

Project Maths Ordinary Must know file

Conclusions
Question 1 area and Volume (50 marks)

Section A (125 marks)

2 questions from strand 1 and 3 questions from strand 2 .

Section B (for 2010 exam)(125 marks)

2 questions from Strand 1 and 2 questions from Strand 2

Must Know for Leaving Cert Ord Project maths

Probability Strand 1 : Must Know

(i)The number of arrangements of n different objects is $n!$ (ii)The number of ways of choosing r different objects from n different objects is ${}^n C_r$, (iii)Be able to estimate the probabilities from experimental data such as 2 Dice ,Spinners, cards, tossing several coins .Appreciate that if an experiment is repeated the outcomes will vary and by increasing the number of times you do the experiment the better will be the estimates of probability. Be able to associate the probability of an event with its long run relative frequency. Be able to calculate probabilities through the use of Venn diagrams/tree diagrams. Understand the and /or rules be familiar with the **independent events /mutually exclusive** .

Be able to calculate the expected value, be able to use the expected value in decision making ,also use the expected value and the issue of fair games note the fact that the expected value does not need to be one of the outcomes

Statistics Strand 1 ;Must Know :

You must be able to design a plan and collect data based on the plan (avoid bias)

Must know the meaning of the words concerning data /variables.

Population ;This the whole set of measurements about which we want to draw a conclusion .

Univariate ;If we are interested in only one variable we call the population univariate.

Bivariate When two variables are involved.

Categorical; variable this is the value taken by the variable in a non-numerical category or class an example of a categorical variable is gender with two categories male and female. A purely categorical variable is one that simply allows you to assign categories but you cannot clearly order the variables. Categorical data (or variable) consists of names representing categories. For example, the gender (categories of male & female) of

the people where you work or go to school; or the make of cars in the parking lot (categories of Ford, GM, Toyota, Mazda, KIA, etc) is categorical data.

Numerical ; Numerical data (or variable) consists of numbers that represent counts or measurements. For example, the number of males & females where you work or go to school; or the number of the makes of cars Ford, GM, Toyota, Mazda, KIA, etc is numerical data

Ordinal ; If the variable has a clear ordering, then that variable would be an ordinal variable

Discrete variable can take only distinct values in a given range .We usually describe that a variable is discrete if it can be counted.

Continuous variable can take on any value .Height is an example of a continuous variable.

| Name of variable | Type of variable | Range of values |
|----------------------|------------------|-----------------|
| Gender | Categorical | Male, Female |
| Weight | Continuous | 50kg-125kg |
| Number of cousins | Discrete | 0,1,2, |
| Distance from school | continuous | 1km to 10km |
| Type of degree | Categorical | BA,BSc,BComm |

You must know the meaning of the words **Mean, Median, and Mode**.

You can be asked to represent the data in a graphical manner and choose the best type of graphical representation for the type of data given and be able to examine the diagram for **symmetry** and **skewness**. Know the difference between the different types of skewness and the impact on **the relative positions of the mean, median and mode** .

Be able to draw **Bar Charts, Cumulative Frequency curves , Histograms, Stem and Leaf plots and scatter plots**.

Be able to compare sets of data using **back to back stem and leaf plots** .Be able to answers questions on **Difference** and **Similarity** between two sets of data. And perform a **Tukey Quick test** . Be able to use **scatter plots** to find the relationship between two variables ,understand that correlation coefficient lies between -1 and +1 , be able to assign appropriate correlation coefficients to scatter plots.

With regard to Histograms you must be able to interpret a Histogram in terms of the distribution of data using **the empirical rule** (this is the relationship between the **mode, median and mean** .

The empirical rule for a frequency curve with **one mode** that is moderately skewed is **Mean – Mode = 3(Mean – Median)**. You can be given a Histogram or Histograms and asked to find the relationship between the **mean median and mode** .

You must also know the significance of the **standard deviation** and be able to calculate the standard deviation (by calculator or formula).You must be able to find the **inter-quartile range** and recognize the existence of **outliers**.

Coordinate Geometry of the Line :

You must be able to use the Coordinate Geometry formulae from the Higher Junior cert
From the sample paper there seems to be a lot of emphasis on slopes and constructions and mixing geometry with the Coordinate geometry. You can be asked for the equation of a line in the form $y = mx + c$ or $y - y_1 = m(x - x_1)$. All the formulae are in the tables including the Area of a triangle .

Coordinate Geometry of the circle .

The course is very similar to the old course but the questions will be very short and probably involve the Geometry of the circle .

Find the points of intersection of a line and the circle $x^2 + y^2 = R^2$. You must be able to prove a line is a tangent to the circle $x^2 + y^2 = R^2$. Equation of the circle can only appear in the following $(x - a)^2 + (y - b)^2 = R^2$ form.

Both the line and the circle questions are very similar to the old course, my advice you should use past papers (regular exam) to practice these questions.

Trigonometry

You must be able to deal with right angled triangles (Pythagoras), Be able to find the area of triangles, use Sine Rule ,Cosine Rule and be able to deal with applications in 2D. Be able to find the length of an arc and the area of a sector and be able to solve problems involving the length of an arc and the area of a sector Be able to define $\sin \theta, \cos \theta, \tan \theta$ for all values of θ . Questions will be very similar to the old course.

Geometry

You must be able to know what the following theorems say

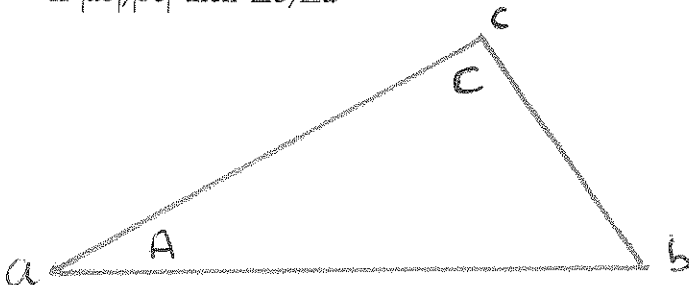
Theorems 7,8,11,12,13,16,17,18,20,21, and corollary 6 and be able to use the theorems to solve problems .The best way to study these (as there is a lot to learn) is to copy down the diagrams see below.

Be able to perform the following constructions.16,17,18,19,20,and 21.

Be able to find the image of a rectilinear figure by an enlargement and scale factor k (using the ray method)where k can be a fraction between 0 and 1 or a number greater than 1.Be able to investigate the relationship between the size of the image and the size (area) of the object ,be able to calculate the scale factor given the object and the image ,find the centre of the enlargement.

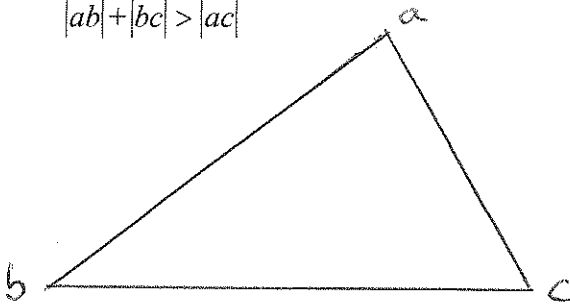
Theorem 7;The biggest side of a triangle is opposite the biggest angle

If $|ab| > |bc|$ then $\angle c > \angle a$

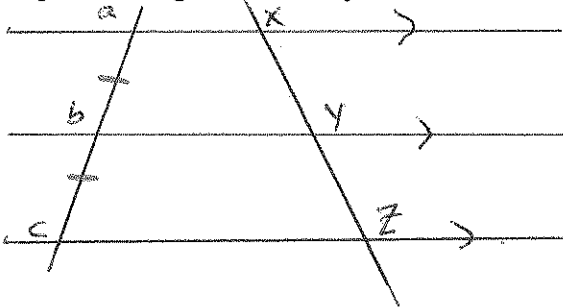


Theorem 8: Two sides of a triangle are together bigger than the 3rd side.

$$|ab| + |bc| > |ac|$$

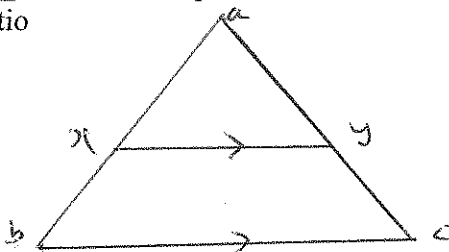


Theorem 11: If 3 parallel lines cut off equal segments of a transversal line then they will cut off equal line segments off any other transversal



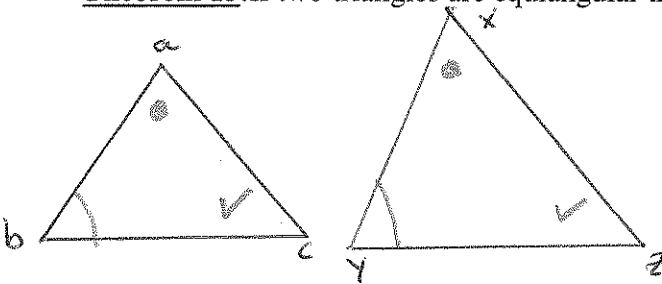
if $|ab| = |bc|$ Then
 $|xy| = |yz|$.

Theorem 12: A line drawn parallel to one side of a triangle divides the other two sides in the same ratio



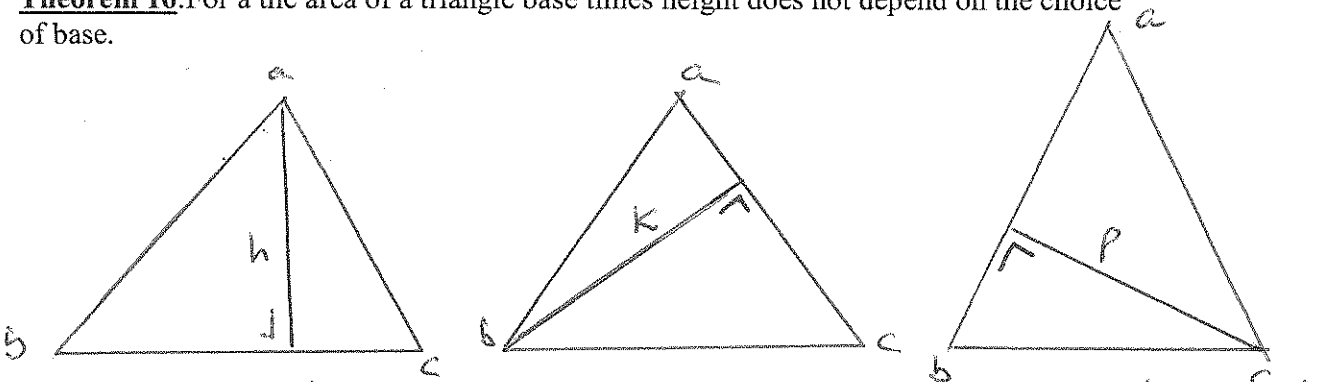
$$\frac{|ax|}{|xb|} = \frac{|ay|}{|yc|}$$

Theorem 13: If two triangles are equiangular their corresponding sides are in proportion.



$$\frac{|ab|}{|xy|} = \frac{|ac|}{|xz|} = \frac{|bc|}{|yz|}$$

Theorem 16: For a the area of a triangle base times height does not depend on the choice of base.

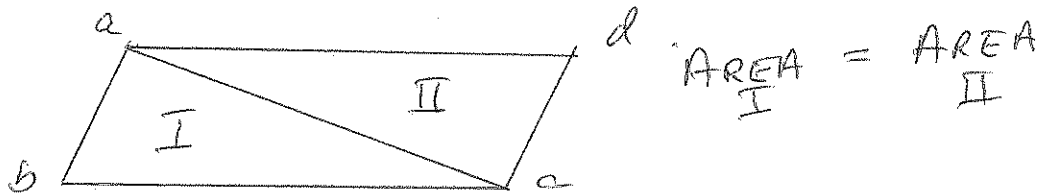


Area of $\Delta abc = \frac{1}{2} |bc| \cdot h$.

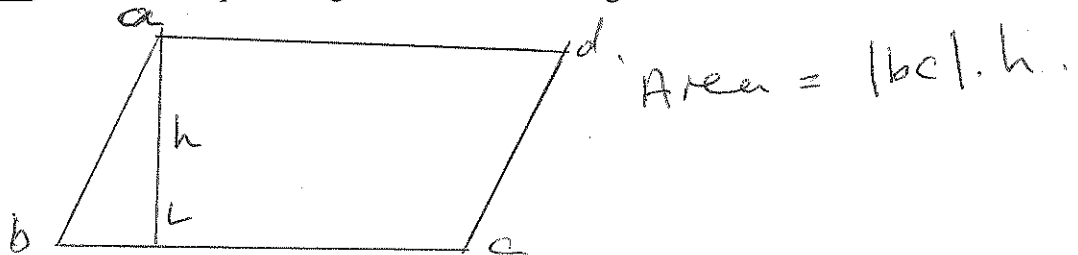
Area of $\Delta abc = \frac{1}{2} |ac| \cdot k$.

Area of $\Delta abc = \frac{1}{2} |ab| \cdot p$.

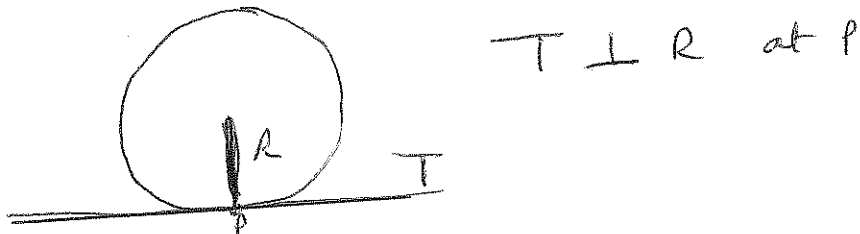
Theorem 17: A diagonal bisects the area of a parallelogram.



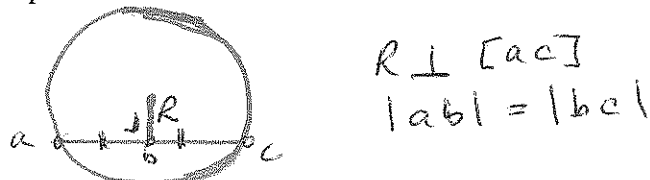
Theorem 18: The area of a parallelogram is base times height.



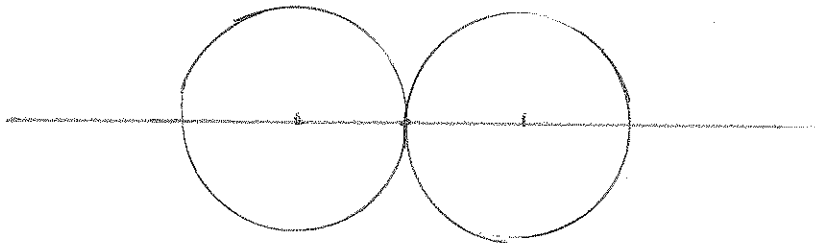
Theorem 20: A tangent is perpendicular to the radius at the point of contact.



Theorem 21: The perpendicular from the centre of a circle bisects the chord.



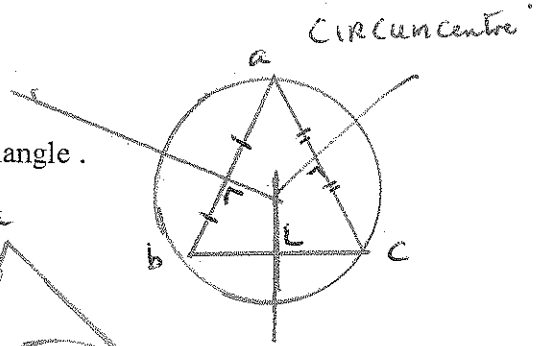
Corollary:6 If two circles intersect at one point (touch) the centres and the point of contact are collinear.



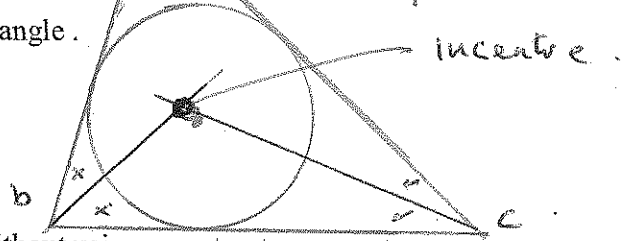
Constructions

You must be able to do the following constructions.

Construction 16: Circumcircle and Circumcentre of a triangle .



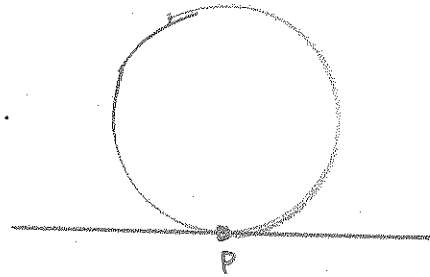
Construction 17: Incentre and incircle of a triangle .



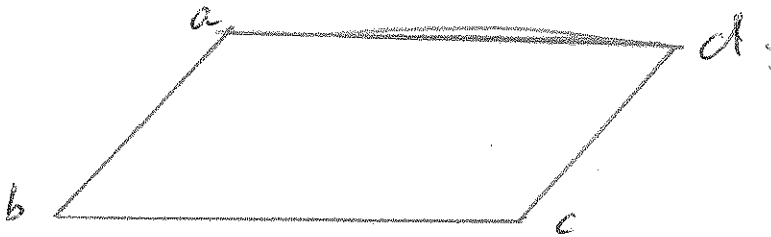
Construction 18: of an angle of 60 degrees without using a protractor or a set square.



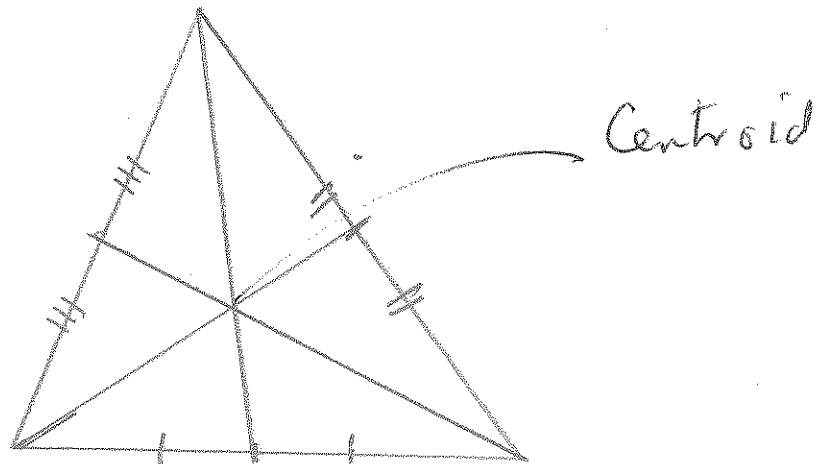
Construction 19: Tangent at a given point on a given circle .



Construction 20: Construction of a parallelogram given the lengths of the sides and the measure of the angles



Construction 21: The centroid of a triangle .



| | Project Maths Ord SEC Sample 1 Official sample set by SEC (the guys who set the real exam) (October 2009) | Project Math Ord (not official) by NCCA and Project Sample 2 (Feb 2010) |
|-------------|--|--|
| Question 1 | Area and volume same as old course. 50 marks | Area and volume same as old course. 50 marks |
| | Section A 125 marks | Section A 125 marks |
| Question 2 | <u>Strand 1</u> Statistics | <u>Strand 1</u> Probability /Statistics |
| Question 3 | <u>Strand 2</u> Geometry (enlargement) same as Q4old course | <u>Strand 2</u> Geometry (enlargement) same as Q4old course |
| Question 4 | <u>Strand 1</u> Probability /Statistics | <u>Strand 1</u> Probability /Statistics |
| Question 5 | <u>Strand 2</u> Coordinate Geometry | <u>Strand 2</u> Coordinate Geometry |
| Question 6 | <u>Strand 2</u> Coordinate Geometry | <u>Strand 2</u> Coordinate Geometry |
| | Section B (125 marks) | Section B (125 marks) |
| Question 7 | <u>Strand 1</u> (40 marks) Probability and Statistics | <u>Strand 1</u> (40 marks) Probability and statistics |
| Question 8 | <u>Strand 2</u> (40 marks) Geometry and Trigonometry | <u>Strand 2</u> (40 marks) Geometry and Trigonometry |
| Question 9A | <u>Strand 1</u> (45 marks) Probability and Statistics | <u>Strand 1</u> (45 marks) Probability and Statistics |
| Question 9B | <u>Strand 2</u> (45 marks) Geometry and Trigonometry | <u>Strand 2</u> (45 marks) Geometry and Trigonometry |