

<b>Part B</b>	Problems 1-10 which only require answers.
<b>Part C</b>	Problems 11-16 which require complete solutions.
<b>Test time</b>	120 minutes for Part B and Part C together.
<b>Resources</b>	Formula sheet and ruler.

### Level requirements

The test consists of an oral part (Part A) and three written parts (Part B, Part C and Part D). Together they give a total of 73 points of which 27 E-, 27 C- and 19 A-points.

Level requirements for test grades

E: 18 points

D: 28 points of which 9 points on at least C-level

C: 37 points of which 16 points on at least C-level

B: 48 points of which 6 points on A-level

A: 57 points of which 11 points on A-level

The number of points you can have for a complete solution is stated after each problem. You can also see what knowledge level(s) (E, C and A) you can show in each problem. For example (3/2/1) means that a correct solution gives 3 E-, 2 C- and 1 A-point.

For problems labelled “*Only answers required*” you only have to give a short answer. For other problems you are required to present your solutions, explain and justify your train of thoughts and, where necessary, draw figures.

**Write your name, date of birth and educational program on all the sheets you hand in.**

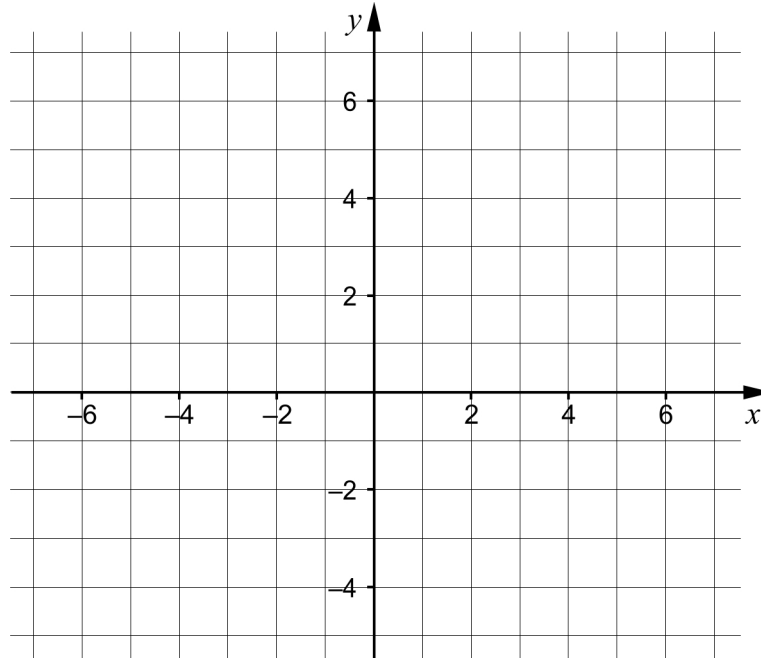
Name: \_\_\_\_\_

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

Educational program: \_\_\_\_\_

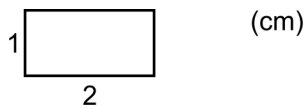
**Part B:** Digital resources are not allowed. *Only answer is required.* Write your answers in the test booklet.

1.

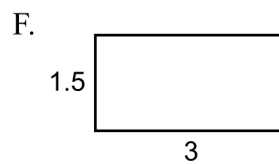
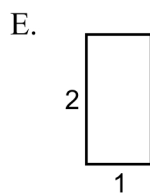
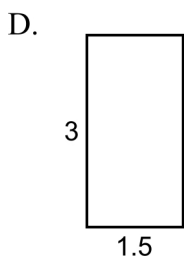
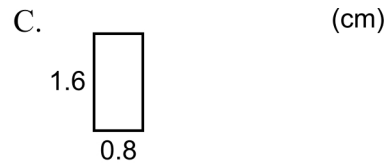
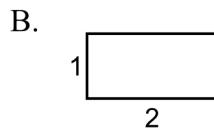
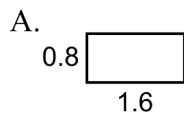


- a) Draw the line  $y = 2x + 1$  in the coordinate system. (1/0/0)
- b) Give an example of an equation of another line that is parallel to the line in task a). \_\_\_\_\_ (1/0/0)

2. The figure shows a rectangle.



Which of the rectangles A-F are congruent to the rectangle above?



\_\_\_\_\_ (1/0/0)

3. Solve the equations and give exact answers.

a)  $x^2 - 4x = 0$  \_\_\_\_\_ (1/0/0)

b)  $10^x = 5$  \_\_\_\_\_ (1/0/0)

c)  $x^{\frac{1}{2}} \cdot x^{\frac{1}{2}} = 2^{\frac{1}{2}}$  \_\_\_\_\_ (0/1/0)

4. It holds for the quadratic function  $f$  that  $f(x) = (x - 4)(x - 8)$

a) State the coordinates of a point on the graph of the function.  
 \_\_\_\_\_ (1/0/0)

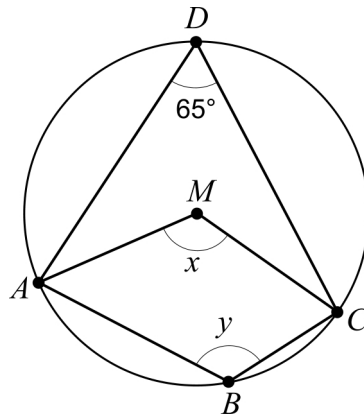
b) For what value of  $x$  does the graph of the function have a local minimum?  
 \_\_\_\_\_ (0/1/0)

5. Simplify the following expression as far as possible.

a)  $(x + 3)^2 - x^2$  \_\_\_\_\_ (1/0/0)

b)  $4\left(\frac{x}{2} - 1\right)\left(\frac{x}{2} + 1\right)$  \_\_\_\_\_ (0/1/0)

6. The quadrangle  $ABCD$  is inscribed in a circle with centre  $M$ .



a) Determine angle  $x$ . \_\_\_\_\_ (1/0/0)

b) Determine angle  $y$ . \_\_\_\_\_ (0/1/0)

7. Three figures consisting of dots are shown below. The figures are formed according to a pattern. More figures can be formed according to the same pattern.

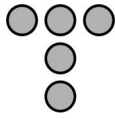


Figure 1

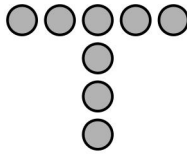


Figure 2

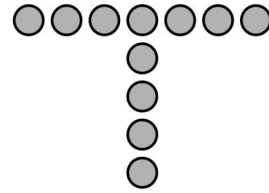


Figure 3

- a) How many dots would there be in Figure 4? \_\_\_\_\_ (1/0/0)
- b) Find an expression for the number of dots in Figure  $n$ .  
 \_\_\_\_\_ (0/1/0)
8. Give an example of a quadratic function that does not have any real roots.  
 \_\_\_\_\_ (0/1/0)
9. What should be written in the box in order for the linear system of equations  

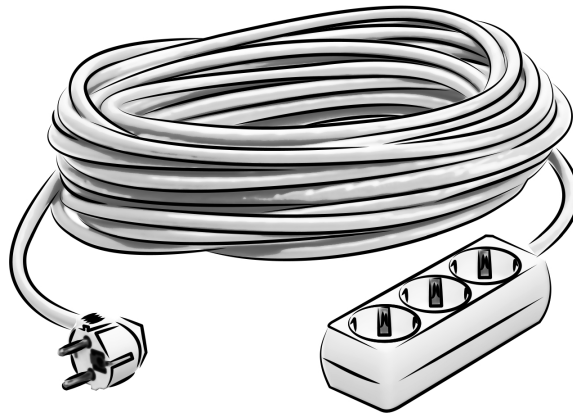
$$\begin{cases} 2x+5y=35 \\ \square x+3y=21 \end{cases}$$
 to have an infinite number of solutions?  
 \_\_\_\_\_ (0/0/1)
10. Simplify the expression  $3^{\frac{n}{2}-1} + 3^{\frac{n}{2}-1} + 3^{\frac{n}{2}-1}$  as far as possible.  
 \_\_\_\_\_ (0/0/1)

**Part C:** Digital resources are not allowed. Do your solutions on separate sheets of paper.

11. Solve the equation  $x^2 + 2x - 24 = 0$  algebraically. (2/0/0)

12. Solve the simultaneous equations  $\begin{cases} 4x + y = 20 \\ x - 2y = -13 \end{cases}$  algebraically. (2/0/0)

13. A company manufactures extension cords. The lengths of the cords are supposed to be normally distributed with a mean of 25 m and with standard deviation 0.10 m. Only cords longer than 24.8 m can be sold.



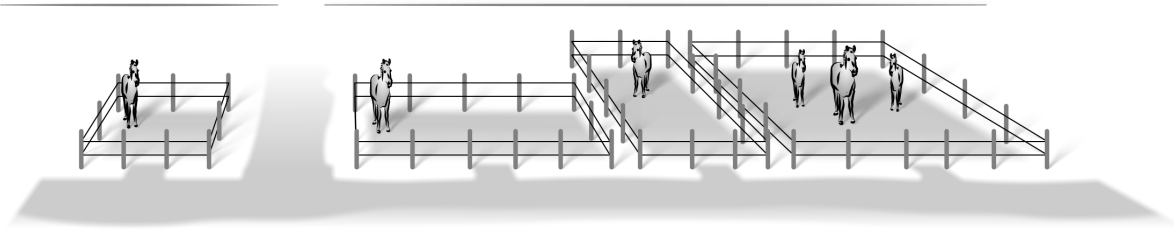
During one day the company manufactures 1000 cords. How many of these can be sold? (3/0/0)

14. Solve the equations.

a)  $x^{\frac{2}{3}} = 5^2, x > 0$  (0/2/0)

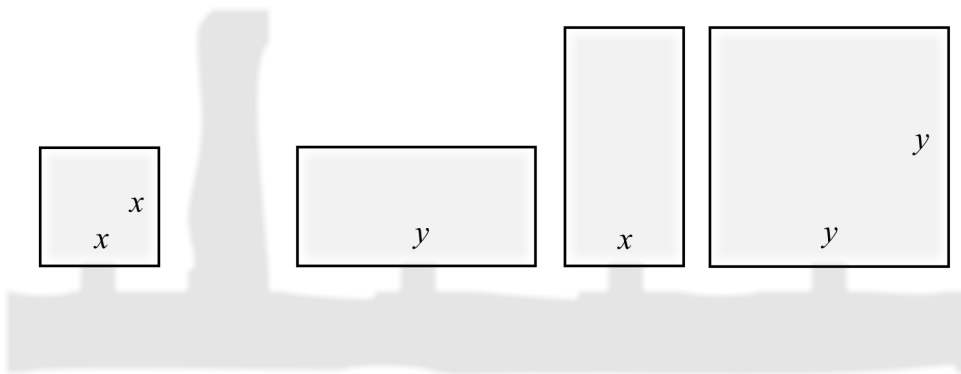
b)  $4^x = 2^{4x+5}$  (0/0/2)

15. The figure show four pastures that are quadratic and rectangular respectively with side lengths  $x$  and  $y$  metres.



Below is a sketch of the pastures seen from above.

(m)

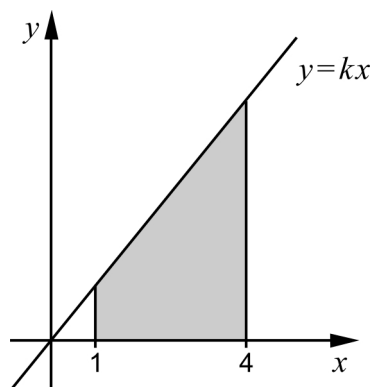


The horses will be moved into a new common pasture. The new pasture is quadratic and the area is equal to the total area of all the four original pastures combined.

Find a simplified expression for the length of the side of the new pasture.

(0/1/1)

16. A region is bounded by the  $x$ -axis, the lines  $x = 1$  and  $x = 4$  and the straight line  $y = kx$  where  $k > 0$



Calculate the gradient  $k$  algebraically so that the area of the region is exactly 10 area units.

(0/0/4)