

Mathematics

Delprov D

1c

Elevens namn och klass/grupp

Instructions – part D

Time for the test 120 minutes for part D.

Aids The allowed aids on part D are digital devices, a formula sheet and a ruler.

Tasks For the tasks in this part, it is required of you to show your solutions.
Write your solutions separately and turn them in together with the test booklet.

If only the answer needs to be shown in a task, this will be indicated by “*Only answer required*”. For these tasks, no solutions need to be shown.

The maximum number of points you can be given for your answer is shown after each task.

Grading limits The test (parts B–D) gives a total maximum of 70 points.

Limit for test grade

- E: At least 14 points.
- D: At least 27 points, of which at least 12 points on level C or higher.
- C: At least 35 points, of which at least 18 points on level C or higher.
- B: At least 46 points, of which at least 6 points at level A.
- A: At least 55 points, of which at least 11 points at level A.

Write your name and class/group on the papers you turn in.



22. Stina has deposited money in to a bank account with a fixed interest rate. The following function can be used to calculate how much money, in SEK, is in her bank account:

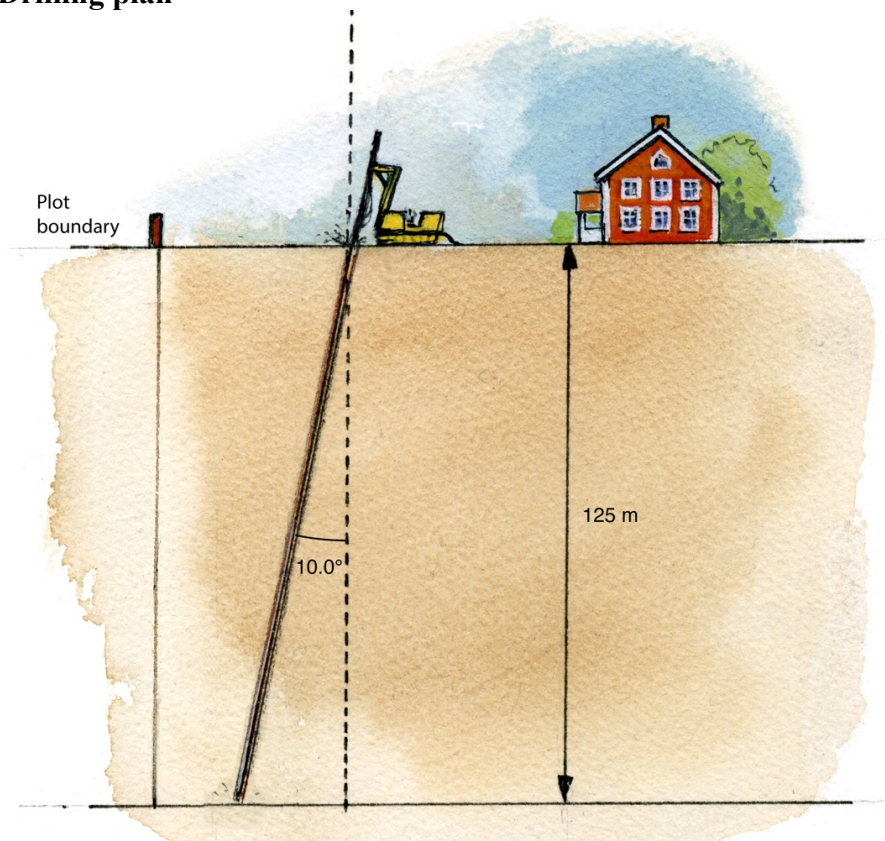
$$f(x) = 10\,000 \times 1.04^x$$

where x is the number of years after she has deposited the money into her bank account.

- What interest rate did she receive from the bank?
Only answer required. (1/0/0)
- Calculate $f(5)$
Only answer required. (1/0/0)

23. Jonas is going to drill a hole for geothermal heat and needs to drill down to a depth of 125 m. According to a drilling plan, the inclination of the drill hole must be 10.0° .

Drilling plan



- How deep does Jonas need to drill *at a minimum*? (2/0/0)
- How far from the plot boundary should Jonas start drilling at a *minimum* so as to not drill outside the plot boundary, if he drills according to the drilling plan? (0/2/0)

24. Aida takes out a loan for SEK 20 000. The monthly interest rate is 3% and she wants to amortise SEK 1 000 each month. For the purpose of calculating how much the monthly payment will be, Aida makes a spreadsheet.

	A	B	C	D	E
		Remaining loan (SEK)	Interest rate/month (in decimals)	Amortisation/month (SEK)	Monthly payment (interest cost + amortisation in SEK)
1	Month				
2	January	20 000	0.03	1 000	
3	February		0.03	1 000	
4	March				
5	April				
6	May				
7	June				

- a) What *value* is displayed in cell E2 when the monthly payment has been calculated? *Only answer required.* (1/0/0)

Aida wants the spreadsheet to be usable irrespective of interest rate, loan amount and amortisation.

- b) What *formula* should then be written in cell B3? *Only answer required.* (1/0/0)
- c) What *formula* should then be written in cell E3 to calculate the monthly payment? *Only answer required.* (0/1/0)

25. A triangle has the angles A , B and C .
 Angle B is 72% *smaller* than angle A .
 Angle C is 60% *larger* than angle A .
 Determine the size of each of the angles. (0/3/0)

26. The energy needs of dogs can be calculated using either of two formulas.

Formula 1: $y_1 = 70x^{0.75}$

Formula 2: $y_2 = 30x + 70$

where y_1 and y_2 is the energy needs in kcal/day for a dog weighing x kg.

How many percent lower energy needs does Formula 1 provide compared to Formula 2 for a dog weighing 40 kg?

(0/2/0)

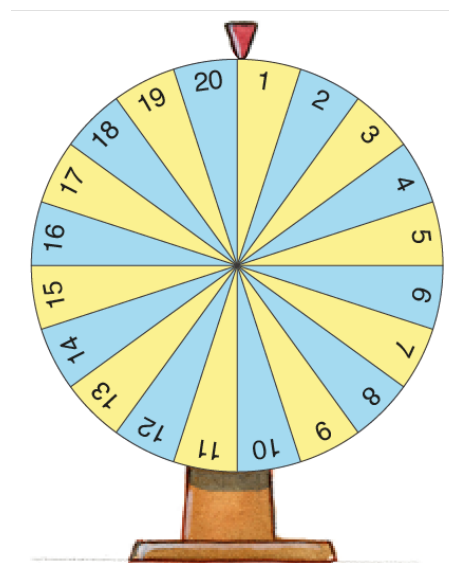
27. Moa has a car that she purchased for SEK 230 000. After 6 years she sells the car for SEK 157 000. How much per year, on average, has the car's value decreased in percentage?

(0/2/0)

28. Removed due to confidentiality

29. Hugo goes to an amusement park and plays on a number on the chocolate wheel. The chocolate wheel has 20 fields, where one of the fields gives a win on each round of play.

- a) What is the probability that he wins two consecutive rounds of play?
- b) What is the probability that he wins *at least* one time if he plays seven rounds?



(1/0/0)

(0/2/1)

30. A newspaper article presents a formula for calculating the time difference in minutes if one drives the same distance at two different speeds.

$$t = \left(\frac{1}{s_1} - \frac{1}{s_2} \right) \times d \times 60$$

where

t is the time difference in minutes

s_1 is the average speed 1 in km/h

s_2 is the average speed 2 in km/h

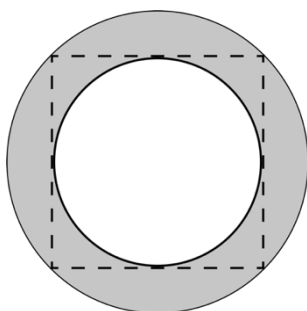
d is the distance in kilometres

Kim drives a car to work. The distance to Kim's work is 20 km.

- a) Use the formula to calculate the time difference in minutes if one day Kim drives at the average speed of 80 km/h and on the second day instead drives at the average speed of 90 km/h to work. (1/1/0)
- b) Kim compares two other days' trips to work. Due to traffic, one of the average speeds was twice as high as the other. The time difference between the two trips to work was 12 minutes. What average speeds did Kim drive those two days? (0/1/2)

31. The number x is somewhere between the numbers 17 and 23. x is $p\%$ greater than 17 and $p\%$ less than 23. Determine x . (0/0/3)

32. The figure shows a smaller circle that is drawn in a square, which in turn is drawn in a larger circle. Determine an exact expression for the area of the shaded area when the radius of the smaller circle is r . Simplify the expression as far as possible.



(0/0/3)

