

QUESTION 1

1.1 Solve for x :

1.1.1 $x^2 - 5x - 6 = 0$ (2)

1.1.2 $(3x-1)(x-4) = 16$ (correct to TWO decimal places) (4)

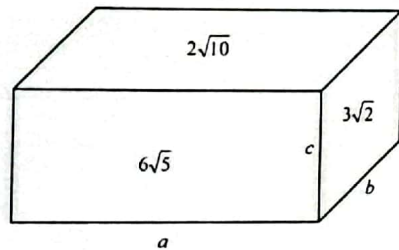
1.1.3 $4x - x^2 \geq 0$ (3)

1.1.4 $\frac{5^{2x} - 1}{5^x + 1} = 4$ (3)

1.2 Solve simultaneously for x and y :

$x + 3y = 2$ and $x^2 + 4xy - 5 = 0$ (5)

1.3 A rectangular box has dimensions a , b and c . The area of the surfaces are $3\sqrt{2}$ and $6\sqrt{5}$, as shown in the diagram below. $2\sqrt{10}$



Calculate, without using a calculator, the volume of the rectangular box. (5) [22]

QUESTION 2

Given the exponential function: $g(x) = \left(\frac{1}{2}\right)^x$

2.1 Write down the range of g . (1)

2.2 Determine the equation of g^{-1} in the form $y = \dots$ (2)

2.3 Is g^{-1} a function? Justify your answer. (2)

2.4 The point $M(a; 2)$ lies on g^{-1} .

2.4.1 Calculate the value of a . (2)

2.4.2 M' , the image of M , lies on g . Write down the coordinates of M' . (1)

2.5 If $h(x) = g(x+3) + 2$, write down the coordinates of the image of M' on h . (3) [11]

QUESTION 3

3.1 Given: $f(x) = \frac{1}{x+2} + 3$

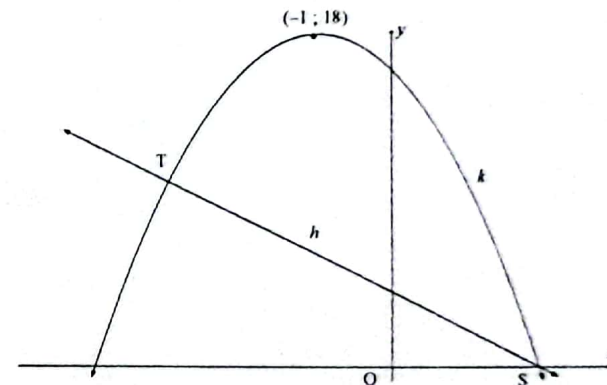
3.1.1 Determine the equations of the asymptotes of f . (2)

3.1.2 Write down the y -intercept of f . (1)

3.1.3 Calculate the x -intercept of f . (2)

3.1.4 Sketch the graph of f . Clearly label ALL intercepts with the axes and any asymptotes. (3)

3.2 Sketched below are the graphs of $k(x) = ax^2 + bx + c$ and $h(x) = -2x + 4$. Graph k has a turning point at $(-1; 18)$. S is the x -intercept of h and k . Graphs h and k also intersect at T .



3.2.1 Calculate the coordinates of S . (2)

3.2.2 Determine the equation of k in the form $y = a(x+p)^2 + q$. (3)

3.2.3 If $k(x) = -2x^2 - 4x + 16$, determine the coordinates of T . (5)

3.2.4 Determine the value(s) of x for which $k(x) < h(x)$. (2)

3.2.5 It is further given that k is the graph of $g^{-1}(x)$.

(a) For which values of x will the graph of g be concave up? (2)

(b) Sketch the graph of g , showing clearly the x -values of the turning points and the point of inflection. (3) [25]

QUESTION 4

Each child in a group of four-year-old children was given the same puzzle to complete. The time taken (in minutes) by each child to complete the puzzle is shown in the table below.

TIME TAKEN (t) (IN MINUTES)	NUMBER OF CHILDREN
$2 < t \leq 6$	2
$6 < t \leq 10$	10
$10 < t \leq 14$	9
$14 < t \leq 18$	7
$18 < t \leq 22$	8
$22 < t \leq 26$	7
$26 < t \leq 30$	2

- 4.1 How many children completed the puzzle? (1)
 - 4.2 Calculate the estimated mean time taken to complete the puzzle. (2)
 - 4.3 Complete the cumulative frequency column in the table given in the ANSWER BOOK. (2)
 - 4.4 Draw a cumulative frequency graph (ogive) to represent the data on the grid provided in the ANSWER BOOK. (3)
 - 4.5 Use the graph to determine the median time taken to complete the puzzle. (2)
- [10]**

QUESTION 5

Learners who scored a mark below 50% in a Mathematics test were selected to use a computer-based programme as part of an intervention strategy. On completing the programme, these learners wrote a second test to determine the effectiveness of the intervention strategy. The mark (as a percentage) scored by 15 of these learners in both tests is given in the table below.

LEARNER	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
TEST 1 (%)	10	18	23	24	27	34	34	36	37	39	40	44	45	48	49
TEST 2 (%)	33	21	32	20	58	43	49	48	41	55	50	45	62	68	60

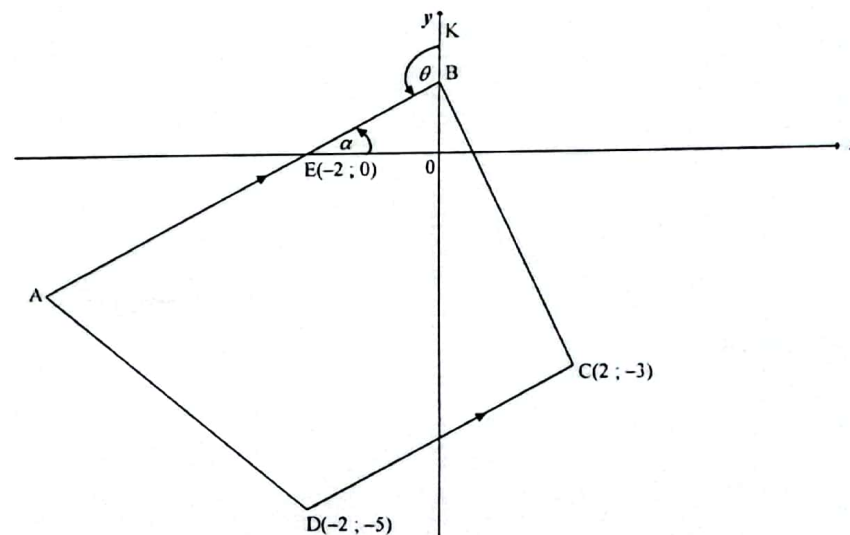
- 5.1 Determine the equation of the least squares regression line. (3)
- 5.2 A learner's mark in the first test was 15 out of a maximum of 50 marks.
 - 5.2.1 Write down the learner's mark for this test as a percentage. (1)
 - 5.2.2 Predict the learner's mark for the second test. Give your answer to the nearest integer. (2)

5.3 For the 15 learners above, the mean mark of the second test is 45,67% and the standard deviation is 13,88%. The teacher discovered that he forgot to add the marks of the last question to the total mark of each of these learners. All the learners scored full marks in the last question. When the marks of the last question are added, the new mean mark is 50,67%.

- 5.3.1 What is the standard deviation after the marks for the last question are added to each learner's total? (2)
 - 5.3.2 What is the total mark of the last question? (2)
- [10]**

QUESTION 6

In the diagram, A, B, C(2 ; -3) and D(-2 ; -5) are vertices of a trapezium with $AB \parallel DC$. E(-2 ; 0) is the x-intercept of AB. The inclination of AB is α . K lies on the y-axis and $\widehat{KBE} = \theta$.



- 6.1 Determine:
 - 6.1.1 The midpoint of EC (2)
 - 6.1.2 The gradient of DC (2)
 - 6.1.3 The equation of AB in the form $y = mx + c$ (3)
 - 6.1.4 The size of θ (3)
- 6.2 Prove that $AB \perp BC$. (3)
- 6.3 The points E, B and C lie on the circumference of a circle. Determine: