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.

The test consists of three written parts (Part B, Part C and Part D).
Together they give a total of 57 points consisting of 20 E-, 21 C- and 16 A-points.

Level requirements for test grades
E: 13 points
D: 22 points of which 7 points on at least C-level
C: 29 points of which 12 points on at least C-level
B: 37 points of which 5 points on A-level
A: 44 points of which 8 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 $y = 3x + 2$

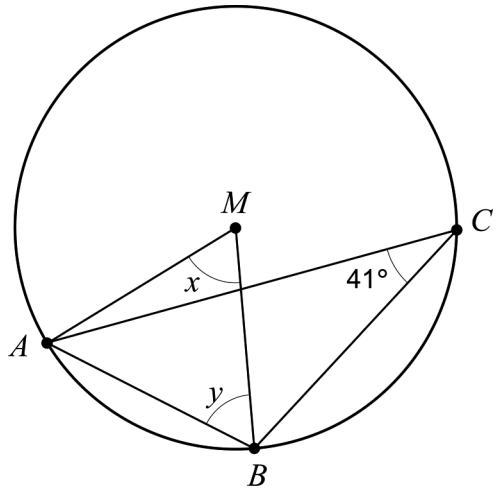
a) Write down the coordinates for a point on the line.

_____ (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 below shows the triangle *ABC* which is inscribed in a circle with centre *M*.



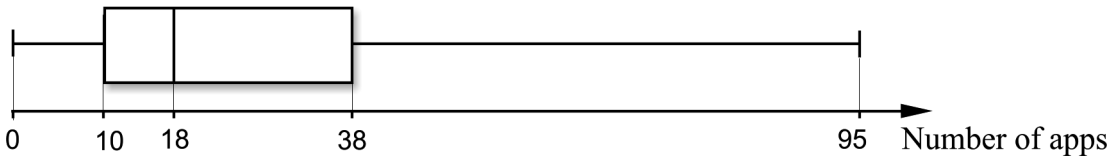
a) Determine the angle *x*. _____ (1/0/0)

b) Determine the angle *y*. _____ (1/0/0)

3. The equation $x^2 + 25 = 0$ has two solutions. Write these down.

_____ (1/0/0)

4. Berra, Emil and Elias carry out a statistical survey where they ask their 27 class mates: "How many apps have you installed on your phone?" They present the results of the 27 answers in the box plot below.



a) Determine the interquartile range. _____ (1/0/0)

Only one class mate had installed exactly 38 apps.

b) How many of the class mates had installed more than 38 apps?

_____ (0/1/0)

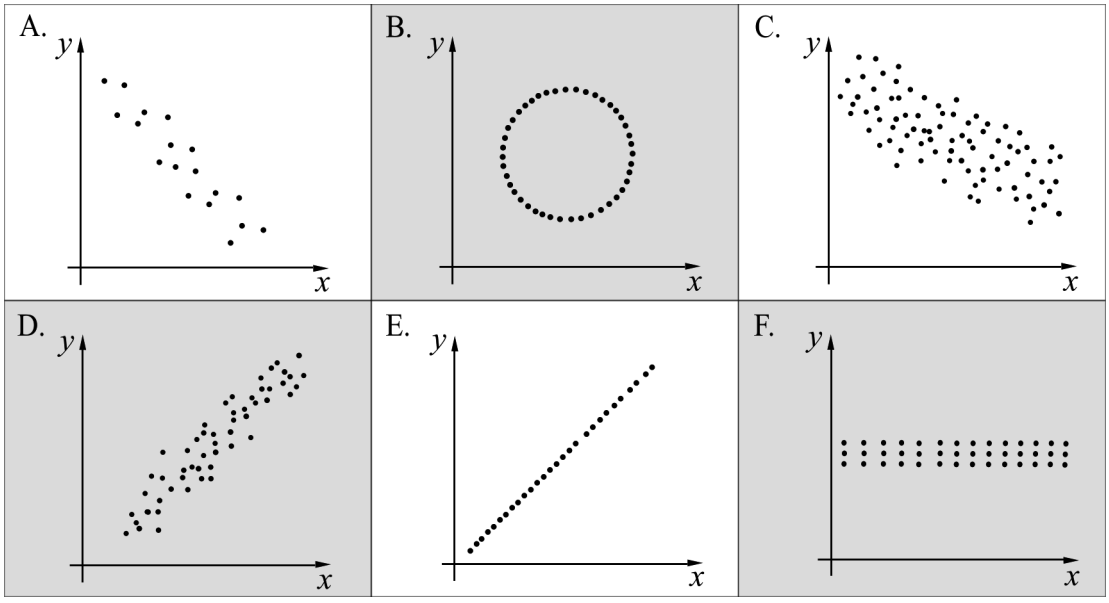
5. Below are six scatter plots, A–F.

a) Which of the scatter plots A–F has the strongest correlation between the variables x and y?

_____ (1/0/0)

b) Which two of the scatter plots A–F have the correlation coefficient $r = 0$?

_____ (0/1/0)

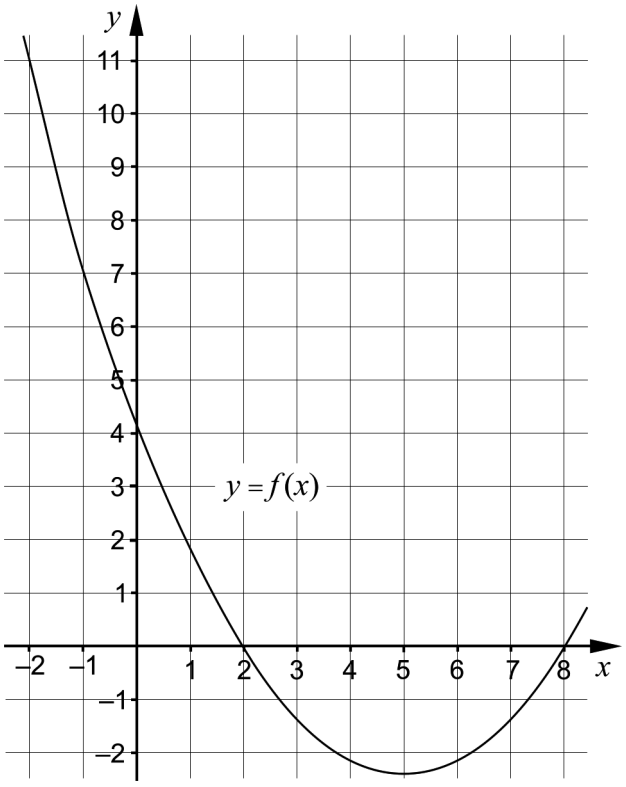


6. Solve the equations. Give exact answers.

a) $5^x = 3$ _____ (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.

$\left(\sqrt{2x+1}+\sqrt{2x-1}\right)\left(\sqrt{2x+1}-\sqrt{2x-1}\right)$ _____ (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)

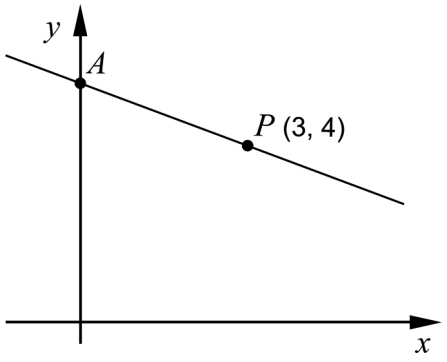
11. Solve the equations algebraically. Give exact answers.

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 point $P\,(3, 4)$.
The line intersects the positive y-axis at a point A. The distance between the origin and the point A is equal to the distance between the origin and the point P.



Determine the equation of the straight line that passes through the points A and P. (0/3/0)

13. 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)

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

$100^x = 10^{1+\lg 50}$ (0/0/1)

b) Which of the intervals A–F contains the solution to the equation $100^x = 10^{1+\lg 50}$? Justify your answer. (0/0/2)

A. $-1 \le x < -0.5$

B. $-0.5 \le x < 0$

C. $0 \le x < 0.5$

D. $0.5 \le x < 1$

E. $1 \le x < 1.5$

F. $1.5 \le x < 2$