

Part B	Problems 1–11 which only require answers.
Part C	Problems 12–17 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, C and 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: 15 points
 - D: 23 points of which 6 points on at least C-level
 - C: 30 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.

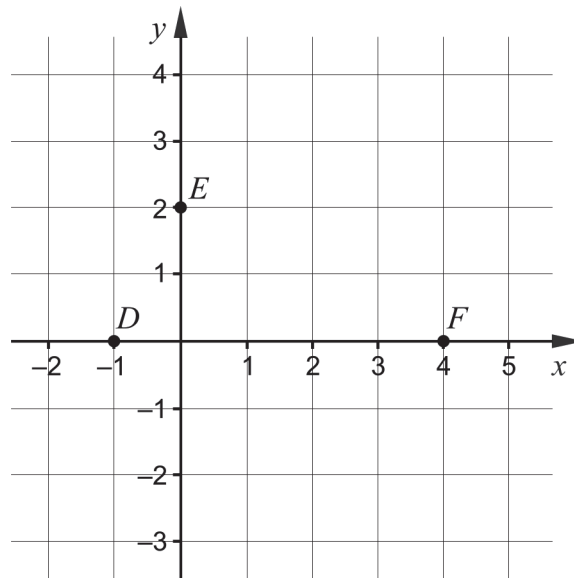
Write your name, date of birth and educational programme on all the sheets you hand in.

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

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

1. A straight line with the equation $y = -2x + 6$ is drawn in a coordinate system.
- a) What value does y have where the line intersects the y -axis?
 _____ (1/0/0)
- b) What value does x have where the line intersects the x -axis?
 _____ (1/0/0)
- c) Give an example of a line that is parallel to the line $y = -2x + 6$
 _____ (1/0/0)

2. The graph of the quadratic function f , where $y = f(x)$, passes through the points $D(-1, 0)$, $E(0, 2)$ and $F(4, 0)$.



- a) The function f can be written in the form $f(x) = ax^2 + bx + c$. Determine the constant c .
 _____ (1/0/0)
- b) The graph of the function f has a maximum point. Determine the x -coordinate of the maximum point.
 _____ (1/0/0)

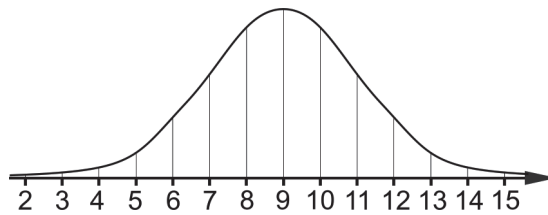
3. Simplify the expressions as far as possible.

a) $(x + 5)^2 - 10x$ _____ (1/0/0)

b) $(x + 3)(x - 3) + 9$ _____ (1/0/0)

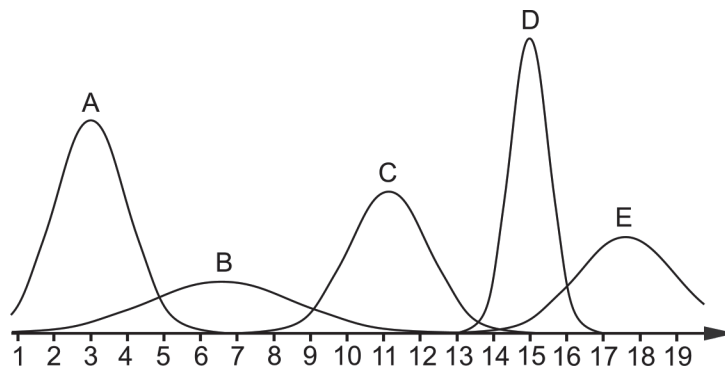
c) $x^5 \cdot x^4$ _____ (1/0/0)

4. a) The figure shows a curve representing a normal distribution.



What is the mean of the normal distribution? _____ (1/0/0)

b) The figure shows five curves A–E representing normal distributions.



Which one of the curves A–E represents the normal distribution with the smallest standard deviation? _____ (0/1/0)

5. a) In a coordinate system there is a point $Q(1, 0)$. Give an example of coordinates of the point P if the distance between P and Q is 5 length units. _____ (1/0/0)

b) The point $M(1, \frac{3}{4})$ is the midpoint between the points $A(\frac{1}{2}, \frac{1}{4})$ and B .
Determine the coordinates of the point B . _____ (0/1/0)

6. Solve the equations and give exact answers.

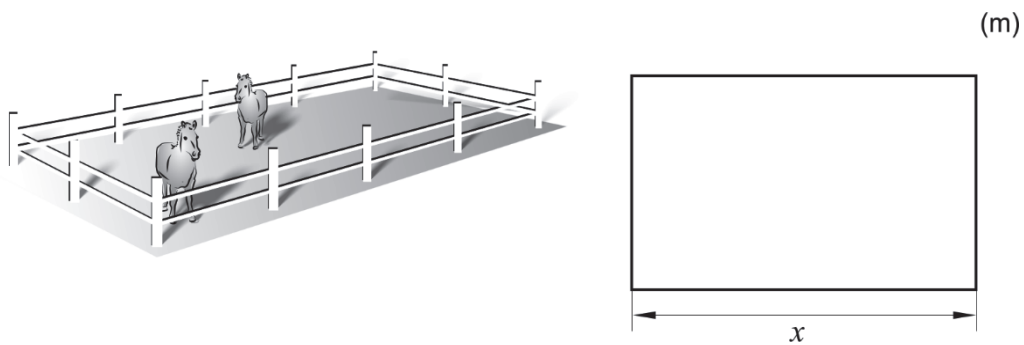
a) $x^5 = 21$ _____ (1/0/0)

b) $\frac{x^3 \cdot x^5}{x^{-3}} = 2$ _____ (0/1/0)

c) $(2x + 6)^{\frac{1}{2}} = 2$ _____ (0/1/0)

d) $(5987 - x)^2 - 2(5987 - x) = 0$ _____ (0/0/1)

7. Bosse is building a rectangular paddock for his two horses, using 120 metres of fencing. The length of one side of the paddock is denoted by x . See figure.



Write down the area A of the paddock as a function of x .

_____ (0/1/0)

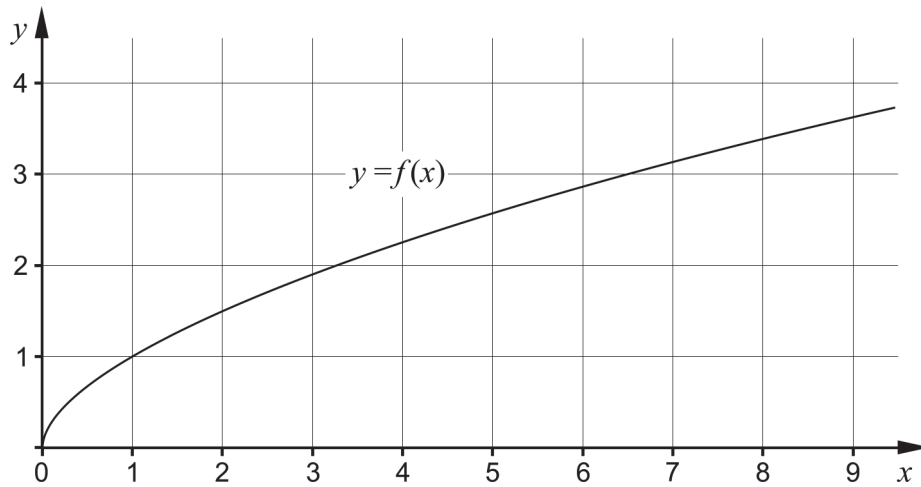
8. There are many quadratic functions whose graph has symmetry line $x = 3$

Give an example of such a function. _____ (0/1/0)

9. The graph of a quadratic function passes through the points $(-4, 6)$ and $(7, 6)$ and the function only has one zero.

Write down the zero of the function. _____ (0/0/1)

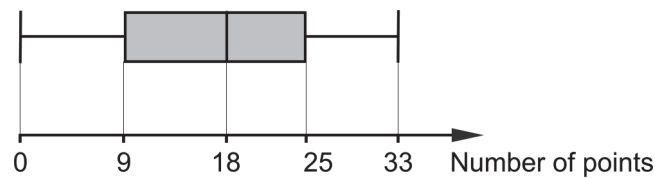
10. The figure shows the graph of a function f .



Solve the equation $\frac{f(a-3)}{2} = 1.5$ using the graph.

$a =$ _____ (0/0/1)

11. On a maths test, the possible scores were 0 to 35 points. The results of the students were presented in a box plot. See figure.



Those students who were absent from the test took the same test the week after. The median of the results of those students was 20 points. The student who did best on the later test got 34 points.

All the results from both tests are presented in a new box plot.

One or more of the claims A–D are true. Which one or which ones?

There is enough information to confidently draw the conclusion that

- A. the smallest value is unchanged in the new box plot
- B. the largest value has changed in the new box plot.
- C. the median has changed in the new box plot.
- D. the share of students who scored 9 points or more on the test has changed in the new box plot.

_____ (0/0/1)

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

12. Solve the quadratic equation $x^2 + 8x + 12 = 0$ algebraically. (2/0/0)

13. Emma and Sanna want to solve the system of equations $\begin{cases} x - y = 3.5 \\ 2x + y = 5.5 \end{cases}$

a) There are many ways of solving a system of equations. Emma starts by solving for y in both equations and gets:

$$\begin{cases} y = x + 3.5 \\ y = -2x + 5.5 \end{cases}$$

Has Emma correctly solved for y in the two equations?
Justify your answer.

(1/0/0)

b) Sanna claims that $\begin{cases} x = 5 \\ y = 1.5 \end{cases}$ is a solution to the system of equations $\begin{cases} x - y = 3.5 \\ 2x + y = 5.5 \end{cases}$

Is Sanna right? Justify your answer.

(1/0/0)

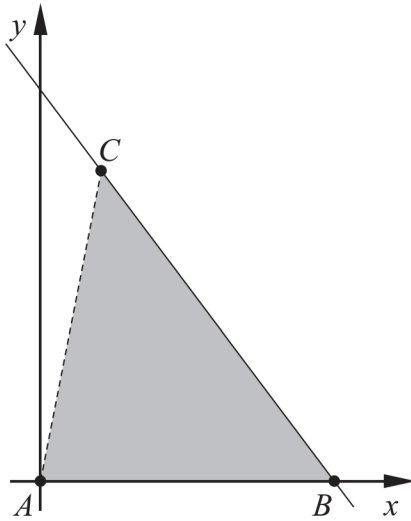
14. Solve the system of equations $\begin{cases} 0.2x - 0.5y = 1.2 \\ x + y + 3.5 = 6 \end{cases}$ algebraically. (0/2/0)

15. Fiona is investigating two numbers whose difference is 1. She claims that the difference between the square of the larger number and the square of the smaller number is the same as the sum of the numbers.

Show that Fiona's claim is always correct for two numbers whose difference is 1.

(0/2/0)

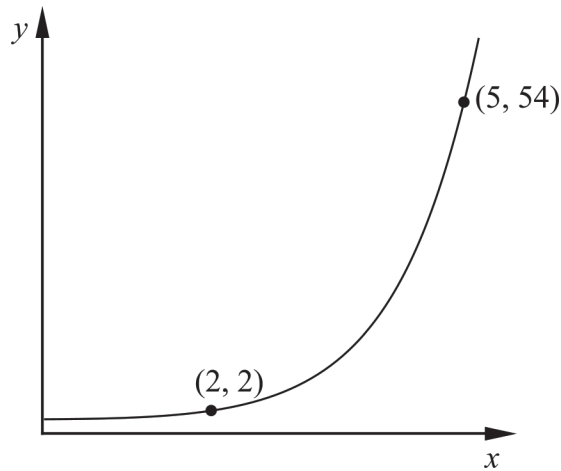
16. The triangle ABC has vertex A in the origin, vertex B on the positive x -axis and vertex C in the first quadrant. The vertices B and C lie on the straight line $y = -1.5x + 12$. See figure.



Determine the coordinates of point C if the area of the triangle ABC is 36 area units.

(0/3/0)

17. The figure shows the graph of an exponential function.



Determine the y -coordinate of the point of intersection between the graph of the function and the y -axis. Simplify your answer as far as possible and give an exact answer.

(0/0/2)