

# Mathematics

Delprov D

1b

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Elevens namn och klass/grupp



## Instructions – Part D

**Time for the test** 120 minutes for Part D.

**Aids** Allowed aids on part D are digital devices, formula sheet and ruler.

**Tasks** This part consists of several tasks. The solutions are to be written on separate paper, which is to be submitted together with the test booklet. For most of the tasks in this part it is not enough to only give an answer, you also have to

- show your solutions
- explain/motivate your thinking
- draw figures when required.

**Grading limits** The test (Part A–D) gives a total maximum of 80 points.

Limit for test grade

E: At least 18 points.

D: At least 33 points of which at least 13 points at level C or higher.

C: At least 41 points of which at least 19 points at level C or higher.

B: At least 54 points of which at least 7 points at level A.

A: At least 63 points of which at least 12 points at level A.

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

Date of birth: \_\_\_\_\_

Programme: \_\_\_\_\_ Class: \_\_\_\_\_

**Also write your name, date of birth, programme and class on the sheets you hand in.**

Illustrations: Jens Ahlbom



17. A bank loan of SEK 60 000 is to be repaid in equal instalments every month for 10 years. How much is the monthly instalment? (1/0/0)

18. In 1950 the world's population was 2.5 billion. A forecast was made to help predict the size of the world's population in the future. The forecast resulted in the formula:



$$y = 2.5 \times 1.017^x$$

where  $y$  is the world's population in billions and  $x$  the number of years after 1950.

What is the size of the world's population this year according to the formula?

(2/0/0)

19. A 125-ml tube of toothpaste contains 1450 ppm of fluoride. How many millilitres (ml) of fluoride does the toothpaste tube contain? (2/0/0)



20. The table below shows the Consumer Price Index (CPI) for three different years. It also lists the price of a pair of jeans in the same years.

| Year                       | 2000  | 2005  | 2010  |
|----------------------------|-------|-------|-------|
| Consumer price index (KPI) | 260.7 | 280.4 | 303.5 |
| Price of jeans (SEK)       | 700   | 750   | 900   |



Investigate whether the price trend of the jeans conforms to the CPI for the years in the table.

(1/1/0)

21. Alice and David are investigating how long it takes to serve a certain number of customers in the local grocery store. Finally they write a formula to calculate the time,  $T$  seconds, that it takes  $n$  customers carrying a total of  $v$  items to be served at the checkout.

$$T = 40n + 3v$$

- a) How long does it take to serve 4 customers who are carrying a total of 50 items? (2/0/0)
- b) One week later a new cash register arrives which shortens the time to be served at the checkout by 4 seconds per customer. What should the formula look like to fit the new cash register? (0/1/0)



22. The table shows estimated population change in the world, 2010.

|        | Births      | Deaths     | Increase   |
|--------|-------------|------------|------------|
| Year   | 131 940 516 | 56 545 138 | 75 395 378 |
| Month  | 10 995 043  | 4 712 095  | 6 282 948  |
| Day    | 361 481     | 154 918    | 206 563    |
| Minute | 251         | 108        | 143        |
| Second | 4.2         | 1.8        | 2.4        |

Source: U.S. Census Bureau

- a) Around 9 million people lived in Sweden at that time. Using the table, calculate the approximate time it would take for the world's population to increase by 9 million. (2/0/0)
- b) Pelle states: "For every breath I take, one new person is born on average." Can Pelle be right? Motivate your answer. (0/1/0)

23. Simon has a part-time job in a grocery store. He wants to come up with a method for calculating the number of shopping baskets in a stack by measuring the height of the stack. He knows that each shopping basket has a height of 28 cm and that two stacked shopping baskets have a height of 32 cm.

- a) How tall is a stack of five shopping baskets? (2/0/0)
- b) Write a formula for the relation between the number of shopping baskets and the height of the stack. (0/2/1)



24. In 2013, 3% of all trips on public transport services in Stockholm were made by “fare-dodgers”, i.e. trips made without paying. This is equivalent to one million dodged fares per month. How many trips in total were made on public transport services in Stockholm in the whole of 2013? (0/2/0)
25. The temperature inside a sauna is  $20^{\circ}\text{C}$ . 10 minutes after the stove has been lit, the temperature has risen to  $25^{\circ}\text{C}$ . The temperature increased exponentially. By how many percent did the temperature increase per minute? (0/3/0)

26. Yasmine is playing a go-kart video game. The game has mushrooms that you can hit to help drive faster.



A green mushroom that increases your speed by 10 %



A red mushroom that increases your speed by 20 %



A yellow mushroom that increases your speed by 10 km/h

- a) Yasmine needs to hit one mushroom of every colour.

In what order does she need to hit the mushrooms to increase her speed as much as possible?

Motivate your answer.

(0/2/1)

- b) Yasmine hits the mushrooms in the order you have given in a) and doubles her speed as a result.

What was her speed before she hit the mushrooms?

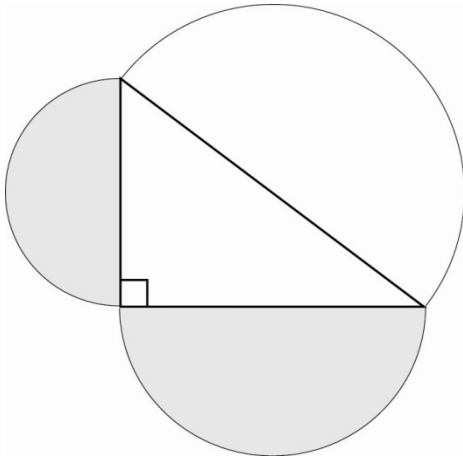
(0/1/1)

27. An advertising leaflet has the following statement:

What percentage of sugar does the energy drink contain after the reduction?

(0/1/1)

28. Nora claims that the sum of the areas of the two smaller semicircles is *always* equal to the area of the larger semicircle. Show that Nora is right.



(0/2/2)





