AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA

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LEAVING CERTIFICATE EXAMINATION, 2000

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MATHEMATICS - FOUNDATION LEVEL

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PAPER 1 (300 marks)

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THURSDAY, 8 JUNE - MORNING, 9.30 - 12.00

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Attempt **QUESTION 1** (100 marks) and **FOUR** other questions (50 marks each).

Marks may be lost if necessary work is not clearly shown.

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1. *(i)* Find $\sqrt{65}$, correct to one decimal place.

(ii) Find $(0.45)^2 - (0.14)^2$, correct to three decimal places.

(iii) Find the value of $\dfrac{25.68}{\sqrt{6.25}}$.

(iv) Find the value of $\dfrac{1}{0.0025} - (19.8)^2$.

(v) Find 16% of IR£25.18, correct to the nearest penny.

(vi) Find $\dfrac{2}{9} + \dfrac{5}{11}$, correct to two decimal places.

(vii) On a certain day, IR£1 = £0.8149 sterling.
Find, to the nearest IR£, the value of £250 sterling on that day.

(viii) A journey of 36 km started at 1100 hours and finished at 1125 hours.
Find the average speed for the journey in km/hr.

(ix) Find the value of

$$\frac{(2.45 \times 10^6) - (1.8 \times 10^4)}{(0.16 \times 10^5)}.$$

(x) Find, correct to two significant figures, the value of

$$\frac{(84.7 - 19.8)}{(2.46 \times 0.27)}.$$

2. **(a)** A person is paid IR£5.80 for each hour worked. The person works a 35 hour week.

   (i) Calculate the gross income for a week.

   (ii) The tax free allowance for a week is IR£116.
   Tax is paid on taxable income at the rate of 22%.
   Calculate the income tax paid for a week.

   (iii) The first IR£100 of gross income in a week is exempt from PRSI.
   PRSI is paid on the balance of gross income at the rate of 4.5%.
   Calculate, to the nearest penny, the PRSI paid for a week.

   (iv) Calculate the take-home pay for a week.

(b) A motorist travels a journey of 185 km.
The motorist travels the first 80 km at an average speed of 75 km/hr.
How many hours and minutes does it take the motorist to travel the first 80 km?

The remainder of the journey takes 1 hour and 45 minutes.
Calculate the average speed for this part of the journey in km/hr.

3. **(a)** The mass of a rock is estimated to be 65 kg. Its true mass is 67.5 kg.
   Find
   (i) the error
   (ii) the percentage error, correct to one decimal place.

(b) A car which costs IR£16 900 will depreciate at the rate of 15% per year.
How much will it be worth at the end of four years?
Give your answer correct to the nearest IR£.

(c) In a competition, team A scored $22\frac{1}{2}$ points and team B scored $17\frac{1}{2}$ points.
The two teams share a prize of IR£25 000 in proportion to the number of points they scored.
How much money does each team receive?

If the prize is increased by 10%, how much money will each team then receive?

4. **(a)** Write 5324 in the form $a \times 10^n$, where $1 \le a < 10$ and $n \in \mathbf{N}$.

(b) Solve the simultaneous equations

$$3x - 4y = 18$$
$$x + 2y = -4.$$

(c) *(i)* Solve $4x - 3 \le 13$.

   (ii) Solve $5 - 2x \le 11$.

   (iii) Write down all the whole numbers which satisfy both $4x - 3 \le 13$ and $5 - 2x \le 11$.

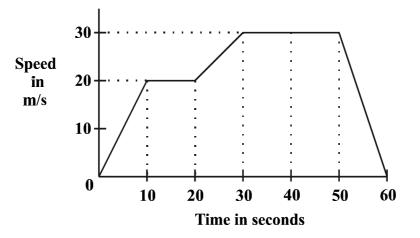**5.** **(a)** Solve for x

$$9x - 17 = 2x - 3.$$

(b) Solve the quadratic equation

$$3x^2 + 4x - 1 = 0.$$

Give your answers correct to two places of decimals.

(c) Five times a certain number added to 12 is the same as three times the same number added to 20.
Let x represent this number and write this information as an equation in x.
Solve the equation for x.

6. The graph below shows the speed of a car over a period of 60 seconds.
The speed, in metres per second, is shown on the vertical axis. The time, in seconds, is shown on the horizontal axis.
For example, the speed of the car is 20 m/s at 10 seconds.

(i) What was the speed of the car at 20 seconds?

(ii) For how many seconds altogether was the speed of the car increasing?

(iii) What was the maximum speed of the car?

(iv) For how long was the car travelling at its maximum speed?

(v) Calculate the distance travelled by the car at its maximum speed.

(vi) The total distance travelled was 1300 metres.
Calculate, in m/s, the average speed of the car over the 1300 metres travelled.
Give your answer correct to two places of decimals.

7. Draw the graph of the function

$$f : x \to x^2 - 3x + 1 \quad \text{for } -1 \le x \le 4, \quad x \in \mathbf{R}.$$

Use your graph to find as accurately as possible

(i) the values of x for which $f(x) = 0$

(ii) the value of $f(-0.5)$

(iii) the minimum (least) value of $f(x)$

(iv) the range of values of x for which $f(x)$ is increasing.

FORMULAE FOR PAPER 1

Compound Interest and Depreciation :

$$A = P\left(1 \pm \frac{r}{100}\right)^n ; \qquad P = \frac{A}{\left(1 \pm \dfrac{r}{100}\right)^n} .$$

The solutions to the quadratic equation $ax^2 + bx + c = 0$ are

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

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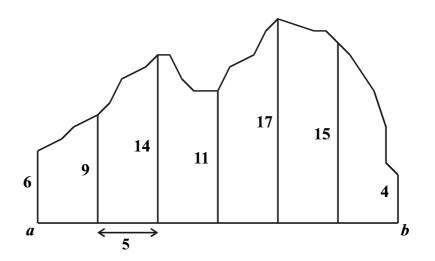
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MATHEMATICS - FOUNDATION LEVEL

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PAPER 2 (300 marks)

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FRIDAY, 9 JUNE - MORNING, 9.30 - 12.00

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Attempt **SIX QUESTIONS** (50 marks each).

Marks may be lost if necessary work is not clearly shown.
A sheet of formulae will be given to you by the Superintendent.

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1. **(a)** The area of triangle *abc* is 10.125 cm².
The length of [*bc*] is 8.1 cm.
The height of the triangle is *h* cm.

Calculate the value of *h*.

(b) The diagram below shows a site for sale.

The offsets of lengths 6, 9, 14, 11, 17, 15 and 4 metres are measured at intervals of 5 metres along [*ab*].
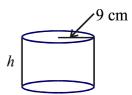
Using Simpson's Rule, calculate the area of this site, correct to the nearest square metre.

2. **(a)** A small rectangular block measures 4 cm × 3 cm × 2 cm.
Calculate its volume.
Calculate the volume of 30 of these small blocks.

A large rectangular block has the same volume as the 30 small blocks.
The large block measures 8 cm × 9 cm × *k* cm.
Find the value of *k*.

(b) A wax sphere has surface area 1017.36 cm².
Calculate, taking $\pi = 3.14$,

        (i) the radius of the sphere

        (ii) the volume of the sphere.

A solid cylinder of radius 9 cm has the same
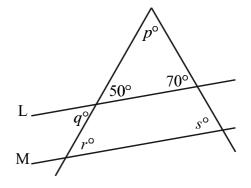volume as the wax sphere.
Calculate the height, *h*, of the cylinder.

3. **(a)** The diagram shows an isosceles triangle.
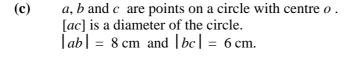
Find the value of x and the value of y.
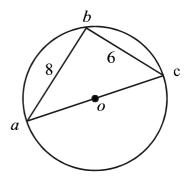
(b) The lines L and M are parallel.

Find the value of

(i) p

(ii) q

(iii) r

(iv) s.

(c) a, b and c are points on a circle with centre o.
[ac] is a diameter of the circle.
$|ab| = 8$ cm and $|bc| = 6$ cm.

Find

(i) the measure of $\angle abc$

(ii) the area of triangle abc

(iii) the length of the diameter $[ac]$
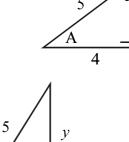
(iv) the area enclosed by the circle, taking $\pi = 3.14$.

4. **(a)** Plot the points $a(3, 3)$ and $b(-1, 1)$ on graph paper.
Find the midpoint of [ab].

(b) $p(-3, 2)$ and $q(2, 14)$ are points.

(i) Find the length of [pq].

(ii) Find the slope of pq.

(iii) Find the equation of the line pq.

(c) The line L has equation $4y = -3x + 12$.
Write down the slope of L.

Find the equation of the line M which passes through the point $(1, 2)$ and is perpendicular to L.

The point $(h, 8)$ lies on the line M.
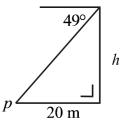Find the value of h.

5. **(a)** Given that $\tan A = \dfrac{3}{4}$, write down the value of

   (i) sin A
   (ii) cos A
   (iii) tan B.

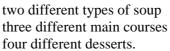**(b)** Calculate the value of *y*, correct to two places of decimals.

(c) The angle of depression of a point *p* from the top of a building is 49°.
The point *p* is on level ground 20 m from the foot of the building.
Calculate the height *h* of the building, correct to the nearest metre.

6. **(a)** A lunch consists of soup, main course and dessert.
The restaurant offers :

> two different types of soup
> three different main courses
> four different desserts.

How many different lunch selections are possible ?

(b) A hat contains 40 tickets. 11 of these tickets are red, 9 are green and 20 are white.
One ticket is picked at random from the hat.

Find the probability that it is

   (i) a red ticket
   (ii) a green ticket
   (iii) not a green ticket.

(c) List the eight possible ways in which three children can be made up of girls and boys.
For example, three of the possible ways are:

> boy, boy, boy;
> boy, boy, girl;
> boy, girl, boy.

If all the possible ways are equally likely, find the probability that

   (i) all of the children are girls

   (ii) at least two of the children are boys

   (iii) only one of the children is a girl.

7. **(a)** The results of a survey of the time spent by 40 people travelling to work are shown in the table below.

Time in minutes	0 – 10	10 – 20	20 – 40
Number of people	5	15	20

Draw a histogram to illustrate the information given in the table.
Put the time in minutes on the horizontal axis.

(b) 70 students at a concert are asked their ages. The results are as follows :

Age (in years)	13 – 15	15 – 17	17 – 19	19 – 21	21 – 23
Number of students	7	12	22	23	6

Note:- 13 – 15 means 13 years of age but not yet 15.

Copy and complete the cumulative frequency table below :

Age (in years)	<15	<17	<19	<21	<23
Number of students	7	19			

Draw the cumulative frequency curve.
Put the number of students on the vertical axis.

Use your curve to estimate the number of students who are 16 years of age or more but less than 20 years of age.
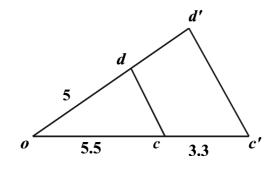
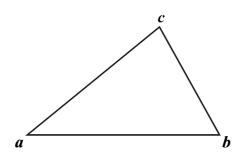**(c)** Find the mean and standard deviation of the numbers

$$3, \quad 4, \quad 6, \quad 7$$

correct to two places of decimals.

8. **(a)** Construct a triangle *abc* where $|ab| = 8$ cm, $|bc| = 5$ cm and $|ac| = 7$ cm.
Measure the angle between the sides [*ab*] and [*bc*], as accurately as possible.

(b) The triangle *o c' d'* is an enlargement of the triangle *ocd*.
The centre of the enlargement is *o*.
$|oc| = 5.5$, $|cc'| = 3.3$ and $|od| = 5$.

(i) Calculate the scale factor of the enlargement.

(ii) Find the length of [*od'*].

(iii) The area of triangle *o c' d'* is 21.12 square units.
Find the area of triangle *ocd*.

(c) Copy the triangle *abc* into your answer book.

Show how to draw the inscribed circle of the triangle *abc*.