Maths Points

Junior and Leaving Cert

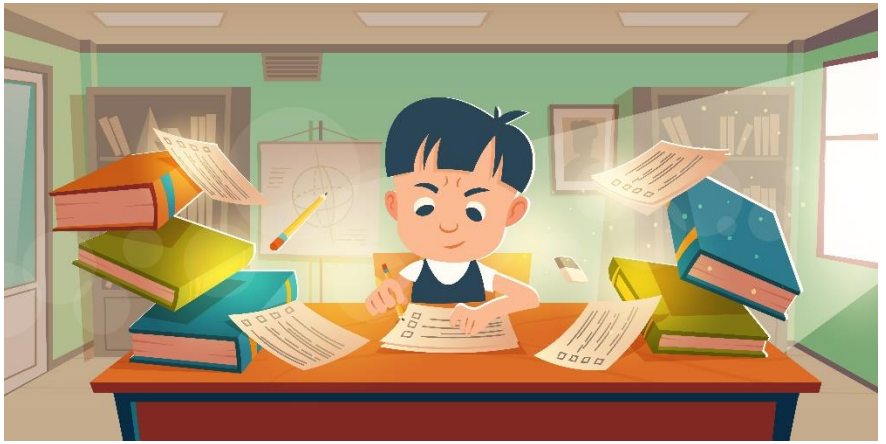
LCOL BASIC SKILLS

PACK 1

Leaving Cert Ordinary Level

LCOL Basic Skills: Pack 1 – Table of Contents

Topic, Year and Level
1 ▶ Algebra : 2008 Paper 1 – Q2 (b)
2 ▶ Applied Arithmetic : 2011 Paper 1 – Q2
3 ▶ Scientific Notation : 2007 (JCHL) Paper 1 – Q1 (b)
4 ▶ Trigonometry : 2011 Paper 2 – Q5 (a)
5 ▶ Coordinate Geometry: 2009 Paper 2 – Q2 (a)



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

Write your solutions in the form $a \pm \sqrt{b}$, where $a, b \in \mathbf{N}$.

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

$a = 1$
$b = -4$
$c = 1$

$-b$ formula

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

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

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(1)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16 - 4}}{2}$$

$$x = \frac{4 \pm \sqrt{12}}{2}$$

$$x = \frac{4 \pm \sqrt{4}\sqrt{3}}{2}$$

Rule of Surds
$\sqrt{ab} = \sqrt{a}\sqrt{b}$

$$x = \frac{4 \pm 2\sqrt{3}}{2}$$

$$x = 2 \pm \sqrt{3}$$

Leave in the form $a \pm \sqrt{b}$.

The Quadratic Formula ($-b$ formula) is on page 20 of the Maths Formulae Book.

A certain deposit account will earn 3% interest in the first year and 6% interest in the second year. The interest is added to the account at the end of each year. If a person invests €20 000 in this account, how much will they have in the account at the end of the two years?

The formula for **Compound Interest** is on **page 30** of the Maths Formulae Book.

$F = P(1+i)^t$

$F = ?$
$P = 20{,}000$
$i = 0.03$
$t = 1$

$F = P(1+i)^t$

$F = 20{,}000(1+0.03)^1$

$F = €20{,}600$

$F = P(1+i)^t$

$F = ?$
$P = 20{,}600$
$i = 0.06$
$t = 1$

$F = P(1+i)^t$

$F = 20{,}600(1+0.06)^1$

$F = €21{,}836$

(b)

Show that, to the nearest euro, the same amount of interest is earned by investing the money for two years in an account that pays compound interest at 4·49% (AER).

$F = P(1+i)^t$

$F = ?$
$P = 20{,}000$
$i = 0.0449$
$t = 2$

$F = P(1+i)^t$

$F = 20{,}000(1+0.0449)^2$

$F = €21{,}836.32$

$21{,}836.32 - 20{,}000 = 1{,}836.32$

Interest Earned
$\approx$ €1,836
as in (a).

In 1981 the population of Peru was approximately 1.8×10^7.
By 1988 the population had increased by 2.5 million.

What would be the approximate population of Peru in 1988?
Express your answer in the form $a \times 10^n$, where $n \in \boldsymbol{Z}$ and $1 \leq a < 10$.

1981
$1.8 \times 10^7 = 18{,}000{,}000$

Increase
2.5 million = 2,500,000

$$\begin{array}{r} 18{,}000{,}000 \\ 2{,}500{,}000 \\ \hline 20{,}500{,}000 \end{array} \quad +$$

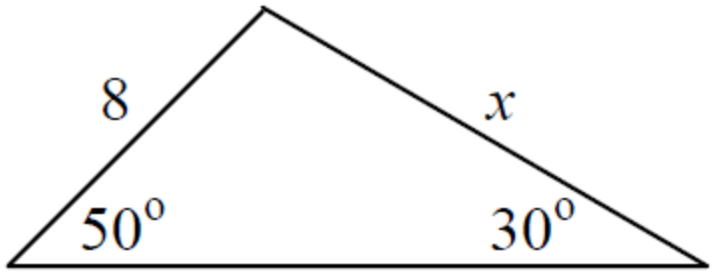
$$= 2.05 \times 10^7$$

The size of the power is found by counting the number of digits after the 1st digit.

Use the sine rule to calculate the value of x in the diagram.

Give your answer correct to the nearest integer.

The **Sine Rule** is on **page 16** of the Maths Formulae Book.



Sine Rule

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{x}{\sin 50} = \frac{8}{\sin 30}$$

$$x \sin 30 = 8 \sin 50$$

$$x = \frac{8 \sin 50}{\sin 30}$$

$$x = 12.26$$

$$x \approx 12$$

Correct to the nearest integer!

When to use the Sine Rule?

The Sine Rule can be used to solve triangles when you know:

1. The lengths of two sides of the triangle and the measure of the angle opposite one of the sides.
2. The lengths of two sides of the triangle and the measure of the angle opposite the other side.
3. The length of one side of the triangle and the measures of the angles opposite the other two sides.

$a(-2,1)$ and $b(4,5)$ are two points.

Find the equation of ab.

The **Slope** and **Distance formulae** are on **page 18** of the Maths Formulae Book.

To find the **equation of a line** we need a point and a slope. We can find the slope using the **slope** formula.

$a(-2,1)$ $b(4,5)$
(x_1, y_1) (x_2, y_2)

Slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{5-1}{4-(-2)}$$

$$= \frac{4}{6}$$

$$= \frac{2}{3}$$

$$m = \frac{2}{3}$$

$(x_1, y_1) \rightarrow a(-2,1)$

Equation of Line

$$y - y_1 = m(x - x_1)$$

$$y - y_1 = m(x - x_1)$$

$$y - 1 = \frac{2}{3}(x - (-2))$$

$$3(y-1) = 2(x+2)$$

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

$$-2x + 3y - 3 - 4 = 0$$

$$-2x + 3y - 7 = 0$$

$$2x - 3y + 7 = 0$$

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