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# **Mathematical Drawing Instruments and How to Use Them**

**Hulme Frederick Edward**

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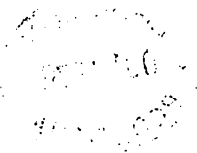
**Title: Mathematical Drawing Instruments and How to Use Them**

**Author: Hulme Frederick Edward**

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MATHEMATICAL  
DRAWING INSTRUMENTS,

AND

*HOW TO USE THEM.*

BY

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"Drawing is the A B C of the architect, engineer, and surveyor."  
SIR ISAMBARD BRUNEL.

"Drawing supplies us with a power whereby long descriptions and  
pages of writing are at once superseded, and thus it is a condensed  
shorthand as well as a universal language."

R. REDGRAVE, R.A.



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## INTRODUCTION.

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THE use of mathematical instruments enters so largely into various kinds of technical drawing, that some few suggestions as to their employment cannot but be of service to many who find themselves for the first time in their lives the possessors of a box of drawing instruments, and who therefore have all their experience yet to learn. Having for many years been engaged in teaching the use of such things, and thereby become acquainted with the difficulties of the novice, we would desire to give all such the benefit of our own experience, and to smooth their path before them as far as may be possible.

The student who provides his own things is at once met on the very threshold by a difficulty—the choice of a suitable box of instruments. He sees in the shop-windows a card of things marked “one shilling the set;” and, on the other

hand, in consulting the catalogue of a first-class maker, he finds that even twenty guineas would not buy some of the sets enumerated with such tempting richness of detail. Somewhere between these extremes is the very thing he wants, but where the happy mean may be is a mystery to him.

It will be noticed that we assign the true position of the hoped-for box somewhere between the extremes; for we would at once hasten to say that few things are so dear as cheap instruments. The legitimate difficulties of drawing with instruments are sufficiently great to the beginner without complicating them by the introduction of pens that will not mark, screws that will not turn, and all the other troubles that assail any one rash enough to buy things at a price that absolutely forbids good workmanship. On the other hand, even where the pecuniary question raises no bar to considerable expenditure, it is rather a mistake for the novice to get an expensive box; he had far better get one with fewer instruments, and learn thoroughly what can be done with those, before getting what may be considered to some extent luxuries, and the preliminary failures will have been got through at the risk of damaging instruments of comparatively small cost. When the student has passed through his novitiate, has learned to take care of his things, and has, moreover, learned the real nature of the work he has to do, and what means

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will most effectually do it, he can then go in for a more complete set of implements.

For a beginner, an expenditure of three or four pounds should give him all that is needful to make a very effective start: this should include a board, T square, &c.; and even half this might in many cases be found sufficient. The surest way of getting value for the money is to go at once to some good maker; his charges will probably seem somewhat high, but it must be remembered that he got his reputation by the production of good things, and that his name will be a sufficient warranty. The novice should beware of second-hand cases, as they are often considerably worn, while at other times the name veils a fraud: it is merely an attempt to pass off some worthless things that have never had a previous owner at all. It is always safer, too, to buy a set that has the maker's name stamped somewhere, either on the box or on some of the instruments.

It must be borne in mind, in calculating expense, that when the draughtsman has once got a sufficient knowledge of how to treat his instruments to justify him in getting a good set the expense comes once for all: unlike the daily bread-and-butter, an ever-recurring charge, a good box of instruments is a possession for life. The instruments we ourselves use we have had now some twenty years, and there is no reasonable



room to doubt that another twenty years may pass over them and find them less affected by the ravages of time than their owner.

It is impossible to define very exactly the box that should be procured; but no set should be considered sufficient that does not contain compasses suitable for either pen or pencil work, a ruling-pen, and a scale. In most boxes two sizes of compasses are found, one suitable for small and the other for large circles. The material of which the instruments are made is another item adding more or less to the cost; and even the nature of the case—walnut, mahogany, Russia leather, and whatever it may be — influences the total expenditure.

Where it is possible to avail oneself of the advice of an experienced friend, it is clearly a great gain to do so; or where a beginner is going to pass into some definite position, as the engineer's office of some great railway, or the training at the Royal Military College at Woolwich, he should endeavour to ascertain if any particular set of instruments receives a more especial and official sanction and approval than others, when he will do well to get it. Assuming, however, that neither of these solutions of the problem can be rendered available, that neither the aid of a friend can be invoked nor the experience of any special office utilised, our

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student will do well, as we have already said, to place himself in the hands of a respectable firm, and what they will probably give him we now proceed to analyse, instrument by instrument, pointing out its method of use, how it can be most effectively employed, together with any other little details gathered during a long experience, that may be helpful to those making their first steps in a new direction.



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