AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1994

M. 25

16293

MATHEMATICS - ALTERNATIVE - ORDINARY LEVEL

THURSDAY, 9 JUNE – MORNING, 9.30 to 12.00

PAPER 1 (300 marks)

Attempt **QUESTION 1** (100 marks) and **FOUR** other questions (50 marks each).
Marks may be lost if all your work is not clearly shown.

1. **Attempt Section A or Section B.**

SECTION A

(i) A person pays IR£1089 for a computer.
This price includes 21% VAT.
How much, in IR£, is the VAT?

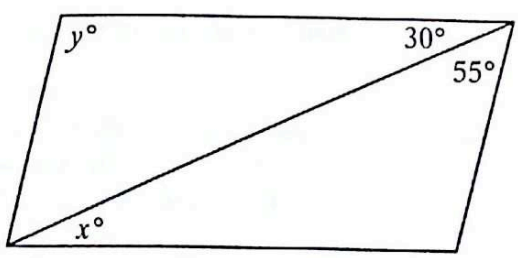
(ii) A card is picked at random from a deck of 52 cards.
If there are 4 aces in the deck, what is the probability that an ace is picked?

(iii) f is the function $x \to 2x - 7$.
Find $f(3)$.

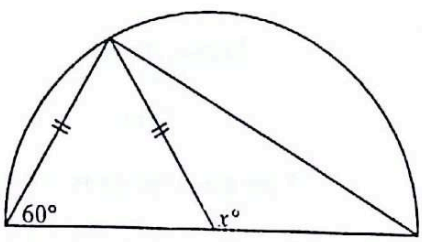
(iv) The interest on a couple's savings in one year is IR£560.
Tax on this interest is at the rate of 35%.
Calculate the tax the couple pays.

(v) Because of an error in a computer programme, a company received a bill for IR£10 000 instead of IR£100.
Calculate the percentage error.

(vi) The diagram shows a parallelogram.
Calculate the value of x
and the value of y.



(vii) Calculate the value of x.



(viii) If tan A = 0.253, find sin A.
See Tables p.18 and p.16.

(ix) Construct an angle B such that

$$\sin B = \tfrac{3}{5}.$$

(x) The point a has coordinates (3, 1) and the point b has coordinates (–1, 2).
Find the slope of ab.

OVER →

SECTION B

Use your calculator to answer each of the following:

(i) Find $\sqrt{99}$, correct to two decimal places.

(ii) Find $(0.99)^3$, correct to four decimal places.

(iii) Find $3 - \sqrt{3}$, correct to two decimal places.

(iv) An article priced at IR£15.99 is reduced by 20% in a sale.
Find, to the nearest IR£, the sale price.

(v) Find $\frac{601}{700} - \frac{6}{7}$, correct to three places of decimals.

(vi) A person buys \$840 when the exchange rate is \$1.50 = IR£1.
A charge of 2.5% is made for this service.
How much altogether does the person pay in IR£ ?

(vii) Find $\sqrt{7}$, correct to two significant figures.

(viii) Is $(\sqrt{6})^3 - (\sqrt{3})^3$ greater than $\sqrt{82}$ and if so, state by how much correct to two significant figures.

(ix) Evaluate

$$\frac{1.97 \times 10^6 + 7.25 \times 10^5}{3.55 \times 10^4},$$

giving your answer correct to three significant figures.

(x) Find, correct to four significant figures,

$$(896.9 \times 70) / (50 - \sqrt{64}).$$

Write your answer in Scientific notation.

2. *(a)* A hiker walks 16.5 km in 3 hours.

(i) What is the average speed of the hiker in km per hour ?

(ii) How long does it take the hiker to walk 6.875 km ?

(b) The present and previous unit readings on two ESB meters are as follows:

Present reading	Previous reading	Meter description
55655	52433	Domestic use
5854	4974	Night heating

Write down the units of electricity used for domestic use and for night heating.

The bill is calculated as follows:

7.14p per unit for domestic use
2.90p per unit for night heating
Standing Charge of IR£3.35
Special Discount of IR£12.33.

(i) Find the amount of the bill, to the nearest penny.

(ii) If VAT at 12.5% is added to the bill, calculate, to the nearest IR£, the total amount paid to the ESB.

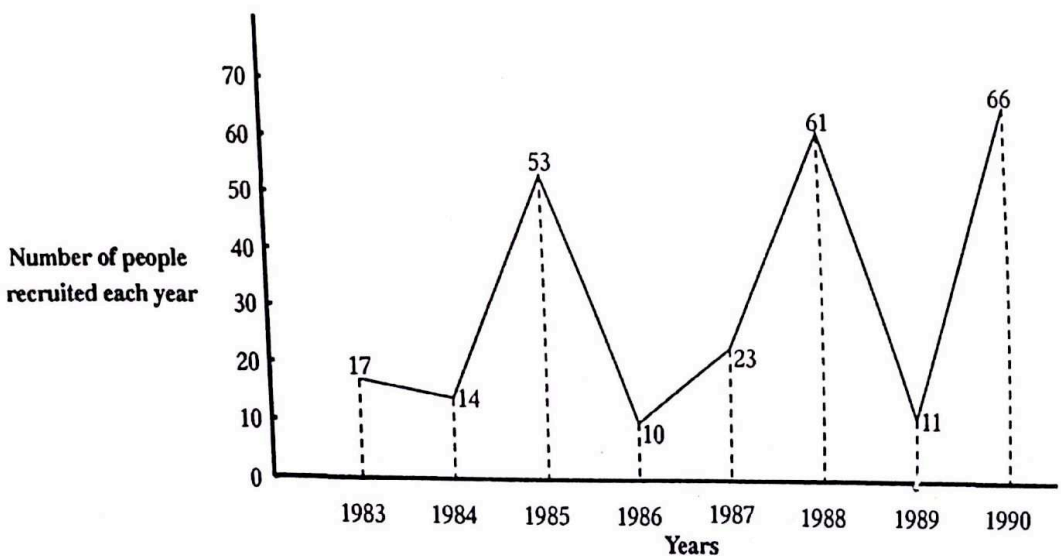
3. *(a)* Company Y employs 20 office staff and 165 production staff. Due to a drop in sales company Y has to reduce its staff by

(i) 25% of the office staff
(ii) 40% of the production staff.

Calculate the number of staff in company Y after the reductions.

(b) A person borrowed IR£2000 at 15% per annum compound interest.
Calculate the amount the person owed at the end of the first year.
If the person repaid IR£1000 at the end of the first year, how much does the person owe at the end of the second year?

4. A certain industry started up in Ireland in 1983.
The number of people recruited each year into this industry from 1983 up to and including 1990 is given in the graph below:



Note: 17 people recruited in 1983, 14 in 1984, etc. as shown on the graph.

Find

(i) which two consecutive years had the least number of people recruited
(ii) what was the maximum recruitment in any consecutive two year period
(iii) how many people were recruited from 1983 to 1990 inclusive.

If the industry's average salary of IR£10 000 in 1983 increased in each subsequent year at the compound rate of 8% per year, what, to the nearest IR£, is the average salary in 1990 ?

5. *(a)* Solve the equation

$$6x - 5 = 2x + 7.$$

(b) Solve the quadratic equation

$$64x^2 + 20x + 1 = 0.$$

(c) Solve the simultaneous equations

$$x + 3y = -5$$
$$5x - 2y = 9.$$

OVER →

6. Draw the graph of the function

$$f : x \rightarrow x^2 - 2x - 3$$

for the values $-2 \leq x \leq 4, \quad x \in \mathbf{R}$.

Use your graph to find, as accurately as possible,

(i) $f(3\frac{1}{2})$

(ii) the values of x for which $f(x) = 1$

(iii) the interval of x for which $f(x)$ is negative and increasing.

7. *(a)* The ages, in years, of a group of pupils in a school are as follows:

14, 11, 13, 12, 11, x, 13, 14.

If the average age of the group is 12.5 years, find the value of x.

(b) The times, in minutes, taken for 100 different telephone calls are recorded in the following table:

Time	2 – 4	4 – 6	6 – 8	8 – 10	10 – 12	12 - 14
Number of Calls	18	38	28	10	4	2

(Note: 2 – 4 means 2 minutes and longer but less than 4 minutes and similarly for the others).

Complete the following cumulative frequency table:

Time	< 4	< 6	< 8	< 10	< 12	< 14
Cumulative Frequency						

Draw the cumulative frequency curve.

Use this curve to estimate

(i) the number of calls which lasted between 3 minutes and 5 minutes

(ii) the median

(iii) the time taken for the 20 th. longest call.

FORMULAE FOR PAPER I

Slope formula: $\frac{y_2 - y_1}{x_2 - x_1}$

Compound Interest:

$$\text{Amount} = P\left(1 + \frac{r}{100}\right)^n$$

Roots of quadratic equation $ax^2 + bx + c = 0$ are

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$