

PISA 2000 RELEASED ITEMS: MATHEMATICS

AS USED IN ENGLAND AND NORTHERN IRELAND

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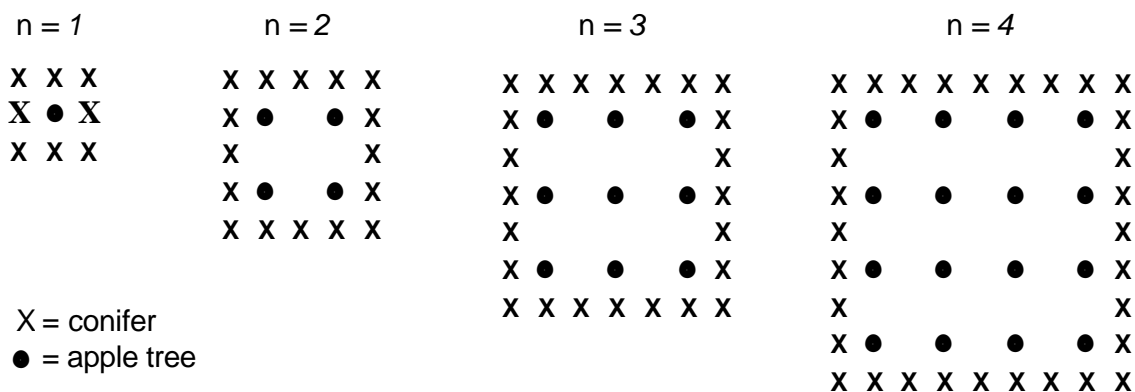
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APPLES

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

Here you see a diagram of this situation where you can see the pattern of apple trees and conifers for any number (n) of rows of apple trees :



Question 1: APPLES

M136Q01- 01 02 11 12 21 99

Complete the table

n	Number of apple trees	Number of conifers
1	1	8
2	4	
3		
4		
5		

Question 2: APPLES*M136Q02- 00 11 12 13 14 15 99*

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

$$\text{Number of apple trees} = n^2$$

$$\text{Number of conifers} = 8n$$

where n is the number of rows of apple trees.

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

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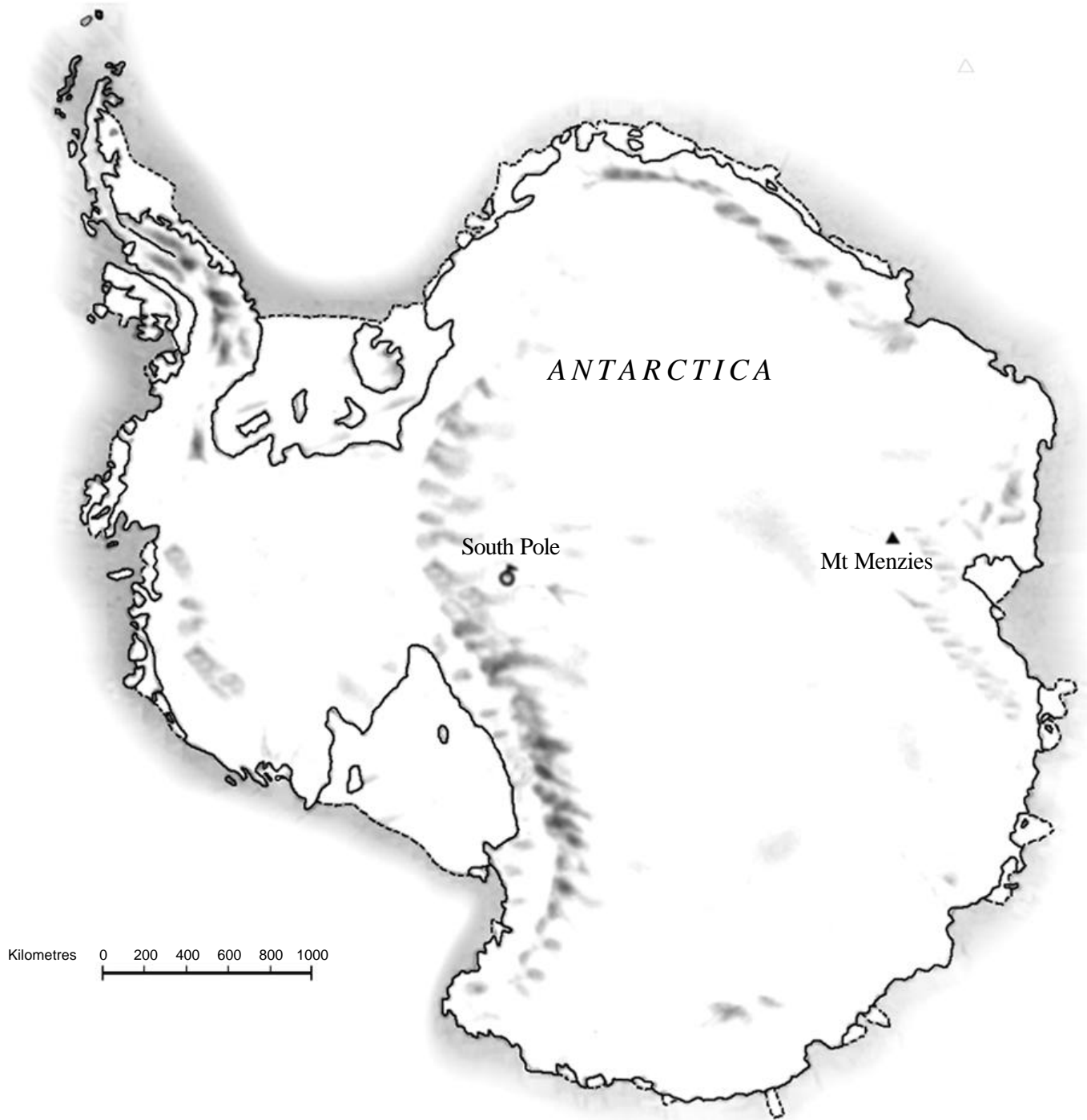
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Question 3: APPLES*M136Q03- 01 02 11 12 21 99*

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 conifers? Explain how you found your answer.

CONTINENT AREA

Below is a map of Antarctica.



Question 4: CONTINENT AREA

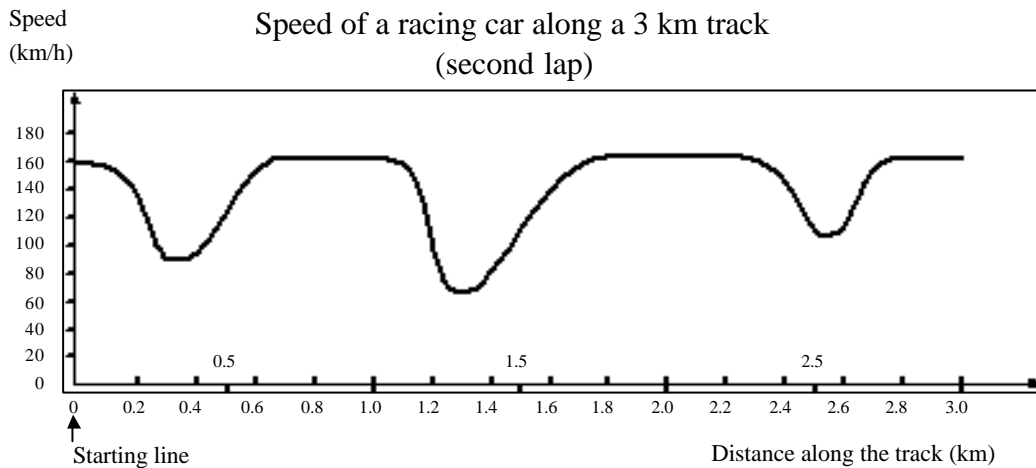
M148Q02-01 02 11 12 13 14 21 22 23 24 25 99

Estimate the area of Antarctica using the map scale.

Show your working out and explain how you made your estimate. (You can draw over the map if it helps you with your estimation)

SPEED OF RACING CAR

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



Question 5: SPEED OF RACING CAR

M159Q01

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

Question 6: SPEED OF RACING CAR

M159Q02

Where was 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. halfway around the track.

Question 7: SPEED OF RACING CAR

M159Q03

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

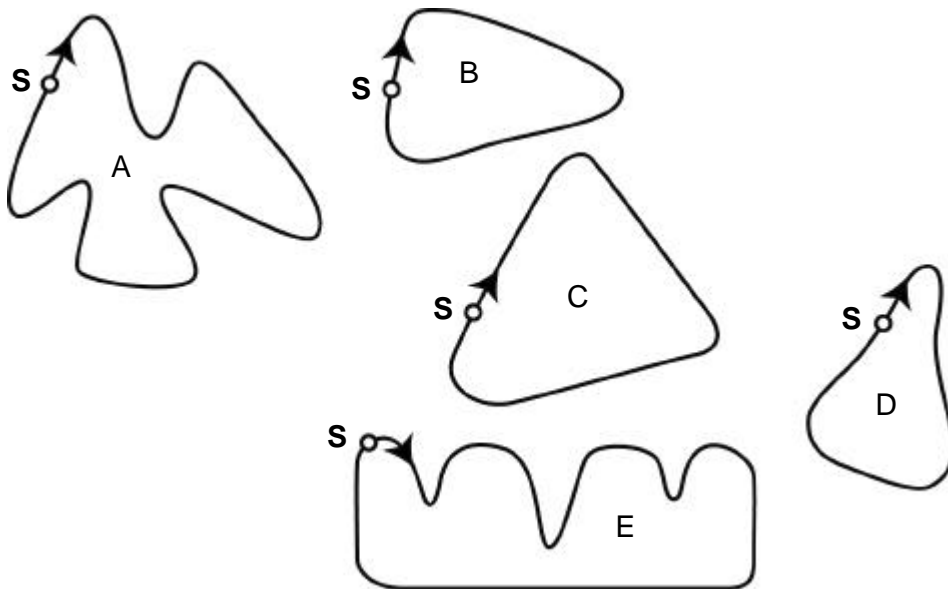
- A. The speed of the car remains constant.
- B. The speed of the car is increasing.
- C. The speed of the car is decreasing.
- D. The speed of the car cannot be determined from the graph.

Question 8: SPEED OF RACING CAR

M159Q05

Here are pictures of five tracks:

Along which one of these tracks was the car driven to produce the speed graph shown earlier?



S: Starting point

TRIANGLES

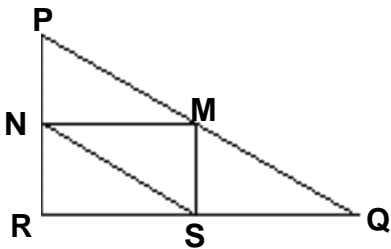
Question 9: TRIANGLES

M161Q01

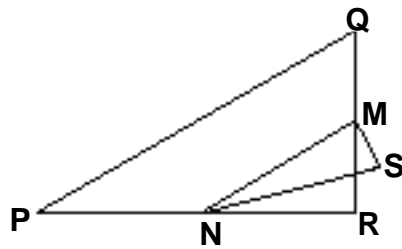
Circle the one figure below that fits the following description.

Triangle PQR is a right angled triangle with right angle at R. The line RQ is shorter 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 longer than the line MS.

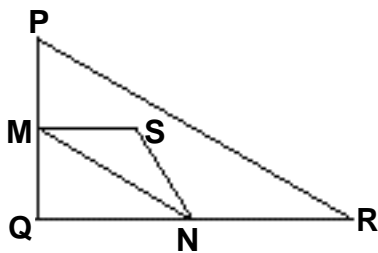
A



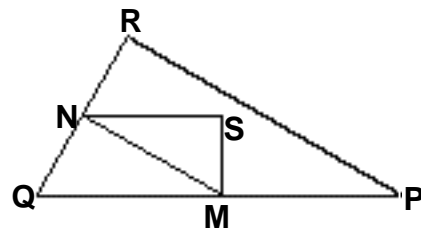
B



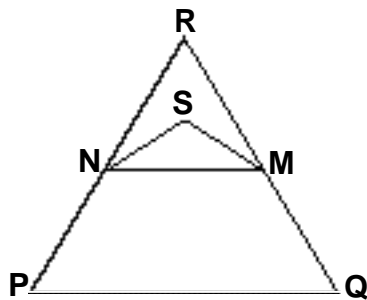
C



D



E

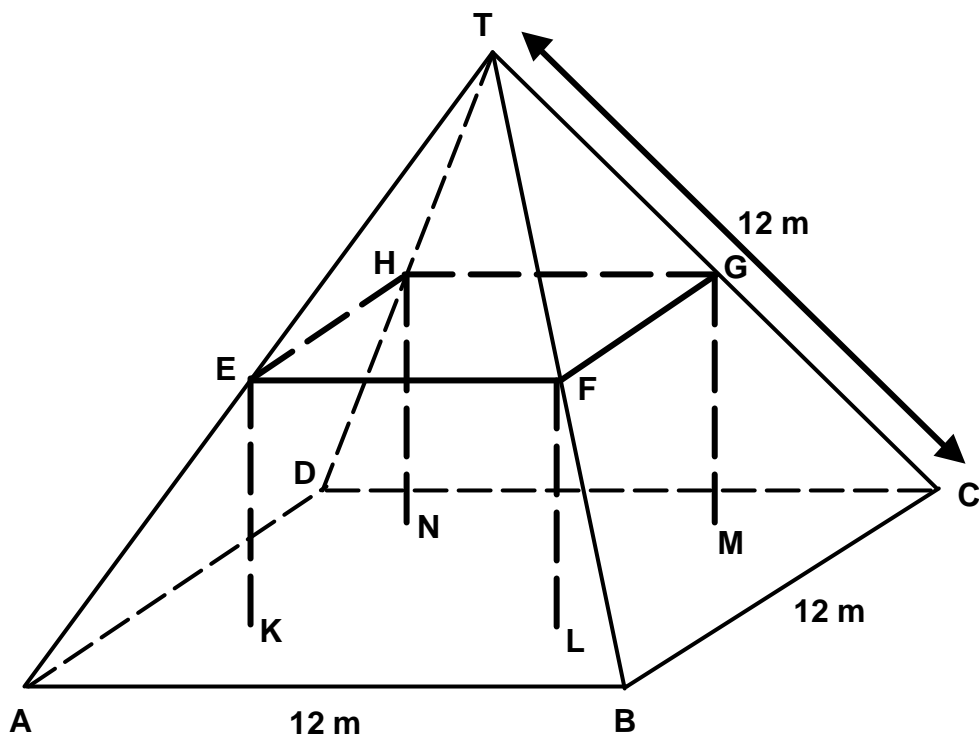


FARMS

Here you see a photograph of a farmhouse with a roof in the shape of a pyramid.



Below is a student's mathematical model of the farmhouse **roof** with measurements added.



The attic floor, ABCD in the model, is a square. The beams that support the roof are the edges of a block (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 12 m.

Question 10: FARMS*M037Q01*

Calculate the area of the attic floor ABCD.

The area of the attic floor ABCD = _____ m²

Question 11: FARMS*M037Q02*

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

The length of EF = _____ m