PAPER TWO

Question 1: Area and Volume

The first part of the question will be based on area and applications of Pythagoras. The rest of the question will be based on cones, cylinders and spheres. All the formulae needed are on pages 7 and 8 of the maths tables. If you are asked for an answer in terms of π do not give π a value. If you are asked to give an answer correct to a number of decimal places and the value for π is not given. use the value of π given by your calculator. If you leave out the units you will lose marks.

Question 2: Coordinate geometry of the line

You will be tested on you knowledge of and ability to use the four coordinate geometry formulae. Remember that this question can be asked in two ways

(a) A question based on points which will require you to use the following formulae

$$(i)|ab| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}, (ii) Mid..pt.. \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, (iii) Slope..ab \frac{y_2 - y_1}{x_2 - x_1}$$

$$(iv) equation..ab, y - y_1 = m(x - x_1)$$

(b) A question based on given lines.
You will need to use all of the following .

(i) If (x_1, y_1) is on the line $ax + by + c = 0 \Rightarrow ax_1 + by_1 + c = 0$

(ii)The slope of the line $ax + by + c = 0$ is $\frac{-a}{b}$

(iii)A line cuts the X axis when y = 0.

(iv) A line cuts the Y axis when x = 0.

You may be asked to find the image of a point by an axial symmetry in a line. You will also be asked to draw a diagram (sketch one or two lines) on graph paper.

Questions three and four: Geometry

The Geometry syllabus is as follows:

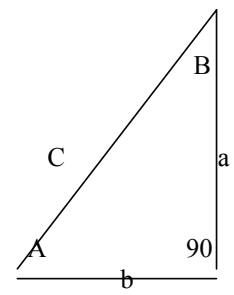
(i) There are ten theorems which must be proved. This means learn them off by heart.
(ii) There are seven theorems which do not have to proved but you must know what they say. These are often examined in part C of the question.
(iii) There are nine facts that you must know. These facts are information based on the properties of angles, congruent triangles and area.
(iv) There are six constructions.

The theorem proofs have been asked in questions two, three and four but the main geometry questions are three and four.

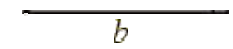
The structure of the geometry questions

Part (a) of the question usually involves finding the measure of an angle or the length of a side of a triangle (there is no formal proof here).
Part (b) will require you to prove a theorem and/or do one of the required constructions.
Remember, the syllabus indicates that they will ask a procedure (a set piece that you have learned) in part (b) of each question.
Part (c) will be a bit more testing. It will usually require knowledge of what the theorems say.

What you need to prove theorems
The theorems proofs involve a series of steps (three marks per step).
Step one: "To prove", stating what you are asked to prove.
Step two: Construction
Steps three to six: Proof.
You must give the reason at each step. There are no marks for writing down what you are "given".
Many students are very worried about the geometry. It can be worth 40 per cent of the marks on paper two but the questions are very fair and often quite short.
A word about the proof of Pythagoras Theorem:
There are many ways to prove this theorem.
(i) The standard proof using similar triangles is quite long. Students find this method difficult.
(ii) The short proof based on the small square inside the big square is perfectly acceptable.
(iii) There is also a very nice proof based on a trapezium. See below.



To prove $a^2 + b^2 = c^2$.
Construct the trapezium below using the given triangle .The angles of the given triangle are
A, B and 90^o
$\Rightarrow A + B + 90^o = 180^\circ$



The area of the trapezium is given by the formula
½ (sum of the lengths of the parallel sides) x perpendicular height.

$$A = \frac{1}{2}(a+b)(a+b) = \frac{1}{2}(a^2 + 2ab + b^2) =$$

$$\frac{1}{2}(a^2 + b^2) + ab \text{ .(i)}$$

The area of the Trapezium is also the sum of the areas of the three triangles

$$A = \frac{1}{2}b.a + \frac{1}{2}c.c + \frac{1}{2}a.b = ab + \frac{1}{2}c^2$$

(ii), Set (i) = (ii) to get
$a^2 + b^2 = c^2$

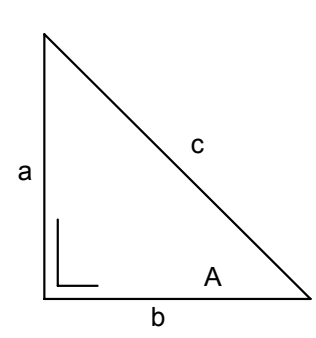
Transformations

A question based on the application of central symmetry, axial symmetry, translations and rotations. Note you cannot use transformations to prove the similar triangles theorem.

Question 5: Trigonometry

All of the following will be examined in the trigonometry question.

(i) To Find the sides and angles of a right-angled triangle using the following:



$$SinA = \frac{a}{c}, CosA = \frac{b}{c}, TanA = \frac{a}{b}$$

$$a^2 + b^2 = c^2$$

(ii) To find the area of a triangle using the formula $A = \frac{1}{2}ab\sin C$.

(iii) To find the sides and angles of a triangle using the sine rule.

$$\frac{SinA}{a} = \frac{SinB}{b} = \frac{SinC}{c}.$$

(iv) To use the unit circle to solve equations of the form:

$$SinA = \frac{-\sqrt{3}}{2} \quad \text{for } 0 \le A \le 360^\circ$$

Question 6: Statistics

This should be the easiest question on the paper and is most students' favourite question.
All of the following topics will be examined.
(i) To construct a pie chart or read the information from a pie chart.
(ii) To find the mean of a set of data.
(iii) To find the mean of a group frequency table.
(iv) To construct a histogram based on a group frequency table which has unequal class intervals.
(v) To find the class interval in which the median lies.
(vi) To construct a cumulative frequency table from a given frequency table.
(vii) To construct an ogive from a cumulative frequency table.
(viii) To use the ogive to find the median and the interquartile range.
(ix) To use the ogive to answer the questions "how much" and "how many".