



Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE 2009

MARKING SCHEME

PHYSICS & CHEMISTRY

ORDINARY LEVEL



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General Guidelines

In considering this marking scheme the following points should be noted.

1. In many instances only key words are given, words that must appear in the correct context in the candidate's answer in order to merit the assigned marks.
2. Marks shown in brackets represent marks awarded for partial answers as indicated in the scheme.
3. Words, expressions or statements separated by a solidus, /, are alternatives which are equally acceptable.
4. Answers that are separated by a double solidus, //, are answers which are mutually exclusive. A partial answer; from one side of the // may not be taken in conjunction with a partial answer; from the other side.
5. The descriptions, methods and definitions in the scheme are **not** exhaustive and alternative valid answers are acceptable. Marks for a description may be obtained from a relevant diagram, depending on the context.
6. The context and the manner in which the question is asked and the number of marks assigned to the answer in the examination paper determines the detail required in any question. Therefore, in any instance, it may vary from year to year.
7. Where indicated, 1 mark is deducted for incorrect/ no units.

SECTION I – PHYSICS (200 marks)

Three questions to be answered

Question 1

Answer any eleven parts

- (a) **A cyclist moves at a constant speed of 10 m s^{-1} . What distance does the cyclist travel in 5 minutes?**
 $v = s \div t$ / $10 = (s) \div (5 \times 60)$...5
 3000 (m) ...1
 [50 ...(-1)]
- (b) **What is meant by *acceleration*?**
 rate of change // change of velocity // $v-u \div$...3
 of velocity // w.r.t. time // t ...3
 [$F=ma$...3]
- (c) **In the equation $g = \frac{GM}{r^2}$ what does G represent?**
 Gravitation / gravity ...5
 constant ...1
- (d) **Give one example of a thermometric property.**
 length of mercury (alcohol) column / pressure / volume / emf / resistance, etc. any one ...6
 [definition ...3]
- (e) **Figure 1 shows rays of light passing through a lens and meeting at the focus F. What type of lens is shown?**
 convex (converging) ...6
- (f) **How would you show the *dispersion* of white light?**
 pass the light through ...1
 a prism / diffraction grating / spectrometer ...5
 [definition ...3]
- (g) **Figure 2 shows a waveform. What name is given to the number of waves passing a fixed point every second?**
 frequency / hertz ...6
 [wavelength ...3]
- (h) **What happens when light waves with the same wavelength meet?**
 interference / bigger wave / smaller wave any one ...6
 [constructive / destructive ...5]

- (i) **Copy and complete the following statement of *Coulomb's law*: "The force between two point charges is proportional to the of the charges and inversely proportional to the square of the between them."**
- product ...1
distance ...5
- (j) **Calculate the number of units (kW h) used by a 3 kW electric immersion heater in 30 minutes.**
- $3 \times (30 \div 60)$...3
1.5 (kWh) ...3
[90 / 0.9 ...(-1)]
- (k) **What is the purpose of a fuse in a 3-pin plug?**
- melts / breaks / blows // protects // prevents ...3
if current is too large // an appliance // a fire ...3
[safety device ... 6]
- (l) **Figure 3 shows an energy efficient lamp with a power rating of 11 W when connected to a 230 V source. Calculate the current drawn by the lamp.**
- $P = V \times I$ / $11 = 230 \times I$...3
0.05 (A) ...3
[20.9 ...3]
- (m) **State the principle on which the moving-coil galvanometer is based.**
- conductor (coil) (current), in a magnetic field, experiences a force (moves) ..6
[each term omitted ...(-1)]
- (n) **Iodine-131 has a half-life of 8 days. What fraction of a sample of iodine-131 remains after 16 days?**
- 2 half lives ...5
 $\frac{1}{4}$...1
- (o) **What type of nuclear reaction occurs in a nuclear power plant?**
- fission ...6
[fusion ...3]

Question 2

State the principle of conservation of energy.

energy cannot // total ...3
be created // energy ...3
or destroyed / it can only be changed from one form to another // is constant ...3

Define (i) weight

pull / force/ attraction // measure of // m ...3
of the earth // how heavy a body is // $\times g$...3

(ii) work

force / F ...3
 \times distance / $\times d$...3

Give the unit of work.

joule / J ...3

Figure 4 shows a weightlifter who has lifted a barbell of mass 50 kg to a height of 1.6 m above the ground. The work done by the weightlifter is stored as energy in the barbell. Name this form of energy.

potential ...3

Explain why no work is done by the weightlifter on the barbell if he holds it steady.

no movement / no distance moved ...3

Calculate: (iii) the weight of the barbell

$W = m \times g$...3
 $W = (50) \times (9.8)$...3
490 (N) ...3

(iv) the work done in lifting the barbell

$W = F \times s$ / $W = (490) \times (1.6)$...3
784 (J) ...3
[80 ...(-1)]

(v) the energy lost by the weightlifter in lifting the barbell.

$E_p = mgh$ / $E_p = (50) \times (9.8) \times (1.6)$ or 784 (J) ...3

The weightlifter then drops the barbell. State the energy change which occurs as the barbell is falling.

potential ...6
kinetic ...3
correct order ...3

Calculate the velocity of the barbell as it strikes the ground.

$v^2 = u^2 + 2gs$ / $v^2 = 0 + 2(9.8)(1.6)$...3
 $= 5.6$ (m s⁻¹) ...3

Question 3

What is meant by the reflection of light?

light bounces
off a surface

2x3

...3

...3

A plane mirror is a flat highly reflective surface. Give one use of a plane mirror.

a fitting room / periscope / mirror ball / increase light in a room etc.

6

any one ...6

A law of reflection of light states that the angle of incidence equals the angle of reflection.

Describe an experiment to verify this law using a plane mirror. Give one precaution to ensure a more accurate result.

5x3, 6

Apparatus: mirror, ray box / pins

...2x3

Method: correct arrangement
mark incident ray
mark reflected ray
draw normal
measure angles

any three ...3x3

Precaution: mirror perpendicular to page / mark back of mirror / narrow beam of light /
sharp pencil / repeat, etc.

any one ...6

Figure 5 shows a pin O placed 8 cm in front of a concave mirror of focal length 4 cm.

Draw a ray diagram to show the formation of the image.

6, 2x3

one correct ray to the mirror

...6

correct reflection

...3

2nd ray correct

...3

Find the distance of the image from the concave mirror.

2x3

$$1/u + 1/v = 1/f \quad / \quad 1/8 + 1/v = 1/4$$

...3

8 (cm)

...3

Give two differences between this image formed in the concave mirror with an image formed in a plane mirror.

inverted, real, same side of mirror as object (pin) etc.

6, 3

1st correct ...6

2nd correct ...3

Give one use of a concave mirror.

6

shaving (make-up) mirror / searchlights / floodlights / torch / headlights / dentist /
microscope, etc.

...6

[use of convex mirror ...3]

Question 4

(a) Water is boiling in a kettle. What is the temperature of boiling water when using
(i) the Celsius scale, (ii) the Kelvin scale? **9, 3**

(i) 100

(ii) 373

1st correct ...9

2nd correct ...3

[reference to 273 only ...3; 173 ...(-1)]

Using these terms, copy and complete the following statement of Charles' law:
"The ... of a fixed mass of ... is proportional to the absolute ... at constant
...."

6, 3

volume, gas, temperature, pressure

1st correct ...6

additional two correct ...3

Figure 6 shows a balloon containing 200 cm³ of helium gas at 280 K. The balloon is then placed in a flask of liquid nitrogen at a temperature of 70 K. Calculate the new volume of the balloon when it is in the flask.

9, 3

$$\frac{V_1}{T_1} = \frac{V_2}{T_2} \quad / \quad \frac{200}{280} = \frac{V_2}{70} \quad \dots 9$$

50 (cm³) ...3

(b) State two assumptions of the kinetic theory of gases. **9, 3**

elastic collisions / rapid motion / random motion / negligible volume / straight line motion / negligible duration of collisions / large number of molecules / temperature depends on kinetic energy

1st correct ..9

2nd correct ...3

What is Brownian motion?

6, 3

motion

of particles / molecules

1st correct ...6

2nd correct ...3

Describe an experiment to show Brownian motion.

4x3

App: microscope, smoke cell, lamp / microscope, pollen grains, water any two ...2x3

Method: fill cell with smoke / shine light from side / focus microscope any one ...3

Result: describe observation ...3

Question 5

(a) A straight wire carrying a current is surrounded by a magnetic field.

How can this magnetic field be detected?

compass / iron filings

6
any one ...6

Sketch the shape of this magnetic field.

rings around the wire

arrows indicating direction of magnetic field

2×3

...3

...3

Name one other effect of an electric current.

heating / chemical

6
any one ...6

Figure 7 shows a circuit with a 10 Ω resistor and a 5 Ω resistor in series connected to a battery. The current in the circuit is 0.4 A. Calculate:

6, 3×3

(i) the effective resistance of the two resistors

$$R = R_1 + R_2 \quad / \quad R = 10 + 5$$

...6

15 (Ω)

...3

(ii) the voltage (potential difference) across the 5 Ω resistor.

$$V = R \times I \quad / \quad V = (5)(0.4)$$

...3

2 (V)

...3

(b) A transformer is used to change a. c. voltages. What does a. c. represent?

alternating

current

2×3

...3

...3

Name one device which uses a transformer.

battery charger / TV, etc.

6
any one ...6

Why does an electricity supply company transmit electrical power at high voltages? 3

less heat (energy) lost

...3

Figure 8 shows a transformer. Identify the parts labelled A, B and C.

6, 3

A = primary

B = secondary

C = core / frame / structure

1st correct ...6

remainder ...3

[coil for A / B ...3; A and B reversed ...(-1)]

Part A is connected to a 300 V a. c. supply and has 600 turns. If the output voltage is 1200 V, calculate the number of turns needed on part B.

$$N_p/N_s = V_p/V_s \quad / \quad 600/N_s = 300 / 1200$$

...6

2400 (V)

...3

Question 6

Answer any two parts

- (a) **Define momentum.** 2×3
 mass / m ...3
 × velocity / $\times v$...3

State the principle of conservation of momentum. 3×3
 momentum before / $m_1u_1 + m_2u_2$ // total ...3
 equals / = // momentum ...3
 momentum after / $= m_1v_1 + m_2v_2$ // remains constant ...3
 [in a closed system ...3]

In Figure 9, a bowling ball of mass 4 kg moves with a velocity of 8 m s^{-1} on a smooth bowling alley. The ball strikes a stationary bowling pin of mass 1.5 kg. After the collision they both move in the same direction and the bowling ball moves with a velocity of 3 m s^{-1} . Calculate: 2×6, 2×3

- (i) **the momentum of the bowling ball before the collision**
 $p = m_1 \times u_1$ / $p = (4) (8)$...6
 $32 \text{ (kg m s}^{-1}\text{)}$...6

- (ii) **the momentum of the bowling pin after the collision.**
 $p = m_1 \times v_1$ / $p = (1.5) (3)$...3
 $4.5 \text{ (kg m s}^{-1}\text{)}$...3

- (b) **Ultraviolet radiation is a region of the electromagnetic spectrum.**
Name two other regions of the electromagnetic spectrum. 9, 3
 gamma rays, X-rays, visible, IR, microwaves, radio, TV etc. 1st correct ...9
2nd correct ...3

Give one property common to all regions of the electromagnetic spectrum. 6
 travel at the same speed, can be reflected / refracted / polarised, undergo
 interference / diffraction etc. any one ...6

Figure 10 shows a piece of zinc on a negatively charged gold leaf electroscope. When ultraviolet radiation is shone on the zinc, the gold leaf drops. Name this phenomenon. 6, 3

photoelectric ...6
 effect ...3

Explain why the leaf drops. 2×3
 electrons ...3
 are released (from the zinc) ...3

- (c) **Figure 11 shows the two charged plates of a parallel plate capacitor.**
Copy the diagram and show the direction of the electric field between the plates. 6, 3
 parallel lines
 arrows towards negative plate
 1st correct ...6
 2nd correct ...3
- State how the capacitance of the capacitor will change if:**
- (i) **the distance between the plates is increased** 6, 3
 decrease
- (ii) **the common area between the plates is decreased**
 decrease
 1st correct ...6
 2nd correct ...3
- Figure 12 shows how two capacitors can be combined with a battery.**
In diagram A the capacitors are arranged in series.
How are the capacitors arranged in diagram B? 6
 parallel ...6
- Calculate the effective capacitance of the two 10 μF capacitors**
- (i) **in diagram A** 6, 3
 $1/C = 1/C_1 + 1/C_2$ / $1/C = 1/10 + 1/10$ / 5 (μF)
- (ii) **in diagram B.**
 $C = C_1 + C_2$ / $C = 10 + 10$ / 20 (μF)
 1st correct ...6
 2nd correct ...3
 [reverse ...6]
- (d) **What is radioactivity?** 2x3
 decay (disintegration) ...3
 of nuclei / atoms ...3
- In beta (β) radiation, negatively charged particles are emitted. Which type of nuclear radiation emits positively charged particles?** 6
 alpha ...6
 [gamma ...3]
- List two uses of radioactive substances.** 9, 3
 medical / cancer / carbon dating / detecting leaks / smoke detectors etc.
 1st correct ...9
 2nd correct ...3
- Give two precautions when using radioactive substances.** 6, 3
 use of tongs / wear protective clothing / minimise time, etc.
 1st correct ...6
 2nd correct ...3

SECTION II – CHEMISTRY (200 marks)

Three questions to be answered

Question 7

Answer any eleven parts

- (a) **Sketch an *s*-orbital.**
 spherical shape (shown / stated) ...6
 [p-orbital ...3]
- (b) **How many (i) protons, (ii) neutrons, are there in ${}^9_4\text{Be}$?**
 (i) 4
 (ii) 5 1st correct ...5
 [reverse / (ii) 9 ...(-1)] 2nd correct ...1
- (c) **Define *electronegativity*.**
 attraction // EN difference ...3
 for electrons // greater than 1.7 [less than 1.7 ... (-1)] ...3
 [determines the type of bond formed ...3]
- (d) **Copy and complete the statement: “Isotopes of an element have the same number of and different numbers of”**
 protons / same atomic number
 neutrons 1st correct 5
 2nd correct 1
- (e) **Give one example of an ionic compound.**
 sodium // magnesium ...3
 chloride // oxide, etc. ...3
 [salt ...3]
- (f) **The relative molecular mass of hydrogen gas (H_2) is 2.**
Calculate the number of molecules in 18 g of hydrogen gas.
 9 moles ...3
 5.4×10^{24} (molecules) ...3
- (g) **Calculate the percentage of oxygen by mass in calcium carbonate (CaCO_3).**
 $M_r = 40 + 12 + 48 / M_r = 100$...3
 % Oxygen = 48 ...3
- (h) **Define *electrolysis*.**
 decomposition ...3
 of an electrolyte ...3
 [example / use ...5]

- (i) **What is the pH of a 0.05 M solution of hydrochloric acid (HCl)?**
 $\text{pH} = -\log_{10}[\text{H}^+]$ / $\text{pH} = -\log_{10}[0.05]$...3
 1.3 ...3
- (j) **Which one of the following oxides is acidic?**
MgO CO NO₂
 NO₂ ...6
 [MgO / CO ...3]
- (k) **Give one characteristic property common to transition elements.**
 variable valency / form coloured compounds / metallic in nature , etc. any one ...6
- (l) **Copy, complete and balance the following reaction:**
 $\text{Na}_2\text{SO}_3 + \text{HCl} \longrightarrow \text{NaCl} + \text{_____} + \text{H}_2\text{O}$
 complete: SO₂ ...5
 balance: 2HCl → 2NaCl ...1
 [SO / SO₃ ...(-1)]
- (m) **List the following elements in order of decreasing chemical activity:**
copper calcium iron
 calcium iron copper ...6
 [reverse order ...(-1); any two correct ...5]
- (n) **What is a hydrocarbon?**
 carbon and ...3
 hydrogen compounds ...3
- (o) **Why is the compound shown in Figure 13 classified as aromatic?**
 benzene ...3
 ring ...3

Question 8

A neutron is a subatomic particle found in the nucleus of an atom.

Name one other particle found in the nucleus of an atom.

proton

2×6

...6

Give one difference between these two particles.

neutron has no charge / proton has a positive charge

...6

Give the electronic (s, p) configuration of an atom of chlorine.

$1s^2 2s^2$

$2p^6 3s^2 sp^5$

2×3

...3

...3

State the type of bond formed when two atoms of chlorine combine .

covalent

[ionic ...3]

6

6

Explain, with the aid of a diagram, how this bond is formed.

overlap of two orbitals / dot and cross diagram

shared pair of electrons

2×3

...3

...3

Give one property of a substance with this type of bond.

usually liquids (gases) / low m.p. / low b.p. / insoluble in water / do not conduct electricity, etc

6

any one ...6

Fluorine and chlorine are elements found in the same group of the periodic table.

Explain the underlined terms.

substance that cannot be broken down

into a simpler substance (by chemical means)

[example / found in the periodic table ...3]

// atoms

// with the same atomic number

4×3

...3

...3

vertical // similar

column // electronic configuration / number of outer electrons / properties

...3

...3

Name one other element in this group.

bromine / iodine, etc

6

...6

What is meant by *ionisation energy*?

energy to remove

most loosely bound (outer) electron

6

...3

...3

Explain why the first ionisation energies decrease down a group.

increase // greater distance // screening // less attraction

atomic radius // from the nucleus // inner electrons // between electron and nucleus

[easier to remove an electron / less energy required ...3]

6

...3

...3

Question 9

(a) In a redox reaction, oxidation and reduction occur.

Explain the underlined words in terms of electron transfer.

6, 2×3

loss

gain

1st correct ...6

2nd correct ...3

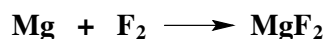
of electrons

...3

[reverse order ...9]

Identify the substance oxidised in the following reaction:

6



Mg

...6

Copy and complete the following reaction: $\text{CuO} + \text{H}_2 \longrightarrow$

Identify the oxidising agent in this reaction.

9, 2×3

Cu

H₂O

CuO

1st correct ...9

2nd and 3rd correct ...2×3

(b) Using the Brønsted-Lowry theory, define (i) an acid, (ii) a base.

4×3

(i) proton / H⁺

...3

donor

...3

[in terms of pH ...3]

(ii) proton / H⁺

...3

acceptor

...3

[in terms of pH ...3]

What is meant by a *strong acid*?

3

good proton donor / fully dissociates

...3

Identify two acids and two bases in the following reaction:



acids: H₂O and NH₄⁺

bases: NH₃ and OH⁻

1st correct ...6

2nd correct ...3

remainder ...3

[reverse ...6]

Give one example of an acid-base pair in this reaction.

6

NH₃ and NH₄⁺ / H₂O and OH⁻

...6

Question 11

Figure 14 shows glassware used during a titration to find the concentration of a potassium hydroxide (KOH) solution.

- (i) **Explain the underlined terms.** 9,3
conc: amount / moles / grams present
soln: a mixture of a solute and solvent 1st correct ...9
2nd correct ...3
- (ii) **Identify the pieces of glassware labelled A, B and C.** 6,3
A: pipette
B: burette
C: flask 1st correct ...6
remainder ...3
- (iii) **Give one safety precaution required when filling A.** 6
use a pipette filler / safety glasses ...6
[other precaution ...3]
- (iv) **State one precaution required when reading the level of liquid in B.** 3
read at eye level / read the bottom of the meniscus / white card behind the scale, etc
any one ...3
- (v) **Why is an indicator used during a titration?** 6
show the end-point / show point of neutralisation, etc any one ...6
[shows colour change ...3]
- (vi) **Explain why deionised water is added to C during the titration.** 6
to wash any acid droplets into the flask ...6

It was found that 21.5 cm³ of 1.5 M hydrochloric acid (HCl) solution reacted with 25 cm³ of the potassium hydroxide (KOH) solution.

- (vii) **Copy and complete the equation for the reaction that takes place in this titration:**



KCl ...3

H₂O ...3

- (viii) **Calculate the molarity of the potassium hydroxide solution.** 3×3

$$\frac{M_1 \times V_1}{n_1} \quad / \quad \frac{1.5 \times 21.5}{1} \quad \dots 3$$

$$\frac{M_1 \times V_2}{n_2} \quad / \quad \frac{M_2 \times 25}{1} \quad \dots 3$$

$$M_2 = 1.29 \text{ (M / moles per litre (dm}^3\text{))} \quad \dots 3$$

- (ix) **Name the salt produced in this experiment.** 3
potassium chloride ...3
- (x) **Explain how a sample of the salt can be separated from the solution.** 6
evaporation ...6

Question 11

Methanol (CH₃OH) is the first member of a *homologous series*.

- (i) **What is a homologous series?** 6
successive members differ by CH₂ / same general formula /
gradual change in physical properties any one ...6
[example / same functional group ...3]
- (ii) **Name the homologous series to which methanol belongs.** 6
alcohols ...6
- (iii) **Name one other member of this homologous series.** 6
ethanol, propanol, etc ...6
- (iv) **Sketch the structural formula of methanol.** S
2x3
C — OH ...3
H's attached ...3

Methanol burns in air according to the following reaction:



- (v) **Is this reaction exothermic or endothermic? Give a reason for your answer.** 6, 3
exothermic
heat given off / ΔH minus 1st correct ...6
2nd correct ...3
- (vi) **Describe an experiment to detect one of the products when methanol burns.** 6, 3
limewater // boils // melts // density // cobalt chloride paper
turns milky // 100 °C // 0 °C // 1 g cm⁻³ // turns pink 1st correct ...6
2nd correct ...3

Methanol can be oxidised to form methanoic (formic) acid.

- (vii) **Sketch the structural formula of methanoic acid.** 2x3
correct functional group ...3
H attached to C ...3
- (viii) **What is observed when methanoic acid reacts**
(a) with litmus solution;
(b) with magnesium? 4x3
(a) turns ...3
pink / red ...3
(b) hydrogen gas ...3
released ...3
- (ix) **Methanol and methanoic acid react to form an ester.**
Give one property of an ester. 6
undergo hydrolysis / solvents / perfumes / flavour essences etc any one ...6

Question 12Answer any two parts.

- (a) **Define a mole of a substance.** 2×3
 Avogadro number // molecular mass // same number of particles ...3
 of particles // in grams // as 12 g of carbon ...3

Describe the appearance of carbon and oxygen at room temperature. 6, 3
 carbon: black / solid
 oxygen: colourless / gas 1st correct ...6
2nd correct ...3

Carbon and oxygen react together to form carbon dioxide as follows:



If 36 g of carbon were used in this reaction, calculate:

- (i) **the number of moles of carbon used** 2×3
 $n = m \div M_r$ / $n = 36 \div 12$...3
 3 ...3
- (ii) **the mass of carbon dioxide produced** 2×3
 M_r of $\text{CO}_2 = 44$ (g) / 3 moles ...3
 132 (g) ...3

What environmental impact is caused by carbon dioxide in the atmosphere? 3
 greenhouse effect / global warming / acid rain etc. any one ...3

Name one major source that releases carbon dioxide into the atmosphere. 3
 burning fossil fuels / cars ...3

- (b) **Figure 15 shows oxygen (O_2) gas being prepared.**
Name the liquid A and the solid B. 9, 3
 hydrogen peroxide
 manganese dioxide 1st correct ...9
2nd correct ...3

What is the purpose of solid B? 9
 catalyst / speed up reaction ...9

Describe a test for the presence of oxygen. 6
 relights a glowing splint ...6

Give one commercial use for oxygen gas. 6
 hospitals / mountain climbing / diving, etc. any one ...6

(c) **Figure 16 shows three molecular shapes from the *electron pair repulsion theory*. Name each of the molecular shapes A, B and C.** 6, 3

A: linear

B: planar / pyramid / triangular

C: tetrahedral

1st correct ...6

remainder ...3

Give the bond angle (i) in molecule A; (ii) in molecule B. 2x3

(i) 180°

...3

(ii) 120° / 107°

...3

What is the molecular shape of methane (CH_4)? 6

C / tetrahedral

...6

Explain the molecular shape of H_2O using the electron pair repulsion theory. 9, 3

show / state: V-shaped

2 l.p. and 2 b.p. // l.p.:l.p. > l.p.:b.p. // l.p.:b.p. > b.p.:b.p.

1st correct ...9

2nd correct ...3



Coimisiún na Scrúduithe Stáit

Marcanna Breise as ucht freagairt trí Ghaeilge

Léiríonn an tábla thíos an méid marcanna breise ba ch oír a bhronnadh ar iarrthóirí a ghnóthaíonn níos mó ná 75% d'iomlán na marcanna.

N.B. Ba chóir marcanna de réir an ghnáthráta a bhronnadh ar iarrthóirí nach ghnóthaíonn níos mó ná 75% d'iomlán na marcanna don scrúdú. Ba chóir freisin an marc bónais sin **a shlánú síos**.

Tábla 400 @ 10%

Bain úsáid as an tábla seo i gcás na n-ábhar a bhfuil 400 marc san iomlán ag gabháil leo agus inarb é 10% gnáthráta an bhónais.

Bain úsáid as an ngnáthráta i gcás 300 marc agus faoina bhun sin. Os cionn an mharc sin, féach an tábla thíos.

Bunmharc	Marc Bonais
301 - 303	29
304 - 306	28
307 - 310	27
311 - 313	26
314 - 316	25
317 - 320	24
321 - 323	23
324 - 326	22
327 - 330	21
331 - 333	20
334 - 336	19
337 - 340	18
341 - 343	17
344 - 346	16
347 - 350	15

Bunmharc	Marc Bonais
351 - 353	14
354 - 356	13
357 - 360	12
361 - 363	11
364 - 366	10
367 - 370	9
371 - 373	8
374 - 376	7
377 - 380	6
381 - 383	5
384 - 386	4
387 - 390	3
391 - 393	2
394 - 396	1
397 - 400	0

