

‘O’ LEVEL MATHS

REVISION GUIDE

244 marks

Paper 1(Section A)

Paper 2(Section B)

Instructions to candidates

- Answer all questions
- Omission of essential working will result in loss of marks
- The number of marks is given in brackets () at the end of each question or part question.
- Decimal answers which are not exact should be given correct to three significant figures unless stated otherwise.
- Electronic calculators can only be used in Paper 2 (Setion B).

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MUSENDO POWER

PAPER 1(SECTION A)

1.a) Giving your answer as a common fraction in its lowest terms, find the value of:

(i) $\frac{3}{4} - \frac{3}{4}$ (1) (ii) $\frac{9}{14} \div \frac{6}{7}$ (1)

(iii) $1\frac{3}{4} \div 1\frac{2}{5} + 1\frac{5}{8}$ (2) (iv) $3\frac{4}{5} - \left(1\frac{2}{3} + \frac{7}{15}\right)$ (3)

b) Express 0,05896 correct to:

(i) 3 significant figures (1)

(ii) 3 decimal place (1)

c) Express $\frac{14}{25}$ as a percentage (1)

2. Evaluate (a) $15-21+7$ (1)

(b) $1,56-1,3$ (1)

(c) $1,56 \times 1,3$ (2)

3. Express 0,0978

a) Correct to two decimal places (1)

b) Correct to 2 significant figures (1)

c) In standard form (1)

4. a) It is given that 300 cattle are to be shared in the ratio 12: 10: 8

I. Express the ratio in its simplest form. (1)

II. Calculate the difference between the largest and the smallest shares (4)

5. Evaluate

(a) i. $432_5 + 414_5$

ii. $212_4 - 133_4$ (2)

(b)(i) Convert 65_{10} to a number in base 3 (1)

(ii) Simplify $3102_4 + 11101_2$, giving your answer in base 4 (3)

(iii) Express 10111_2 as a number in base 5 (3)

6. Factorise completely

a) $2ax + 3ay + 4x + 6y$ (2)

b) $8x^2 - 18$ (2)

c) $y^2 + 10y - 24$ (2)

d) $27 - 3x^2$ (2)

e) $x^2 - 4x - 21$ (2)

f) $7x^3 - 28x$ (2)

7. Solve the following equations

a) $\frac{y-3}{2y+1} = 4$ (3)

b) $\frac{x}{16} = \frac{4}{x}$ (3)

8. Given that $P = \frac{n}{2}\{2a + (n-1)d\}$

I. Express a in terms of d , n and P (3)

II. Find the value of a when $n=10$, $d=4$ and $P=20$ (2)

9. If $dx = r + qx$

I. Find the value of d when $q = 3$, $r = -1$ and $x = 2$, (2)

II. Express x in terms of d , q and r . (3)

10. Make R the subject of the formula $Q = m + nR^2$ (3)

11. Solve the simultaneous equations

a) $3x - 2y = 8$
 $5x - 4y = 12$ (3)

b) $3x - y = 7$
 $y = 5 - x$ (3)

c) $2p + 3q = 1$
 $p - 4q = 17$ (3)

$$\begin{aligned} \text{d) } 3x + y &= 1 \\ 2x + y &= 5 \end{aligned} \quad (3)$$

12. It is given that y varies directly as the square root of z

- Write down the equation connecting y , z and a constant k .
- Find k when $y = 3$ and $z = 4$
- Find y when $z = 16$ (6)

13. It is given that w is inversely proportional to f and when $f = 20$, $w = 150$.

- Find an equation connecting f and w
- Find the value of f when $w = 60$ (4)

14. 9 white and 6 yellow identical tennis balls are placed in a box. Kuda picks balls at random one at a time.

Find the probability that the first and second balls picked are

- both white
- of different colours (4)

15. A rural district council increases the value of land by 5% every year. If the value of a piece of land is \$4 600, calculate its value in 2 years' time. (3)

16. Solve the equation $3 - 2(2n - 5) = 32$ (2)

17. Evaluate

$$\text{a) } \frac{\log 36 - \log 4}{\log 15 - \log 5} \quad (3)$$

$$\text{b) If } \log(2x + 21) - \log 5x = 0, \text{ find the value of } x. \quad (3)$$

$$\text{c) } 2 \log 8 + \log 25 - \log 16 \quad (2)$$

18. Two similar drums have their diameters in the ratio 3 : 5,

- Write down the ratio of their volumes.
- Given that the volume of the bigger drum is 100litres, calculate the volume of the smaller drum. (2)

19. The table shows the number of passengers in each of 50 taxis leaving airport one day.

Number of passengers in taxi	1	2	3	4
Number of taxis	x	20	y	13

- Find the value of $x + y$ in its simplest form.
- If the mean number of passengers per taxi is 2,66 ; show that $x + 3y = 41$.
- Find the value of x and the value of y by solving appropriate equations. (8)

20. A straight line joins the points A (1;3) and B (4;7).

- What is the length of AB? (1)
- What is the gradient of AB? (2)
- A line parallel to AB passes through the origin and the point(3; k). What is the value of k? (2)

21. Given that $a = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$ $b = \begin{pmatrix} 8 \\ 5 \end{pmatrix}$ $c = \begin{pmatrix} l \\ 12 \end{pmatrix}$

- Find a) $b - a$ (1)
- $|b - a|$ (2)
- the value of l if $|c| = 13$ (2)

22. The equation of a straight line is given as $5x + 4y - 30 = 0$.

- Make y the subject of the equation. (2)
- Write down the gradient of the straight line. (1)
- Write down the coordinates of the point where the line crosses the x - axis. (1)

23. Remove the brackets and simplify

$$(a + 2)(a - 3) - 3(a - 5) \quad (3)$$

PAPER 2(SECTION B)

24. a) A drama club has 15 members, 8 of whom are girls.

- (i) Find the probability of randomly choosing a boy from the group.
- (ii) Six more members joined the club to bring the total membership to 21.

Given that the probability then of randomly choosing two girls, one after the other became $\frac{3}{14}$, find the number of new girls who joined the club. (4)

b) Express $2 - 2 \log 50$ as a logarithm of a single number. (2)

c) Solve the equation $2x^2 - 4x - 3 = 0$, giving your answers correct to one decimal place. (5)

25. In an ordinary level examination, each of 124 candidates sat for the Mathematics, English and Science examinations. 9 candidates passed Mathematics only, 15 passed English only and 10 more candidates than those who passed all three subjects passed Science only.

Given that 28 passed Mathematics and Science, 32 passed Mathematics and English, 30 passed English and Science and that 27 candidates did not pass any of the three subjects, find the

- (i) Number of candidates who passed all the three subject,
- (ii) Number of candidates who passed Science,
- (iii) Percentage pass rate for Mathematics among these candidates correct to 1 decimal place. (5)

26. Solve the equation $3x^2 - 5x - 15 = 0$, giving your answers correct to 2 decimal places. (5)

27. The sum of interior angles of a polygon is 3240° . Three of its interior angles are 140° , 110° and 100° . The rest are equal. Find the size of each of the equal angles. (4)

28. The rectangle on the left is twice the area of that on the right.



- I. Form a quadratic equation in x and show that it reduces to $x^2 + 3x - 40 = 0$. (4)
 - II. Solve the equation, stating which solution is realistic in terms of the given data. (6)
 - III. Find the area of the larger rectangle. (2)
- 29. a)** (i) Solve the inequality $x - 3 < 4 - 2x \leq x + 13$ (4)
- (ii) Illustrate your solution in part a(i) on a number line. (1)
- 30.** Given that $m = 2p + 1$ and $n = p - 2$, express mn in terms of p in its simplest form. (2)
- 31. a)** Given that x is an odd number, find the possible values of x , which satisfy the inequalities $x \geq 3$ and $5x - 10 < 35$ (2)
- b) If $f(x) = x^2 - 2x + k$, where k is a constant, and $f(3) = -32$, find the value of k .
- Hence, find the values of x for which $f(x) = 0$. (4)

Answer the following questions on sheets of plain paper

Use ruler and compasses only

All the construction lines must be clearly shown

32.a) Construct, on a single diagram,

- i. the triangle ABC in which $AB = 6,8$ cm, $BC = 10$ cm and $\angle ABC = 120^\circ$ (2)
 - ii. the perpendicular from A on to CB produced, (2)
 - iii. the locus of points which are 3cm from BC, (2)
 - iv. the bisector of angle ABC. (2)
- b) i. Measure and write down the length of AC. (1)
- ii. Mark two points X and Y which are 3cm from BC and are equidistant from AB and BC (2)

33.All constructions should be on a single diagram.

- (a) i. Line $VW = 12$ cm. Mark a point X on VW such that $VX = 8$ cm. (3)
- ii. Construct a perpendicular to VW passing through point X. (3)
- (b) i. Mark points Y and Z on the perpendicular such that $XZ = XY = 5,5$ cm. (1)
- (c) i. Draw lines VZ, VY, WZ and WY. (2)
- ii. Hence state the name of the quadrilateral VYWZ. (2)
- (d) describe fully the locus of points equidistant from V and Y. (1)
- (e) i. Construct the locus of points equidistant from V and Y. (1)
- ii. Hence draw a circle that passes through V, X and Y. (4)
- iii. measure and write down the radius of the circle. (4)

34. The table shows the number of books borrowed from Power library in one week.

Subject	Geography	Science	Maths	English	Commerce
Number of books	30	45	25	20	60

- Find the total number of books borrowed in that week. (2)
- Express the total number of Commerce books as a fraction of all the books borrowed in its lowest terms. (2)
- Show this information on a clearly labelled pie-chart. (6)
- Two students borrowed books from the library during that week.

Calculate the probability that the first student borrowed a Science book and the second a Maths book. (2)

Answer the following questions on sheets of graph paper

35. a) $\Delta A_1B_1C_1$ has vertices at $A_1(-2; 2)$, $B_1(1; 2)$, $C_1(10; 6)$ and ΔABC has vertices at $A(-6; 2)$, $B(-3; 2)$ and $C(-2; 6)$.

- Draw and label clearly $\Delta A_1B_1C_1$,
- Draw and label clearly ΔABC .
- Describe fully the single transformation which maps $\Delta A_1B_1C_1$ clearly ΔABC . (5)

b). $\Delta A_2B_2C_2$ is the image of ΔABC under a one-way stretch of factor -2 with the x-axis invariant.

Draw and label clearly $\Delta A_2B_2C_2$ (2)

c) i. N is a transformation represented by $\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$.

Draw and label clearly $\Delta A_3B_3C_3$, the image of ΔABC under the transformation N.

- Describe fully the single transformation which maps ΔABC onto $\Delta A_3B_3C_3$ (5)

NB: Use a scale of 2cm to represent 2 units.
for $x = -8$ to 12
 $y = -12$ to 8

36. The following is an incomplete table of values for $y = 2x^2 - 5x - 3$.

X	-2	-1	$\frac{1}{2}$	0	1	2	3	4
Y	15	4	P	-3	-6	q	0	9

a) Calculate the value of p and the value of q. (2)

b) Using a horizontal scale of 2 cm to represent 1 unit and a vertical scale of 2cm to represent 2 units, draw the graph $y = 2x^2 - 5x - 3$ for $-2 \leq x \leq 4$ and $-8 \leq y \leq 16$. (4)

c) Find the gradient of the curve when $x = 1$. (2)

d) Use your graph to solve the equation $2x^2 - 5x - 3 = -4$ (2)

e) find the area bounded by the curve and the x-axis from $x = 1$ to $x = 3$ (2)

37. A newly constructed school wishes to buy desks and chairs for its pupils.

Let x be the number of desks and y the number of chairs.

a) i. The school wishes to buy at least 75 desks and at least 100 chairs.
Write down two inequalities which satisfy these conditions.

ii. The number of chairs should be more than the number of desks.

Write down an inequality which satisfies this condition.

iii. Desks cost \$25 each and chairs cost \$17,50 each. The school has only \$5 000 to spend on these items.

Write down an inequality and show that it reduces to

$$10x + 7y = 2\,000 \quad (5)$$

b) using a scale of 2 cm to represent 25 desks and 2 cm to represent 50 chairs, show by shading the unwanted regions, the region in which (x; y) must lie. (5)

c) use your region to determine the number of desks and chairs that would use up the greatest possible amount. (2)

**ANSWERS TO ALL THESE QUESTIONS
ARE AVAILABLE ON REQUEST**