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**National Test in
MATHEMATICS
COURSE A
Spring 2008
Part II**

Instructions

Time 120 minutes for Part II.

Aids Calculator, approved formula page and ruler.

Part II Part II consists of 11 questions. Most of the questions require not only an answer, you must also

- write your solution
- explain your line of thought and reasoning so that it is easy to follow
- draw clear figures when needed.

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

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

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

Grading The test (Part I + Part II) gives a total maximum of 55 points, of which 22 are vg-points.

Lower limits for examination grade

Pass: 19 points

Pass with distinction: 34 points of which at least 9 vg-points

Pass with special distinction: At least 16 vg-points. In addition you must demonstrate several of the MVG-qualities that are possible to show in the questions marked $\boxplus$.

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

1. Elena is going to have a party. She is going to buy pizza and soft drinks for 21 people.



- a) She buys the soft drink in 1.5-litre bottles. She estimates that each person will drink 0.5 litre of soft drinks. How many bottles should she buy? *Only answer is required.* (1/0)
- b) She intends to cut each pizza into eight slices and expects that everyone will eat three slices each. How many pizzas must she buy? (2/0)
2. Mikael says to his brother Erik: “Today is Friday. What week-day will it be in 90 days?” Help Erik with an answer and explanation. (2/0)
3. a) In order for chocolate to be called dark chocolate it must contain at least 35 % cocoa butter. How many grams of cocoa butter must there be (at least) in a dark chocolate bar weighing 200 grams? (1/0)
- b) The price of a 200 g chocolate bar is 18 SEK. The shop has a special price on these chocolate bars. You get three bars for 40 SEK. Find the percentage discount you get if you buy three chocolate bars. (1/1)

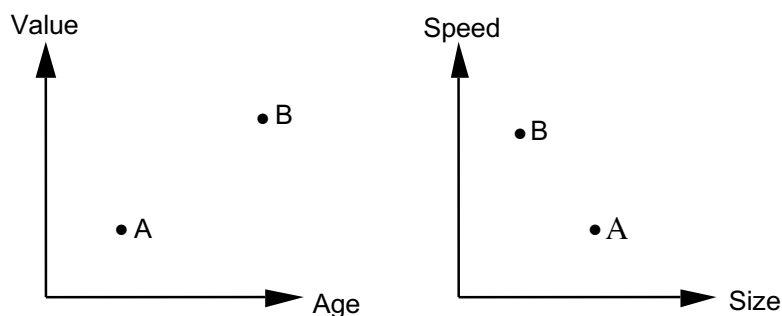


4. We use up different amounts of energy depending on how much we move.

<i>Activity</i>	<i>Energy consumption per minute in kilocalories (kcal)</i>
Lying down	1
Sitting	1.4
Standing	2
Slow walk	3
Fast walk	7
Skiing	21

- a) The energy content in 100 g of dark chocolate is 590 kcal. How long must you do a fast walk in order to use up the energy content in 100 g of dark chocolate? (2/0)
- b) To use up the energy content in a large piece of chocolate takes 14 hours if you stay sitting. How long does it take to use up the same energy if you go skiing instead? (0/2)

5. The properties of two antique cars A and B are shown in the diagram.



- a) Use the diagrams to compare the cars. (2/0)
- b) Draw a new diagram with “Age“ on the one axis and “Size” on the other axis and then mark in car A and car B. (0/1)

6.

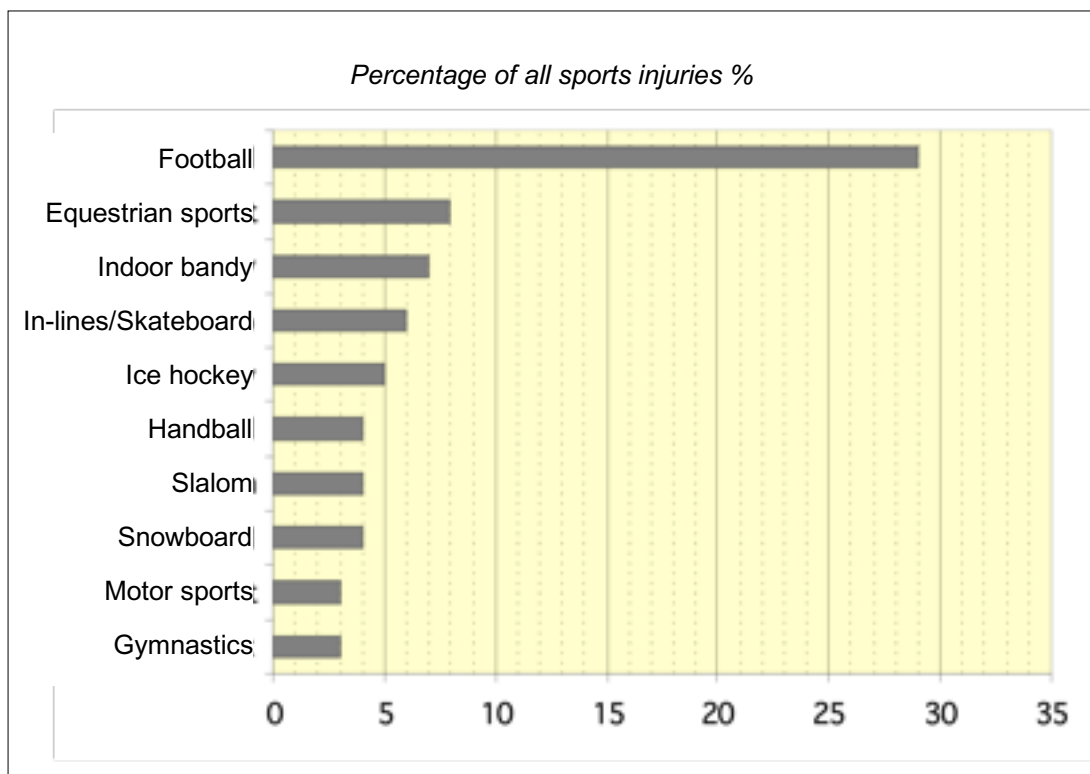
<i>Metre (m)</i>		<i>Foot (ft)</i>		<i>Centimetre (cm)</i>		<i>Inch (in)</i>
1 m	=	3.281 ft	=	100 cm	=	39.37 in
0.3048 m	=	1 ft	=	30.48 cm	=	12 in

- a) Glenn, an American boy, is 4 feet and 9 inches tall. Express his height in feet. (1/0)
- b) Glenn’s sister is 5 feet (ft) and 3 inches (in) tall. Express her height in metres. (1/1)

7. The most common sports injuries are knee injuries, foot joint injuries, wrist injuries and tooth injuries.

<i>Sports with the most injuries (per thousand participants)</i>
1. Ice hockey
2. Rugby
3. Handball
4. Wrestling
5. Football

The diagram below shows the sports with the most injuries (percentage of all sports injuries).



- a) If you were to add a bar in the diagram for “Other sports”, how many percent should it show? (2/0)
- b) Based on these statistics you could claim that either ice hockey or football is the sport with the most injuries. Which claim is most correct? Explain your reasoning with the help of the table and the diagram. (1/1)

8. Christer and Jakob got different answers when they solved the following problem:

”Small boxes for which all sides are 4 cm are to be packed into a large carton with inner dimensions 24 cm × 18 cm × 21 cm. How many small boxes, at most, have room inside the large carton?”

- Which of the following solutions is correct, Christer’s or Jakobs? Explain why.

(1/1) 

Christer’s solution

Volume of one small box = $4 \cdot 4 \cdot 4 = 64 \text{ cm}^3$

Volume of the big carton = $24 \cdot 18 \cdot 21 = 9\,072 \text{ cm}^3$

Number of small boxes that fit into the big carton = $\frac{9\,072}{64} = 141.75 \approx 141 \text{ boxes}$

I round off downwards because you cannot place a part of a box in the carton.

Answer: At most 141 boxes can fit into the big carton.

Jakob’s solution

Answer: There is room for 120 small boxes in the big carton.

$$24/4 = 6$$

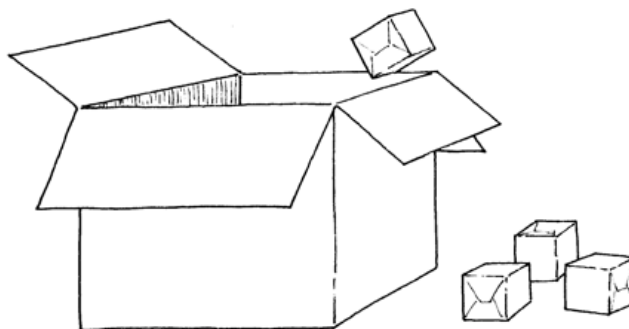
$$21/4 = 5.25 \approx 5$$

30 boxes/layer

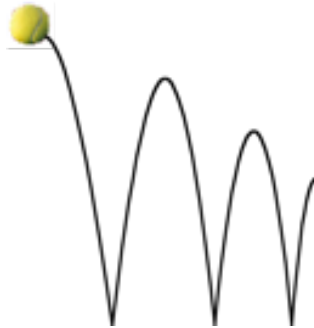
$$18/4 = 4.5 \approx 4$$

Upward = 4 layer

$$30 \times 4 = 120$$



9. A ball is dropped from a height of 100 cm above the floor. After the first bounce the ball bounces up 80 cm above the floor. The ball continues to bounce in the same way, so that the next height is always 80 % of the previous height.

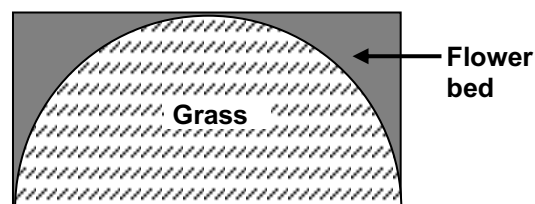


- a) Make this table on your paper and calculate the missing values. (2/0)

Number of the bounce	1	2	3	4
Rebound height in cm	80			

- b) After how many bounces is the height of the bounce less than 20 cm? (1/0)
- c) From what height must the ball be dropped if it is to reach 108 cm above the floor after the first bounce? (0/2)
- d) Describe with words or a formula the relationship between the ball's falling distance, the number of bounces and the height of the bounce. (0/1) 

10. In front of Hanna's house there is a rectangular lawn that is 6.0 metres long and 3.0 metres wide. She wants to make a flower bed in the region outside the semi-circle (see figure). For this bed she needs a layer of soil that is one decimetre deep. She can buy soil in 25 litre bags. How many bags of soil does Hanna need to buy? (1/2)



11. At a certain secondary school there are only two programs, the Electrical and Building programs. 24 % of the students in the Electrical program are girls but in the Building program only 3 % are girls. There are twice as many students in the Electrical program as in the Building program. What percentage of the students at this school are girls? (1/1) 