AN EXAMPLE IN GEOMETRICAL ANALYSIS.¹

BY PROFESSOR J. T. CRAWFORD,

Ontario College of Education, University of Toronto.

When an original exercise in geometry is to be solved, the most powerful weapon at the command of the pupil is analysis. It often happens that an exercise can be analysed in a variety of ways and it is interesting to examine if each of these methods of analysis will lead to a solution of the problem. Take the following as an illustration.

In the triangle ABC (fig. 1), the side AC is twice the side AB ; show that the angle B is greater than twice the angle C .

We are here required to prove an inequality—that one angle is greater than twice another angle. Now there is no theorem that does this directly, so we must vary the conclusion required to make it conform to one theorem already proven. This may be done in a number of ways.

(1) Use the fact that the exterior vertical angle of an isosceles triangle is double either base angle. Bisect AC (fig. 1) at D and draw DE perpendicular to AC meeting BC at E . Now angle AEB is twice angle C . If we can now prove angle B greater than angle AEB , or AE greater than AB , the conclusion required will follow. Can this be done?

(2) If we double the angle C (fig. 2) by making angle BCF equal to angle C , we must prove that angle BFC is greater than angle C , or BC greater than BF . Can this be done?

(3) If we double the angle C (fig. 3) by making angle ACG equal to angle C , we must now prove angle B greater than angle BCG , or CG greater than BG . Can this be done?

(4) From angle B (fig. 4) cut off angle ABH equal to angle C . Can we now prove that angle HBC is greater than angle C ?

¹Reprinted by permission from *The School*, Toronto, Canada.

WHY 5428 schools throughout the country and numerous schools in China, Japan, India, Palestine, Egypt, Chile, Cuba, Porto Rico, Alaska, Hawaii and the Philippine Islands are now using

MILLIKAN AND GALE'S PRACTICAL PHYSICS

It is well-organized, simple, teachable.
It emphasizes basic principles.
It makes practical applications.
It has unusually fine illustrative material.
It is up-to-the-minute.

GINN AND COMPANY

BOSTON NEW YORK CHICAGO LONDON
ATLANTA DALLAS COLUMBUS SAN FRANCISCO

CORRECT ENGLISH

How to use it

JOSEPHINE TURCK BAKER, Editor

A Monthly Magazine

\$2.50 THE YEAR

Send 10 Cents for Sample Copy

Correct English Publishing Co.
EVANSTON, ILLINOIS

SARGENT'S HANDBOOKS

AMERICAN PRIVATE SCHOOLS

8th Edition, 1922-1923, 896 pages;
round corners, crimson silk cloth,
gold stamped, \$4.00

A Guide Book for Parents

A Compendium for Educators

Annual Review of Educational Lit-
erature and Events.

NEW ENGLAND

3d Edition, carefully revised through-
out, 8 vo., 928 pages, 4 maps in
5 colors, 25 other maps and plans,
52 illustrations. Full leather, \$5.00.
Silk cloth, \$4.00.

All the Principal Motor Routes
are clearly shown. Every town
and city in New England of im-
portance is described. The history
and present-day activities are given
in detail.

It is the Only Book That Treats
New England as a Whole.

PORTER SARGENT

14 BEACON STREET BOSTON

YOUR OPPORTUNITY!!

Advancement offered in all types
of educational positions.

Our highly specialized service is
fashioned for your promotion.
Personal interest in each member
a keynote.

Surely, this is the agency you are
looking for.

A. P. GODDARD The coupon mailed today will bring
PRESIDENT you a "Free List of Vacancies"

EDUCATORS-AGENCY

19 SOUTH LA SALLE STREET

ROOM 1401 Y. M. C. A. BLDG. CHICAGO, ILLINOIS

NAME

ST. & NO.

CITY STATE

Please mention School Science and Mathematics when answering Advertisements.

(5) If we make such a change that angle B (fig. 5) becomes an exterior angle of a triangle in which angle C is an interior angle, we could then express the angle B in terms of angle C . With the centre A and radius AB describe a circle cutting BC at K . We must now prove angle KAC greater than angle C . Can this be done?

(6) Draw BL (fig. 6) to bisect angle B . Can we now prove that angle LBC is greater than angle C ?

(7) Make angle CBM (fig. 7) equal to angle C . Can we now prove angle ABM greater than angle C ? What is the conclusion when angle ABC is a right angle; when it is an obtuse angle?

(8) Can we prove it trigonometrically by showing that $\sin B$ is greater than $\sin 2C$?

These are not all the possible methods of attack, but they are sufficient to show that the pupil who is not successful with the first method he has tried should not therefore assume that he cannot solve the exercise.

Note concerning the preceding article on geometrical analysis. If any teacher wishes reprints of this article for use in their classes, such reprints may be obtained from the publishers at the rate of \$1.50 per 100, or 80 cents for 50, postpaid. See also problem 760 in the Problem Department.

THE NEW CHAIRMAN OF THE DEPARTMENT OF GEOLOGY AT THE UNIVERSITY OF CHICAGO

Dr. Edson Sunderland Bastin, Professor of Economic Geology in the University of Chicago, has been made Chairman of the Department to succeed the late head, Dean Rollin D. Salisbury, according to a recent announcement of the Board of Trustees. Professor Bastin, who for fifteen years was geologist in the United States Geological Survey and was recently chief of the Division of Mineral Resources, received both his Master's and Doctor's degrees at the University of Chicago. He has done special work for the government in Maine and the western mining districts, made an examination of copper properties in Chile, and is the author of numerous scientific reports published by the United States Geological Survey.

It is a matter of special interest that Professor Bastin's father was a professor in the Old University of Chicago.