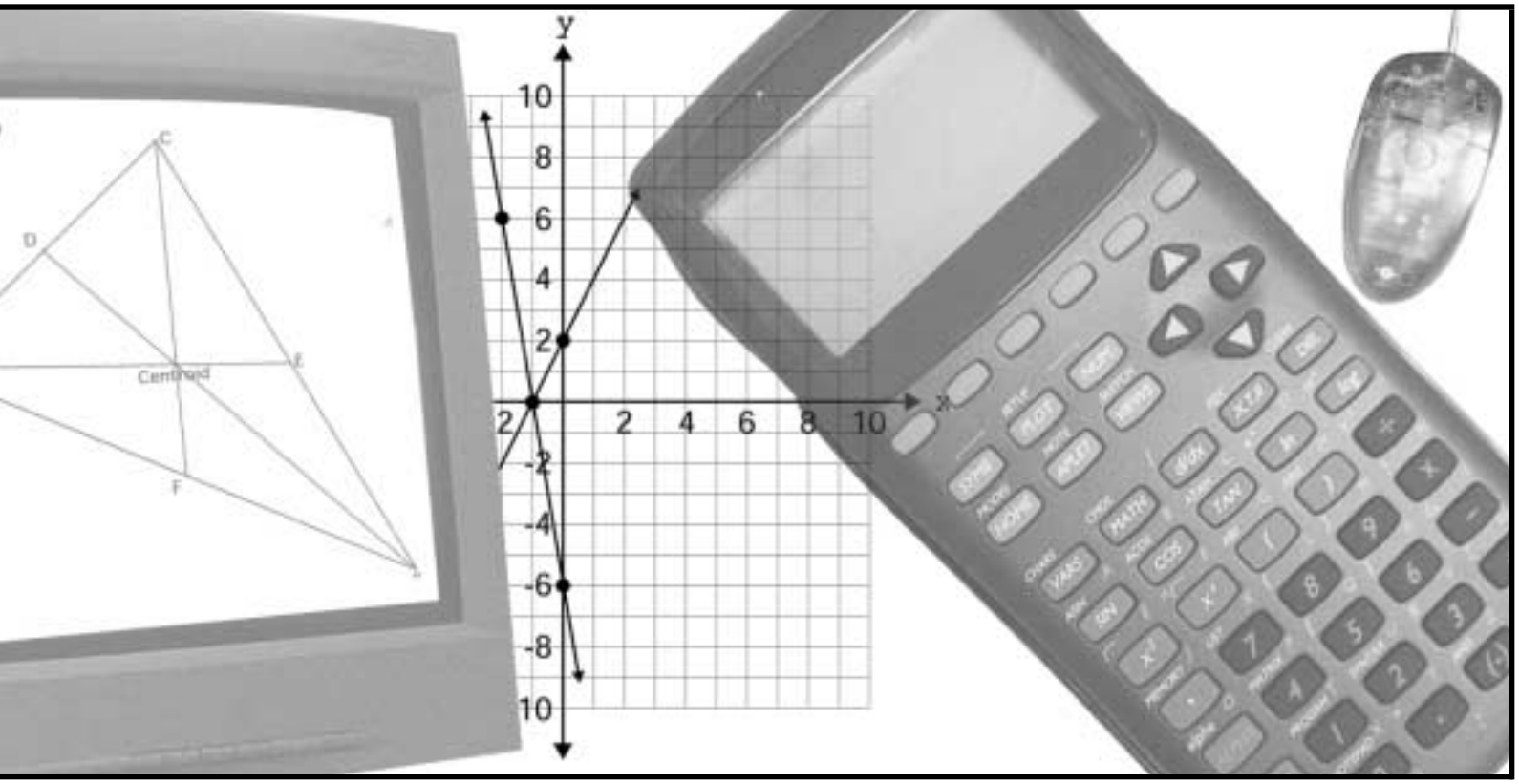
Grade 9 Assessment of Mathematics, 2002–2003



Academic Booklet 2

EQAO
Education
Quality and
Accountability
Office

Directions to Students About Answering Tasks

1. For this part of the assessment, make sure you have the following items along with *Booklet 2*:
   - a pencil and an eraser or a pen
   - a scientific or graphing calculator
   - a ruler and a protractor
2. Do all of your work (even your rough work) in *Booklet 2*.
3. You will work in the booklet on two different days. Each day you will have 40 min to do 3 tasks. Allow about 15 min for each of the first two tasks and about 10 min for the third. Give yourself time to answer all of the questions.
4. Figures in this section are not drawn to scale.
5. The tasks are designed to allow you an opportunity to show what you know and what you can do. Provide as much information as you can to show your understanding. Your teacher may be marking some of your work. In addition, someone who does not know your work will mark all of it, including what your teacher has marked. So, you must provide clear, well-organized answers to illustrate your complete understanding and ability to communicate in mathematics.
6. Make sure you follow directions from the Key Words and Phrases in Instructions sheet. It is provided for you so you will know the kind of question that is being asked.

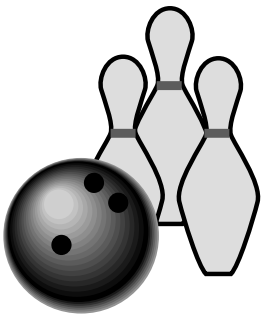
   For example, the question might ask you to "**Show your work**." Read the Key Words and Phrases in Instructions sheet. It says to record all calculations. If you use your calculator, you need to show what calculations you do. If you sketch a graph in the process of getting to your solution, show the sketch and label it. Use proper and correct mathematical conventions when you present your work.
7. When using a calculator, write down the numbers and operations that you carried out on the calculator.

   For example: Find the area of a circle with a diameter of 7 cm.

   You need to write $A = \pi(3.5)^2$
   as well as the answer you got on your calculator.
8. There are always many different ways to solve a problem. Use your broad range of mathematical knowledge to present a complete and creative solution to each question.
9. You have **40 min** to work.
10. When you see the 

sign, you have completed the work for the day. Check your answers. Then wait quietly for directions from your teacher.

Task 1: Bowling!



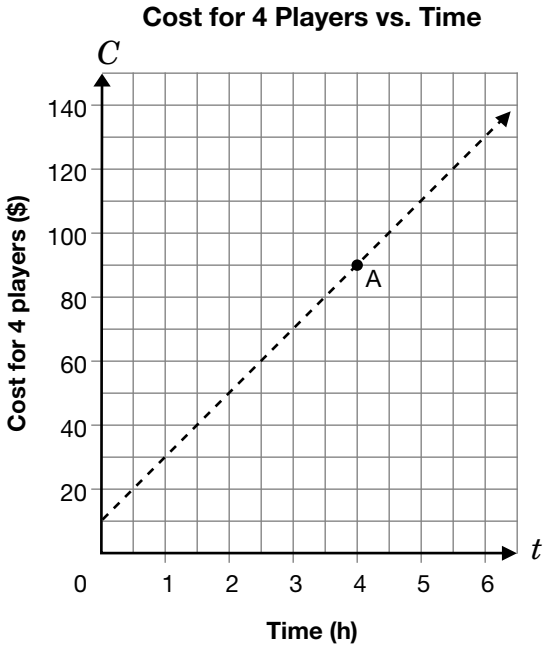
A group of 4 friends is going bowling at **Bowling Bonanza.** **Bowling Bonanza** charges

- $2.50 for each player to rent shoes
  plus
- $20/h for a group of 4 to bowl.

a) The graph below represents the relationship between cost, C, in dollars, and time, t, in hours, for 4 players to bowl.

i) **Write the coordinates** of point A.

ii) **Explain** what the coordinates of point A tell you about the cost of bowling.



b) **Explain** how this graph would change if the cost for renting the shoes increased.

> **Hint:**
> Refer to slope and y-intercept.

c) **Circle** the equation that represents the graph in question **a).**

$C = 20t + 10$ $C = 20t^2 + 10$ $C = \frac{20}{t} + 10$

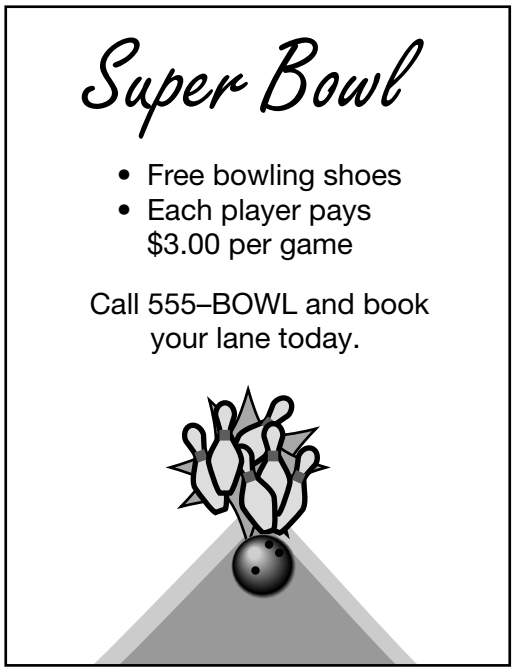
Give reasons for your answer.

d) This group of friends wants to spend $80.
How many hours can they bowl at **Bowling Bonanza?**
Give reasons for your answer or **show your work.**

e) William **and** his 3 friends are going bowling.
He finds an advertisement in the newspaper for a new bowling alley, **Super Bowl.**
William and his friends will play 6 games in 3 hours.

Determine whether William and his friends should go bowling at **Bowling Bonanza** or **Super Bowl.** Use the information given in the advertisement and in the hint box.

Give reasons for your answer.



Hint:
Bowling Bonanza charges
• $2.50 for each player to rent shoes
and
• $20/h for a group of 4 to bowl.

Task 2: BC Bound

Students at Jayson's school are planning a school trip to Vancouver. Jayson is working with the organizers. They have gathered the following information about costs.

- The price of airfare for each person is $600.
- The cost of the hotel room is $60 **per night per student** and twice that **per night per adult**.

The organizers want to calculate the total cost of different combinations of numbers of nights and numbers of students and teachers.

a) Calculate the total cost of the trip, including airfare, for **one** student staying **six** nights in the hotel. **Show your work**.

b) Calculate the total cost of the trip, including airfare, for **one** adult staying **four** nights in the hotel. **Show your work**.

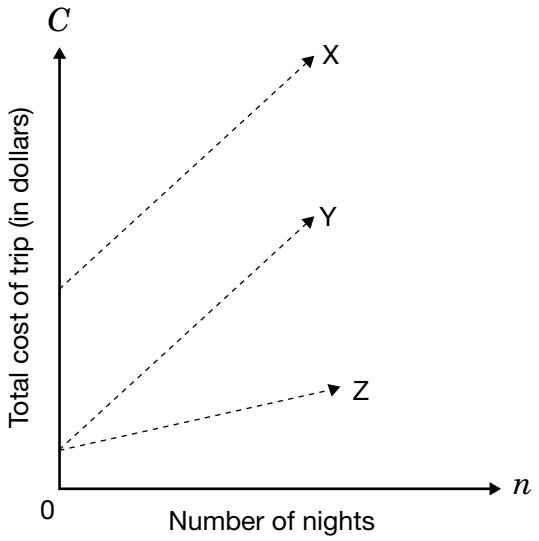
c) Let n represent the number of nights the students and adults will stay in the hotel and let C represent the total cost including airfare for the Vancouver trip.

i) Write an **equation** to represent the total cost of a trip for Jayson (a student) if he stays n nights.

ii) Write an **equation** to represent the total cost of a trip for **five** students if each stays n nights. Expand and simplify if possible.

iii) Write an **equation** to represent the total cost of a trip for **five** students and **one** adult if each stays n nights.
Simplify if possible.

d) There are three lines on the graph below.
One line represents the total cost of a trip for **one** student if he or she stays n nights.
Another line represents the total cost of a trip for a group of **five** students if they stay n nights.



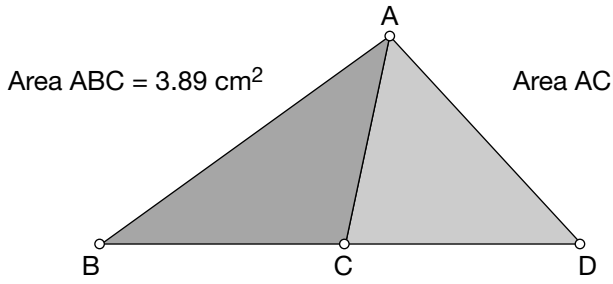
i) Which line represents the total cost of a trip for one student who stays n nights?
Give reasons for your answer.

ii) Which line represents the total cost of a trip for **five** students who stay n nights?
Give reasons for your answer.

e) **Five teachers** travel to Vancouver and stay **seven** nights. How many **students** could travel to Vancouver and stay for **seven** nights for the same total cost?
Show your work.

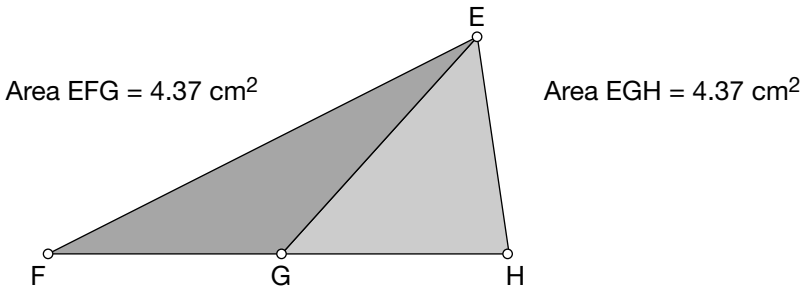
Task 3: Mission Improbable

Case 1: AC is the median of $\triangle ABD$.

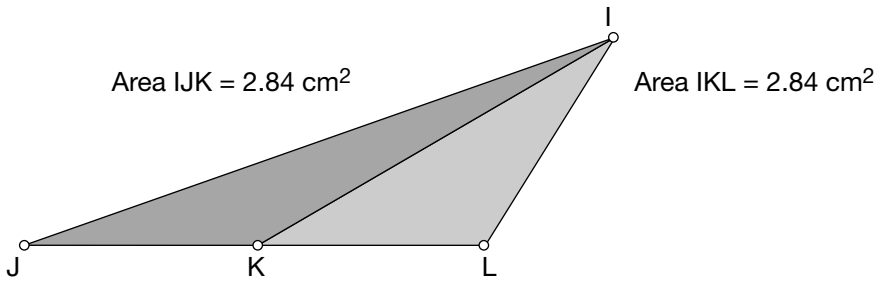


Hint:
A median is a line segment joining a vertex of a triangle to the midpoint on the opposite side.

Case 2: EG is the median of $\triangle EFH$.



Case 3: IK is the median of $\triangle IJL$.



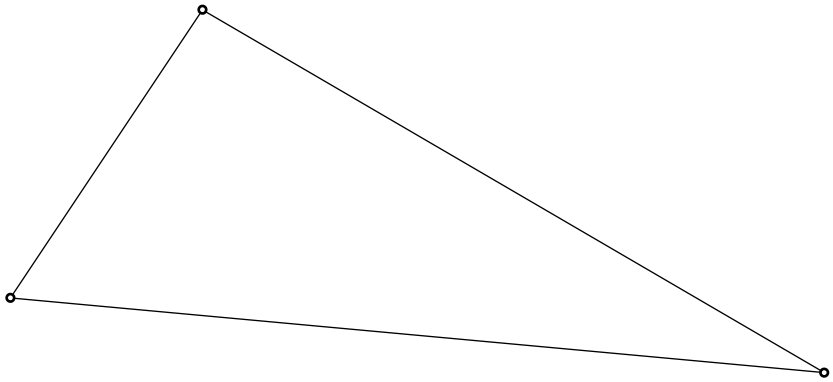
a) Each median cuts a triangle into two smaller triangles.
Examine the information about the two smaller triangles within each triangle.

Write a hypothesis about the relationship between a **median** and the **areas** of the smaller triangles.

b) A compact disc containing top secret information has been lost in a triangular field. Agent 008 and three members of her crew are preparing to search for the missing disc. The triangle below represents the field.

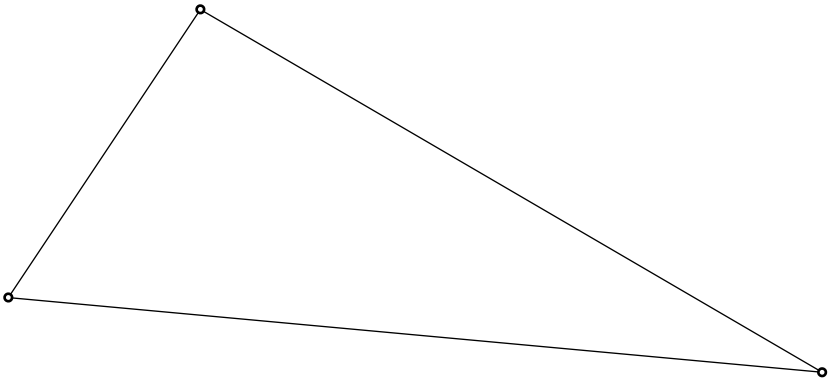
i) Divide the triangle into four equal search areas.
List the steps you used to construct the equal parts.
Explain how you know you are right.

Hint:
Refer to question **a).**

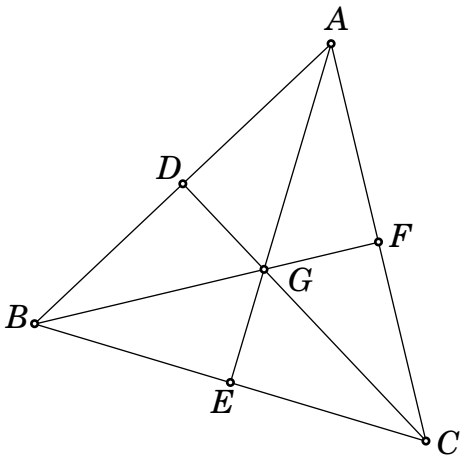


Steps:

ii) **Sketch** a possible construction for dividing the triangle into four equal areas that is different from the one you drew above.



c) Agent 008 has just found out that the field is in the shape of an equilateral triangle. She has also found out that there will now be a total of six agents searching for the lost disc.



The diagram on the right above shows how Agent 008 divided the field into six sections, using the medians of the triangle.

Describe in detail how you would use geometry tools to determine whether the field has been divided into six sections of equal area. Your geometry tools could include rulers, protractors, compasses and dynamic geometry software such as The Geometer's Sketchpad.