

*Skolverket*  
(National Agency for Education)

National Test in  
**MATHEMATICS**

Course A

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Spring 2005

Part II

**PRIM**  
gruppen

Stockholm Institute of Education  
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The National Agency for Education, referring to 4 kap 3 § Sekretesslagen, emphasises that this material is to be kept confidential. **This material must remain confidential until June 10, 2005.**

**National Test in Mathematics**  
**Course A – Part II**  
**Spring 2005**

**Instructions**

**Time** 180 minutes altogether for Part I and Part II. We recommend that you spend at least 30 minutes working on Question 11.

**Tools** Calculator, approved formula pages and ruler.

**Part II** Part II consists of 11 questions. A mere answer is not sufficient for most of the questions. You must also

- express your solutions
- explain your line of thought so that it is easy to follow
- draw clear figures when necessary.

Some questions require only the answer. These are indicated by the text “*Only answer is required*”.

After each question the maximum number of points possible is shown. For example (2/3) indicates that the question can give 2 g-points and 3 vg-points.

In questions marked  $\alpha$  you have an opportunity to demonstrate MVG-quality (Pass with Special Distinction). This means that you for example use general methods, models and reasoning, that you analyse your results and present a clear line of thought with correct mathematical language.

Question 11 is a larger task that requires more time than the other questions. In the box below this question you can see the criteria the teacher will use in assessing your solution.

**Grade Limits** The test (Part I and Part II) gives a maximum of 60 points, of which 27 are vg-points.

*Lower limit for examination grade*

Pass (G): 19 points

Pass with Distinction (VG): 35 points of which at least 11 vg-points

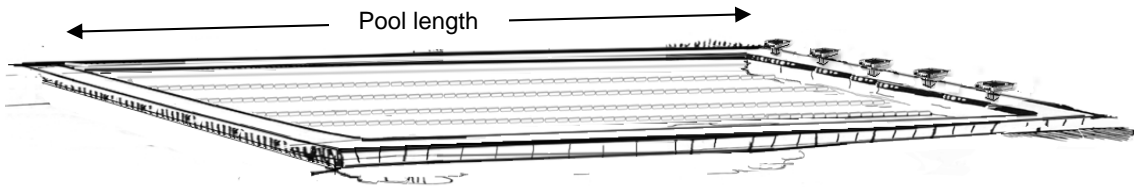
Pass with Special Distinction (MVG): Over and above the requirements for Pass with Distinction you must show several *Pass with Special Distinction qualities in at least two* of the  $\alpha$ -marked questions. In addition you must have at least 20 vg-points (Pass with Distinction points).

Write your name, adult education/secondary school program and school name on the papers you hand in.

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

Adult education/secondary school program: \_\_\_\_\_

1. Carlos swam the 800 m race at a swimming competition. The pool was 25 m long.
  - a) How many pool lengths did Carlos swim in this race? *Only answer is required.* (1/0)
  - b) Carlos reaches the finish line and his time for the race is 9 minutes and 24 seconds. What was his average speed? (2/0)



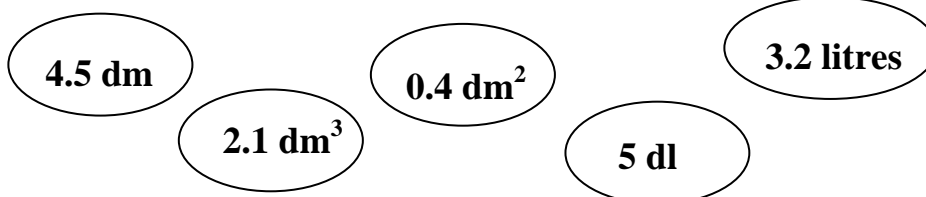
2. The average age for the five employees in a sports store was 24 years. A woman, aged 36, is hired as the new store manager. What will the new average age be for all the personnel in the store? (2/0)

3. Lisa is designing a piece of jewellery in the form of a small ball, made of silver. How many grams of silver does she need for a silver ball with diameter 12 mm? 1 cm<sup>3</sup> of silver weighs 10.5 g.



(2/1)

4. Below you see some measurements, including units.



Some of these can be added together. Determine which ones and calculate their total sum.

(2/0)

5. When a freezer is turned off, the temperature inside rises. The following formula can be used to calculate the temperature ( $y$ ) in degrees Celsius after the freezer has been turned off for  $x$  hours.

$$y = 0.2x - 18$$

- a) Find the temperature inside the freezer if it has been turned off for two hours. (1/0)
- b) How long has the freezer been turned off if the temperature inside it is  $0\text{ }^{\circ}\text{C}$ ? (1/1)
- c) Explain in your own words what the formula means. (0/2)

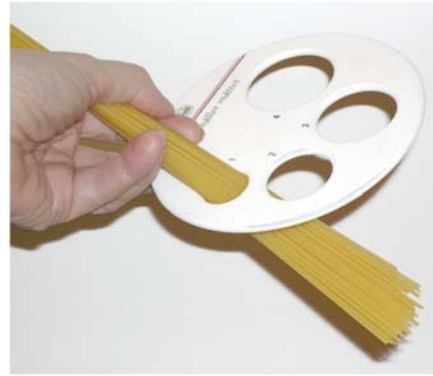
6. Table showing numbers of visitors at some swimming facilities in 2002, and changes from 2001.

<i>Swimming facility</i>	<i>Location</i>	<i>Number of visitors 2002</i>	<i>Change from previous year</i>
Eriksdalsbadet	Stockholm	1 106 000	199 000
Fyrishov, bad	Uppsala	700 000	51 800
Eyrabadet	Örebro	641 000	156 400
Aq-Va-Kul	Malmö	627 000	-7 000
Gustavsvik, bad	Örebro	554 200	-16 900
Valhallabadet	Göteborg	507 319	-24 630
Rosenlundsbadet	Jönköping	50 100	-3 219
Högevallsbadet	Lund	483 925	17 092

Source: Turistdelegationen

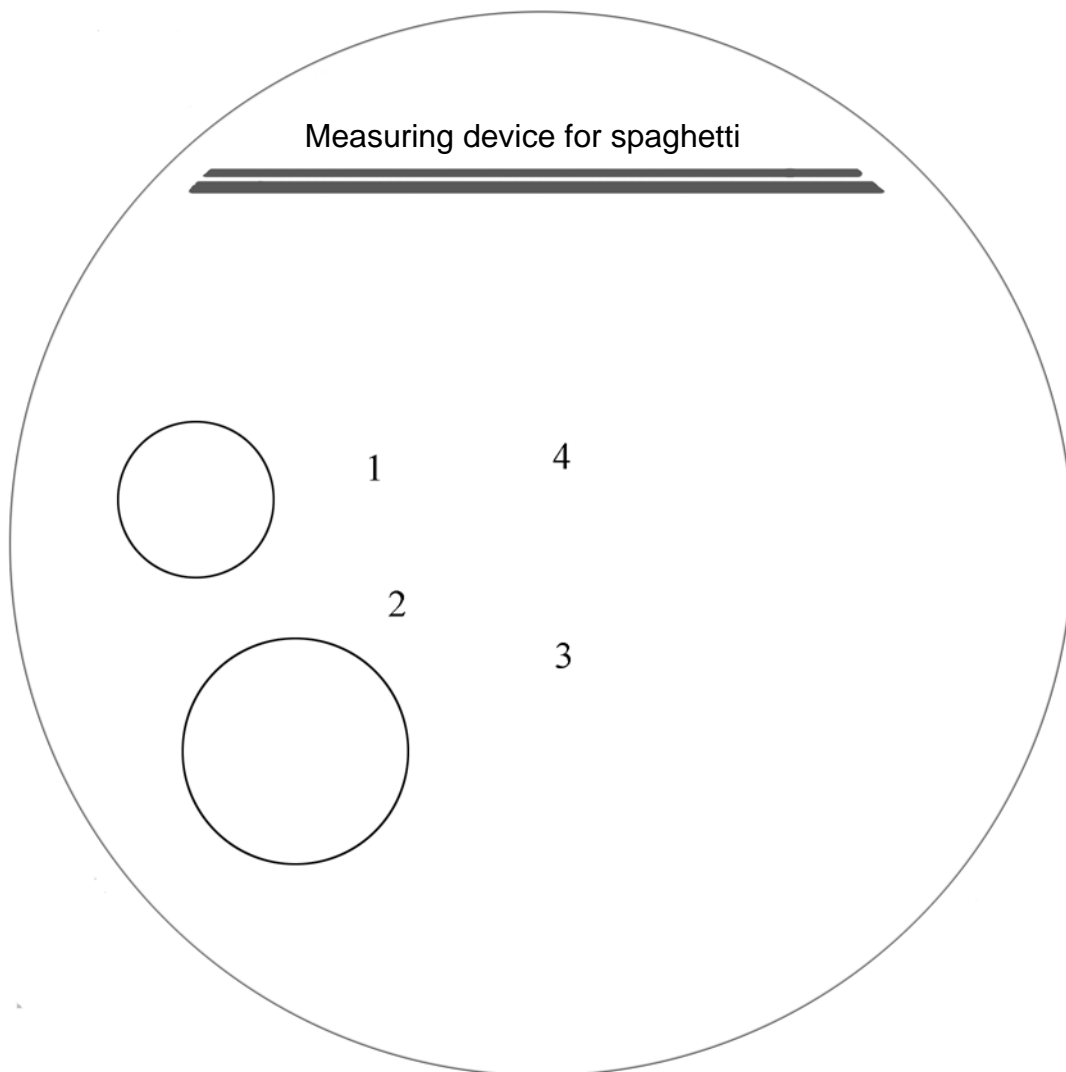
- a) How many visitors were there at the Valhalla facility in 2001? (1/0)
- b) The number of visitors has increased at both the Eriksdal and the Eyra facilities. Andreas claims that the increase is greatest at Eyra while Johan says that the increase at Eriksdal is greatest. Explain how they might have reasoned. Present your solution with explanations and calculations. (1/2)

7. In the picture to the right you can see how to use a measuring device for spaghetti.

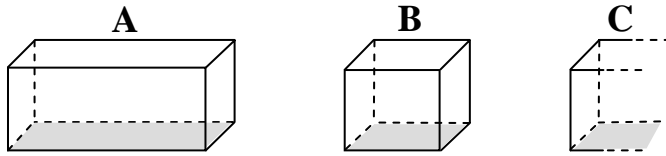


a) The amount of pasta for 2 portions can be measured in two ways. Show, with calculations, that the portions will be equal in size. (1/1)

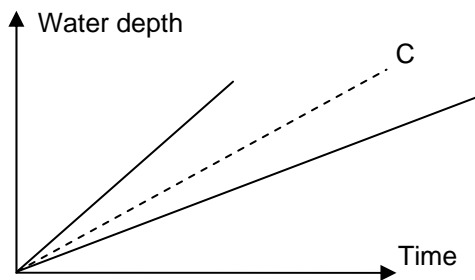
b) Make some calculations to show what diameter is needed for a similar device, in order to measure out 4 portions of spaghetti. (1/1)



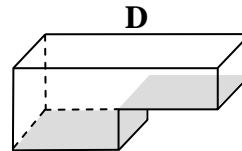
8. At the swimming pool there are four separate pools A, B, C and D. These are all being filled with water, flowing in at the same rate.



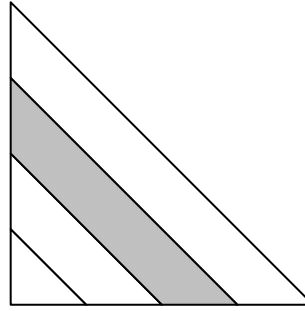
The diagram below shows how the water depth changes with time while pools A, B and C are being filled.



- a) Mark pools A and B in the diagram. *Only answer is required.* (1/0)
- b) Describe in words the appearance of the pool C corresponding to graph C. (1/0)
- c) Pool D is filled with water in the same way. Describe in words and with a graph how the water depth changes. (0/2) ✖



9. The figure shows an isosceles right-angled triangle. Two of the sides are divided into four equal parts. What fraction, or percentage, of the area of the triangle is shaded? Explain your reasoning.



(2/1) ✖

10. Martin and Johanna are going to buy a new car. Johanna likes a car which costs 194 000 kr. Martin says that the value of this type of car falls by about 17 % per year. They wonder how much the car would be worth in 3 years and each of them calculates in their own way.

Martin's calculations

$$17\% + 17\% + 17\% = 51\%$$

$$100 - 51 = 49\%$$

$$49\% \cdot 194\,000 = 95\,060 \text{ kr}$$

Johanna's calculations

$$1 - 0,17 = 0,83$$

$$0,83^3 \cdot 194\,000 \text{ kr} = 110\,927 \text{ kr}$$

Which of them has interpreted the problem correctly? How might Martin and Johanna have *reasoned* in their calculations?

(1/2) ✖

## 11. Sequences of numbers

**Choose three integers that follow directly after one another, e g: 6, 7, 8**

**Add the numbers:  $6 + 7 + 8 = 21$**

**Multiply the number of numbers by the middle number:  $3 \cdot 7 = 21$**

- Make the corresponding calculations for some other number sequences consisting of three numbers following directly after each other. Describe the result of your investigation. Explain the relationship with words or a formula.
- Investigate in a similar way the sum of five or seven numbers following directly after each other. Describe the result of your investigation. Explain the relationship with words or formulas.
- Investigate what can be said about the sum of four or six numbers following directly after each other. Describe the result of your investigation. Explain the relationship with words *and* formulas.
- What relationship holds if the number of numbers is  $n$ ?

(5/6) ✎

***In assessing your solution, the teacher will take into consideration***

- what mathematical knowledge you have demonstrated
- how you have motivated your conclusions
- how you have written your solution.