

Part B	Problems 1-9 which only require answers.
Part C	Problems 10-14 which require complete solutions.
Test time	120 minutes for Part B and Part C together.
Resources	Formula sheet and ruler.

Level requirements

The test consists of three written parts (Part B, Part C and Part D). Together they give a total of 53 points consisting of 22 E-, 18 C- and 13 A-points.

Level requirements for test grades

E: 14 points

D: 22 points of which 6 points on at least C-level

C: 29 points of which 10 points on at least C-level

B: 37 points of which 4 points on A-level

A: 43 points of which 7 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 answer 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 thought and, where necessary, draw figures.

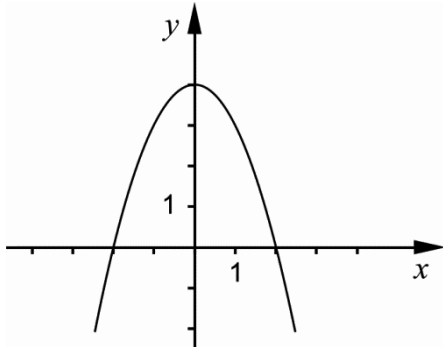
Write your name, date of birth and educational programme on all the sheets you hand in.

Name: _____
Date of birth: _____
Educational programme: _____

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

1. Calculate $f(3)$ if $f(x) = 9 + x^2$ _____ (1/0/0)

2. The figure shows the graph of the function $y = -x^2 + c$



a) Use the figure to determine the zeroes of the function. _____ (1/0/0)

b) Use the figure to determine the value of the constant c . _____ (1/0/0)

3. Simplify $(x + 5)^2 - 10x$ as far as possible. _____ (1/0/0)

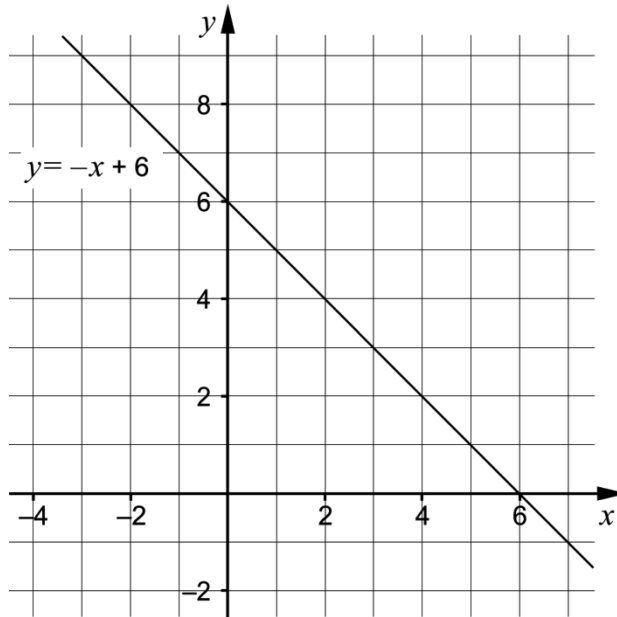
4. Solve the equations

a) $x^2 - 64 = 0$ _____ (1/0/0)

b) $x^{\frac{1}{2}} = 2$ _____ (1/0/0)

5. Calculate $5^{\frac{1}{3}} \cdot 5^{\frac{5}{3}}$ _____ (1/0/0)

6. A system of linear equations consists of two equations. The graph of one of the equations is drawn in the coordinate system.



- a) The graph of the other equation has a gradient $k = 0.5$
 Draw the graph of this equation so that the system of linear equations has the solution $\begin{cases} x = 2 \\ y = 4 \end{cases}$ (1/1/0)
- b) Specify the system of linear equations which is now drawn in the coordinate system.

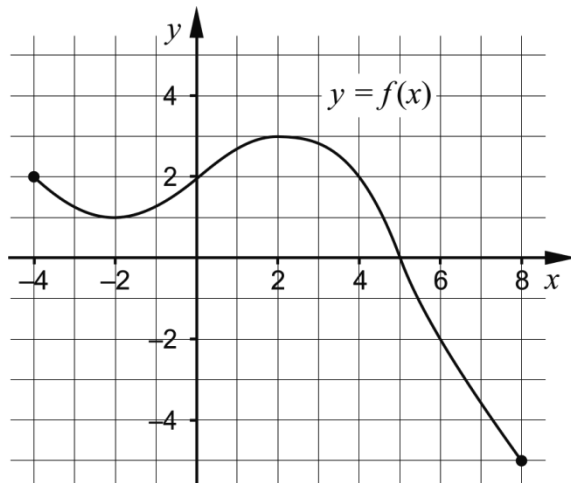
_____ (0/1/0)

7. Below are three equations and four statements.

$(x + 2)^2 = (x - 2)^2$	The equation does not have a solution
$(x + 2)(x - 2) = (2 + x)(2 - x)$	The equation has one solution
$(x + 2)^2 = (x + 2)^2$	The equation has two solutions
	The equation has an infinite number of solutions

Draw a line from each one of the equations to the correct statement. (0/1/1)

8. The figure shows the graph of the function f



a) Which of the alternatives A-F represents the range of the function?

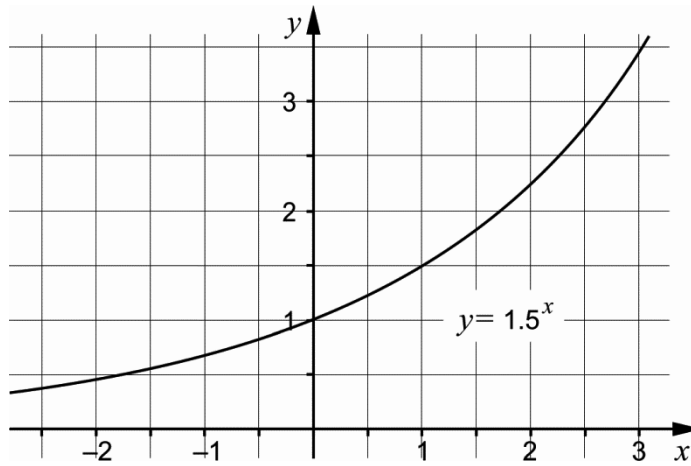
- A. $-5 \leq y \leq 2$
- B. $-5 \leq x \leq 2$
- C. $-4 \leq y \leq 8$
- D. $-4 \leq x \leq 8$
- E. $-5 \leq y \leq 3$
- F. $-5 \leq x \leq 3$

_____ (0/1/0)

b) Determine $f(a)$ when $f(a+1) = -2$

_____ (0/0/1)

9. The figure shows the graph of the exponential function $y = 1.5^x$



Use the graph to solve the following equations.

a) $1.5^x = 3$ _____ (1/0/0)

b) $1.5^x \cdot 1.5^{-2x} = 3$ _____ (0/0/1)

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

10. Solve the equation $x^2 - 12x + 20 = 0$ algebraically. (2/0/0)

11. Sonny is visiting Umeå. During his visit he plans to travel on the local bus. On the bus company's web page he can read about ticket prices for youths aged 7-19.

Ticket price youths aged 7-19		
Single trip		SEK 13/trip
Travel card	Price for a card without prepaid trips	SEK 25
	Price for each prepaid trip	SEK 9/trip

When buying a card that are prepaid with x number of trips the total cost will be SEK y .

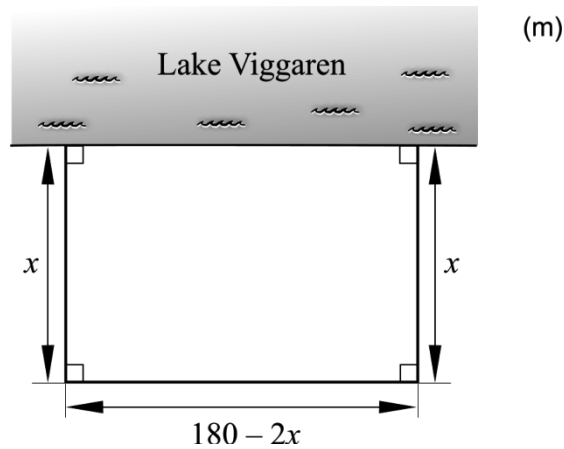
a) Specify a linear relation between the total cost SEK y and the number of trips x . *Only answer required* (1/0/0)

Sonny is thinking of buying a travel card.

b) How many trips does Sonny at least have to make if it is going to be worth buying a travel card instead of buying single tickets? (2/0/0)



12. Bengt in Boda is going to build a rectangular pasture for his horses on the fields bordering to Lake Viggaren. He has 180 m of fencing which he will use when building the pasture. No fencing is needed along the lake, see the figure below.



Write down an expression for the area of the pasture and decide what dimensions the pasture should have in order for the area to be as large as possible.

(1/3/0)

13. What are the possible values of the constant m if the graphs of the functions $y = x^2 + 3.7$ and $y = 2x + m$ should not intersect?

(0/0/2)

14. The corners of a right-angled triangle has the coordinates $(-2, 0)$, $(6, 0)$ och $(0, a)$ where $a > 0$. Find the exact value of a .

(0/0/3)