Kursprov, höstterminen 2015

Mathematics

Delprov D

1b

Elevens namn och klass/grupp

Prov som återanvänds av Skolverket omfattas av sekretess
enligt 17 kap. 4 § offentlighets- och sekretesslagen.
Detta prov återanvänds av Skolverket t.o.m. 2024-06-30.

Skolverket

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.

For some tasks only the answer needs to be given. They are marked with *"Only answer required"*.

Grading limits

The test (Part A–D) gives a total maximum of 83 points.

Limit for test grade

E: At least 19 points.
D: At least 35 points of which at least 14 points at level C or higher.
C: At least 45 points of which at least 22 points at level C or higher.
B: At least 57 points of which at least 7 points at level A.
A: At least 68 points of which at least 13 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

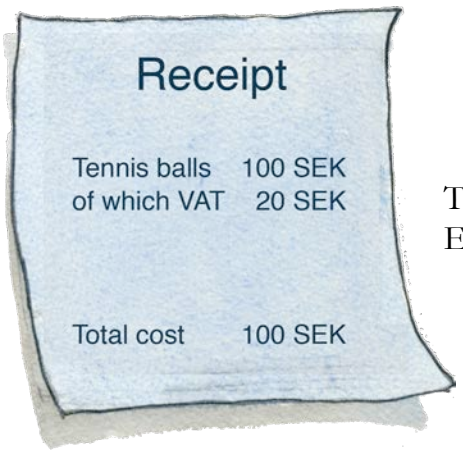
16. A shop sells a TV at the cash price of SEK 6 599.
It can also be bought on instalments according to the following terms:

> Pay SEK 199 per month for 36 months.
> A notification fee of SEK 29 per month and
> an arrangement fee of SEK 395 will be added.

How much *more* will the TV cost in total when bought on instalments? (2/0/0)

17. The number 1010_{two} is written in base 2 (binary form).
Which number does that correspond to in base 10? (2/0/0)

18. VAT on sports and leisure articles is 25 % of the price without VAT.
Maria received the following receipt when she bought tennis balls.



There is nothing wrong with the receipt.
Explain why the VAT amount is SEK 20. (1/1/0)

19. Three positive integers, all greater than 1, have the product 210.
Investigate how many different combinations of numbers there are where this is the case. (1/2/0)

20. The tax which is payed for a car depends on how much carbon dioxide the car emits.

For petrol cars, the tax S is calculated using the formula

$S = 360 + (k - 117) \times 20$

where k is the car's carbon dioxide emissions in grams/kilometre.
If the emissions are below 117g/km, only a basic charge of SEK 360 is paid.

a) What should be written in the empty boxes in the table? Motivate. (1/1/0)

Petrol cars

Car model	Carbon dioxide emissions	Tax
A	193 g/km	SEK 1 880
B	116 g/km	
C	147 g/km	
D	213 g/km	SEK 2 280

b) Alex is due to pay SEK 3 320 in tax on his car.
How much carbon dioxide does the car emit? (1/1/0)

21. In a lottery, there are a total of 16 tickets. 4 of the tickets are winning tickets. Karin draws the first two tickets.

a) What is the probability that both are winning tickets? (1/1/0)

b) What is the probability that *exactly one* of Karin's tickets is a winning ticket? (0/2/0)

22. In the year 2010, about 1.3 per mille of the world's entire population lived in Sweden. Of those living in Europe, around 1.3 per cent lived in Sweden. How great a proportion of the world's population lived in Europe?

(1/2/0)

23. c and d are variables in the expression $\frac{c-d}{d-c}$, and $c \neq d$.

a) Replace c and d with numbers and calculate the value of the expression. (1/0/0)

b) Show that the expression's value is always the same. (1/1/1)

24. According to a forecast the rent of a flat is expected to increase by 4 % per year. By how many per cent is the rent expected to increase in a five-year period according to the forecast?

(1/1/1)

25. One of the dips on a roller coaster ride looks like this when drawn from the side.

The speed which the carts reach when going down the dip can be calculated using the formula

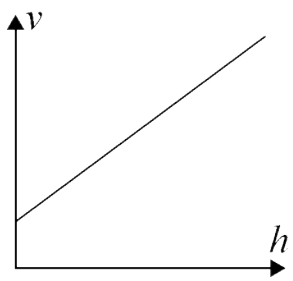
$$v = 1 + \sqrt{20h}$$

where v is the speed in m/s and h is the vertical distance in metres between the middle cart and the top of the dip.

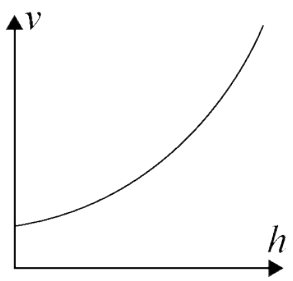
a) What is the speed of the carts when the vertical distance between the middle cart and the top of the dip is 10 metres? *Only answer is required.* (1/0/0)

b) Which of the graphs below describes the relationship between h and v? Motivate your choice. (0/2/0)

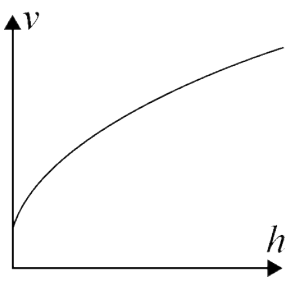
A



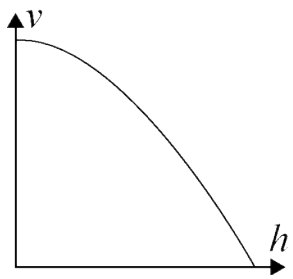
B



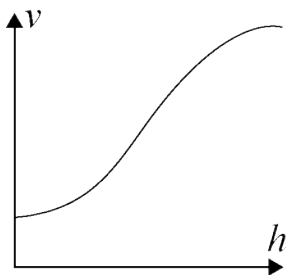
C



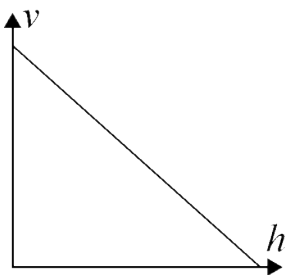
D



E

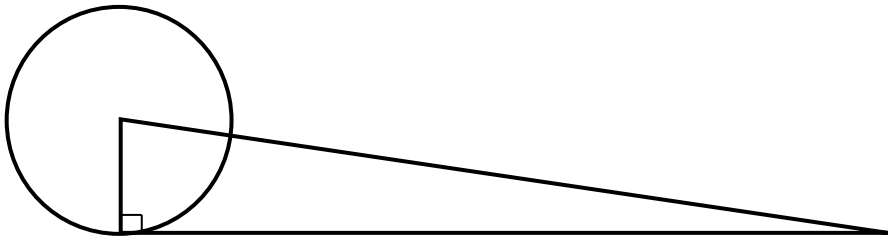


F



26. The figure below shows a circle and a right triangle. The length of the radius of the circle is the same as the height of the triangle. If the circle rolls until it completes one whole rotation, the distance it travels will correspond to the length base of the triangle. Pythagoras stated that the area of the circle and the triangle is always the same. Investigate whether or not his statement is true.

The figure is not drawn to scale.



(0/2/2)

27. Andreas has a set of Russian dolls. The height of his smallest dolls is shown below. The ratio of the height between the dolls is the same for all dolls.

The smallest doll fits inside the next smallest doll.
Both of these dolls fit inside the next doll.
The largest doll in the picture is big enough for all the other dolls to fit inside.

What is the minimum height of a doll that fits 10 dolls inside? (0/2/2)

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