

Part B	Problems 1–9 which only require answers.
Part C	Problems 10–15 which require complete solutions.
Test time	120 minutes for Part B and Part C together.
Resources	Formula sheet and ruler.

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

B: 36 points of which 4 points on A-level

A: 42 points of which 7 points on A-level

The number of points you can get for a complete solution is stated after each problem. You can also see what knowledge levels (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 is 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. A straight line has the equation $y = 3x + 2$

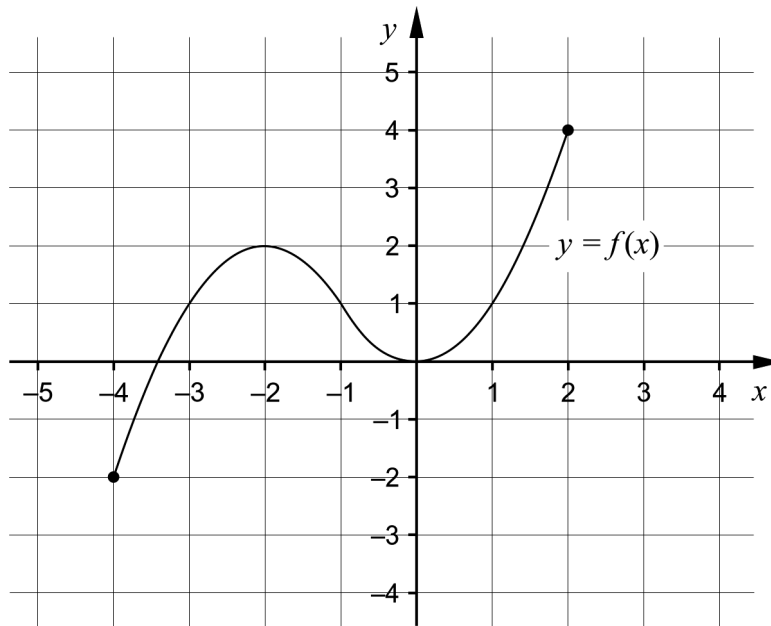
a) Write down the coordinates for a point on the line.

_____ (1/0/0)

b) Write down the equation for another straight line that is parallel to the line $y = 3x + 2$

_____ (1/0/0)

2. The figure shows the graph of a function f , where $y = f(x)$.



One of the alternatives A–F shows the domain of the function. Which one?

A. $-2 \leq x \leq 0$

B. $-2 \leq x \leq 4$

C. $-4 \leq x \leq 2$

D. $0 \leq y \leq 2$

E. $-2 \leq y \leq 4$

F. $-4 \leq y \leq 2$

_____ (1/0/0)

3. The quadratic equation $x^2 - a = 0$ has the solutions $x_1 = 5$ and $x_2 = -5$

Determine the value of a . _____ (1/0/0)

4. Tuva is a member of Strömbäcks Kajakklubb. The membership costs SEK 350 per season and she can then rent a kayak for SEK 125 per day.



- a) Write down a relation in the form $y = kx + m$ for the total cost SEK y of renting a kayak x days during a season.

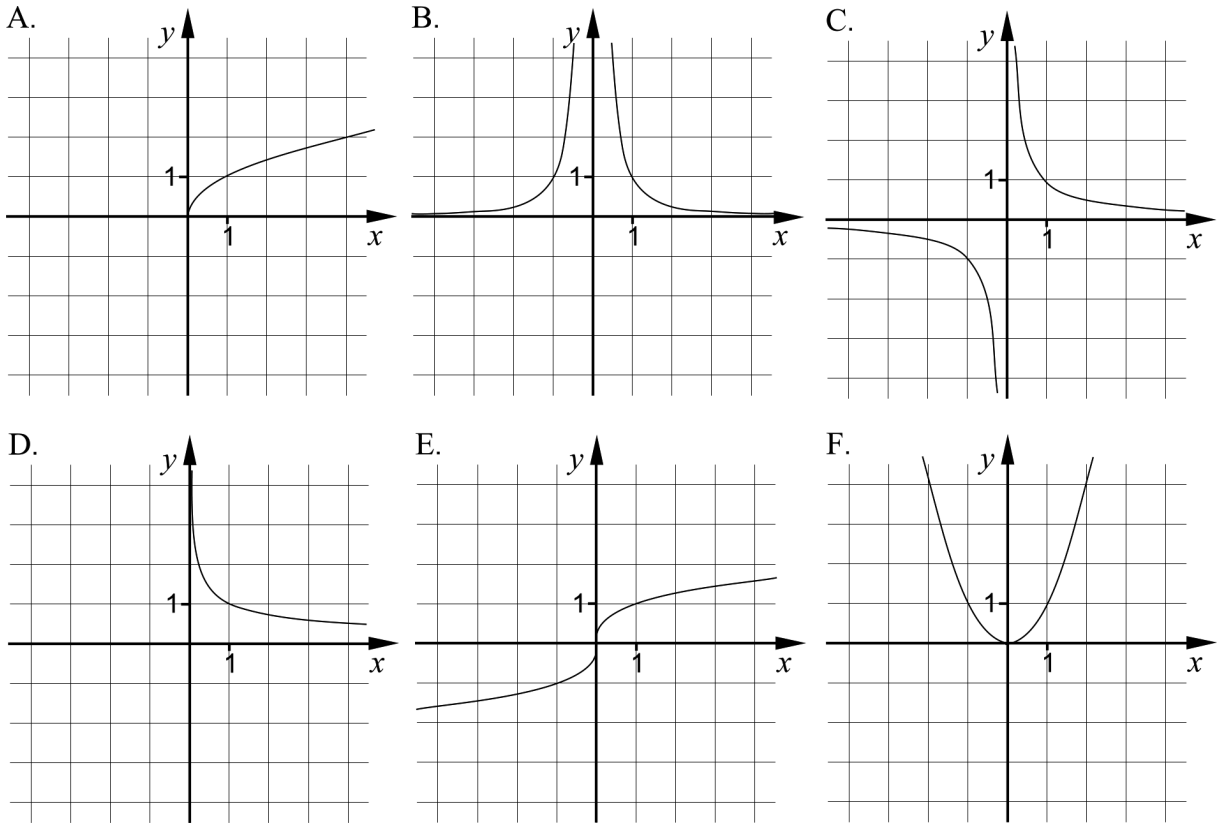
_____ (1/0/0)

During one season, Tuva paid, in total, SEK 850

- b) How many days did Tuva rent a kayak during that season?

_____ (1/0/0)

5. The figures A–F show the graphs of six different potential functions.



a) Which of the figures shows the graph of $y = \frac{1}{x^{0.5}}$? _____ (0/1/0)

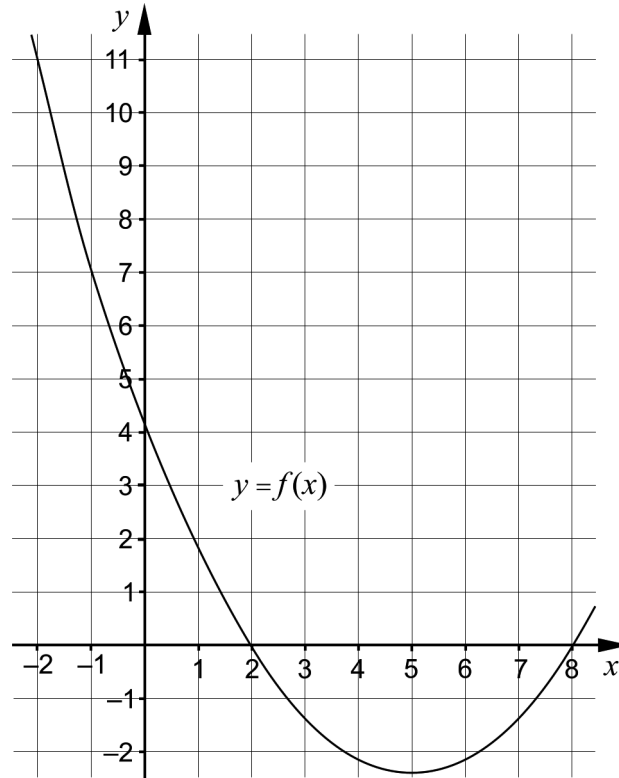
b) Re-write the function $y = \frac{1}{x^{0.5}}$ in the form $y = C \cdot x^a$ _____ (0/1/0)

6. Solve the equations. Give exact answers.

a) $x^5 = 3$ _____ (1/0/0)

b) $\left(1 + \frac{x}{100}\right)^{\frac{1}{3}} = 2$ _____ (0/1/0)

7. The figure shows a part of the graph of a quadratic function f , where $y = f(x)$.



- a) Write down the zeroes of the function. _____ (1/0/0)
- b) Determine $f(11)$. _____ (0/1/0)
- c) Solve the equation $f(x+1) = -1$ _____ (0/0/1)

8. Simplify the following expression as far as possible.

$$\left(\sqrt{2x+1} + \sqrt{2x-1}\right)\left(\sqrt{2x+1} - \sqrt{2x-1}\right) \quad \underline{\hspace{2cm}} \quad (0/0/1)$$

9. There are an infinite number of lines $y = f(x)$ which intersect the x -axis at $x = 4$

It is possible to form quadratic functions g such that $g(x) = x \cdot f(x)$.

The graphs of all such quadratic functions g pass through two mutual points.

Write down the coordinates for the two mutual points.

_____ (0/0/2)

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

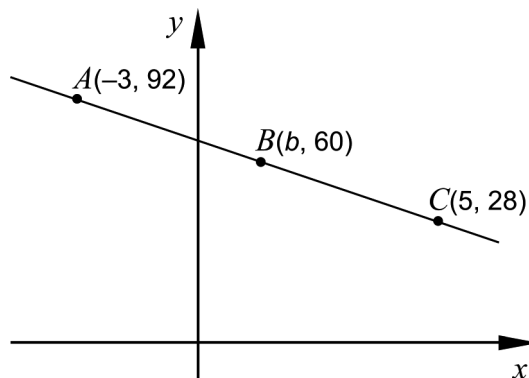
10. Karin has been given the task of solving the linear system $\begin{cases} 3x + 2y = 14 \\ 2x - y = 7 \end{cases}$

She starts by solving both equations for y and rewrites the linear system to:

$$\begin{cases} y = -1.5x + 7 \\ y = 2x + 7 \end{cases}$$

- a) Has Karin solved both equations for y correctly? Justify your answer. (1/0/0)
- b) Solve the linear system $\begin{cases} 3x + 2y = 14 \\ 2x - y = 7 \end{cases}$ algebraically. (2/0/0)
11. Solve the equations algebraically. Give exact answers.
- a) $x^2 - 8x + 7 = 0$ (2/0/0)
- b) $(x - 4)^2 = 2(x - 4)$ (0/2/0)
- c) $\left(\frac{1}{8}\right)^{\frac{1}{3}} + \left(\frac{1}{8}\right)^{\frac{1}{3}} + \left(\frac{1}{8}\right)^{\frac{1}{3}} + \left(\frac{1}{8}\right)^{\frac{1}{3}} = \frac{1}{x}$ (0/0/2)

12. The figure shows a straight line that passes through the points $A(-3, 92)$, $B(b, 60)$ and $C(5, 28)$.



Determine the x -coordinate b of point B . (2/1/0)

13. It holds for a function A that $A(x) = -\frac{3x^2}{2} + 30x$

a) Does the function A have a maximum? Justify your answer. (0/1/0)

b) Determine the coordinates of the maximum/minimum point of the function. (0/2/0)

14. A function f can be written in the form $f(x) = kx + m$ where k and m are constants. Investigate what values k and m can have in order for the equality $f(a+b) = f(a) + f(b)$ to be true for all values of a and b . (0/1/1)

15. a) Solve the equation and give an exact answer.

$$(x^3 - 5)^{\frac{1}{5}} = 4^{\frac{1}{10}} \quad (0/0/1)$$

b) Which of the following intervals A–F contains the solution to the equation

$$(x^3 - 5)^{\frac{1}{5}} = 4^{\frac{1}{10}} ? \text{ Justify your answer.} \quad (0/0/2)$$

- A. $0.5 \leq x < 1$
- B. $1 \leq x < 1.5$
- C. $1.5 \leq x < 2$
- D. $2 \leq x < 2.5$
- E. $2.5 \leq x < 3$
- F. $3 \leq x < 3.5$