

Preparing Students for **PISA***

Mathematical Literacy

Assessment Questions

* Programme for International Student Assessment

Dear Student,

The tasks and questions in this booklet are for you to practise your mathematical skills. If you have been selected to participate in the Programme for International Student Assessment (PISA) then you should be confident that you will do well. By paying close attention in your mathematics class and by working through the tasks and questions in this booklet, you will be well prepared to complete the assessment with success.

Here are a few assessment-taking strategies:

- Always read the information for each task carefully. Think about what the information is telling you.
- Reread each task question and any accompanying text before attempting an answer.
- Give each question a try, even if you are not sure. Remember that partial value is given for partially correct answers.
- Questions that begin with Why? Why do you think? or How do you know? require more than a few words to answer. Take your time to fully explain and give reasons for your answer.
- For graphs, study the axes and determine the purpose of the information before attempting an answer.
- For multiple choice questions, look at each choice and eliminate those that are incorrect or not the best possible answer. There is no penalty for guessing, if you do not know the exact answer.

Best wishes with the tasks that follow.

Mathematics Task 1

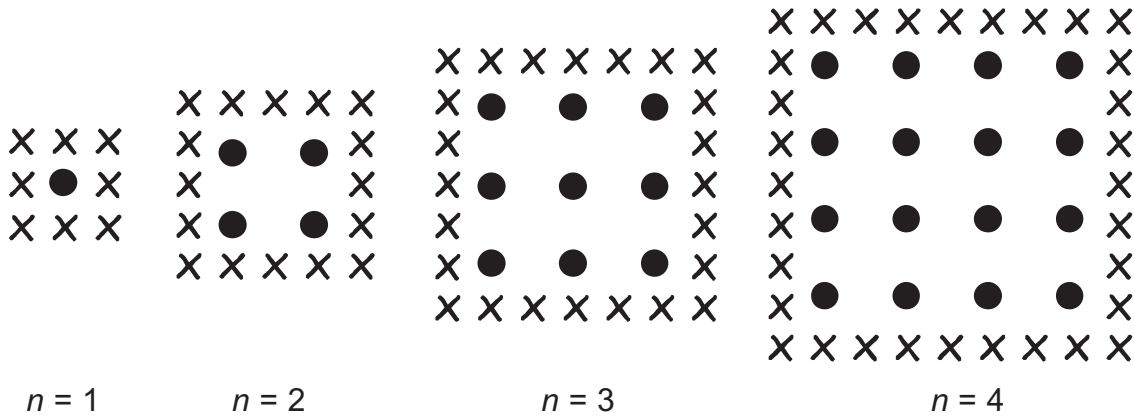
APPLES



A farmer plants apple trees in a square pattern. In order to protect the trees from the wind he plants evergreens all around the orchard.

The diagram below illustrates the pattern of apple trees and evergreens for any number (n) of rows of apple trees:

- X = evergreen
- = apple tree



Question 1:

Complete the table:

n	Number of Apple Trees	Number of Evergreens
1	1	8
2	4	
3		
4		
7		

Question 2:

There are two formulae you can use to calculate the number of apple trees and the number of evergreens for the pattern described above:

Let " n " be the number of rows of apple trees

Then, the number of apples trees = _____

and the number of evergreens = _____

There is a value for " n " for which the number of apple trees equals the number of evergreens. Find the value of " n " and show your method of calculating this.

Question 3:

Suppose the farmer wants to make a much larger orchard with many rows of trees. As the farmer makes the orchard bigger, which will increase more quickly: the number of apple trees or the number of evergreens? Explain how you found your answer.

Mathematics Task 2

ANTARCTICA

Question 1:

Estimate the area of Antarctica using the map scale. Show your work and explain how you made your estimate. (You can draw over the map if it helps you with your estimation.)



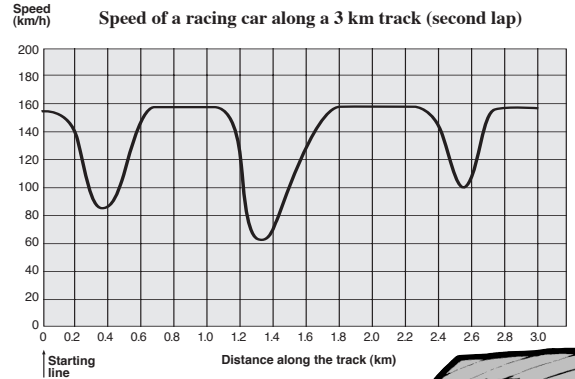
Mathematics Task 3

RACING CAR

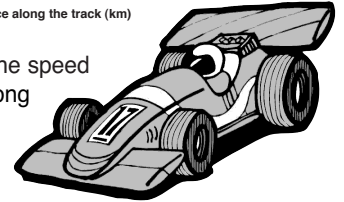
Question 1:

What is the approximate distance from the starting line to the beginning of the longest straight section of the track?

- A. 0.5 km
- B. 1.5 km
- C. 2.3 km
- D. 2.6 km



This graph shows how the speed of a racing car varies along a flat 3 kilometre track during its second lap.



Question 2:

Where is the lowest speed recorded during the second lap?

- A. at the starting line
- B. at about 0.8 km
- C. at about 1.3 km
- D. half-way around the track

Question 3:

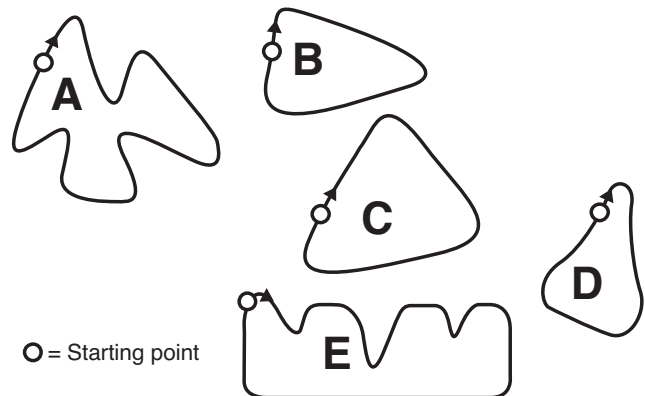
What can you say about the speed of the car between the 2.6 km and 2.8 km marks?

- A. The speed of the car remains constant.
- B. The speed of the car is increasing.
- C. The speed of the car is decreasing.
- D. The speed of the car cannot be determined from the graph.

Question 4:

Along which one of the tracks below was the car driven to produce the speed graph above?

- A.
- B.
- C.
- D.
- E.



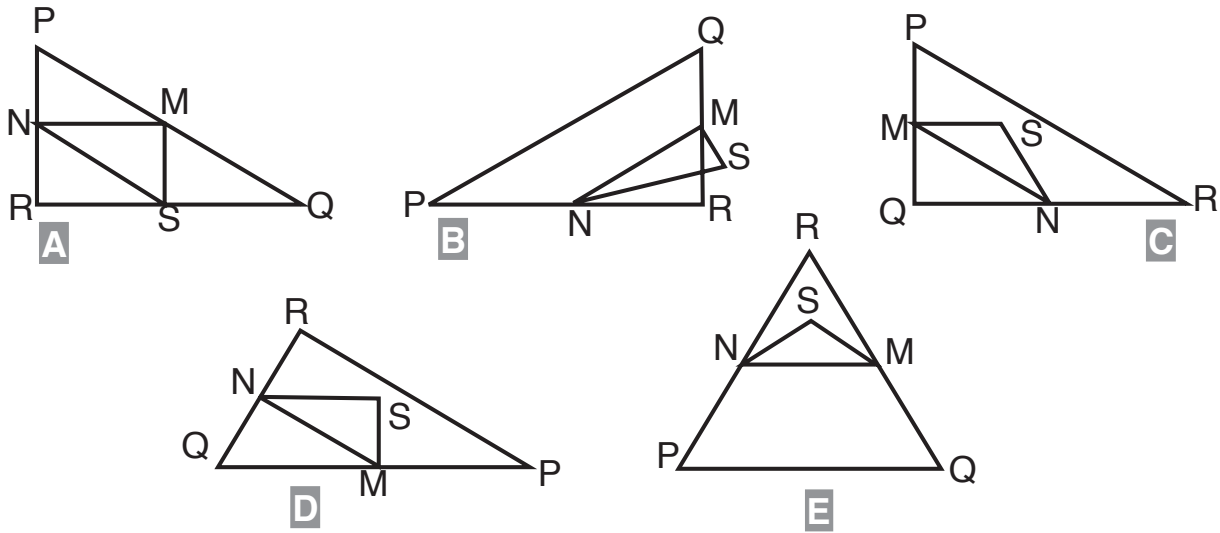
Mathematics Task 4

TRIANGLES

Question 1:

Circle the one figure below that fits the following description:

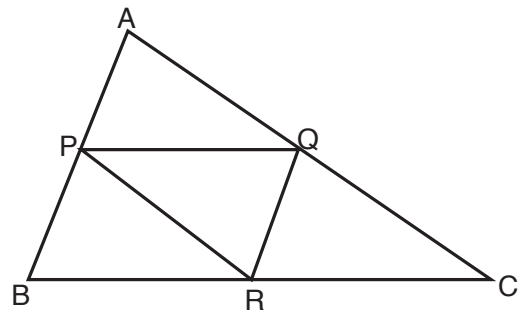
Triangle PQR is a right triangle with the right angle at R. The line RQ is less than the line PR. M is the midpoint of the line PQ, and N is the midpoint of the line QR. S is a point inside the triangle. The line MN is greater than the line MS.



Question 2:

Given that P, Q, and R are the midpoints of the three sides of the $\triangle ABC$ respectively.

Determine at least one pair of triangles that must be congruent, and justify your decision.

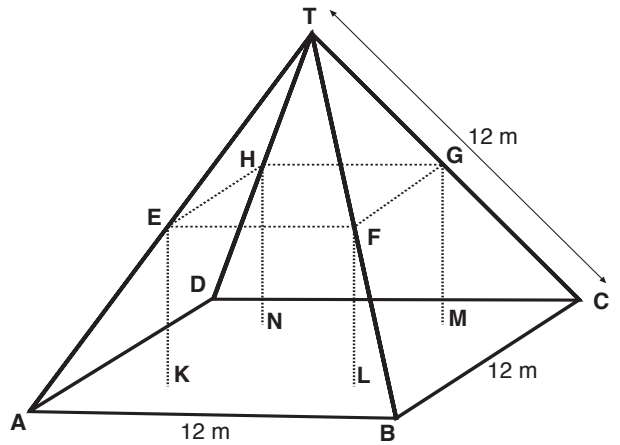


Mathematics Task 5

FARMS

Below you see a student's mathematical model of a farmhouse roof with measurements:

The attic floor, ABCD in the model, is a square. The beams that support the roof are the edges of a rectangular prism, EFGHKL MN. E is the middle of AT, F is the middle of BT, G is the middle of CT, and H is the middle of DT. All the edges of the pyramid in the model have length of 12 m.



Question 1:

Calculate the area of the attic floor ABCD.

The area of the attic floor ABCD = _____



Question 2:

Calculate the length of EF, one of the horizontal edges of the block.

The length of EF = _____

Question 3:

If the measurement of the base of the pyramid in the model did not change, but the edges AT, BT, CT, and DT were all 15 m and E, F, G, and H remained as midpoints, would the length of EF change? Justify your answer.
