JUNIOR CERT
Part 2

- Maths: How the new marking scheme is different
- Science: How to gain those extra marks in coursework
- Geography: The benefits of past exam papers
- History: Organising your revision
Exam Times – Junior Cert: Maths, science, geography and history

Welcome to the final issue of our Exam Times series for 2014, a collaboration between the Institute of Education and The Irish Times.

This week’s supplement focuses on four specific subjects for the Junior Cert: maths, science, geography and history.

At the Institute of Education we have over 45 years experience of preparing and supporting students as they prepare for the State exams. Over the past eight weeks we hope that we have imparted some of this knowledge and experience to students and that our advice, used in conjunction with class notes and textbooks, will help students maximise their performance in June.

On behalf of the institute I would like to wish all students preparing for the exams in June a productive couple of months of revision and every success in the exams.

PETER KEARNS
Director
The Institute of Education

Author profiles

MATHS
Gerry Culleton
Gerry, an honours graduate of Trinity College Dublin, has taught maths at Junior and Leaving Cert level for over 30 years and has been teaching for 16 years at the Institute of Education.

SCIENCE
Emer Finnin
Emer is an experienced examiner for Junior Cert science and has been teaching at the Institute of Education for the past 10 years. She graduated with a BSc and a HDip in education and then continued her studies in Trinity College Dublin with a diploma in computers in education. Emer has successful entries each year in the BT Young Scientist exhibition and has years of experience correcting the Junior Cert papers.

GEOGRAPHY
Michael Doran
Michael has been teaching geography at the Institute of Education since 1995. He is an experienced Leaving Cert examiner and has written many published articles on the subject. Michael believes that the geography course can be a stimulating learning experience for both student and teacher.

HISTORY
Seán Delap
A UCD graduate in history and Irish, Seán has been teaching history at the Institute of Education since 1980. He has participated in a number of radio and television documentaries, most recently on the television series Éalú produced for TG4.

Seán gives talks regularly on behalf of the History Teachers Association of Ireland to students and teachers and has lectured at conferences on the methodology of teaching both Leaving and Junior Cert history as well as teaching history through Irish. He is the author of Leaving and Junior Cert textbooks: Nation States and International Relations 1871-1926, Dictatorship and Democracy 1920-1945, Division and Re-Alignment in Europe, 1945-1992 and European Retreat from Empire and the Aftermath, 1945-1990. He is also the co-author of Junior Cert textbook Uncovering History.
Gerry Culleton has been teaching maths at Junior and Leaving Cert level for over 30 years – 16 of them at the Institute.

Mathematics is said to be “the study of quantity, structure, space and shape”. Through its application to the simple and every day, as well as to the complex and remote, it is true to say that mathematics is involved in almost all aspects of life and living. (Mathematics syllabus 2012)

Throughout this article, material for higher level only will be clearly indicated. Remember mathematics is not learned in isolation. It has significant connections with your other curricular subjects. Many elements of science, technical graphics, geography, home economics, business studies, music and art are all rich in mathematical structure.

At a glance – The exam papers

Strands
Junior Cert maths consists of five strands:
- Strand 1: Statistics and probability
- Strand 2: Geometry and trigonometry
- Strand 3: Numbers
- Strand 4: Algebra
- Strand 5: Functions

Strands 1-4 have already been introduced. Strand 5 has not yet been introduced.

Papers
Both ordinary and higher level students have to attempt two papers.

(i) Each ordinary level paper will be of two hours duration.
(ii) Each higher level paper will be of two and a half hours duration.
(iii) Every question must be attempted. There is no choice.

Students at the Institute of Education
Photograph: Brenda Fitzsimons

JUNIOR CERT MATHS

Paper One

An overview of topics covered in this paper for both Higher and Ordinary Levels:
- Arithmetic
- Use of the calculator
- Algebra
- Indices / Surds
- Sets
- Functions
- Graphs
- Number systems

☆ Arithmetic ☆

Percentages
Familiarise yourself with a definite method for finding percentages.

Q.  What is 15% of 300?

SOLUTION:

METHOD 1: Multiply 300 by 0.15 = 45

METHOD 2: Divide 300 by 100 and multiply by 15 = 45.

[ORDINARY / HIGHER]

Q.  John bought an antique for €300, and sold it later for €500. Find his profit as a percentage of the cost price.

SOLUTION:

\[
\text{Profit} = \frac{500 - 300}{300} = 66\frac{2}{3}\%
\]

or use your calculator:

\[
\frac{500 - 300}{300} = 66.67\%
\]

[ORDINARY]


SOLUTION:

The question is asking you to divide €350 into 7 equal parts.

1 part ⇒ 350 ÷ 7 = 50
3 parts ⇒ 50 × 3 = 150
4 parts ⇒ 50 × 4 = 200
Answer: €150 and €200

[HIGHER]

Q.  Mary and Bill divide a sum of money between them in the ratio 2 : 7 respectively. If Bill gets €60 more than Mary, find the sum of money.

SOLUTION:

Between Mary and Bill the sum of money is divided into 9 parts.

2 for Mary and 7 for Bill.

⇒ 60 = 5 parts, that is the difference between 2 and 7.

If 5 parts = €60
⇒ 1 part = €12
⇒ 9 parts = €12 × 9 = €108

Answer: €108

Taxation

Make sure you understand the terms: gross salary (pay), gross tax, Standard Rate Cut – off Point (SRCP), tax credits, tax payable, net (take home) pay.

[ORDINARY / HIGHER]

Q.  Tom earns €45000. He has a Standard Rate Cut-off Point of €15,000 and a tax credit of €7250. If the standard rate of tax is 20% and the higher rate is 42%, how much tax will he pay?

SOLUTION:

STEP 1: Gross Pay = €45,000
STEP 2: Gross Tax = 20% of SRCP + 42% of what remains
= 20% of 15000 + 42% of 30000
= €3000 + €12600
= €15600
STEP 3: Tax Payable = Gross Tax - Tax Credits = €15600 - €7250 = €8350
Answer: €8350

Note: Higher Level students need to practise a number of variations of the above problem.

Currency Exchange

Remember the Rule:
Always keep the currency you are looking for on the right.

[ORDINARY / HIGHER]

Q.  If €1 = $1.25 (dollars),

(i) change €175 to $ (dollars)

(ii) change $120 to € (Euro).

SOLUTION:

(i) We need dollars; keep them on the right.

\[
\text{€175} \times \frac{1}{1.25} = 140
\]

(ii) We need Euro; keep them on the right.

\[
\text{€120} \times \frac{1}{1.25} = €96
\]

Summer Maths Academy
Monday, 18 August – Friday, 22 August 2014.

Aimed specifically at students entering 5th year in 2014, this course introduces key maths topics on the Higher Level Leaving Cert Maths syllabus.

Book online at ioe.ie, call 01 661 3511 or email info@ioe.ie.

The Institute of Education
79-85 Lower Leeson Street, Dublin 2
**MATHS**

**Paper 1**

1. **Estimations**
   What is an estimate of each of the following:
   (i) \( \sqrt{10} \)
   (ii) \( \sqrt{77} \)
   (i) The nearest perfect square to 18 is 16 and \( \sqrt{16} = 4 \). Thus an estimate of \( \sqrt{10} \) would be 4.
   (ii) The nearest perfect square to 79 is 81 and \( \sqrt{81} = 9 \). Thus an estimate of \( \sqrt{77} \) would be 9.

2. **Fractions**
   a) Calculate:
      (i) \( \frac{2 + 3}{5} \)
      (ii) \( \frac{36 + 34}{30 - 23} \)
      (a) without using a calculator
      (b) using a calculator.
   Solution:
   a) Without a calculator: Remember (i) Do Top (ii) Do Bottom (iii) Then Divide.
      (i) \( \frac{2 + 3}{5} = \frac{5}{5} = 1 \)
      (ii) \( \frac{36 + 34}{30 - 23} = \frac{70}{7} = 10 \)
   b) With a calculator: Remember that you must use brackets.
      (i) \( (2 + 3) \div 5 = 1 \)
      (ii) \( (36 + 34) \div (30 - 23) = 10 \)

3. **Scientific Notation**
   (Index Notation)
   A number written in the form \( a \times 10^n \), where \( 1 \leq a < 10 \) and \( n \in \mathbb{Z} \) is said to be written in Scientific Notation.
   27000 in scientific notation is \( 2.7 \times 10^4 \),
   154,000 in scientific notation is \( 1.54 \times 10^5 \).
   Solution:
   \[ 27000 = 2.7 \times 10^4, \quad 154000 = 1.54 \times 10^5 \]

4. **Algebra**
   Lots of basic algebraic operations and skills will be tested. Familiarise yourself with the following:
   * Simplifying algebraic expressions
   * Factorisation
   * Division
   * Solving equations
   * Word problems leading to equations

5. **Simplifying Algebraic Expressions**
   Q. **Factorise** \( 2a^3 + 4a^2 - 3ax + 6b \)
   Answer: \( 2a(a^2 + 2a - 3x + 3b) \)

6. **Factorisation**
   1. **Common Factors**
      Q. Factorise \( 8ab^2 - 16a^2 b + 24a^3 b^2 \)
      Answer: \( 8ab(6b - 2a + 3ab) \)
   2. **Grouping**
      Q. Factorise \( 2a^2 + 4a^2 - 3ax + 6b \)
      Answer: \( (2a + 3)(x + 2) \)

7. **Simultaneous Equations**
   (i) **Solving Equations**
      Equations are asked in every exam so make sure you are familiar with the following types:
      **TYPE 1:** Linear equations (no \( x^2 \))
      Q. **Solve** \( 10 - 8(x - 6) = x - 4 \)
      Answer: \( x = 18 \)
   (ii) **ORDERED / HIGHER**
      The Simultaneous Equation Type
      Method:
      Step 1: Let \( y = \) an unknown number
      Step 2: Look for 2 facts that link \( x \) and \( y \) and form two equations
      Step 3: Then solve these simultaneous equations.
      Q. **Solve** \( 3x^2 - x - 3 = 0 \), correct to two decimal places.
      Solution: Solve, correct to two decimal places: ‘is a direct hint to use the formula’
      \[ x = \frac{3 \pm \sqrt{9 + 4 \times 3}}{2} \]
      Answer: \( x = 1.18 \) or \( x = -0.85 \)
   (iii) **Solve** \( 5x - 2y = 13 + 0 \)
      Answer: \( x = 2, y = -1.5 \)
      \( x \) and \( y \) are whole numbers.

**Timing is key**

The new Junior Cert format gives a suggested maximum time for the completion of each question. This is indicated clearly at the top of the question. Remember, this is a suggested maximum time. It is very important that you do not give more time to a question than the time indicated as you may run into a time problem at the end. If you remain within the suggested time for each question you should have about 10 minutes to review your work.

So keep an eye on the clock!
Functions

A function is a rule that changes one number, called an input, into another number, called an output. We could think of a function as a number machine that changes an input x into an output y = f(x).

A function will generally be represented in one of two ways.
(i) \( f : x \rightarrow x^2 \) or  (ii) \( f(x) = x^2 \)
in out in out

Consider the following five types of questions.

**TYPE 1**: Evaluate a Function

Q. \( \text{If } f(x) = 5x - 3, \text{ evaluate } f(2). \)

SOLUTION:
\[
f(x) = 5x - 3
f(2) = 5(2) - 3 = 7
\]

\[2 \text{ in, } 7 \text{ out}\]

**TYPE 2**: Find x when given the value of the function.

Q. \( \text{If } f(x) = 5x - 2, \text{ find } x \text{ for which } f(x) = 18. \)

SOLUTION:
\[
f(x) = 5x - 2
f(x) = 18
5x = 20
x = 4
\]

\[18 \text{ out, 4 was put in}\]

**TYPE 3**: [HIGHER] Difficult Substitutions

Q. \( \text{If } f(x) = x^2 - 4, \text{ write an expression for } f(x - 2). \)

SOLUTION:
\[
f(x) = x^2 - 4
f(x - 2) = (x - 2)^2 - 4
= x^2 - 4x + 4 - 4
= x^2 - 4x
\]

\[x - 2 \text{ in, } x - 2 \text{ out}\]

**TYPE 4**: [HIGHER] Looking for a missing number.

Q. \( f(x) = p - 2x^2 \) is a function, find p if \( f(-2) = 12. \)

SOLUTION:
\[
f(x) = p - 2x^2
f(-2) = p - 2(-2)^2 = 12
p - 8 = 12
p = 20
\]

**TYPE 5**: [HIGHER] The Simultaneous Equations Type.

Q. \( \text{If } f(x) = x^2 + px + q, \text{ is a function. If } f(1) = 2 \text{ and } f(-1) = -12, \text{ find the value of } p \text{ and the value of } q. \)

SOLUTION:

**STEP 1:**
\[
f(x) = x^2 + px + q
f(1) = 1^2 + p(1) + q = 2
p + q = 2
\]

**STEP 2:**
\[
f(x) = x^2 + px + q
f(-1) = (-1)^2 + p(-1) + q = 12
- p + q = 11
\]

**STEP 3:** Solve the simultaneous equations.

\[
p = -5 \quad \text{and} \quad q = 6
\]

Graphs

Most students like drawing graphs. Make sure you know the difference between (i) a linear function and (ii) a quadratic function.

**Note 1:** The graph of a linear function (one with no squares) will be a straight line, e.g.
\[
f(x) = 3x - 7
\]

**Note 2:** The graph of a quadratic function will be a smooth curve, e.g.
\[
f(x) = x^2 + x - 6
\]

Q. \( \text{Draw the graph of the function } f(x) = 2x^2 - 1 \text{ in the domain } -1 \leq x \leq 3. \)

SOLUTION:

**STEP 1:** Make a table and take the endpoints of the domain as your two x-values.

<table>
<thead>
<tr>
<th>x</th>
<th>2x - 1</th>
<th>y = f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>-3</td>
<td>-5</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

*one endpoint is (-1, -3) and the other is (3, 5)*

**STEP 2:** The Graph

Number Systems

Types of numbers and their symbols.

* The set \( N \) of natural numbers.
  \( N = \{1, 2, 3, 4, 5, \ldots\}. \)

Know: Place value, sets of divisors, pairs of factors, prime numbers, H.C.F., L.C.M., cardinal number, number line.

* The set \( Z \) of integers.
  \( Z = \{-\ldots, -2, -1, 0, 1, 2, 3, \ldots\} \)

* The set \( Q \) of rational numbers.
  Decimals, fractions, percentages. Decimals and fractions plotted on the number line.

[Higher only] The set \( I \) of irrational numbers. These are numbers that cannot be written as a fraction such as \( \sqrt{2}, \sqrt{3} \).

Know: Inequality Symbols (reading from left to right)

\[ > \text{ "is greater than"} \]
\[ < \text{ "less than"} \]
\[ \geq \text{ "is greater than or equal to"} \]
\[ \leq \text{ "is less than or equal to"} \]
**Maths**

**Junior Cert Maths**

**Paper Two**

Here is an overview of the topics covered in this paper for both Higher Level and Ordinary Level.

- **Perimeter and Area & Surface Area and Volume**
- **Statistics**
- **Probability**
- **Synthetic Geometry**
- **Transformation**
- **Trigonometry**
- **Co-ordinate Geometry**

**Area and Volume**

Need to know:

- **[Ordinary]**
  - Perimeter and Area: rectangle, square, triangle, parallelogram, circle (disc) and sector of a circle
  - Surface Area and Volume: rectangular solid, cube, cylinder, sphere and hemisphere
  - Find the radius of a container
  - Find the height of a container (Depth of liquid)
  - Equal volumes.

- **[Higher]**
  - All of the above
  - Cone: where \( r = \text{radius}; h = \text{height}; l = \text{slant height.} \)
  - Combinations of different shapes
  - Rates of Flow

Note: Many of the formulae you require are in the Formulae and Tables booklet and these are supplied in the exam; if you are not given one ask the supervisor for one.

**[Ordinary / Higher]**

**Q.** Find the volume, in terms of \( \pi \), of a cylinder with radius 5cm and height 7cm.

**Solution:**

- Volume of cylinder = \( \pi r^2 h \) = \( \pi (5)^2 (7) \) cm

**Answer:** 175 \( \pi \) cm

Note: “Find in terms of \( \pi \)” means, leave \( \pi \) as \( \pi \).

**Q.** A sphere has a volume of \( 36 \pi \) cm

Find the radius of the sphere.

**Solution:**

- Volume of sphere = \( \frac{4}{3} \pi r^3 \)

But \( \frac{4}{3} \pi r^3 = 36 \pi \) (cancel \( \pi \))

\[ r^3 = \frac{3 \times 36}{4} = 27 \]

**Answer:** \( r = 3 \) cm

**[Higher]**

**Q.** A cylinder of height 24cm and radius 3cm has the same volume as that of a cone of radius 6cm. Find the height of the cone.

**Solution:**

**Step 1:** Volume of cylinder = \( \pi r^2 h \) = \( \pi (3)^2 (24) \) = 216 \( \pi \)

**Step 2:** Volume of cone = \( \frac{1}{3} \pi r^2 h \) = \( \frac{1}{3} \pi (6)^2 (h) \)

**Step 3:** But \( \text{volume of cone} = \text{volume of cylinder} \)

\[ 12 \pi h = 216 \pi \] (cancel \( \pi \))

\[ h = 18 \text{ cm} \]

**Note:** Always leave \( \pi \) as \( \pi \) when comparing two volumes.

**[Higher]**

**Q.** Sweets, made from a chocolate mixture, are in the shape of solid spherical balls. The diameter of each sweet is 3cm. 25 sweets fit exactly in a rectangular box which has an internal height of 3cm. The base of the box is a square.

(i) How many sweets are there in each row?

(ii) What is the internal volume of the box?

(iii) Find the volume of air in the box when the 25 sweets are placed inside it. Give your answer correct to 2 places of decimals and use \( \pi = 3.14 \)

**Solution:**

(i) There are 5 sweets in each row.

(ii) Volume of box = \( L \times B \times H \) = \( 15 \times 15 \times 3 \) = 675 cm

(iii) Volume of air in box when 25 sweets are placed inside it = volume of box - volume of 25 sweets = \( 675 - 25 \times \frac{4}{3} \pi r^3 \)

= \( 675 - 353.25 \)

= \( 321.75 \) cm

**Marking Scheme**

- Questions do not necessarily carry equal marks. The main point to note is that it is not possible to predict the allocation of marks within a question.

- The Project Maths marking scheme is quite different from the marking schemes used in the past.

There are five marking scales, with up to six categories per marking scale. It is a lot more complicated than the previous system. Don’t get hung up on the details of these marking schemes. The important thing is to answer all required questions, making your best attempt even if you are unsure, and avoid the common simple errors.
You need to know:
* Are they parallel or perpendicular?
* How to find their point of intersection by
  (i) Graphing or (ii) Calculation

Q. £ K is the line \( x - 2y - 3 = 0 \) and
  L is the line \( 2x + y - 1 = 0 \)
  (i) Investigate if \( K \parallel L \)
  (ii) By graphing lines K and L find
  their point of intersection.
  (iii) By using simultaneous
  equations find the point \( K \cap L \).

SOLUTION:
(i) Slope of \( K - \frac{1}{2} \), slope of \( L = -2 \)
As \( \frac{1}{2} \times -2 = -1 \), \( K \perp L \).
(ii) Graph lines K and L on graph paper.
Then from your graph read the point
\( K \cap L \) and you should get \((1, -1)\).
(iii) Solve the simultaneous equations.
\[
\begin{align*}
  K: \quad x - 2y &= 3 \\
  L: \quad 4x + 2y &= -2 \\
  5x &= -5 \\
  x &= -1 \\

  y &= -1
\end{align*}
\]
By substitution, \( y = -1 \).
\[ \therefore \quad K \cap L = (1, -1). \]

Bits and Pieces
Q1. £ The point \((4, 1)\) lies on the line
\[ 4x - 3y + 15 = 0 \]
Find the value of \( k \).
Answer: \( k = -3 \)
Q2. £ The point \((-3, 4)\) is on the line
whose equation is \( 5x + y + k = 0 \).
Find the value of \( k \).
Answer: \( k = 11 \)
Q3. £ \((-1, 6)\) and \((3, -1)\) are two points.
The point \( d = (2, y) \) is such that
\[ \frac{|x|}{|y|} = \frac{1}{2} \]
Find the two possible
values of \( y \).
Answer: \( y = 14 \) or \( y = -2 \)

☆ Trigonometry ☆

Right-Angled Triangles only
The Theorem of Pythagoras

- Ordinary level students will be required to:
  - Apply the result of the Theorem of Pythagoras
    to solve right-angled triangle problems of
    a simple nature involving height and distances.
  - Use trigonometric ratios, Sin, Cos and Tan
    to solve problems involving angles (integer values)
    between 0° and 90°.

Higher level students will be required to:
- Know all of the above.

- Trigonometric ratios in Surd form for
  angles 30°, 45° and 60°.
- Solve problems involving radii.
- Manipulate measure of angle in both
  decimal and DMS forms.

[ORDINARY / HIGHER]

Theorem of Pythagoras

Q. £ Find the
length \( x \)
correct to
one decimal
place.
Answer: \( x = 12 \)

The Three Ratios: Sin, Cos and Tan

Memory Aid: Silly Old Harry, Caught A
Herring; Trailing Off America

Q. £ Write down
\[ \sin A, \cos A \]
and \( \tan A \).
Answer:
\[
\begin{align*}
\sin A &= \frac{4}{5} \\
\cos A &= \frac{3}{5} \\
\tan A &= \frac{4}{3}
\end{align*}
\]

The Three Ratios and Pythagoras

Q. £ If \( \cos A = \frac{3}{5} \), find \( \sin A \) and \( \tan A \).
SOLUTION:
STEP 1: Draw a
right-angled
triangle.
STEP 2: Find the
missing side,
8, using
Pythagoras.
STEP 3: \( \sin A = \frac{4}{5} \)
\[ \tan A = \frac{4}{3} \]

The Calculator

Make sure you can calculate sin, cos and tan
on your calculator. Ordinary level students
will not be asked to use minutes; Higher
Level students could be.

Q. £ What is \( \cos 37°42' \), correct to two
places of decimals?
SOLUTION:
Answer: \( 0.79 \)
Note: On some calculators, the DMS
button is the button.

Solving Triangles

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45 Years of Academic Excellence
Ordinary Level students will be given right angled triangles only; so consider using Pythagoras and/or the three ratios, sin, cos and tan. Higher Level students can expect the Sine Rule and the Sine Area formula.

**[HIGHER]**

Q. A vertical pole ab stands on level ground. A straight wire joins a, the top of the pole, to c, a point on the ground, c is 40m from b, the bottom of the pole. A second straight wire joins a to d, another point on the ground. The length of this wire is 110m. \( \angle abh = 67 \text{°} \).

Find
(i) \( [ab] \), to the nearest metre,
(ii) \( [aubh] \), correct to the nearest degree.

**SOLUTION:**

(i) In \( \triangle abc \), let \( [ab] = h \).

\[ \tan 67 \text{°} = \frac{h}{40} \]

\[ h = 96 \times 188 = 96m \]

(ii) In \( \triangle aubd \), let \( [aubd] = d \).

\[ \sin d = \frac{96}{110} \]

\[ d = 60 \times 97 \approx 61m \]

**Statistics**

For most students the statistics question is a favourite. There are basically two sections to this topic:

* Calculate
* Draw

Work in this strand focuses on engaging you as learners in the process of data collection.

1. Pose a question
2. Collect data
3. Present and analyse the data
4. Answer question
   - Data Handling Cycle
   - Age of children
   - Number of children

**[Ordinary/HIGHER]**

Indicate in the box provided whether each of the following is categorical or numerical data:
1. Goal scored in a football match
2. Hair colour of your classmate
3. Makes of cars in a car park
4. Time taken for athletes to run 100 metres.

**Answer:**
1. Numerical
2. Categorical
3. Categorical
4. Numerical

**Knowledge:**

1. **Primary Data:** This is first hand data, that is, data you collect yourself by means of a survey.
   - Personal interviews using a questionnaire
   - Telephone surveys
   - Observing what is happening, experiments.
   - Very often it is not possible to collect data from everybody. In such cases, a sample is chosen and data is collected from the sample. This is known as a sample survey.

2. **Secondary Data:** This is second hand data that has already been collected.

**Representing Data**

*Numerically*

1. Learn how to find Mean, Median, Mode and Range of a sample array (group) of numbers.

**Q.** Find the mean, median, mode and range of 2, 3, 4, 10, 10.

**Answer:** Mean = 6, Median = 6, Mode = 10, Range = 8.

**Q.** Find the mean and the mode of the following frequency table:

<table>
<thead>
<tr>
<th>Ages of children</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of children</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**Answer:** Mean = 5, Mode = 6

**Graphically**

To display data we use:
- Pie charts
- Bar charts
- Line plots
- Histograms (equal intervals)
- Stem plots (stem and leaf diagram)

You must always add a key to show how the stem and leaf combine.

**Higher level** students need the above and the following:
- Back-to-back stem and leaf plots to compare data sets
- Use stem plots to calculate quartile and interquartile range
- Remember to add a key to each leaf to show how the stem and leafs combine
- Recognise the existence of outliers.

**Q.** The table shows the marks gained in a test by 20 students.

<table>
<thead>
<tr>
<th>Marks</th>
<th>No of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
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<tr>
<td>2</td>
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<td>7</td>
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<td>8</td>
<td>3</td>
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<tr>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

Draw a Bar chart of the data, putting marks on the horizontal axis.

**Solution:**

**Probability**

Probability involves the study of the laws of chance. It is a measure of chance or the likelihood of something happening.

**Learn the following terms:**

1. **A Trial:** A trial is the act of doing an experiment. Each toss of a coin or throw of a die is a trial.

2. **Outcome:** The possible things that can happen from a trial are called outcomes. E.g. rolling a die: the outcomes are 1, 2, 3, 4, 5, or 6.

3. **An Event:** An event is the occurrence of one or more specific outcomes of an experiment. It is what you want to happen, e.g. getting an odd number from the roll of a die: answer = \( \frac{3}{6} = \frac{1}{2} \)

4. **Sample Space:** The set or list of all possible outcomes in a trial or an experiment.

5. **The Fundamental Principle of Counting:** If one event has \( n \) possible outcomes and a second event has \( m \) possible outcomes, then the two events have \( mn \) possible outcomes.

6. **For equally likely outcomes, the probability of event \( E \) occurring is given by**

\[ P(E) = \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}} \]

**Remember:** The probability of an event, \( E \), happening is a number between 0 and 1 including 0 and 1.

**7. The Probability Scale**

\[ 0 \leq P(E) \leq 1 \]

Impossible

Unlikely

Likely

Certain

Chance

**Q.** An unbiased six sided die is thrown once.

Find the probability that the number obtained is
1. (a) 3
2. (b) Even
3. (c) A Prime Number

**Answer:**
1. (a) \( \frac{1}{6} \)
2. (b) \( \frac{1}{2} \)
3. (c) \( \frac{1}{6} \)
Q. A card is drawn at random from a pack of 52 playing cards. Find the probability that the card will be
(a) A diamond (b) An Ace (c) An even number

Answers:
(a) \( \frac{13}{52} = \frac{1}{4} \)  (b) \( \frac{4}{52} = \frac{1}{13} \)  (c) \( \frac{26}{52} = \frac{1}{2} \)

8. Two Events: Using a sample space

Q. A fair die is thrown and a coin is tossed.
(i) List the set of all possible outcomes i.e. the sample space.
(ii) Find the probability of getting a 3 and a Head.
Answer:
(i) \{1H, 2H, 3H, 4H, 5H, 6H, 1T, 2T, 3T, 4T, 5T, 6T\}
(ii) \( P(3\ and\ Head) = \frac{1}{6} \times \frac{1}{2} = \frac{1}{12} \)

HIGHER

9. Relative Frequency also known as experimental probability is an estimate of the probability of an event happening.

Relative Frequency = \( \frac{\text{Number of successful trials}}{\text{Total number of trials}} \)

Q. A coin is flipped 1000 times. It lands on heads 450 times. Find the relative frequency of getting a head.
Answer: \( \frac{450}{1000} = 0.45 \) or 45%

HIGHER

10. Expected Frequency = \( P(E) \times \) number of trials.

Q. The probability that a biased die will land on each of the numbers 1 to 6 is given in the following table

<table>
<thead>
<tr>
<th>Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td>0.2</td>
<td>0.3</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td></td>
</tr>
</tbody>
</table>

(i) Write down the values of \( x \).
(ii) If the die is thrown 500 times, how many fives would you expect?
Answers (i) \( x = 0.1 \) (ii) 100

11. HIGHER: Set Theory

Learn: Shaded area

A \( \cup \) B
“both A and B”
A \( \cup \) B
“A or B”
A \( \cap \) B
“A only”

\[
\begin{align*}
\text{U} & \quad \text{U} \\
A & \quad B \\
\text{A} \quad \text{B} \\
\text{A} \quad \text{B} \\
\text{A} \quad \text{B} \\
\end{align*}
\]

3. (H) Line perpendicular to a given line \( l \), passing through a given point not on \( l \).
4. Line perpendicular to a given line \( l \), passing through a given point on \( l \).
5. Line parallel to a given line, through a given point.
6. Division of a line segment into 2 or 3 equal segments, without measuring it.
7. (H) Division of a line segment into any number of equal segments, without measuring it.
8. Line segment of a given length on a given ray.
9. Angle of a given number of degrees with a given ray as one arm.
10. Triangle, given lengths of three sides.
11. Triangle, given SAS data.
12. Triangle, given ASA data.
13. Right-angled triangle, given the length of the hypotenuse and one other side.
14. Right-angled triangle, given one side and one of the acute angles.
15. Rectangle, given side lengths.

B. Theorems:

Apply the results of all theorems, converses and corollaries to solve problems.

1. Vertically opposite angles are equal in measure.
2. In an isosceles triangle the angles opposite the equal sides are equal. Conversely, if two angles are equal, then the triangle is isosceles.
3. If a transversal makes equal alternate angles on two lines then the lines are parallel (and converse)
4. The angles in any triangle add to 180°
5. Two lines are parallel if and only if, for any transversal, the corresponding angles are equal.
6. Each exterior angle of a triangle is equal to the sum of the interior opposite angles.
7. In a parallelogram, opposite sides are equal and opposite angles are equal (and converses).
8. The diagonals of a parallelogram bisect each other.
9. (H) If three parallel lines cut off equal segments on some transversal line, then they will cut off equal segments on any other transversal.
10. (H) Let ABC be a triangle. If a line \( l \) is parallel to BC and cuts [AB] in the ratio \( xt \), then it also cuts \( [AC] \) in the same ratio (and converse).
11. (H) If two triangles are similar, then their sides are proportional, in order (and converse) [statements only at OL].
12. (Theorem of Pythagoras) In a right-angled triangle the square of the hypotenuse is the sum of the squares of the other two sides.
13. If the square of one side of a triangle is the sum of the squares of the other two sides, then the angle opposite the first side is a right angle.
14. (H) The angle at the centre of a circle standing on a given arc is twice the angle at any point of the circle standing on the same arc.

Note: Formal proofs of theorems 4, 6, 9, 14 and 19 are examinable at higher level.
Formal proofs are not examinable at ordinary level.
Emer Fannin is an experienced examiner for Junior Cert science and has been teaching at the Institute of Education for the past 10 years.

Introduction

The revised Junior Cert science exam was introduced in 2006 and therefore will be examined for the ninth time in June 2014. The most significant change is an increased emphasis on scientific investigation and on the application of science process skills in student activities and the relevance to everyday life.

Science is assessed at two levels, higher and ordinary. At each level, assessment is by means of coursework and an examination paper.

Assessment arrangements

The assessment arrangements are as follows:

Coursework A: Experiments and investigations specified in the syllabus.

Coursework B: Additional specified investigations (or one investigation of the student’s own choice).

Written examination (Two hours duration):

- 60 marks (20 per cent of total)
- 150 marks (20 per cent of total)
- Written examination (Two hours duration)
- 390 marks (65 per cent of total)

Coursework A (60 marks)

Coursework A comprises the mandatory student experiments or investigations specified in the syllabus, ten each from biology, chemistry and physics completed during the last three years.

For assessment purposes, students are required to complete reports on these activities in their practical science notebooks. This record must be available for inspection and must be the individual work of the student. It can also serve as a valuable study/revision aid when preparing for the coursework B elements of assessment and for the terminal examination paper. It is easy to gain full marks by just ensuring all thirty activities are written up and dated and you should take full advantage of this benefit.

The only differences between higher and ordinary levels in coursework A is that ordinary level students:

1. Do not need to know the chemical equation for the decomposition of H₂O₂ using MnO₂, as a catalyst.
2. Do not need to know the chemical equation for preparation of carbon dioxide.
3. Do not need to know the chemical equation for the reaction between zinc and HCl.
4. Do not need to carry out simple experiments to investigate conduction and convection in water.

At the end of the three years, you will be required to indicate, on checklists in the coursework reporting booklet (green booklet) the number of these mandatory activities that you have carried out and for which you have completed a report. If you have been unable to complete all of the mandatory activities, alternative experiments or investigations listed in the syllabus – and for which a record has been maintained – may be included. This is limited to a maximum of two in each section.

Coursework B (150 marks)

Coursework B investigations carry 25 per cent of the total marks for the examination. Each student is required to conduct two investigations selected from the three set by the State Examinations Commission or, alternatively, one investigation of his/her own choosing which represents an equivalent amount of work and which meets the requirements of the State Examinations Commission.

The reports have to be written into a special reporting booklet (green booklet).

The report on each investigation is not to exceed 1,000 words and can include labelled diagrams and graphs drawn on the pages of the booklet but you should not insert any extra loose material. Only what is written or drawn on the pages of the booklet will be marked. Any other material is discarded.

There is guidance in the booklet about the level of detail needed – there is only a certain amount of space to write in the information in each section. You should use this space to the full to get the best chance of obtaining full marks for each part of the report.

Refer to the marking schemes for previous year’s investigations available on examination.ie.

Make sure that the written report is unique by using your own language and style – do not copy from the internet, from books or others of the investigation group or class.

All the work in the booklet must be your own.

The Investigations

The three investigations this year 2014 are:

1. **Biology**
   - Investigate and compare the effects of pH on the catalytic effects of the enzyme catalase, found in (a) celery and (b) animal liver, on the rate of breakdown of hydrogen peroxide.

2. **Chemistry**
   - Investigate and compare how the solubility, in water, of (a) potassium chloride and (b) sodium carbonate (anhydrous) change with temperature.

3. **Physics**
   - Investigate and compare how the rates of flow of powdered or granulated solids through a funnel are affected by (a) the size of the solid particles and (b) any one of the funnel dimensions.

How to get those extra marks

- The best way to answer questions is in points. Long descriptions do not gain any extra marks.
- Try to have just one item of information in each sentence.
- Read the question carefully a few times and answer exactly what you are asked.
- Plan before you write – otherwise marks are lost through lack of detail.
- Do not use red or green to highlight any part of your work – the examiner corrects in red, underlining the items of information for which they are awarding marks and their supervisor corrects independently in green.
- Use the amount of space set aside for the answer as a guide to the length and detail needed – try to use all the space. There is a blank page at the end of the answer book for additional work.
- Do not delay over a part that you cannot answer, move on and come back to it later.
- Attempt all the parts of a question: try not to leave any blank spaces. You get no marks for each blank space, but you may get marks for an attempted or even guessed answer.
- If you have to carry out calculations, show all the steps in your answer book. If you make a small mathematical error, you will lose only a small number of marks. Remember to include the units with your answer.
- If you have to draw diagrams: use a good sharp pencil and draw them as large as you can. Include as many labels as you can.
- When you are finished, check that you have answered all parts of the questions.

The general marks allocation for each investigation is as follows but what is expected each year can vary due to the nature of the investigation.

- Introduction (five marks)
- Preparation and planning (20 marks)
- Procedure (20 marks)
- Analysis and Conclusion (20 marks)
- Comment (10 marks)

The investigation should be carried out under the guidance of your teacher but all the investigative work, planning, research, preparation, set up, observations, recordings, conclusion has to be your own.

How to gain those extra marks in coursework B

The first three sections are straightforward and you should be able to score high here.

1. Introduction (five marks)
   - (i) Statement/identification of the problem/topic. A repeat of the title is acceptable. A general attempt in your own words is acceptable.
   - (Two marks)
   - (ii) Background research. There must be clear evidence of research undertaken. Any reference to a book must have the title and author. Internet resources must have web address or a specific person consulted.
   - (Three marks)

2. Preparation and planning (20 marks)
   - (i) Variables and controls (10 marks).
   - The allocation of marks here can change.
slightly from year to year depending on the investigation but usually you will have to identify six variables: any three essential variables and any three other variables, and/or indicate how some of these need to be controlled or held fixed.

This is one section where students lose valuable marks because an insufficient number of variables are stated. It is a really good idea to study the marking schemes of coursework B from previous years to gain an understanding of what the examiner is looking for here.

(ii) Equipment needed (five marks).

You need to identify at least five pieces of equipment used. Be very specific and remember safety equipment is not acceptable in this section.

(iii) List of tasks (five marks).

You only need to identify any four tasks carried out in the investigation written in general terms as a statement of what you intend to do. Remember this is the planning of the experiment. Always state that you will repeat the experiment, record the results in a table and graph the data obtained. You can also make some reference to the calculations you intend to carry out. “Gather equipment” or “Make space for the experiment”, etc gets no marks.

However beware: in 2012, any procedural point given marks in the tasks section, that was repeated in the procedure section was not awarded any marks.

3. Procedure (20 marks)

(i) Safety precautions (five marks).

You must identify any two specific safety precautions followed in conducting the investigation. General statements, eg “follow lab rules” or “listen to my teacher and no messing” are not acceptable here and will not be awarded marks. Stating ‘wear a lab coat and safety goggles/glasses to protect my eyes’ will always merit marks.

(ii) Procedure (10 marks).

This is very straightforward. You must identify any five steps (at least) taken in conducting the investigation. You should always draw labelled diagrams in both spaces provided in the booklet as marks can be awarded for items in the diagram not mentioned in the steps.

(iii) Recorded data/observations (five marks).

A table presentation of the data obtained is the most straightforward way of identifying any two points related to the method used. Make sure it is easy to read the information and the headings are clear.

4. Analysis and conclusion (20 marks)

(i) Calculations/data analysis (10 Marks).

Graphs, bar charts, calculations and statements about data are all acceptable. They can be taken independently or combined as necessary. A good guideline to determine if full marks can be awarded is to ask yourself if the graph or statement could be interpreted without having to refer back to the data section.

In this section you should present well drawn graphs with the axes clearly labelled, scaled and the points clearly plotted if high marks are to be obtained.

(ii) Conclusion (10 Marks).

You must have data or graphs in the previous section to merit marks for the conclusion. Make sure that the conclusion is not a repeat of any statement of information given already in the data analysis section. (This does not include graphs).

One or two relevant conclusions must be drawn and evaluation of results obtained. When writing a conclusion you should show a clear understanding of the results obtained and be able to relate them to the aim of the investigation. Direct simple language should be used.

5. Comment (10 marks)

Comments should be “looking forward” and not simply a repeat of procedural points.

Two key statements are required on how the investigation could have been improved or extended, what applications it might have and what the main sources of error were. Give possible reasons for an unexpected result. State anything you learned from doing the investigation other than the conclusion for example, a new technique, method or apparatus.

Experience indicates that neatness and good presentation of your coursework is very effective in gaining a high mark. It is worth the time and effort.

CANDIDATES’ OWN INVESTIGATIONS (150 marks)

The coursework reporting booklet is yellow with the same format as the green one. The total work undertaken should be equivalent to the work required for two SEC prescribed investigations and this is reflected in the marking scheme. If you choose to do your own coursework, make sure that your investigation is valid and not just a repeat of a prescribed investigation from the previous year.
Written exam overview

The written paper is divided into three major sections – biology, chemistry and physics. There are nine questions in total: three biology, three chemistry and three physics.

There is no choice – you are asked to answer all questions and all parts of each question.

Warning: You cannot afford to leave out any part of science in your revision. To guarantee that you can tackle every question and avoid being caught out, you should study all topics.

Layout of paper
The paper is presented in a special 20 page booklet. There are spaces with the question for the answers. Should you need extra space you can write the extra material on page 20, the final page of the booklet.

The first question in biology, chemistry and physics sections (questions 1, 4 and 7) has 8 parts – again you have to answer all parts - no choice.

The second and third questions have each three major subsections (a), (b) and (c). Again you have to answer all parts of each subsection - no choice.

OVERVIEW OF SECTIONS

Biology
- Question 1 has parts (a) to (g) which are simple recall questions. Part (h) involves a little more detail than simple recall. This question will range over all the topics on the biology course.
- Question 2 is a longer question on one or two topics it requires more detailed knowledge.
- Question 3 is similar but is likely to be about experiments and investigations. Again more detailed answers are required.

Chemistry
- Questions 4, 5 and 6. These questions have the same structure as the biology section.

Physics
- Questions 7, 8 and 9. Again these questions have the same structure as both the biology and chemistry sections.

MARKING SCHEME
- Questions 1, 4, and 7: Parts (a) to (g) get six marks for each part but (h) gets 10 marks.
- Total mark is 52.
- Questions 2, 5 and 8: The breakdown of the marks will be shown on the paper.
- The total mark is 39.
- Questions 3, 6 and 9: The breakdown of the marks will be shown on the paper.
- The total mark is 39.

Tip
As the marks are allocated in groups of three you know that:
- If there are six marks the examiner wants two points of information.
- If there are nine marks the examiner requires three points of information and so on.

OUTLINE OF COURSE CONTENT AND THE MAJOR SUBDIVISIONS

Biology
Biology is the science of living things and can be categorised broadly into the study of animals and plants. This section of the syllabus deals with aspects of human and plant biology.
- Section 1A: Human Biology – food, digestion and associated body systems.
- Section 1B: Human Biology – the skeletal/muscular system, the senses and human reproduction.
- Section 1C: Animals, plants and micro-organisms.

As stated before all areas should be covered but pay special attention to the following topics as they did not appear on the 2013 exam paper:
- Human Reproductive system: male and female, the menstrual cycle, development of the baby.
- Respiration and breathing system.
- Food and enzymes.
- Excretion.
- Ecology and habitat study (very important).
- Conservation, pollution and waste management.
- Germination of seeds, plant reproduction, plant structure.
- Transpiration and transpiration, Microbiology and biotechnology.

Chemistry
The world is made up of a variety of substances. Some of these occur naturally in our environment, others are made through the combination of naturally occurring substances to form new materials.

The main areas of chemistry are:
- Section 2A: Classification of substances.
- Section 2B: Air, oxygen, carbon dioxide and water.
- Section 2C: Atomic structure, reactions and compounds.

For the 2014 examination paper look out for:
- Elements, compounds and mixtures.
- Metals including the reaction of zinc with HCl and the chemical equation.
- Ionic and covalent compounds and their conductivity.
- Hardness of water and electrolysis of water.
- Atomic structure of the elements and the Periodic Table.
- Separation methods.
- The atmosphere, oxygen and carbon dioxide. (Equations for preparation are important.)
- Neutralisation reactions/ titration with acid and base to form a salt.

Physics
Physics is involved in most of the everyday applications of science and technology that we meet in our daily lives, in work, medicine, entertainment and in the home. While physics is principally concerned with the laws and relationships that govern our world, it also provides insights into how things work and contributes to the development of problem-solving skills.
- Section 3A: Force and energy.
- Section 3B: Heat, light and sound.
- Section 3C: Magnetism, electricity and electronics.

For the 2014 examination look out for:
- Velocity and acceleration.
- Mass, density, pressure.
- Energy: renewable and non-renewable sources.
- Force, work, centre of gravity.
- Heat transfer.
- Conduction.
- Convection.
- Radiation.
- Light.
- Static electricity.
- Parallel and series circuits.
- Wiring a plug.
- Electronics.
- Heat, temperature, cooling curves.

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Five top tips
1. Remember coursework A and B gives you as much as 35 per cent.
2. Revise entire course, do not be tempted to leave any topic out.
3. Learn definitions off by heart.
4. Equations: keep writing them out until you know them.
5. Practise as much as you can with past exam paper questions. This really is key to success.

Common errors
- Definitions are not known accurately. It is very important to learn off all the definitions.
- Experiments are badly explained with poor, unlabelled, diagrams.
- Graphs are badly drawn with weak interpretation.
- Questions are left blank or the student didn’t read the question correctly.
- Calculations are careless with units absent.
Science – Focus on biology

Biology sample questions and answers from examination marking schemes

SAMPLE QUESTION 1
The photograph shows *Amanita Phalloides*, a poisonous fungus, whose common name is “Death Cap”. Fungi are decomposers. Explain the term “decomposers”.

**Answer**
Decomposers are living organisms that break down or feed on dead plants and animals, and return nutrients to the soil.

SAMPLE QUESTION 2
The study of a habitat requires the use of sampling instruments, as it is not possible to count every individual organism living there.
(i) How is random sampling achieved when using a quadrat? (Three marks)
(ii) Give two different types of data collected (two different tasks performed) at each site in the habitat when using the quadrat. (Six marks)

**Answer**
(i) Any suitable method, e.g. throw without bias.
(ii) 1. The names or types of animals or plants present.
2. The number, frequency (percentage) of each plant or animal present.

SAMPLE QUESTION 3
Line transects are also used to sample habitats.
(i) What is a line transect? (Three marks)
(ii) Describe how to sample a habitat using a line transect. (Six marks)

**Answer**
(i) A length of string or rope with marks or knots at intervals (every metre).
(ii) Place the line transect across the area to be sampled. Identify the plant or animal present at each metre (mark).

SAMPLE QUESTION 4
A sweep net is used to collect small animals, e.g. insects from vegetation in a habitat so that they can be identified.
(i) Name a second item of equipment used to collect small animals for identification. (Three marks)
(ii) Draw a labelled diagram, in the box provided, of the item that you have named in (i) above. (Six marks)
(iii) Describe how to use the item that you have named and drawn. (Six marks)
(iv) Give two reasons why the groups of organisms living together can vary greatly from one part of a habitat to another. (Six marks)

**Answer**
(i) Tweezers.
(ii) Diagram of sweep net.
(iii) To use the sweep net, first place the opening over the plant, then quickly pull the net up, using a gentle upward motion.
(iv) 1. The habitat may be shallow or deep.
2. The plant may be tall or short.

SAMPLE QUESTION 5
Diagram 1 shows a laboratory microscope.
(i) What are the functions of parts labelled “A” and “B”? (Six marks)
(ii) Onion epidermis is a tissue only one cell thick. It is used in school laboratories on microscope slides to investigate plant cell structure using a microscope.

**Answer**
(i) A: Magnify/ enlarge view.
B: Hold or support slide/ specimen.
(ii) Diagram of microscope.

SAMPLE QUESTION 6
The diagram 2 shows the female reproductive system during the fertile period of the menstrual cycle. What happens in the ovary during this time? What happens to the lining of the uterus during this time?

**Answer**
Ovary: Ovulation/ release of egg (gamete) Uterus: Thickens rich blood supply/ prepares for implantation

SAMPLE QUESTION 7
Plants, animals and human activity all have important roles in conserving the living environment on the planet.
(i) Complete the following word equation for aerobic respiration. (Six marks)
Glucose + Oxygen + Water

**Answer**
Burn a peanut (crisp/cracker) under a test tube of water. The temperature of water rises/ thermometer shows increase.
Sample questions

Chemistry

Chemistry sample questions and answers from examination marking schemes

SAMPLE QUESTION 1
The apparatus shown in diagram “Chemistry 1” was used to investigate the reaction of zinc with hydrochloric acid. Hydrogen gas is produced.

(i) Describe a test for hydrogen.
(ii) Write a chemical equation for the reaction of zinc with hydrochloric acid.

Answer
(i) Light a test tube of the gas. A popping sound is heard.
(ii) Zn + 2HCl → ZnCl₂ + H₂

SAMPLE QUESTION 2
The diagram “Chemistry 2” shows an apparatus used to decompose water by passing an electric current through it. The volumes of gases released by this process can be measured as shown.

(i) Name the process which decomposes a substance when electric current is passed through it. (Three marks)
(ii) Why is a small amount of sulphuric acid added to the water? (Three marks)
(iii) Name gas “A” and give a test to confirm your answer. (Six marks)
(iv) Name gas “B” and give a test to confirm your answer. (Six marks)
(v) Water is a compound formed by the chemical combination of elements “A” and “B”. In what proportion do “A” and “B” combine to form water? (Three marks)

Answer
(i) Electrolysis.
(ii) Sulphuric acid is added to the water to aid conductivity.
(iii) Gas “A” is oxygen.
Test: Relights a glowing splint.
(iv) Gas “B” is hydrogen.
Test: Burns with a popping sound.
(v) Twice as much hydrogen (gas “B”) as oxygen (gas “A”), H₂O

SAMPLE QUESTION 3
In 1774 Joseph Priestley, an English chemist, discovered oxygen.
Name the two chemicals that you reacted together to prepare oxygen in the school laboratory.
One of the chemicals acted as a catalyst.
Which one of the two chemicals used was the catalyst?

Answer
Hydrogen peroxide and manganese diox.
The catalyst is manganese dioxide.

SAMPLE QUESTION 4
(a) The pieces of laboratory equipment shown, together with some other items, were used to prepare a sample of sodium chloride. (See “Chemistry 3”)
(i) Name item “A” or item “B” (Three marks)

Answer
A: Burette or B: Pipette

(ii) There were 25 cm³ volumes of base used in this experiment. Describe how the piece of equipment A was used to measure the volume of acid required to neutralise this amount of base. (Six marks)

Answer
Read the volume before and after release of the acid and subtract or Read the volume of acid at the colour change.

(iii) Name a suitable acid and name a suitable base for the preparation of sodium chloride by this method. (Six marks)

Answer
Acid: Hydrochloric acid. Base: Sodium Hydroxide/sodium carbonate

(iv) Write a chemical equation for the reaction between the acid and the base that you have named. (Six marks)

Answer
HCl + NaOH → NaCl + H₂O
or HCl + Na₂CO₃ → NaCl + H₂O + CO₂

EXAM TIMES ONLINE
For more Irish Times/Institute of Education Exam Times, see irishtimes.com/examinations

Don’t panic Junior Cert science survival guide

REVISION STRATEGY
First of all don’t panic: there is still plenty of time to achieve a high grade if you start revising now.
A good way to prepare is to know all the answers to the past examination papers. This will give you confidence and it will surprise you how many of these (or similar) will appear on this year’s examination.
Write your answers in pencil into the exam paper book, have them checked by your teacher, or look up the answers in the marking schemes for the papers online (examinations.ie) and correct them if necessary.
If you are a higher level student then it is a good idea to practise on the ordinary level papers. Remember, however, that the questions are slightly easier and some topics are not asked at ordinary level.
Also make sure you know the answers to the short questions at the end of the chapters in your textbook.
Great revision can be done by getting a friend and quiz each other on all these short questions.
Learn and study carefully all the science experiments paying close attention to diagrams.
Practise labelling all the diagrams in the biology, chemistry and physics sections of the course.
Learn all the definitions and equations. Make a list of them and test yourself on them.
Finally, a positive mental attitude is vital. Work in groups, many of the best ideas come from group work.

DIAGRAMS
Expect to be asked to draw many diagrams.
Don’t worry if you lack artistic ability. Your diagrams just need to be accurate and neat.
Make your drawings large, and have all the important structures in the correct positions.
Sample questions

Physics sample questions and answers from examination marking schemes

**SAMPLE QUESTION 1**
The boiling point of water can be determined using the apparatus shown in the diagram “Physics 1”.
(i) Why are boiling (anti-bumping) chips added to the water? (Three marks)
(ii) At what temperature does water boil at standard (normal) atmospheric pressure? (Three marks)
(iii) What effect does the raising of pressure have on the boiling point of water? (Three marks)
(iv) What effect does the lowering of pressure have on the boiling point of water? (Three marks)

**Answer**
(i) Chips give a smooth boil.
(ii) Temperature: 100°C.
(iii) Raising pressure raises boiling point.
(iv) Lowering pressure lowers boiling points.

**SAMPLE QUESTION 2**
A girl of mass 60kg (weight 600N) climbed a 6m high stairs in 15 seconds.
Calculate the work she did and the average power she developed while climbing the stairs.

**Answer**
Work = Force x Distance = 600 x 6 = 3600 joules
Power = Work/Time = 3600/15 = 240 watts

**SAMPLE QUESTION 3**
(i) Name the mode of heat transfer from the hot liquid, through the spoon, to the hand in the diagram “Physics 2”.
(ii) Heat moves in liquids by convection. Give one difference between convection and the way heat moves along the spoon.

**Answer**
(i) Conduction
(ii) Particles of liquid move carrying the heat with them; particles of a solid do not move around.

**SAMPLE QUESTION 4**
A pupil heated some lauric acid, which is a solid at room temperature, until it turned into a liquid.
The lauric acid was then allowed to cool at a uniform rate. The temperature of the lauric acid was taken every minute. The data from this experiment is given in the table “Heating Lauric Acid”.
(i) Draw a graph, using this data, of temperature against time (x-axis) in the grid provided below. (Nine marks)
(ii) Explain the shape of the graph that you obtain. (Nine mark)
(iii) Use the graph to estimate the melting point of lauric acid. (Three marks)

**Answer**
(i) See “Lauric Acid Graph”. Six points plotted correctly merit six marks. Curve drawn correctly merits three marks.
(ii) Cooling: temperature falls. Graph shows decrease in temperature. When graph levels off – shows change of liquid to solid/change of state (latent heat). Then graph shows decrease in temperature/cycling
(iii) Melting point from graph: 43°C + 1

**SAMPLE QUESTION 5**
A pupil measured the volume of a potato using the items of laboratory equipment, labelled “A” and “B” as shown in the diagram “Physics 3”.
(i) Name the items labelled “A” and “B”.
(ii) The potato had mass 175 g and volume 125 cm³. Calculate the density of the potato. Give the units of density with your answer.
(iii) Why did the potato sink in the water?

**Answer**
(i) A: Overflow can. B: Measuring (graduated) cylinder
(ii) Density = 175/125 = 1.4 g/cm³ or g cm⁻³
(iii) It had a greater density.

**CREDITS**
- Use pencil only. Do not shade or use colour – no extra marks will be gained.
- Make sure you fully label everything in the diagram.
- Like other information you must learn the diagrams.
- Practise drawing the diagrams and test yourself regularly.

**EXPERIMENTS**
- Knowledge of experiments is crucial to securing those extra marks.
- Science is an experimental subject and the mandatory practical experiments feature very strongly in all the past examination papers.
- It will always pay you a good reward to learn the 30 mandatory practical activities very well and all other experiments covered in class by your teacher during the past three years.
- On the 2012 paper a full description of the experiment “To show that photosynthesis produces starch” was asked plus an optional diagram of the experiment. Always draw a diagram even if questions states “optional” as marks can be awarded if you make a mistake in your account or omit a part of the procedure.

THE IMPORTANCE OF GRAPHS
- Expect at least one or two graph type questions on your examination paper at higher level.
- Graphs can either be given for you to interpret or you can be asked to draw a graph based on supplied data.
- You must make sure you know how to construct graphs, label them and use them.
- The graph paper is usually printed as part of the question so it is best to draw the graph in pencil so you can easily erase any errors.
- You must take the examination supervisor for an extra sheet of graph paper if necessary, but make sure to include it in your answer book.
- Always join the points with a clear line. Marks are awarded for labelling the axis, plotting the points correctly and joining the points.
- The examiner must be able to read your graph to award the marks so care must be taken.

**CALCULATIONS**
- If you have to carry out calculations, show all the steps of your work in your answer book.
- If you make a small mathematical error, you will lose only a small number of marks for a mathematical slip.
- You are allowed to bring a calculator into the examination so check your answer.

**LANGUAGE OF EXAMINATION QUESTIONS**
- Questions beginning with “name”, “give” or “list” all simply require one or two items of information.
- Questions relating to definitions usually begin with the word “define” or “state” but could also include “what is meant by” or “explain the term”.
- Questions that begin with “describe” or “outline an experiment” require more detailed answers.
- Always check the marks allocated to the question as a guide to the extent of the answer.
- The higher the marks the more detail is required.
Forbidding planet

Michael Doran has been teaching geography at the Institute since 1995. He is an experienced Leaving Cert examiner and has written many articles on the subject.

Introduction
You now have only a few months to go until the exam but you still have plenty of time to revise. You can make sure that you are well prepared by using past exam papers. This will help you to really understand the type of exam you will face. It will make it easier to work through the many topics you have covered since first year.

Remember
- Check the lay-out of the exam paper. How are the questions set out?
- Take note of the time you have to answer the paper – two hours.
- For every topic, look through the exam papers for questions asked on that topic. Make sure that you can answer these questions. Write out sample answers.

Section 1
2012 QUESTION 11 – AID
Circle the correct option for each of the following statements.
(i) Bilateral aid is given by charitable organisations. True/False
(ii) Emergency aid is given in times of crisis, e.g., natural disasters. True/False
(iii) Development aid is short-term aid. True/False

Common error
Each correct answer is worth one mark. A common error is that students get the different types of aid mixed up.

2013 QUESTION 18 – ORDNANCE SURVEY MAP
In the boxes provided, match each of the letters in column X with the number of its pair in column Y. One match has been made for you.

<table>
<thead>
<tr>
<th>Column X</th>
<th>Column Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>A S 955 386</td>
<td>1 Garda Station</td>
</tr>
<tr>
<td>B T 009 381</td>
<td>2 Moated Site</td>
</tr>
<tr>
<td>C S 953 374</td>
<td>3 Golf Course</td>
</tr>
<tr>
<td>D T 001 313</td>
<td>4 Spot</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
</tr>
</tbody>
</table>

Note
Red text above indicates correct answers.

Common error
Each answer is worth one mark. Some students make mistakes when reading grid references.

2012 QUESTION 6 – WEATHER INSTRUMENTS
Examine the photograph at left and complete the paragraph below.

“This white box is known as a Stevenson screen. Temperature is measured within the box using a maximum and minimum thermometer. Also found inside the box is a hygrometer which measures humidity.

Common error
Some students are unsure of the different weather instruments and what they are used for, e.g., the hygrometer.

Section 2
2012 QUESTION 1B – VOLCANOES
(i) Name one example of a volcano.
(ii) With reference to the diagram below, explain how volcanoes occur.

Answer
(i) Mt Etna, Sicily. (Two marks)
(ii) A volcano is a mountain that forms from the eruption of volcanic material. Most volcanoes will form at or near the edges of plates. This is because the crust is weak. In the diagram shown in this question, the crust is being pushed apart by magma rising up from the mantle. This is an example of a constructive plate boundary, e.g., the Mid-Atlantic Ridge.

The weakened crust allows hot molten magma to force its way up through cracks in the crust. It will then erupt as lava onto the surface. Ash, dust, cinders and gases are also blown out during the eruption. All this erupted material will build up around the point where the eruption occurs. Each eruption adds material to the growing volcano.

Student tip
Make sure you have clear statements such as those outlined above. Make sure you explain each statement.

Common error
The answer should have at least one reference to the diagram. Many students do not do this.

2013 QUESTION 1C – RIVER FEATURE
(i) Name one feature formed by river deposition and explain with the aid of a labelled diagram, how it was formed.

Marking scheme
■ Name of landform: one mark.
■ Diagram: one mark.
■ Explanation: eight marks.

- Two statements: two marks each.
- Explaining each statement: two marks each.

Answer
■ Name of landform: levee.
■ See levee diagram above.
■ Description:
- A levee is a build-up of deposition beside a river channel. It will most likely form in the lower course (old-age stage) of a river.
- These features have formed along many rivers including the River Liffey and the Mississippi.
■ Formation:
- In the lower course will transport a large load downstream. This is all the material carried or moved by the flowing water. This includes light material such as clay particles carried in suspension. Heavy objects such as stones and pebbles will be rolled and bounced along the river bed.
- Deposition will occur when the river channel fills with water and floods the land beside the channel. This area is called the
floodplain. Deposition happens because the floodwaters lose energy and cannot carry all of its load. The heaviest part of the load will be dropped on the river bank, beside the river channel. The lighter material is carried further from the channel and is deposited across the floodplain. Over time, each flooding adds new material. A sloping ridge will form beside the channel. This is the levee.

WEATHER AND CLIMATE
This is a popular topic. You should look at examples of previous exam questions.

2008 QUESTION 1 – CLIMATE AND PEOPLE
Part A
Diagram 3 above shows a mountainous area in Europe. Explain two reasons why you would expect the place labelled “X” on the diagram to be colder than the place labelled “Y”.

Marking scheme
- Two reasons at five marks each.
- Each of the five marks is divided into three marks for a clearly stated reason and two marks for explaining.

Answer
The place labelled “X” will be colder than the place labelled “Y” for the following reasons:
- Reason 1 - Altitude. This is height above sea level. This has an influence on climate because, as the height of land rises, temperatures become colder. Temperatures will drop by at least 1°C for every 150 metre increase in height.
- Reason 2 - Aspect. This refers to the direction that a slope faces. In Europe, south facing slopes, such as at “Y” will directly receive the sun’s rays and will be warmer. They also benefit from warmer winds blowing up from the south. North facing slopes in Europe, such as at “X”, are colder because they are not directly receiving the sun’s heat. They are also exposed to colder winds blowing from the north.

Part B
The graph below shows the numbers of tourists who visited a coastal resort in Spain over the course of a year.
(i) Which is the “peak” or busiest tourist month at this coastal resort?
(ii) Using the information in the table (figure 5: weather report), explain three reasons why so many people visited the resort during its peak tourist month.

Marking scheme
- Name the peak month: one mark.
- Three reasons at three marks each.
- Each of these three marks is divided between two marks for stating the reason and one mark for explaining the statement.

Answer
(i) The “peak” or busiest tourist month is August.
(ii) Three reasons why so many people visited this resort during the peak month are:
- Reason 1 - High temperatures. Temperatures in August reach an average of 27°C. This is the hottest month of the year. This will attract people from colder parts of Europe such as Ireland.
- Reason 2 - Low rainfall. August does not receive any rainfall and is shown as 0mm. This would attract people from areas that are more likely to have rainfall at that time, eg Northern Europe.
- Reason 3 - Sunshine. The table shows that August has up to 11 hours each day of sunshine. This means that there is likely to be long periods during the daytime with sunny conditions. This attracts people from areas such as Ireland where there is more likely to be cloud cover at that time of the year.
Working with maps and photographs

**INTRODUCTION**

Students should be aware that at least one of the five questions in section 2 asked will refer to the ordnance survey map and the aerial photograph. It is very important for students to examine and practise answering these questions. Students are advised to source the referenced exam papers to gain maximum benefit from the sample answers below.

**2013 QUESTION 5 – AERIAL PHOTOGRAPH SKETCH MAP**

**Part A**

Examine the aerial photograph supplied with this paper (top right).

- Draw a sketch map of the whole area shown on the aerial photograph.
- On your sketch map, show and label each of the following features:
  - A railway bridge.
  - A river.
  - Two connecting streets.
  - A castle.

**Marking scheme**

Ten marks divided as follows:

- Naming each of the four features: one mark each.
- Showing each of the four features: one mark each.
- Correct shape and orientation: two marks.

**Common errors**

- Some students lose marks by drawing the wrong shape for the frame, ie a square shape instead of the rectangular shape of the 2013 aerial photograph.
- Students may also lose marks by using a dot or symbol to show an area. Instead they should indicate the size of the named area.

**Answer**

See figure 1: sketch map.

**Part B(i)**

Name and locate using correct terms (right background, etc) an example of each of the following economic activities:

- Primary.
- Secondary.
- Tertiary.

**Marking scheme**

- Naming each activity: one mark each.
- Locating each activity: one mark each.

**Answer**

- Primary activity: farming activity in the right background.
- Secondary activity: factory located in the centre middle-ground.
- Tertiary activity: retail/shop in the right foreground.

**Part B(ii)**

Choose any one of the examples of the economic activities named above and explain two reasons why it is at its present location.

**Marking scheme**

- Stating each reason: one mark each.
- Explaining each reason: one mark each.

**Answer**

Reasons for farming in the right background:

- Reason 1: The land in the right background is low-lying. Soils will be deeper and it makes it easier to farm using machinery.
- Reason 2: The land in the right background is likely to be well drained by the river. This makes it less likely that the land will become waterlogged and flooded.

**Part C**

Examine the ordnance survey map supplied with this paper (far right). Examine three reasons for the location of the industrial estate at S 977 449. For each reason include specific evidence from the ordnance survey map to support your answer.

**Marking scheme**

Ten marks for the three reasons. There were divided as follows:

- Four marks for one reason split up as follows:
  - Statement: two marks.
  - Explaining statement: one mark.
  - Evaluation of answer: one mark.
- Three marks for the other two reasons split up as follows:
  - Statement: one mark.
  - Explaining statement: one mark.
  - Evaluation: one mark.

**Answer**

Three reasons for the location of the industrial estate at S 977 449:

- Reason 1: The estate is built on a very gently sloping lowland site (Statement). The grid area of S 97 41 shows wide spaces between the contour lines. This means that there are few or no obstacles to the building of factories. It also allows for the future expansion of the estate.
- Reason 2: The industrial estate is located there because it has easy access to the road network (Statement). A national primary road, the N11, runs beside the estate. Access is provided by a third class road at S 976 422. This allows access for raw materials and supply of services and products to other parts of the country.
- Reason 3: The industrial estate is located at that site because it is beside the town of Enniscorthy (Statement). It is just about 1 km to the north-east of the main built-up area of the town. The town will provide workers for the factories and businesses on the estate. The town will also provide important support services, eg the post office located at S 974 397.

**Common error**

Some students do not provide the three reasons needed for the answer. Others do not explain the reason or do not use map evidence in the answer. It is very important to refer to the map when answering this type of question.

**2013 QUESTION 5 – AERIAL PHOTOGRAPHS AND ORDNANCE SURVEY MAP**

**Part A**

Examine the ordnance survey map provided (above right). Draw a sketch map of the...
area shown on the ordnance survey map. On your sketch map show and label each of the following features:
- The railway line.
- The built up area of Carrick-on-Shannon.
- An area of natural woodland.
- The river Shannon.

(10 marks)

Answer
See figure 2: 2012 sketch map.

Part B
The area shown on the ordnance survey map has a long history of settlement.
- Name, locate and explain, using six-figure grid references, any two examples of historic settlement on the map.

Answer
Two examples of historic settlement on the map are:
- Example 1
  There is a crannog located at G 946 038 in the northern part of the map. It was a living place that was built on a lake, ie Lough Naseer. An artificial island would have been built in the lake. It would have been reached by boat. The people who lived there are likely to have farmed the land around the lake. The crannog offered people who lived there a safe living place. It dates from the Iron age or Celtic times.
- Example 2
  There is a megalithic tomb located at G 886 015 in the north-western part of the map. This is a burial ground where large stones were placed. The tomb would also have been built to allow people to remember and honour their dead. This historical feature dates from the Neolithic period (new stone age). It is likely that people settled here because the surrounding land allowed farming. There were also close to a fresh water supply.

Part C
With reference to the ordnance survey map and aerial photograph provided, explain three reasons why Carrick-On-Shannon (and the surrounding area on the map) is an important tourist destination.

Answer
Carrick-on-Shannon (and the surrounding area) is an important tourist destination because:
- Reason 1
  Boating activities: the River Shannon is large enough for boating leisure activities. This can be seen from the aerial photograph. A marina is located in the right background. This is an important local stopping point for leisure boats. The fact that the marina is built here suggests that a large number of boats are using the river.
- Reason 2
  Cycle route: the Kingfisher cycle route begins in Carrick-on-Shannon at M 943 998. It follows a north-east route until G 880 025 where it then moves in a north-west direction. This allows people to view the surrounding landscape and other features of interest such as historical locations.
- Reason 3
  Tourist information office: this is located in the centre of Carrick-on-Shannon at M 939 994. This is an important local service for tourists as it will give them information about the town and the other facilities available there. As it is located in the town, it can be easily accessed, eg from the N4.

At a glance – The exam paper
There are a total of 150 marks awarded for the exam paper. There are two parts to the exam paper, section 1 and section 2.

Section 1 – 60 marks
There are 20 questions in this section. You have to answer all of the questions. If you do not answer a question you will lose marks. Even if you are not sure of some of the answers, make sure that you at least try to answer each question. Section 1 accounts for 40 per cent of the total exam mark.
- Each question is worth 3 marks.
- Each answer needs to be short, eg give a name.
- Some questions will provide multiple choice answers.
- Usually three or four questions will be about the ordnance survey map.
You can allow up to forty-five minutes to answer section 1. This then gives you at least two minutes to answer each question. Do not rush down your answer. Think carefully. Marks can be easily gained but they can be just as easily lost if you are careless.

Note
The section 1 folder must be handed back with your answer book.

Section 2 – 90 marks
There are a total of five questions in section 2. Each question is worth 30 marks. Students must choose three questions to answer. It is better to focus on answering three questions well rather than trying to answer four or five of the questions poorly.
- Each question is divided into three or four parts. If you pick a question, you have to answer each part of that question.
- At least one question will be about the ordnance survey map and the aerial photograph.
- One question is headed "geographical mix". This will include a number of different topics.
- You can allow up to 25 minutes answering each of the three questions.
HISTORY

Questions 1 to 4

Picturing antiquity

Sean Delap has a number of history textbooks to his name and has been teaching at the Institute of Education since 1990

Introduction

The Junior Cert paper at both higher and ordinary level is designed to test work carried out over the three years of the Junior Cert course. Therefore, although what you learned in first year may seem like very “ancient history” to you at this point in time, all sections of the course have to be revised for the exam in June. It is important therefore that you put an organised revision plan in place to prepare for the final exam.

The ordinary level history paper has 4 separate questions. You answer questions 1, 2 and 3 in the spaces provided on the examination paper and question 4 in a separate answer book.

The higher level paper has six questions. You write the answers to questions 1, 2 and 3 in the spaces provided on the examination paper and questions 4, 5 and 6 in a separate answer book.

Question 1

Higher and Ordinary Level

Picture question

This question involves picture interpretation. Students will be presented with three sets of pictures from various parts of the course on which they must answer some short questions.

Preparation

1. Familiarise yourself with illustrations in your textbook for a)
   a) The Stone Age: dolmens, court carns, passage graves, etc.
   b) The Bronze Age: jewelry, cauldrons fulachta faidh, etc.
   c) The Iron Age: Celtic forts, swords, spears etc.
   d) Early Christian Ireland: manuscripts, chalices and high crosses, round towers.
   e) The Middle Ages: identify the main parts of medieval castles, eg motte and bailey, keep, barbican, portcullis, turrent etc.

2. Ensure that you can tell the difference between:
   a) Gothic and Romanesque architecture.
   b) Medieval and Renaissance art.

Before the Renaissance, paintings of people didn’t look very lifelike. Important people were painted larger while less important people were painted smaller. Medieval paintings also show a lack of feeling – look out for the facial expression. They also lack perspective and seem to be flat.

On the other hand Renaissance paintings look more real and concentrate on people’s feelings. Much more care is taken with the background, which often includes scenes from nature.

3. Study pictures, posters and cartoons in your textbook of well-known historical figures and events from the 20th century, eg Hitler, Mussolini, Churchill, Cougrave, De Valera, Leman, Carson and Craig or events such as the Irish Revolt, the Economic War, the Emergency etc. Look at the election poster below. Using evidence from the poster, which political party do you think issued the poster in figure A below?

(Junior Cert higher level 2012)

Question 2

Higher and Ordinary Level

Document question

Question 2 involves the study and interpretation of historical documents. You should read each document very carefully, as quite a number of the answers will be available in them. If this is the case, you must be careful not to transcribe the text into your answer word for word but rewrite the information given in your own words.

You should also be able to explain the difference between primary and secondary sources.

Primary sources
These are written or made at the time the event happened.

Secondary sources
These are written or made after the event by someone who was not there.

Questions on the higher level may be more demanding and may ask you to distinguish between biased and unbiased material or between fact and opinion.

Look at the example below which appeared on the 2013 higher level paper. It describes the spectacle of an auto da fé (burning at the stake), a punishment carried out by order of the Spanish Inquisition during the 16th century. Students were asked to find two examples from the text that shows that the author, William lithgow, was sympathetic towards those being executed.

“In the great square was raised a high scaffold. From seven in the morning until the evening, criminals, both men and women, were brought. All the Inquisitions in the kingdom had sent their prisoners here. Twenty men and women (in this instance, Protestants), with one Muslim, were ordered to be burned. Fifty Jews and Inoscues never before imprisoned were sentenced to a long imprisonment and to wear a yellow cap, and ten others, found guilty of bigamy, witchcraft and other crimes, were sentenced to be whipped and then sent to the gallows. The stakes... are about 12 feet high. The condemned go up a ladder between two priests, who spend nearly 15 minutes persuading them to be reconciled to the See of Rome. When they refuse, the priests come down and the executioner chains them to the stake and leaves them. Then the priests go up a second time to renew their exhortations; and if they find them ineffective, tell them “they leave them to the Devil, who is standing at their elbow ready to receive their souls, and carry them with him into the flames of hell-fire”. The people then cry out “Let the dog’s beards be made!” which means, burn their beards. This is performed when flaming branches are pushed against
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Common errors

- Students sometimes write too much background information on the lives of well-known historical figures. For instance, you were asked to write about a religious reformer (Junior Cert 2013) you will get very few marks for information relating to where and when Martin Luther was born or what his father did for a living etc. It’s important that you concentrate on that part of his life when he began to call for changes in the way the church was being run at that time. The examiner will expect to see information relating to the sale of indulgences, the 95 Theses, the Diet of Worms etc.

- Another common mistake in question 4 is that students fail to understand the difference between the life of a monk living in early Christian Ireland and that of a monk during medieval times.

- Students sometimes panic when under pressure. If you find that a question is difficult in a particular section, give it your best shot and move on. Don’t waste valuable time trying to work out an answer. Concentrate on the positive elements of the paper and who knows but that you may even enjoy the experience.

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their faces with long poles. This barbarity is repeated until their faces are burnt. Fire is then set to the stables, and the criminals are consumed in the flames. The bravery of the 21 men and women in suffering the horrid death was truly astonishing; some thrust their hands and feet into the flames with most dauntless bravery; and all of them yielded to their fate with such acceptance that many of the amazed spectators felt pity that such heroic souls had not been more enlightened.

QUESTION 3
Higher and ordinary level
Short answer questions
Here you will have to answer ten from twenty short questions. However you should attempt, as many questions as you can as some of your answers may be wrong. Marks will be awarded for your best 10 answers. One or two sentences (or words in some cases) will be sufficient. Get straight to the point as answering space is limited. Most of these questions require short factual answers.

Sample questions and answers
Q. Name two types of tomb from Neolithic Ireland. (2013)
A. Dolmen and passage grave.
Q. Which Italian leader was known as Il duce? (2013)
A. Mussolini.
Q. Other questions may ask you to explain certain historical terms:
Q. In the medieval monastery what was the role of the almoner? (2013)
A. The almoner gave food to the poor.
You may also be asked the reason behind certain happenings:
Q. Why were even the poorest of people reluctant to enter the workhouse in Ireland during the 1840s? (2013)
A. They had to give up the little bit of land they rented.
Revision tips
The following points should help with your revision for this question:

- Practice writing short factual answers regularly, using examples from past papers.
- You should familiarise yourself with the names of well-known Irish leaders of the 20th century.

Learn these terms
Q. Pre-history: carbon-dating, archiving, druid, crannóig, fulacht fiach, tuath, torc, ogamh, tanaiste, souterrain, post and wattle, mote and bailey, keep, munt, feudalism, serf, manor, vassal, page; jousting; chivalry, curfew, pillory, gUILD, toll, charter, tithe, Black Death, scriptorium, chapter house, cloister, refectory, almoner, patron, perspective, fresco.

Q. Year 2: Astrolobe, compass, caravel, portolan charts, log and line conquisadores, reformation, counter-reformation, inquisition, simony, nepotism, abstemiousness, pluralism, enlightenment, plantation, blight.

Year 3: Home rule, Unionism, Solemn League and Covenant, flying column, Black and Tans, Auxiliaries, the Squadrants, neutrality, the March on Rome, the Latemar Treaty, Squadrons, Krallnacht, appeasement, collective security, blitzkrieg, Maginot Line, Operation overlord. democracy, socialism, fascism, the Final Solution, scorched earth, Cold War, containment.

QUESTION 4
Higher and ordinary level
People in History
In question 4, both higher and ordinary level students must write descriptive paragraphs on two of six given biographies. There are two different types of biographies, which you must be to be able to present.

1. The story of a real person
A reformer, a missionary, a fascist etc. which you have studied. You must give definite information here rather than general comments on how successful the person was.

Example
Write about a named leader on a voyage during the Age of Exploration. (2011)
You could write an account on Columbus or Magellan. In the case of Columbus you could mention that he believed that the Earth was round and that he was determined to prove that he could sail past the far-off east by sailing west. His voyage was sponsored by King Ferdinand and Queen Isabella of Spain and he used the three ships: the Nina, Pinta and Santa Maria. During the voyage he kept the true distance that he travelled as a secret as he feared that the sailors might become alarmed. When he reached land he was convinced that he was in Asia and called the natives Indians. He went on to discover the islands of Cuba and Hispaniola before returning home in triumph in March 1496.

2. The imaginative biography
Here you will be asked to write about a certain type of person. This type of question would appear more general and some students may think it an easier option. However specific information drawn from your history course is required. Answers to such questions may be written in the first or third person.

Example
Monks in early Christian Ireland lived in monasteries such as Glendalough and Cloonmacnois. Many of these monasteries had round towers which were used as lookout posts to protect the monks from attack by the Vikings and other enemies. Monks worked as blacksmiths, carpenters and stone masons. Others tended the land to provide food for the community. Some monks worked in a room known as the scriptorium, copying important manuscripts by hand. The Book of Kells is the most famous example of manuscript copied in Early Christian Ireland. Other works of art produced by monks during this period include St. Muireach’s High Cross and the Ardagh Chalice.

Revision
Prepare study cards on well-known persons or types of people from your history course. As each account in the people in history section of the paper carries 20 marks a study card should contain about 10 pieces of information.

Sample study card
A person living in a named ancient civilization outside Ireland. (2011)
Ancient Rome
RICH Romans lived in a houses known as adomus while poorer Romans lived in flats known as insulae.
Rich Romans decorated their houses with murals and frescoes.
Private houses had their own water supply by having a lead pipe connected to an aqueduct which brought water down from the mountains.
A market was held every eight day in the forum.
Roman men wore a toga and women wore a large cloth called a stola.
Rich Romans loved their food and ate a large meal of several courses in the evening.
They spent their free time watching chariot races at Circus Maximus or contests between gladiators in the Colosseum.
Public baths which were built throughout Rome offered a quieter type of relaxation.
The Romans believed in many different gods and were very superstitious.
Jupiter was the king of the gods and was the protector of the Roman Empire.

You should prepare study cards on the following people in history:
Year 1: An archaeologist working on a dig.
A person living in ancient (pre-Christian Ireland)
The life of a soldier, student, slave in an ancient civilization.
The lord or lady of a medieval castle.
A serf in a medieval manor.
An artist, sculptor, writer from the Renaissance.
A famed Renaissance artist from outside Italy.
A monk in an early Irish monastery.
The life of a monk in a medieval monastery.
Year 2: A religious reformer.
A revolutionary leader (in France, Ireland or America) during the Age of Revolutions, 1770-1850.
A sailor on a voyage of discovery.
A conquistador.
A person who came to Ireland as a planter.
The life of a worker during the Industrial or Agricultural Revolution.
A factory owner during the Industrial Revolution.
A pop living in rural Ireland during the 1840s.
Year 3: A fascist dictator during the inter-war years.
A soldier that took part in the D-Day landings.
A German soldier that took part in the invasion of Russia in June 1941.
A named leader in the struggle for independence in Ireland, 1900-1923.
A political leader in 20th century Ireland.
An elderly person describing social change in Ireland during the period 1920-1970.
Exploring revolutions

Reformation or the Catholic Counter-Reformation.

Plantation in Ireland
Here you must do a special study on one plantation in Ireland. You could complete this study under the following headings:
- Reasons for plantation.
- Terms of the plantation.
- Results.
Although you only need to learn one plantation in detail you also must be able to explain in general terms why the land changed hands and the main consequences both immediate and long-term of the change in land ownership in Ireland.

Revolutions in Ireland, France and America
Although you only need to do a special study on the life of one revolutionary in America, France or Ireland in the late 18th and early 19th centuries, it is very important that you have background information on all revolutions, ie the causes of discontent in each country, revolutionary movements as well as the results of the revolutions in each country.

In the study of individual countries, the syllabus guidelines state that this would include Ireland from the founding of the United Irishmen 1791 to Robert Emmet’s rebellion 1803, America up to the drafting of the Constitution 1783 and France up to end of the Reign of Terror 1794.

From farm to factory
You must be able to contrast the lifestyles of people in rural Ireland with those in industrial Britain. The easiest way to do this is by studying the changing lifestyles of people during this period, ie living and working conditions, pastimes, modes of transport, food etc.
**Preparations for JCH-Day**

**QUESTION 6**  
**Higher level only**

**Four topics**

This is the most important question for the higher level students as one third of the total marks are awarded here. There are four questions in this section of which two must be answered. One of the questions will always deal with political developments in 20th century Ireland while another always relates to international relations in the 20th century. Most years there is also a question on social changes in 20th century Ireland, but it is important that you don’t bank on this as it did not appear on the 1999 or 2004 Junior Cert exam. A fourth question will usually come from either year one or year two of the course. A question on an ancient civilisation outside Ireland is common here.

**REVISION**

An ancient civilisation outside Ireland

Study an ancient civilisation such as ancient Rome or Greece. Ensure that you can write a short paragraph on the following headings:

- Housing
- Family life
- Clothes
- Work
- Pastimes
- Arts and crafts
- Burial customs

**Political developments in 20th century Ireland**

You should study the main political events in Ireland from 1900–1985 in the following three main areas:

1. Study the aims and methods of the main political groups and individuals (Nationalists and Unionists) at the turn of the 20th Century. This would involve a study of such people as Redmond, Carson, Craig and Larkin as well as their respective movements.

2. The events and movements of the period 1912–1922 leading to the partitioning of Ireland. Here you would study events such as the introduction of the third Home Rule Bill in 1912, the 1916 Rising, the rise of Sinn Féin, the War of Independence and the birth of the Irish Free State.

3. Study the main political developments in Ireland North and South from 1922–1968. You could prepare for this by listing the actions and policies of important leaders such as Cosgrave, De Valera, Lemass, Craig and O’Neill.

**International relations in the 20th century**

For this section ensure that you can explain the reasons for the rise of fascism in Italy and Germany. You could also make a list of the main reasons for the outbreak of the second World War. Make sure that you can write a few sentences on each reason. Study the main battles in Europe in the second World War, e.g. the Battle of Britain, Operation Barbarossa, the Battle of Stalingrad, the D-Day landings, the Battle of the Bulge. You should be able to write a few points on life during the war, the Holocaust etc.

If you choose to study the rise of the superpowers as an option you should have a detailed knowledge of the following events: The Berlin Blockade, the Korean War and the Cuban Crisis.

A study of movements towards European Union should involve an understanding of the Treaty of Rome and the Maastricht Treaty. The study of African or Asian nationalism should involve a study of the independence struggle of one country.

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**Top 5 overall tips for the exam**

1. Keep a close eye on the time. Higher level students should ensure that they leave enough time to complete question 6. If this question carries one third of the total marks, it would be a good idea not to leave it to the end.

2. Buy a set of past exam papers and download them from examination.ie and become familiar with the layout of the paper and the amount of time required for each question. Use the past papers as a revision guide. Remember, many questions on your Junior Cert history paper will most likely have appeared on previous papers.

3. Remain active when studying by practising questions from the past papers. If you cannot answer a particular question, ask your teacher or consult your textbook.

4. Attempt as many short questions as you can in question 3. You will get marks for the 10 best answers and have a great chance of gaining full marks in this question.

5. When answering questions, use the mark allocations as a guide. A question carrying two to four marks requires a short answer. One or two sentences will do. A four to eight mark question would require a short paragraph. A longer paragraph or several paragraphs would be needed for a question carrying ten marks or more. A good rule of thumb here is to divide the marks allotted for the question by two and this should equal the amount of points needed in your answer, e.g. a 10 mark question needs five points. A point equals one relevant historical fact.
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6th Year - Tuesday, 25 March 2014
5th Year - Tuesday, 8 April 2014
4th Year - Wednesday, 9 April 2014

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Information evenings will take place at 6pm in the school on the dates above.

For more information or to register your interest visit ioe.ie, call 01 661 3511 or email info@ioe.ie.