FORM III

Unit 1

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
1	**More about percentages** *Objectives:* (1) To learn the ideas of such things as direct taxation and percentage changes. (2) To get more practice in the use of percentages.	1.1	Use of percentages in solving problems such as the calculation of rates and direct taxes.	3	This is an extension of Unit 11 in Form II. As students are conversant with the calculation techniques involved, problems on direct taxes such as profits tax, salaries tax, property tax and interest tax should now be investigated. The purpose of taxation should be explained clearly before giving practical problems based upon each type of tax. It should also be pointed out that taxes are charged at different rates, which may be changed from time to time. A copy of the table showing tax on net chargeable income from a demand note will be very helpful. Working through examples such as salaries tax for a married man with two children on a combined annual income of say $90 000 will provide students a lot of practice in the use of percentages.
		1.2	Use of percentages in solving problems such as the calculation of errors, percentage increase and decrease.	5	Percentage increase and decrease are introduced to quantitative changes. Problems may include percentage change in a quantity due to (a) successive changes, (b) changes in component quantities. For examples: (a) In a quotation for a car insurance, percentages of successive changes in premium are given: no claim discount: 60% surcharge of the premium as contribution to the central fund of the Motor Insurers' Bureau of Hong Kong: 1% If the basic premium is $1 000, what will then be the net premium? What percentage of the basic premium is the net premium? (b) Suppose the cost of a desk is calculated as follows: wood – $200, paint and sundries – $100, wages – $200. If the cost of wood is increased by 20% and the wages are increased by 10%, what is the percentage increase of the cost of a desk?

FORM III

Unit 1

Unit No.	Basic Content/Objectives	Detailed Content	Time Ratio	Notes on Teaching
1				In addition to the above topics, students can study percentage error in relation to accuracy of measurement. The two terms "absolute error" and "relative error" need explanation. It should also be pointed out that the precision of a measurement is determined by the absolute error, the accuracy by the relative error.
			8	

FORM III

Unit 2

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
2	**Laws of indices** *Objectives:* (1) To learn the laws of indices. (2) To use the laws of indices in numerical exercises.	2.1	Indices and properties of indices.	3	Simple ideas of exponents are introduced in Unit 14 in Form I. It remains to provide at this stage a proof of the laws of indices where the indices are positive. It should be stressed here that students are expected to be convinced of the validity of the laws for negative and fractional indices. It is hoped that with this foundation students can be led to understand better the basic idea of common logarithms.
		2.2	Calculation involving rational indices.	3	The emphasis of this sub-unit is to reinforce the laws of rational (integral and fractional) indices by giving students some numerical examples. Graded numerical exercises can then be assigned for practice.
				6	

FORM III

Unit 3

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
3	**Common logarithms** *Objectives:* (1) To relate powers of 10 to common logarithms. (2) To practise the use of common logarithms.	3.1	Powers of 10 leading to common logarithms.	4	Students should have had plenty of numerical exercises in Unit 2. By now they should be relating the index of 10 to the common logarithm of a number. For example, $2 \approx 10^{0.30}$, the logarithm of 2 is approximately 0.30. This can be illustrated by referring to the graph of 10^x where x is any positive rational number. Logarithm tables can be used to explain how the logarithm of a number is obtained. Sufficient exercises should be given before proceeding to the next sub-unit.
		3.2	Practice in using common logarithms.	5	Students are expected to compute with common logarithm tables. Very often it is advisable to convert numbers to the standard scientific notation so as to avoid using negative characteristics. For example, to evaluate $\frac{27.2 \times 0.000256}{0.00123}$, students may change it to $\frac{2.72 \times 10 \times 2.56 \times 10^{-4}}{1.23 \times 10^{-3}}$ before using tables.
				9	

FORM III

Unit 4

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
4	**More about congruence. similarity and parallels** *Objective:* To understand the idea of deductive reasoning in geometry and to apply it to numerical problems.		General approach.		These topics have been dealt with separately and this unit is intended to knit them together in exercises whose object is to introduce a formal, yet less rigorous, type of proof. The idea here is to make this as easy for students as possible. Sketch and outline proofs may help students at this stage in order to show exactly what is required in a logical sequence of thought. In order to clarify and make more lucid the thought processes involved, teachers are advised to introduce a system of notations, abbreviations and a generalized layout and presentation of work. This makes for easier marking and enables teachers to follow students' proof more easily. In fact, it should enable students to follow their own proofs more easily, which is the point of the exercise. It is suggested that diagrams should be drawn in pencil, any constructions with dotted line. The given, where possible, marked in ink. Some marks should be placed on the diagram to show each piece of the given. The student then knows when thinking through his proof that he may consider each and every mark. It is recommended to use small letters *x, y, z,* etc. to denote angles in a diagram. In order to differentiate between the positions of equal angles so that they can be easily referred to in the proof; a number suffix can be added to the base of the letter. Reasons should be given for each step but an agreed system of abbreviations should be used so as not to make the work laborious.
		4.1	Congruence.	9	The conditions for congruent triangles are to be reviewed. Application of these conditions on proving problems concerning congruence should be involved.

FORM III

Unit 4

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
4		4.2	Similarity.	5	After learning properties of congruence, students would like to learn the properties of similar figures. Projection of a plane figure on a parallel plane may give a very clear idea on similar figures and useful in demonstration. Then, the conditions for similar triangles may be investigated. Exercise on similar triangles should be given. Riders involving the ratio of areas of similar figures may also be assigned and discussed.
		4.3	Parallels.	9	By now students are quite familiar with parallels and conditions of congruence. Teachers may then give a definition of parallelogram and deduce its properties.
		4.4	Mid-point theorem and intercept theorem.	6	The mid-point theorem is undoubtedly a very useful theorem in plane geometry. Teachers should derive the theorem from previous theorems and properties. Reasons should be given for each step. The intercept theorem concerning three or more parallel lines should be stated and proved. The special case of the theorem within a triangle should also be discussed. Exercises relating to mid-point theorem and intercept theorem should be given. It is stressed that students should have reason for making every statement or calculation.
				29	

FORM III

Unit 5

Unit No.	Basic Content/Objectives	Detailed Content	Time Ratio	Notes on Teaching
5	**Coordinate geometry of straight lines** *Objectives:* (1) To learn that an equation of the first degree represents a straight line. (2) To learn to write the equation of a straight line in standard forms. (3) To reinforce the ideas of slope and intercept. (4) To learn how to deduce a linear law from empirical data.	5.1 Section formula (internal division): $x = \frac{sx_1 + rx_2}{r+s}$ $y = \frac{sy_1 + ry_2}{r+s}$	3	Given a ratio $r : s$ where r and s are positive integers students should work from similar triangles to obtain the point of division of a given line segment. After practice, the section formula can be derived. Then exercises relating to this formula may be given. At this stage, r and s should be confined to positive rational numbers. The mid-point formula $x = \frac{1}{2}(x_1 + x_2)$, $y = \frac{1}{2}(y_1 + y_2)$ may be regarded as a particular case of the section formula. Applications such as finding the centroid of a given triangle may be mentioned.
		5.2 Different standard forms of straight lines. $ax + by + c = 0$	9	Whatever approach is used, whether it be through loci or sets, the underlying principle that should be emphasized is that every point on the line obeys a certain condition. This idea can be introduced by considering lines parallel to the x- and y-axes. Firstly, it should be emphasized that all points on the x-axis have a y-coordinate whose value is zero and that $y = 0$ (where x is any value) is the condition that describes this and only this line and hence is called the equation of the line. This idea can be extended to lines parallel to the x-axis, such as $y = 2$, $y = 3$ and $y = 1\frac{1}{2}$. The same sort of thing can be repeated using lines parallel to the y-axis. Consider a line in the first quadrant that passes through the origin, e.g. $\frac{y}{x} = \frac{3}{2}$. It may be shown that, whatever point we take on the line, $\frac{y}{x}$ is always the ratio $\frac{3}{2}$, and that a point above the line would give a greater ratio, whilst a point below a smaller ratio. What happens when the line is "extended back" through the origin into the third quadrant? As soon as students realize that the same ratio applies and that $\frac{y}{x}$ still equals $\frac{3}{2}$, other examples should be taken including the case of a line, through the origin, but in the second and fourth quadrants. When students are sure that a line through the origin is

FORM III

Unit 5

Unit No.	Basic Content/Objectives	Detailed Content	Time Ratio	Notes on Teaching
5				either of the form $3x = 2y$ or $3x = -2y$ then the generalized form $ax + by = 0$ can be introduced. Can we generalize this further? Consider the two graphs $2x + 3y = 0$ and $2x + 3y + 7 = 0$. Students should plot these on the same piece of graph paper. All types of examples of pairs like this should be plotted. It should not take students long to discover that $ax + by + c = 0$ is a line parallel to $ax + by = 0$. What intercept does it make on the y-axis?
		$y = mx + c$		The students should by now realize that any line through the origin is $y = mx$ and that the y-coordinate of a point on the line measures mx. It can again be emphasized that a point whose y-coordinate is greater than mx is above the line, and a point whose y-coordinate measures less than mx lies below the line. In particular, points with y-coordinates that measure $mx + c$ lie at a vertical distance c above (or below) the line $y = mx$ and form a line parallel to it. This is really another way of looking at the underlying principle: the ordered number pair or coordinates of any point on the line are connected by a law. And points not on the line do not obey that law. The idea of points on a line satisfying the equation of the line can now be introduced.
		$\frac{x}{a} + \frac{y}{b} = 1$		Students should be shown the equivalence of $ax + by = 0$ and $y = mx$ and that m is the slope of the line. From the above work it should be also clear that c is the intercept cut off on the y-axis. Rapid practice examples, both oral and written, to determine slope and intercept should now be given. As this is an equation of the first degree it can be put into the form $y = mx + c$ which represents a straight line. Where does it cut the axes? Put $x = 0$ and $y = 0$ to find the intercepts. The points $(a, 0)$ and $(0, b)$ are on the axes and determine the line. Rapid practice in determining the intercepts, given the line, and vice versa, should now be given.

FORM III

Unit 5

Unit No.	Basic Content/Objectives	Detailed Content	Time Ratio	Notes on Teaching
5		$y - y_1 = m(x - x_1)$		It may be shown that the slope of this line (equation of the first degree) is $m = \frac{y - y_1}{x - x_1}$ where (x_1, y_1) is a fixed point on the line and (x, y) is variable point. This form can also be compared with the form $y = mx + c$. Practice should be given in writing down the equation given the slope and the fixed point.
		$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$		If (x_2, y_2) is another fixed point (two points determine the line) then the slope m in the above form is $\frac{y_2 - y_1}{x_2 - x_1}$ which gives the required equation. Practice in writing down the equation of the line should now be given. Mixed sets of examples should now be given to include all the various forms. Intercepts and slopes should be written down given the equation and vice versa.
		5.3 Application: determination of laws.		When pairs of corresponding values of two quantities which obey (or are thought to obey) a linear law $y = mx + c$ are given, perhaps as experimental results, it is possible to test the conjecture by plotting these pairs of values. If the plotted points lie approximately on a straight line, then the students are justified in concluding that the law holds. The graph of the equation is taken to be the straight line drawn as evenly as possible between the plotted points. Discrepancies between the line and some of the points may be considered to be due to experimental errors. The constant m, that is the gradient of the line, can be found from any two points on the line, which may not necessarily be points given by the experimental results. The value of c can be found by reading the intercept on the y-axis. Alternatively, the constants m and c may be found by substituting the values of x and y at any two points on the line and solving the resulting simultaneous equations for m and c.

FORM III

Unit 5

Unit No.	Basic Content/Objectives	Detailed Content	Time Ratio	Notes on Teaching
5				By suitable transformations, the same principle may be applied to test some non-linear laws such as $y = mx^2 + c$; $y = m\sqrt{x} + c$; $y = \frac{m}{x} + c$, etc.
			16	

FORM III

Unit 6

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
6	**Mensuration** *Objectives:* (1) To discover the relationship between the volume of a pyramid and that of a cube. (2) To learn the relationship between the volume of a cone and that of a pyramid. (3) To gain more practice in calculating volumes and surface areas of pyramids, cones and spheres. (4) To discover the relationship among volumes of similar solids.	6.1	Volumes and surface areas of pyramids.	4	The volume of a pyramid can be illustrated by showing how the cube can be divided into six congruent square-based pyramids. Teachers may induce students using a skeleton cube to discover this relationship. Students should then be led to realize that the surface area of a pyramid formed in this way is really a sum of areas of four congruent triangles and the square base. As an activity, students may try to make skeleton pyramids using plasticine and toothpicks or build up pyramids with paper and scissors. From this the volume of any pyramid can be deduced. Graded exercises should be given for practice.
		6.2	Volumes and surface areas of right circular cones.	4	A circle is the limit of a sequence of regular polygons. Similarly a cone may be considered as the limit of a sequence of pyramids. Students may be led to think of a cone as a pyramid with a circular base. This can be illustrated by a series of sketches or a set of polystyrene models. A right circular cone can be formed by rotating a right-angled triangle about one of its shorter sides. Teachers should also encourage students to make cones with paper and verify the volume formula by filling the cones with sand. The area of its curved surface can be shown equal to the area of a sector of a circle. This can be illustrated by cutting along the slant height of a cone and unfolding it.
		6.3	Volumes and surface areas of spheres with formulae given.	3	This is essentially an extension of the above sub-units. With the formulae given, students can solve many problems such as calculating the volume and surface area of a football or basketball. Students may verify the volume formula of a sphere by water displacement or by filling in a hollow sphere with sand.

FORM III

Unit 6

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
6		6.4	Ratio of volumes of similar solids.	4	By this time, students should be quite familiar with the idea of similar plane figures. Teachers may then extend the idea intuitively to similar solids. At this stage, it would be desirable to restrict only to similar regular solids such as cuboids, spheres, and cones etc. The relation between the ratio of the volumes of similar solids and the ratio of their corresponding linear measurements can firstly be demonstrated through practical measurement. Students may then be led to prove the relation for some particular cases.
				15	

FORM III

Unit 7

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
7	**Inequalities in algebra** *Objectives:* (1) To learn the simple laws of inequality. (2) To acquire the techniques of solving linear inequalities.	7.1	Simple inequality and its solution on the number line.	6	As an extension of the unit on "simple idea of ordering", some simple algebraic inequalities can now be considered. The point to emphasize here is the fact that for any two numbers a and b, one of the following statements must be true: $a = b$, $a > b$ or $a < b$ (the law of trichotomy). Before we consider the solution of a linear inequality, it is essential to demonstrate certain basic properties through examples. For $x \geq y$, we have $x + c \geq y + c$, $cx \geq cy$ ($c > 0$) and $cx \leq cy$ ($c < 0$). Students should realize that the law of transposing terms for equalities is also true for inequalities but when an inequality is multiplied by a negative number, the inequality sign should be reversed. The idea of open sentence in inequality can then be considered. The solutions of linear inequalities in one unknown such as $ax + b > 0$ usually can be effectively represented on a number line with the use of coloured chalk. Teachers may also consider mentioning the terms "open interval" and "closed interval", though this is not necessary at this stage.
		7.2	Graphical solution of two linear inequalities in one variable.	6	For $b \leq a$, students should be able to combine $x \geq b$ and $x \leq a$ graphically and to write $b \leq x \leq a$. Care must be taken when the inequalities such as $x > a$ and $x < b$ are considered. Students should be able to state immediately that there is no value of x which can satisfy both inequalities simultaneously, rather than to graph the two inequalities and to think that the solution consists of two intervals.
				12	

FORM III

Unit 8

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
8	**Quadratic equations** *Objectives:* (1) To learn to factorize quadratic polynomials. (2) To learn to solve quadratic equations by factorization and by graphical method. (3) To learn to construct a quadratic equation when its roots are given as a reverse process.	8.1	Factorization of quadratic polynomials.	7	Methods of monomial factorization and grouping terms may be revised. Students are then given examples in using identities such as $x^2 \pm 2xy + y^2 = (x \pm y)^2$ and $x^2 - y^2 = (x - y)(x + y)$ for factorization purpose. For quadratic polynomials $ax^2 + bx + c$ where a, b and c are integers, such as $2x^2 - 5x - 3$, the following way may be introduced. $2x^2 - 5x - 3 = (2x + 1)(x - 3)$ $\begin{array}{ccc} 2 & \times & +1 \\ 1 & & -3 \\ \hline & 1 + (-6) = -5 & \end{array}$ It is advisable for teachers to first consider polynomials of the type $x^2 + bx + c$, i.e. the special case in which $a = 1$, and afterwards polynomials of the type $ax^2 + bx + c$. After sufficient practice, students may be encouraged to write down the factors immediately by inspection.
		8.2	Solution by factor method.	5	As an introduction, teachers may find it profitable to explain the difference between a linear equation, such as $3x - 12 = 0$, and a quadratic equation such as $x^2 - 3x + 2 = 0$. It soon becomes evident that there are 2 values of x, i.e. 1 or 2 to make the open sentence $(x - 2)(x - 1) = 0$ a true statement, and expressed in another way the equation $x^2 - 3x + 2 = 0$ has 2 solutions, called the roots. After some worked examples, teachers may point out that for 2 numbers a and b, if $ab = 0$ then either a or b must be 0. The technique used here is the factor method. While the coefficients in the quadratic equations must necessarily be simple to facilitate the factorization process, students should be made aware that not all quadratic equations can be solved this way and other techniques will be needed to treat equations like $x^2 - 3x + 5 = 0$.

FORM III

Unit 8

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
8					The sort of practical problems considered should be so chosen that they introduce the various pieces of manipulation which the class has to master. Care must be taken to ensure that the meaning of x be clearly stated before writing down an equation in x. Experience shows that when setting the class a problem exercise, it is usually profitable to spend some time discussing the questions beforehand, e.g. "What shall be taken for the unknown?" "What relation can be derived between the known quantities and the unknown?" etc. To illustrate the reverse process, teachers may draw a diagram as follows: Solving an equation to obtain roots → $x^2-3x+2=0$ → $(x-2)(x-1)=0$ → $x = 2$ or 1 → Making an equation with given roots
		8.3	Solution by graphical method.	7	By drawing the graph of $y=ax^2+bx+c$ and reading the x-intercept(s), if any, it is possible to obtain approximate values of the roots of the quadratic equation . Alternatively solutions may also be obtained by drawing the graphs of $y=x^2$ and $y=-\left(\frac{bx+c}{a}\right)$. Difficult cases where there are no real solutions can be shown vividly on the graph and readily understood by the students.
				19	

FORM III

Unit 9

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
9	**Simple idea of probability** *Objectives:* (1) To understand the meaning of "chance" and to appreciate its use. (2) To learn the difference between theoretical and empirical probabilities.	9.1	Meaning of probability.	4	An alternative word for probability is "chance" and it is always represented by a number p ($0 \le p \le 1$). This can be immediately understood by referring to realistic situations, for instance, the chance of throwing a six with a die, and so on. For combining probabilities, students can consider examples which are related to their daily experience. A student, for instance, knows that he has a 50-50 chance (Le. the probability is $\frac{1}{2}$) of getting a ticket with an even number. Then a very natural question to ask is whether he knows the chance of getting another even numbered ticket next time. For abler students, such questions may take the form "What is the chance that the last 2 digits in the number on the ticket have even numbers?". After enough practice, classical examples on drawing balls out of a bag without replacing them and so on may be considered. The teacher may also discuss the chance of choosing 2 winners from 2 races, 3 races, and so on. However, it must be emphasized that if the idea of betting is brought up in class discussion, then the social significance and the ultimate outcome of losing one's money, rather than making a gain, should also be mentioned, the aim being to provide students with a certain amount of "equipment" as a means of protection.
		9.2	Experimental probability and theoretical probability.	4	Experiment here is to confirm the theoretical probability and students should note that most of the probabilities they come across in life such as the accident rate and the crime rate are empirical probabilities.
				8	

FORM III

Unit 10

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
10	**Using trigonometry** *Objectives:* (1) To learn some applications of trigonometry. (2) To understand some simple methods of measuring inaccessible distances. (3) To learn the methods of locating a point on a plane. (4) To learn the techniques of resolving into right angled triangles.	10.1	The use of gradients, angle of depression and angle of elevation.	4	Students should be led to understand that "gradient" is only a measure of the rising and falling of a straight line. This may be taught together with straight line equations. Many possible kinds of teaching aid can be constructed to measure the angle of depression and elevation, e.g. the clinometers. If possible some outdoor activities may be arranged to arouse interest. Throughout the unit we may come across many calculations. The use of calculators is desirable.
		10.2	Bearings on a plane.	4	The two different kinds of bearings such as 008° and N35°E are introduced. It may be much more interesting if each student is required to bring a compass to school so that problems involving bearings can be tackled in a practical manner.
		10.3	Two-dimensional problems soluble by analysis into right angled triangles.	6	The success of this sub-unit depends mostly upon the teachers' analysis and the clarity of diagrams. Teachers usually find coloured chalk very helpful. A good knowledge in geometry as well as trigonometry should be the prerequisite. Hence frequent revision of geometric and trigonometric properties during problem solving is essential.
				14	

FORM III

Unit 11

Unit No.	Basic Content/Objectives	Detailed Content		Time Ratio	Notes on Teaching
11	**Measures of central tendency** *Objectives:* (1) To understand the meaning and significance of the central tendency of a distribution. (2) To learn some simple ways of measuring the central tendency. (3) To draw conclusions from these measures. (4) To apply these measures in daily life.	11.1	Mean, median and mode of discrete data.	8	The idea of average may be introduced by quoting several daily examples. This is one of the most commonly used measures of the "centre" of a distribution. Data from daily life should be given to students. They may be asked to locate the centre using whatever methods they like. Discussions on the different ways of finding the measure of the centre should be conducted before the formal definition of the arithmetic mean is given. The advantages of using the mean should also be emphasized. For an approximately symmetric set of data such as 13, 14, 15, 17, 18.5 the .mean 15.5 gives the centre very effectively. Suppose that the salaries (in $) of a certain company are as follows: 1000, 2000, 3000, 3500, 4500, 5000, 30000. The mean is 7000 which is not a good measure of the centre. But the median is 3500 which is found to be more satisfactory. Any extreme salaries do not cause the median to fluctuate much. The differences between the choices of the mean and the median should be clearly analysed. Examples to indicate the correct use of median should be provided for practice. Usually when a quick and approximate measure of the centre is needed, we take the mode. When we describe the style of dress or shoes worn by the "average woman", we mean the mode (most popular fashion). Daily examples should be provided for the demonstration of this idea. The understanding of the significance of the mean, median and mode is far more important than mathematical proof at this stage.
		11.2	Mean, median and modal class of grouped data.	5	It should be pointed out here that for a large set of data, it may be very difficult to calculate the mean. This leads to the idea of grouping the data first. The mean, thus obtained, is subject to the way of grouping and is only an approximation. This point should be emphasized.

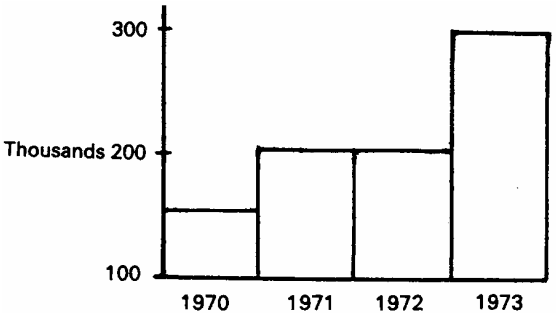
FORM III

Unit 11

Unit No.	Basic Content/Objectives	Detailed Content	Time Ratio	Notes on Teaching
11				The method of "assumed mean" is useful in reducing the burden of numerical calculation. For finding the median, it is also necessary to classify the data when the quantity is large. Why is a reasonable mid-value of a set of numbers, arranged in order of magnitude, obtained by dividing the histogram into two parts of equal areas? This is the underlying principle of making use of the histogram. It may be clarified by simple examples. No formal proof is required. Another graphical method of finding the median is to draw a cumulative frequency polygon. It should be very interesting to compare the results obtained by both methods for a distribution and also compare the underlying principles in both methods. Colourful graphs may be very helpful in the teaching of these topics. For a large set of data, it is cumbersome to arrange it in order of magnitude. Usually we group the data in intervals. A discussion of the modal class, the interval with the highest frequency, may lead to a rough estimate of the mode.
			13	

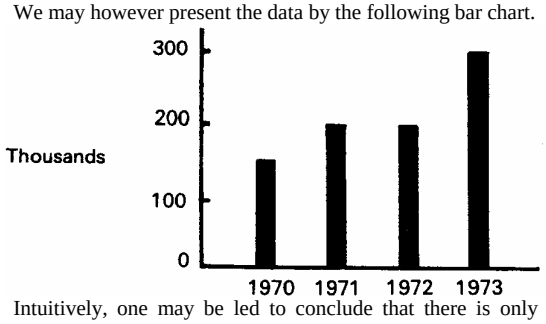
FORM III

Unit 12

Unit No.	Basic Content/Objectives	Detailed Content	Time Ratio	Notes on Teaching
12	**Uses and abuses of statistics** *Objectives:* (1) To understand how statistics is used in daily life. (2) To see the dangers of misinterpreting statistical data. (3) To understand the actual reasons why statistical data are so presented.	12.1 Statistics in everyday life.	3	This sub-unit may be treated both as a general revision of statistics and as a vehicle for further examples. Teachers should prepare examples that are used in daily life as teaching aids. If time allows, students should be asked to collect or construct statistical graphs that serve a particular purpose.
		12.2 Misrepresentation of data.	5	Different ways of representing the same set of statistical data may give quite different impressions. Emphasis should be laid upon how some data are deliberately misrepresented to encourage a wrong conclusion. The following gives one example. A certain egg farmer presents his annual production report up to 1973. 

FORM III

Unit 12

Unit No.	Basic Content/Objectives	Detailed Content	Time Ratio	Notes on Teaching
12				Looking at the proportions of the areas, one may have the feeling that the egg production in 1973 is twice as much as in 1972 and four times as much as in 1970. In fact, it is not. We may however present the data by the following bar chart.  Intuitively, one may be led to conclude that there is only a slight progress in egg production. The teacher should give a complete analysis of the techniques used. Teachers will find that in this work overhead projectors are extremely useful.
		12.3 Telling lies with averages.	3	Throughout this unit, examples and discussions are the essential features. There are three different kinds of averages: the mean, the median and the mode. Each of these measures should be discussed. Attention should be paid to examples from daily life. The following gives one possible example on the "overworked" mean.

FORM III

Unit 12

Unit No.	Basic Content/Objectives	Detailed Content	Time Ratio	Notes on Teaching
12				A certain firm selling products A. B, C, D, E, at \$10, \$20, \$30, \$40 and \$100 respectively, wishes to raise the prices. Due to inflation, it is commonly accepted as reasonable to raise the selling price by 10%. The owner of the firm claims that the average selling price of his goods is still \$40 after inflation has increased his prices. This gives the impression that it is cheaper to buy in his firm. But the actual fact is as follows: Before Inflation A B C D E \$10 \$20 \$30 \$40 \$100 Average = $\frac{10+20+30+40+100}{5} = 40(\$)$ The firm increases the prices due to "inflation" (by far more than the acceptable 10%) A B C D E \$25 \$35 \$45 \$55 out of stock Average = $\frac{25+35+45+55}{4} = 40(\$)$
			11	
		Total :	160	