Mathematics

Delprov D

1b

Elevens namn och klass/grupp

Provet kommer inte att återanvändas enligt beslut från
Skolverket Dnr:6.2.1-2023:233.

Skolverket

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 67 points.

Limit for test grade

E: At least 14 points.
D: At least 25 points, of which at least 9 points on level C or higher.
C: At least 33 points, of which at least 14 points on level C or higher.
B: At least 43 points, of which at least 6 points at level A.
A: At least 51 points, of which at least 10 points at level A.

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

Illustrations: Jens Ahlbom

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.

a) What interest rate did she receive from the bank?
Only answer required. (1/0/0)

b) Calculate $f(5)$
Only answer required. (1/0/0)

23. The dishwasher in the Josefsson family's house has broken down. They call in a technician to have it repaired. The technician charges a basic fixed fee of SEK 300 plus an hourly fee. The technician works for 3 hours and the total charge will be SEK 1 440.

Create a formula where y describes the total cost in SEK for x hours worked. (2/0/0)

24. When the wind blows, it feels colder than actually shown on a thermometer. SMHI has published a table showing how the temperature is perceived depending upon actual temperature and wind speed.

		How the temperature is perceived					
Actual temperature °C (at 0 m/s)		**-15**	**-10**	**-5**	**0**	**5**	**10**
Wind speed	**2 m/s**	-20	-14	-8	-2	3	9
	5 m/s	-24	-17	-11	-5	1	8
	10 m/s	-27	-20	-14	-7	0	6
	15 m/s	-29	-22	-15	-8	-2	5
	20 m/s	-31	-23	-16	-9	-2	5

Perceived temperature

Is the relationship between wind speed and perceived temperature linear for the actual temperature 0°C?
Justify. (1/1/0)

25. 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
1	**Month**	**Remaining loan** (SEK)	**Interest rate/month** (in decimals)	**Amortisation/month** (SEK)	**Monthly payment** (interest cost + amortisation in SEK)
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)

26. 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)

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)

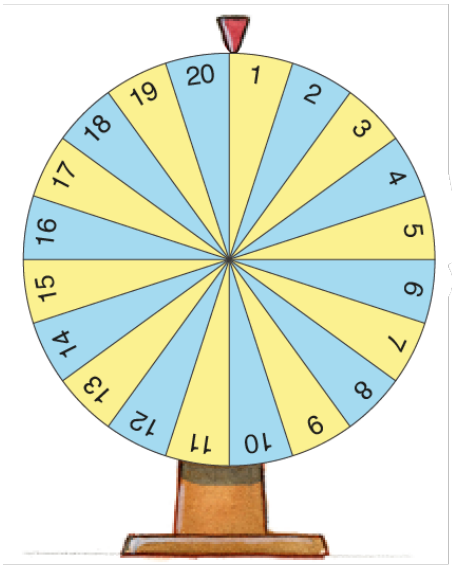
28. The table shows both the amount of money awarded for winning a Nobel Prize for certain years and the corresponding monetary value of the amount in 2016. Use the CPI table to determine the amount of money awarded for winning the Nobel Prize in 2020 in 2016's monetary value.

Year	2016	2020
KPI	316.43	335.92

Year	**Prize total** (million SEK)	**Equivalent monetary value 2016** (million SEK)
2020	10.0	
2016	8.0	8.0
2001	10.0	11.8
1990	4.0	6.1
1980	0.9	2.8
1970	0.4	3.1

(0/2/0)

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? (1/0/0)

b) What is the probability that he wins *at least* one time if he plays seven rounds? (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

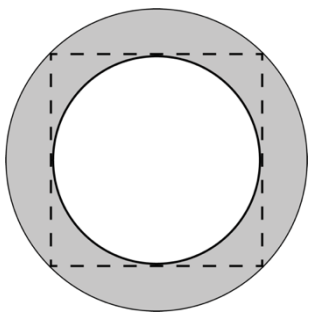
Kim drives a car to work. The distance to Kim's work is 20 km.

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)

PRIM gruppen