is number 10.



2. What is the probability that the next card will be a higher number?

_____

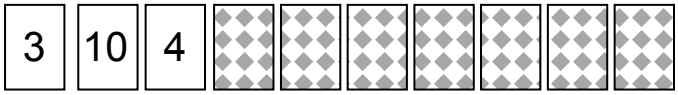
Explain how you know.

_____.

_____

_____

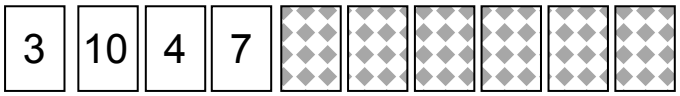
The next card is number 4.



3. What is the probability that the next number is higher?

Show your work.

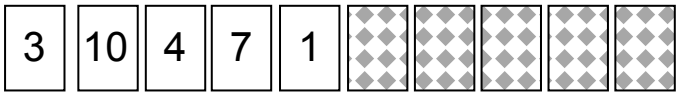
The next card is number 7.



4. What is the probability that the next number is lower?

Show your work.

The fifth card is the 1.



When the sixth card is turned the probability that the following one is higher is the same as the probability that it is lower.

5. What must the sixth card be?

Explain how you figured it out.

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Section B - 40 minutes

Ice Cream

You are planning to make and sell ice creams at a school sports event.

You expect to make and sell 300 ice creams.

You buy ice cream in 1 liter tubs. Each tub costs $2.

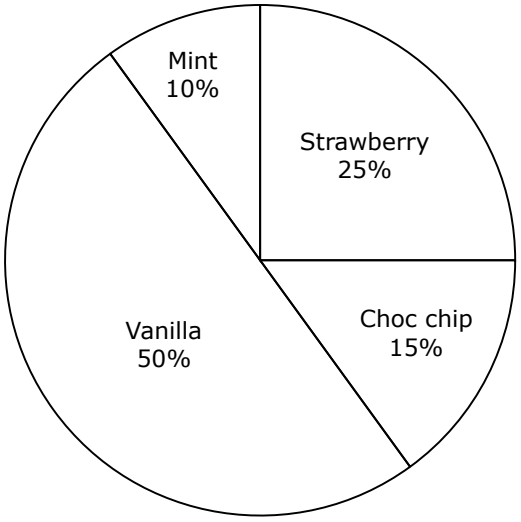
You can fill ten cones from each tub.

Each empty cone costs 5¢

You plan to sell each filled cone for 80¢.

Before buying the ice cream, you survey 60 people to find out what flavors they like.
Here are the results of the survey:

Favorite flavors



Ice Cream continued

1. Figure out the quantities you need to buy and their costs.
   Explain how you figured it out.

_____

_____

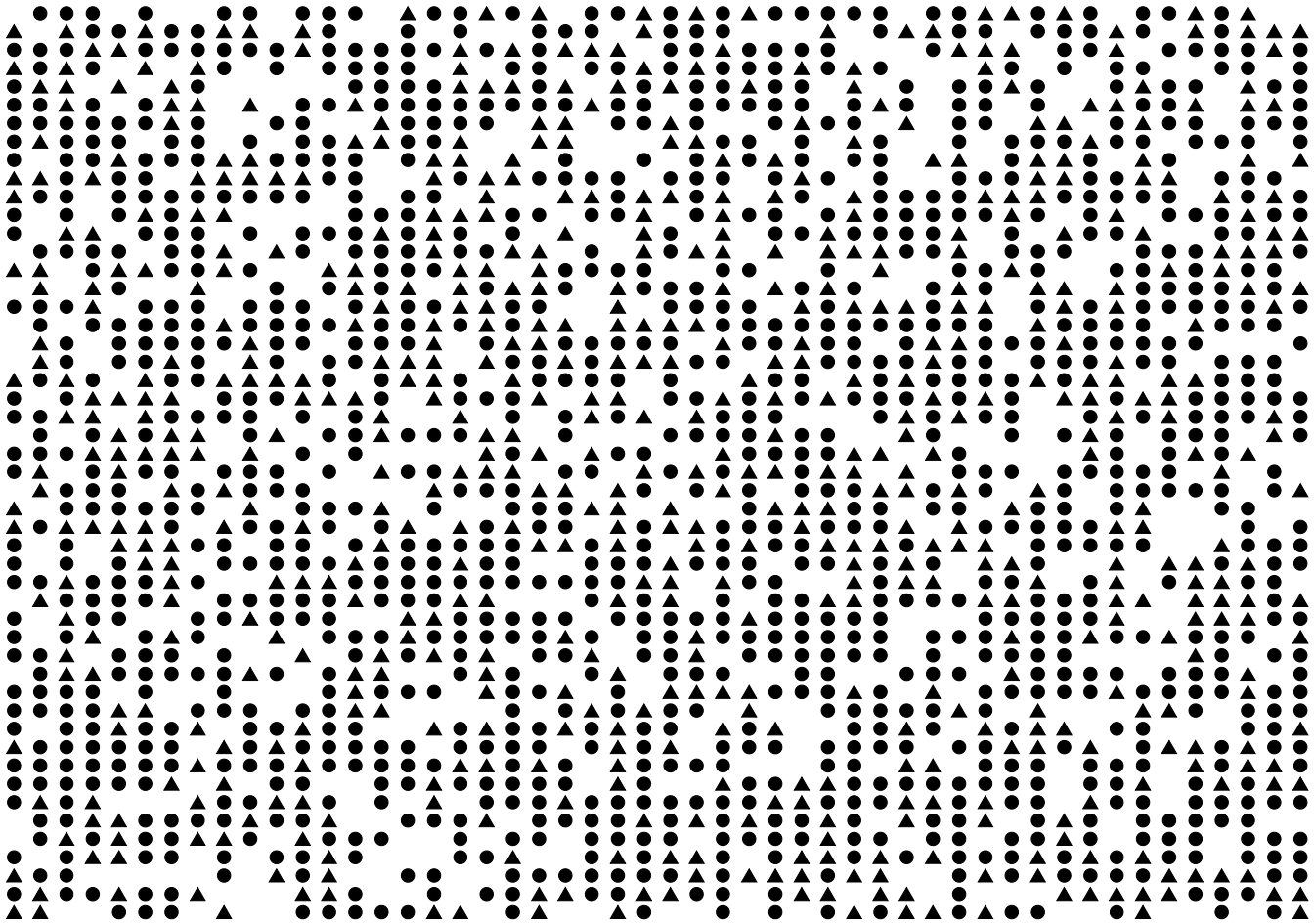
_____

_____

_____

2. How much profit do you expect to make on the day? _____
   Show all your reasoning and your calculations clearly.

Counting Trees



This diagram shows some trees in a tree farm.

The circles ● show old trees and the triangles ▲ show young trees.

Tom wants to know how many trees there are of each type, but says it would take too long counting them all, one-by-one.

1. What method could he use to estimate the number of trees of each type?
   Explain your method fully.

Counting Trees WORKSHEET

2. On this worksheet, use your method to estimate the number of:
   a. Old trees and b. Young trees