Part B	Problems 1-10 which only require answers.
Part C	Problems 11-17 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 55 points consisting of 23 E-, 20 C- and 12 A-points.

Level requirements for test grades
E: 14 points
D: 23 points of which 6 points on at least C-level
C: 31 points of which 11 points on at least C-level
B: 38 points of which 4 points on A-level
A: 44 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.

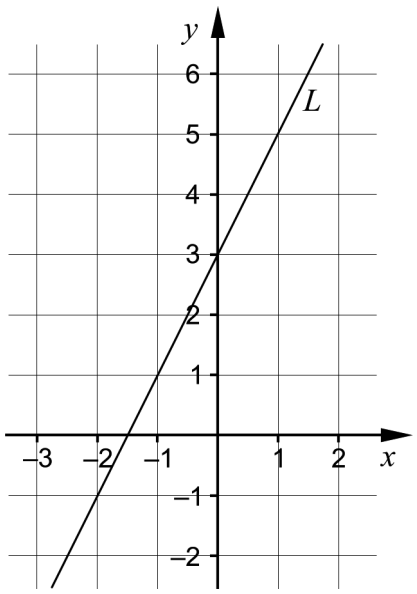
Name: _____

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 L is drawn in the coordinate system.



a) Write down the equation of the line L in the form $y = kx + m$.

_____ (1/0/0)

b) Write down the equation of another straight line that is parallel to the line L.

_____ (1/0/0)

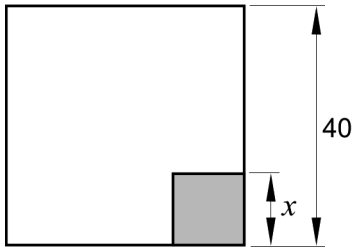
2. Simplify the expressions as far as possible.

a) $(5+x)^2 - x^2$ _____ (1/0/0)

b) $\dfrac{x^{0.5} \cdot x^{\frac{1}{2}} + 2x}{3}$ _____ (1/0/0)

c) $\sqrt[3]{3^6} \cdot x - 3x$ _____ (0/1/0)

3. A quadratic corner with side x cm will be cut out from a quadratic paper with side 40 cm. See figure.



(cm)

The area A cm^2 of the remaining piece of paper is given by $A(x) = 40^2 - x^2$

a) Give the domain of the function A. _____ (1/0/0)

b) Give the range of the function A. _____ (1/0/0)

4. Factorise $25x^2 - 16y^2$ as far as possible. _____ (0/1/0)

5. Two of the equations A – F have $x = \sqrt{3}$ as one solution.
Which two?

A. $x^2 = -3^2$

B. $(x^2 + 3)(x^2 - 3) = 0$

C. $x^3 = -3x$

D. $x(x + \sqrt{3}) = 0$

E. $x^2 = 3$

F. $(x + 3)(x - 3) = 3$ _____ (0/1/0)

6.

a) Solve the equation and give an exact answer.

$(x+1)^3 = 28$ _____ (0/1/0)

b) In which of the intervals A – F can the solution to the equation $(x+1)^3 = 28$ be found?

A. $-4.5 \le x < -3$

B. $-3 \le x < -1.5$

C. $-1.5 \le x < 0$

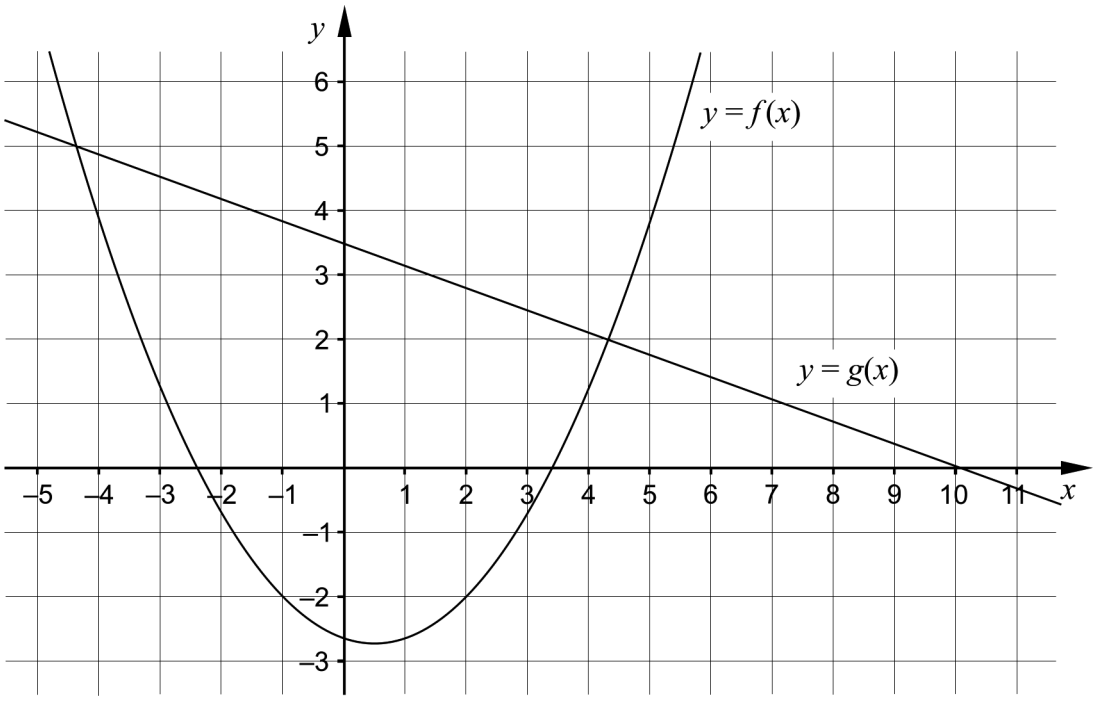
D. $0 \le x < 1.5$

E. $1.5 \le x < 3$

F. $3 \le x < 4.5$

_____ (0/1/0)

7. The figure shows the graph of a quadratic function f and a straight line g.



Use the figure to solve the problems:

a) For what values of x does it hold that $f(x) < -2$?

_____ (0/2/0)

b) For what values of x does it hold that both $f(x) > 0$ and $g(x) > 0$?

_____ (0/0/1)

8. The picture below shows three figures consisting of squares. The figures are formed according to a pattern. More figures can be formed according to the same pattern.

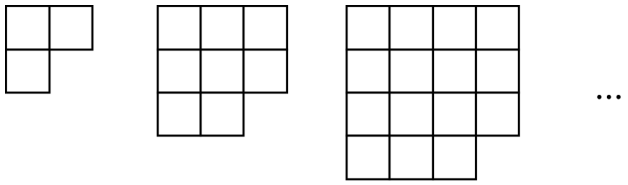


Figure 1 Figure 2 Figure 3 ⋯ Figure *n*

a) Find the number of squares in figure 5 _____ (1/0/0)

b) Find an expression for the number of squares in figure n.

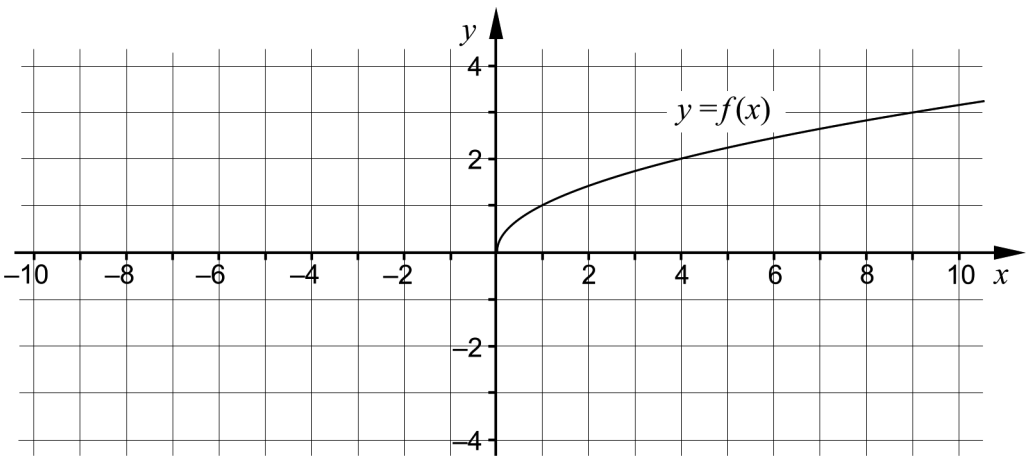
_____ (0/0/1)

9. Solve the equation

$$8^{\left(\frac{1}{x}\right)}+8^{\left(\frac{1}{x}\right)}+8^{\left(\frac{1}{x}\right)}+8^{\left(\frac{1}{x}\right)}+8^{\left(\frac{1}{x}\right)}=10$$

_____ (0/0/1)

10. The figure shows the graph of the function f.



It holds for another function, g, that $g(x)=-f(x)$
Draw the graph of the function g in the coordinate system. (0/0/1)

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

11. Solve the equations algebraically.

a) $x^2 + 4x - 5 = 0$ (2/0/0)

b) $2x^2 + 6x - 36 = 0$ (0/2/0)

12. The graph of a quadratic function has its maximum point at the point $P(0, 4)$.

Determine whether the graph of the quadratic function can pass through the point $Q(-2, 6)$. Justify your answer. (1/0/0)

13. There are many straight lines that pass through the point $(10, 22)$. One such line is the straight line L_1 with the equation $y = 1.2x + 10$

a) What values can k assume for a straight line $y = kx + m$ which should only intersect the line L_1 at the point $(10, 22)$? Justify your answer. (1/0/0)

b) Find a general formula for m expressed in k for all straight lines in the form $y = kx + m$ that passes through the point $(10, 22)$. (0/1/0)

14. Pelle is going to determine the constants A and B so that the equality $7(A - 3x)(A + 3x) = 28 - Bx^2$ holds for all values of x.

Pelle says:
"The only possibility is that A equals -2 and that B equals 63"

Find out whether Pelle is right. Justify your answer. (0/2/0)

15. Valeria starts exercising by running on a treadmill once a week for 21 weeks. Every week she increases the distance by 500 metres. In week 21, Valeria runs three times the distance she ran in week 1.

Determine what distance Valeria ran in week 1. (0/3/0)

16. Solve the simultaneous equations algebraically.

a) $\begin{cases} 2x-5y=22 \\ x+5y=-4 \end{cases}$ (2/0/0)

b) $\begin{cases} (10^x)^2 \cdot 10^y = 10^{10} \\ (10^y)^x = 10^{12} \end{cases}$ (0/0/3)

17. From two quadratic functions f and g a new function h is formed according to $h(x) = f(x) - 3 \cdot g(x)$. Determine what conditions must always be fulfilled in order for h to also be a quadratic function. Justify your answer. (0/0/2)