

## MATHEMATICS TEST

### Year 9 – Part B

The problems are *not* arranged in degree of difficulty.

Almost all problems require complete solutions.

Your solutions should be clear enough for another person to read and understand what you mean. It is important that you show *all* your workings. You can earn points for partially worked problems.

The points total for each correctly solved problem will be shown beside each problem. Only correct answer gives no points, except for the problems which are marked with *Only an answer is required*.

*All calculations and answers except problem 1 a should be written on paper that is handed in at the end of the test. The test packet must be handed in with your solutions.*

You may use calculator and ruler.

Time: 80 minutes.

Name: \_\_\_\_\_

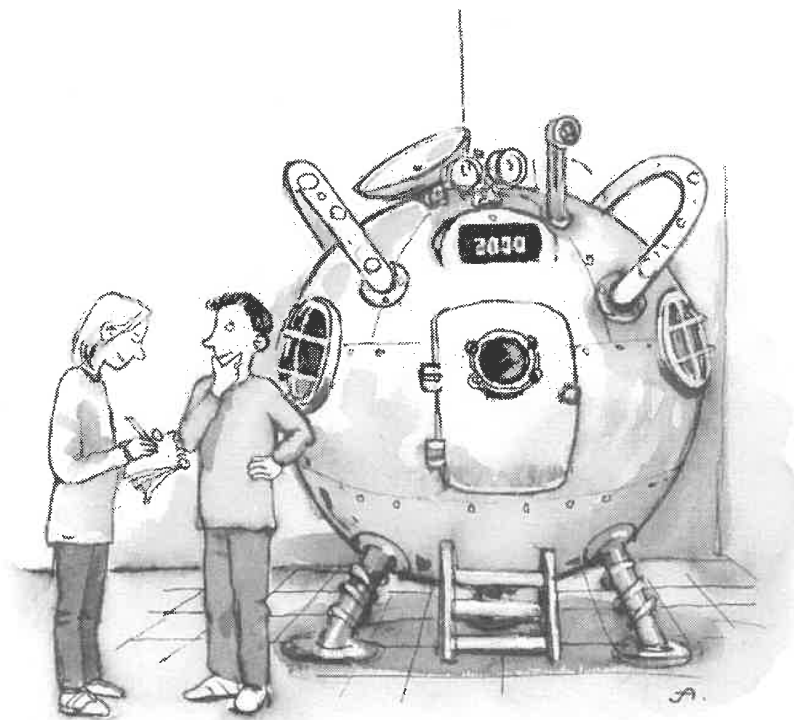
School: \_\_\_\_\_ Class: \_\_\_\_\_

Date of birth: Year   \*   Month \_\_\_\_\_

Day \_\_\_\_\_

Girl ☐ Boy ☐

## Part B – The Time Machine



It is a question of careful planning of the landings in History. Erik and Frida ponder for a long time but finally decide that they want to see a live dinosaur, visit a Stone Age village and participate when the Cheops pyramid is built. They also want to meet Pythagoras.

The dinosaurs lived 200–70 million years ago.

The Stone Age village existed **20000** years B.C.

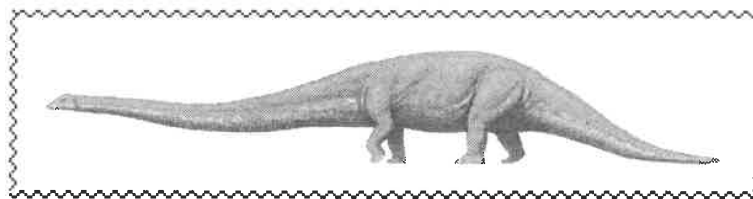
The pyramids were built **2500** B.C.

Pythagoras lived in the sixth century B.C.



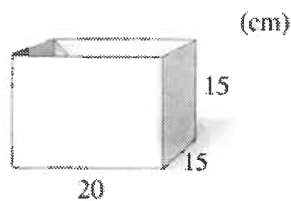
1. a) Mark on the time axis above the years that are written in fat type. You are welcome to use a ruler. (2 p)
- b) Imagine that you should extend the time axis to make it possible to mark the time when the dinosaurs *died out*. How long would that time axis be? (2 p)

## The Dinosaur



A dinosaur mapped in the scale 1:200

2. a) The picture represents a dinosaur mapped in the scale 1:200.  
How many meters long was the real dinosaur? (2 p)
- b) When Erik and Frida walked around the lake they estimated it to be circular,  
and 200 m around.  
Approximately how far was it across the lake? (2 p)
- c) They found a dinosaur egg. To find out how big the egg was, they poured  
water into Erik's sandwich-box. When they put in the egg it sunk completely  
under the surface. The water level rose from 10 cm to 14 cm.  
What volume did the egg have? Answer in litres. (3 p)



Erik's sandwich-box

## The Stone Age village

177 persons lived in the village. Five of the young girls saw to it that the people in the village got the drinking water they needed. The girls carried the water on each their yoke in two leather bags containing 8 litres each.

3. How many times a day must each girl go to the well to get every person 2 litres of water per day?



(3 p)



To keep the supply of food, animal hides and other necessities in order they had a counting system of their own. As they had not started to use figures they used instead different objects like e.g. stones to represent numbers.

The food was kept in clay pots. In front of each pot lay stones, shells, cones and bones that indicated how much of the goods the pot contained.



In front of this pot 2 shells and 3 stones lie.  
The pot contains 11 dried fishes.

- 4 stones were replaced by 1 shell.
- 4 shells were replaced by 1 cone.
- 4 cones were replaced by 1 bone.

4. a) In front of the pot with onions 1 cone and 1 shell lay.  
How many onions were there?

(2 p)

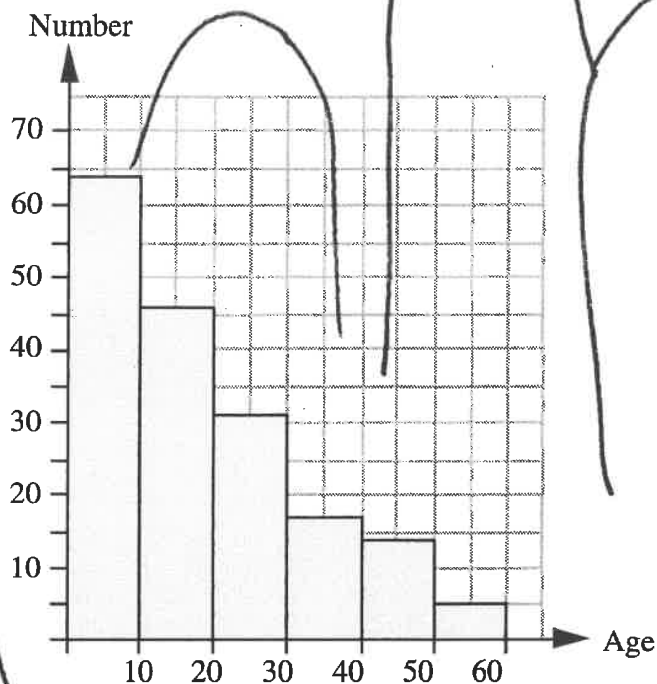
- b) In front of the pot with the village supply of egg one day 1 bone, 3 cones, 1 shell and 1 stone lay.  
One of the village women took 7 eggs from the supply.  
*What should she do* to make the objects in front of the pot show the correct number of eggs in the supply?

Explain how you reason.  
Show your calculations.

(3 p)

5. 3 fresh fishes weigh as much as 20 dried ones.  
How many percent of the weight disappeared in the drying?

(3 p)



The diagram above shows the age distribution in the village.

6. a) How many people in the village were under 20 years of age?

*Only an answer is required.*

(1 p)

- b) Of the children younger than 10 years, 25 % had not yet had their one-year birthday. How many children was less than 1 year old?

(2 p)

- c) Approximately how high was the average age in the village?

(3 p)

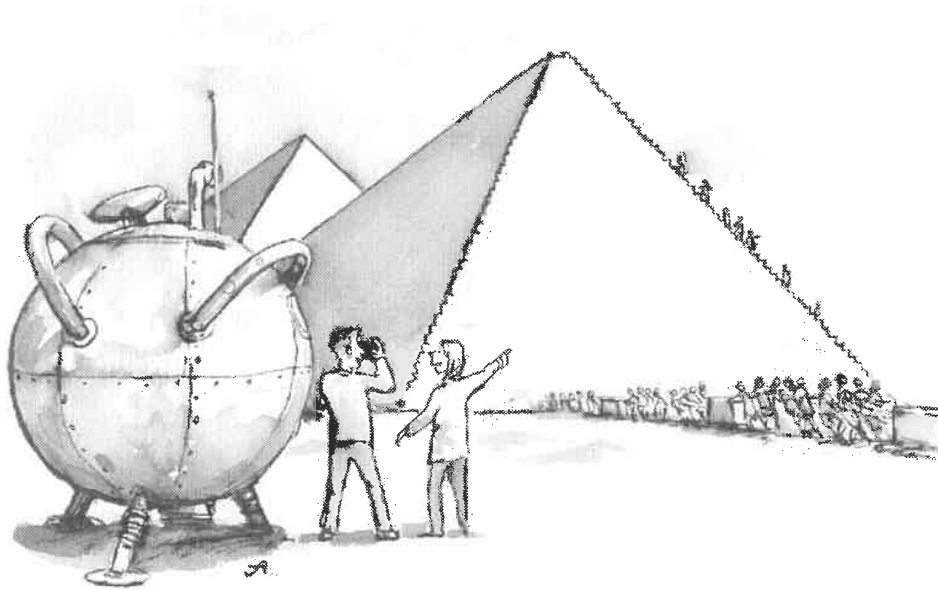
Explain how you reason.  
Show your calculations.

7. In the village there was an impression of a giant hand. On this page you see how large the hand was. Compare with your own hand.

Approximately how tall was the giant person if the length is proportional to the size of the hand?

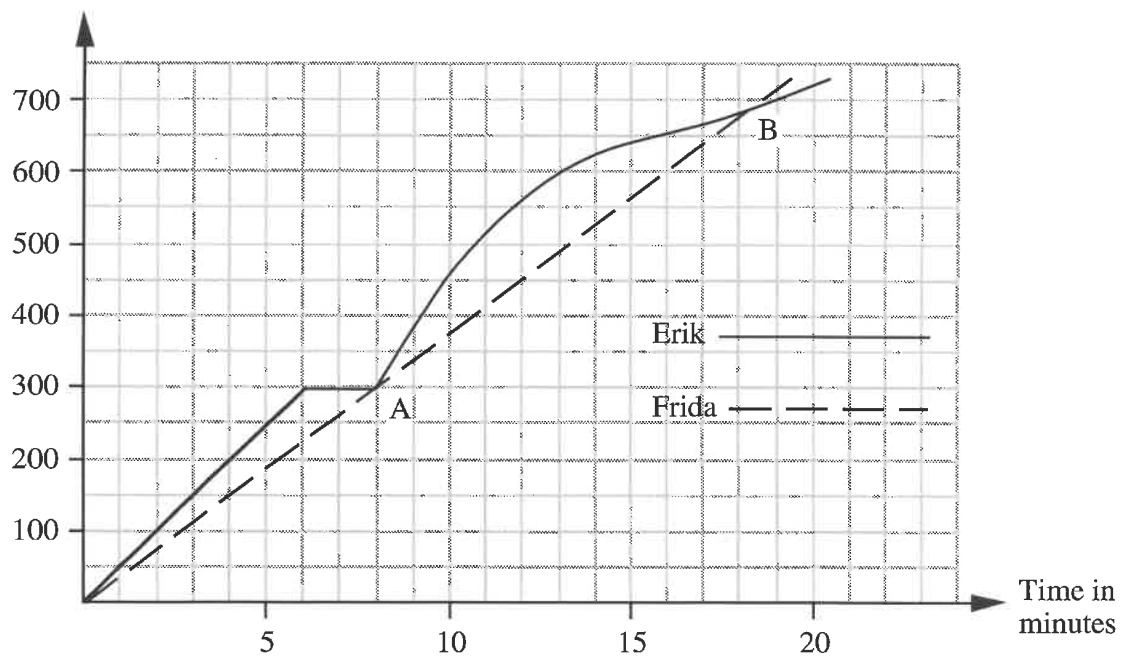
(2 p)

## The Cheops pyramid



Erik and Frida climbed the stairs along the edge of the pyramid. Every step was 20 cm high. Their way up is described in the diagram below.

Number of steps



8. a) How many steps had Frida taken after 12 minutes? *Only an answer is required.* (1 p)
- b) Study the diagram and describe shortly *as much as possible* about Erik's way to the top. (4 p)

## Pythagoras

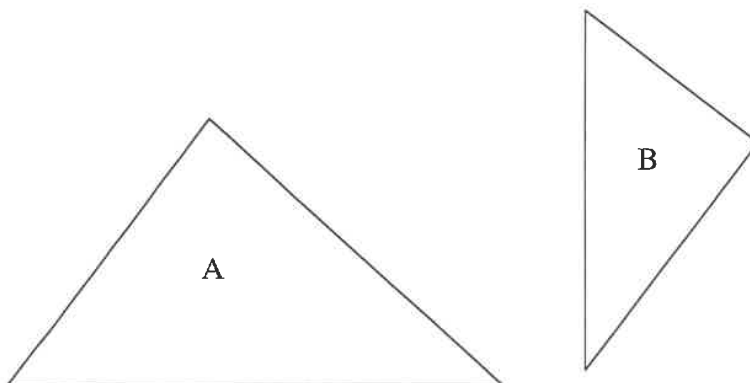


Pythagoras explained that the following relation is valid for all right-angled triangles:  
“The sum of the squares of the shorter sides equals the square of the hypotenuse.”

The relation can also be written with a formula:  $a^2 + b^2 = c^2$  where  $a$  and  $b$  are the short sides and  $c$  is the longest side.

9. Use the relation and investigate if the triangles A and B are right-angled.

(3 p)



10. Pythagoras showed how certain numbers could be described as figures. The first so-called rectangle numbers are drawn here:

Figure no	Figure	Number
1	• •	2
2	• • • • • •	6
3	• • • • • • • • • • • •	12

- a) Which number belongs to figure number 5? *Only an answer is required.* (1 p)
- b) Which number belongs to figure number 75? (2 p)
- c) Write with a formula how one can calculate the number for figure number  $n$ . (2 p)

Show your calculations.