

show, the Oregon ground hog, cherry-colored cat and a fish pond are a few of the features. Music will be furnished by the Ginger City band and a male quartet.

Members and Friends of the Allen & Lewis Company will assemble at the Clark ballroom, Friday evening, February 11, for an evening of entertainment and dancing. This will be a "get-together" party for the employees.

Ionic Court, No. 1, Order of the Amaranth, will give a card party and social at the Nassau Temple at 5 o'clock Saturday night, February 12, to which all Eastern Star members and their friends are invited. Several prizes will be given.

Albina Homestead held a sewing day Friday afternoon at the home of Mrs. Marksen, 427 Skidmore street. Following the sewing a social hour was passed and refreshments served.

Members of the Myrtle Rose Dancing Club are planning an extensive party at Christensen's Hall Wednesday night. The annual masquerade ball will be held February 5.

WEDDINGS.

Raser-Miller.

A surprise to their many friends was the marriage of William Raser and Miss Margaret Miller, both popular young people of this city, Saturday, January 29, at the bride's home on Fremont street. Mr. Raser, a resident of Portland for many years, and an active member of the Oregon Yacht Club and Portland Rowing Club, has a large circle of friends.

After the wedding, supper was served and later the bridal party assembled at the Clark ballroom for dancing and entertainment.

Mr. and Mrs. Raser are at home to their friends at Godfrey Court on the East Side. The bride and groom were attended by Mr. and Mrs. Kenneth Van Scoy, Rev. S. William reading the ceremony.

Walker-Vinton.

Miss Lottie A. Vinton and William M. Walker were married Thursday, January 29, at the home of the bride's mother, Mrs. M. E. Vinton, 1133 Vancouver avenue, Rev. Mr. Fessenden officiating. Only the immediate family and a few friends were present. The bride was charming in a gown of ivory satin and lace.

A wedding supper with covers for 16 followed the ceremony, after which a large reception was given.

Mr. and Mrs. Walker left Friday for their wedding trip. The bride's going-away suit was a chic black velvet with small black hat to correspond.

ANNOUNCEMENTS.

Mrs. R. J. Buchanan, of 5910 Forty-first avenue Southeast, announces the engagement of her daughter, Miss Matildel Scoville, to John Lathaniel McHargue, of Condon, Or.

Coming as a genuine surprise to her many friends in Portland is the announcement of the engagement of Miss Mabelle Koonits and Norman Entler, a young attorney of San Francisco. Miss Koonits is now residing in Los Angeles. The wedding will be an event of early Spring.

SOCIETY PERSONALS.

Mr. and Mrs. Carlos Unna have moved to 266 North Twenty-fifth street, Bruce apartments.

Mr. and Mrs. E. W. Rumble have moved from the Multnomah Hotel to the Hotel Malheur.

Alfred T. Bonney is in New York at Hotel Astor, attending the convention of the Metropolitan Life Insurance Company. He will return soon after February 1.

Congratulations are being showered upon Mr. and Mrs. George Gerald Root, whose home was gladdened by the arrival of a son, Mr. James L. Root.

The little fellow will be called Donald Cromwell Root.

Among those attending the Kappa Sigma Nu formal at Corvallis this week-end are the Misses Inez Radell,

TRIO OF THE PATRONESSES FOR SCOUT YOUNG AUXILIARY VALENTINE DANCE.



The Valentine dance to be given at Christensen's Hall February 13, by the Auxiliary of the Spanish War Veterans, will be a huge success, judging from the elaborate arrangements being made. The committee met yesterday at their rooms at the Courthouse and at the end of the session invited the

of Portland, and Gretchen Harlein, of Hood River. They will be entertained at the Alpha Chi Omega House, 1133 Vancouver avenue, Rev. Mr. Fessenden officiating. Only the immediate family and a few friends were present. The bride was charming in a gown of ivory satin and lace.

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SCIENCE OF MATHEMATICS TRACED TO GEOMETRY AND IS ANALYZED

Professor R. M. Winger Gives Theories Showing Contradiction in Axioms Long Accepted as True and Points Out Possibility of Establishing New Methods by Slight Changes.

BY R. M. WINGER.

Ph. D., Assistant Professor of Mathematics in the University of Oregon.

MATHEMATICS enjoys the distinction of being the oldest of the sciences. Its earliest beginnings are traceable to the earliest times. The Babylonians knew that a regular hexagon could be inscribed in a circle with a radius as its side, which probably accounts for the sexagesimal division of angles and of time. The Chinese and the Hindus were familiar with the right triangle of sides three, four and five, and used it to construct perpendicular lines.

While geometry is ascribed to the Egyptians, who were interested in its practical aspects, its development is due to the Greeks, who cultivated it for its own sake. Pythagoras (569 B. C.) raised it to the dignity of a science, while Euclid (300 B. C.) brought it to a state of perfection unapproachable by any other science. Scientifically speaking, geometry was the "glory that was Greece" and antedates the formulation of the other sciences by around 2000 years.

As mathematics is the oldest of the sciences, so also it is the most exact. Indeed it has long been known as the exact science. So prevalent has this view become, that many, even among scientists, have come to regard mathematics as a fixed and changeless system. "Mathematical truth," they say, "is unassailable because it is demonstrable." An inquiry into the nature of mathematical truth, illustrated by the modern theory of geometry, is the purpose of this paper.

Axioms Used as Basis. Every proposition of geometry in the last analysis rests on the axioms. Granting the truth of the axioms, the question of the truth of geometry is to question the validity of human reasoning. The absolute truth of Euclid, therefore, stands in contrast with the axioms. What then is the status of the axioms?

The old textbooks defined axiom as "self-evident truth," and this notion is widely current among laymen today. Indeed, no less an authority than Kant insisted that the axioms of geometry are truths necessarily imposed on the mind. According to Kant, then, the geometry of Euclid is a monument of truth. He was opposed by Josiah Stuart Allen, who held that geometric axioms are experimental facts; that Euclid therefore is verified by experience.

While the philosophers were arguing the matter, the mathematicians were constructing a system destined to prove that both were wrong. Ever since its publication, one of Euclid's axioms was attacked on the ground that it was not

self-evident. This is the famous fifth postulate: "If a straight line falling on two straight lines makes the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, will meet on that side on which are the angles less than two right angles."

Since the statement was not accepted as self-evident, attempts were made to deduce it from the other axioms or replace it by one more satisfactory. An equivalent hypothesis which is frequently used is that through a given point one and only one line can be drawn parallel to a given line. These attempts extend over a period of 2000 years and form one of the most interesting chapters in the history of mathematics.

Axioms Rejection Considered.

Convinced that the axiom could not be proved, some of the bolder of the investigators asked themselves what would be the consequence of rejecting it altogether. A follower of Kant would have stood at such a proposal, for many of the best known and most important theorems of geometry rest directly on the parallel postulate. For example, to reject it is to deny that the sum of the angles of a triangle is equal to two right angles, that the ratio of the length of a circle to its diameter is constant, and the whole theory of similar figures, for without it the angle sum of a triangle depends on the size of the triangle.

Finally three mathematicians, Gauss, of Germany; Lobachevsky, of Russia; Bolyai, of Hungary, not quite 100 years ago independently arrived at the conclusion that a consistent geometry could be built up without the use of Euclid's postulate. Accepting the other axioms they supposed that through a point two lines could be drawn parallel to a given line.

On this hypothesis two lines perpendicular to the same line are not parallel, neither do they meet in fact, they diverge from the common perpendicular in both directions. On the other hand, two parallel lines continue to approach each other, so that parallel lines are not equidistant, neither are equidistant lines parallel.

Straight Line Locus Attacked. In fact, the locus of a point equidistant from a straight line is not straight at all, but a concave curve. And plane triangles exist whose three vertices are equidistant from a straight line. In this case the three perpendicular bisectors of the sides are parallel, consequently they do not meet, and a circle cannot be drawn through the three points. The sum of the angles of every triangle is less than two right angles so that it is impossible to draw similar figures. There is

no such thing as a square; hence the famous theorem of Pythagoras in celebration of which he sacrificed a hecatomb, falls to the ground.

Let us turn now to another geometry, where even stranger things await us. The Euclidean postulate asserts that through a point just one line can be drawn parallel to a given line. Lobachevsky's geometry, which we have just sketched, is built upon the hypothesis that through any point two lines may be drawn parallel to a given line. A third hypothesis naturally suggests itself, viz., that no parallel lines whatever can be drawn. The geometry which follows from this hypothesis was developed by Riemann in his doctor's dissertation in 1854.

A first requirement of Riemann's system is that a straight line is of finite length, but without ends, so that a point moving along the line will return to the starting point after having traversed a finite distance. Since any two lines coincide, all lines are of equal length. Two lines perpendicular to the same line meet at a finite distance which is half the length of a line. But from symmetry they meet in both directions. To avoid conflict with the theorem that two straight lines can have but one point in common, these two points must be identical. Moreover, all lines perpendicular to a given line intersect in a common point called the pole of the line. Hence, the locus of point equidistant from a straight line is a circle with its center at the pole.

Contradiction Pointed Out. All planes perpendicular to a line meet in a second line, the conjugate of the first. These lines possess the remarkable property that every point of the one is equidistant from every point of the other; hence the locus of points equidistant from either is a surface of revolution about both. A body which slides along one line without rotating, rotates about the conjugate without sliding and vice versa.

Since these two geometries are in essential contradiction to that of Euclid, they have come to be known as non-Euclidean geometry. The first question that arises is, which is the true geometry? We shall restrict the discussion to mathematical truth, by which we mean a logical inference from a set of axioms. By axiom we mean simply an unproved proposition. To the mathematical logician the axioms are not "self-evident truths," as the Greeks probably believed and Kant affirmed. Neither are the experimental facts, as claimed by Mill. They are simply hypotheses or assumptions, whose validity is not a mathematical, but a philosophical question. The answer to our question is now immediate: in the sense explained, all three geometries are mathematically

true, though they are mutually contradictory. Each is a consistent body of propositions developed logically from a set of hypotheses. If the hypothesis of a unique parallel be accepted, the geometry of Euclid follows in all its completeness. If through a point there are two parallels, Lobachevsky's geometry necessarily results. Mathematical truth, then, is qualified or conditioned, an idea long recognized by mathematicians, but one that has not penetrated far into the outer darkness where grope the uninitiated who class mathematics with the black arts rather than with the fine arts.

Mathematics Compared. Mathematics might be compared loosely to the modern mechanical toy which is patterned after structural steel. The individual pieces are the axioms, and the certain number of them, a clever boy can fashion a variety of edifices which might be likened to the individual theorems of geometry. Replace an important piece by one of another type and a new series of structures can be fitted together, some of which will differ materially from the first set.

Obviously in this way an infinite number of "geometries" could be constructed each as "true" as the other, but each with unique and characteristic properties. You will see then in what light mathematicians hold remarks touching the satisfaction of teaching a subject whose only deal is in certainties, as if mathematical science were petrified or had reached the inertia of matter at absolute zero. The same applies to questions concerning the "existence" of a fourth dimension. Any system exists mathematically if it can be shown to be consistent with previous theorems. Fifty years ago Cayley founded a geometry of n dimensions which has "existed" ever since. It was on such grounds as these that Poincare maintained the essential impropriety of the question under discussion. From this point of view it is as absurd to ask "Which is the true geometry?" as to ask which is the true system of weights and measures, the metric or the English, or which is the true thermometer, the Fahrenheit or the centigrade.

A question of more interest to some is whether the material universe is constructed on a Euclidean or non-Euclidean model. Into that we cannot enter here except to say that natural phenomena can be explained in terms of either. The geometry of Euclid, being the simplest, is most convenient and will perhaps always prevail. Such is the position taken by Poincare. He even goes so far as to say that Euclid should be maintained even at the cost of revising physics.

What then is the conclusion of the whole matter? Shall we say with an early pessimist that "all is vanity"? Have we only raised up specters out of the imagination to be destroyed by the clear light of reason? Only one familiar with the history of the subject will realize how profoundly the long intellectual struggle has affected the spirit in mathematics and the attitude of mathematicians.

In the words of Somerville, "All this labor has not been fruitless, for it has led in modern times to a rigorous examination of the principles not only of geometry, but of the whole of mathematics, and even logic itself, the basis of mathematics. It has had a marked effect upon philosophy and has given us a freedom of thought which in former times would have received the award meted out to the most deadly heresies."

Baby Girl Gladdens Home of Former Izzetta Jewel.

Announcement Cards Sent to Portland Friends of Actress Who Was Married to Representative Brown Two Years Ago.

WED cards, edged with blue, and bearing the name of Izzetta Jewel Brown, enclosed with a card of father Harry May Goodwin, arrived at the home of the actress in the mail for various Portland friends of the former Izzetta Jewel. She is now Mrs. William Izzetta Brown, of Kingwood, W. Va., and the baby girl arrived on January 17. Mr. Brown is a Representative in Congress from his district, and is prominent in politics and in a business way in the South.

Miss Jewel's wedding occurred nearly two years ago and she immediately announced her permanent retirement from the stage. She met Representative Brown during her season as leading woman with the Poli Stock in Washington, D. C.

Miss Jewel was leading woman with the Baker Players for one season and became a great favorite with stock patrons here. Later, she toured with Otis Skinner and appeared in New York in several productions. Interesting news in connection with the arrival of little Miss Izzetta Jewel Brown is that she has a cousin just one month older to a day. On December 17 Miss Hazel May Goodwin arrived at the home of Lieutenant and Mrs. D. C. Goodwin. Mrs. Goodwin is Mrs. Brown's only sister and appeared with her in stock under the name of Hazel May. She married Lieutenant Goodwin, who is stationed in Washington, D. C., and her baby was born at Mrs. Brown's home in Kingwood, W. Va.

Library Notes.

THE regular story hour for the little folks will be held at the Central Library, 1212 Commercial street, at 4 o'clock. There will be stereoscopic pictures of Holland for the older boys and girls, to complete the series of stories and that country.

The following newspapers and newspapers have been added to the Library, and may be found on file in the library room, 1212 Commercial street, at 4 o'clock. The new additions are: "Florists' Exchange," "Hairdresser's Journal," "Machinists' Monthly Journal," "Modern Hospital," "Musical Quarterly," "The Yacht," "The Current History of the War," "Numismatic," "Social Hygiene," "Fuller's Daily Report" (Seattle), "Juneau (Alaska) Dispatch" and "Oakland Tribune."

The class in children's literature will meet in room A of the Central Library on Saturday morning, January 29, at 10:30 o'clock. The next lecture in the course on "History of Education" will be given in room B on Monday evening, January 24, at 8 o'clock.

On Wednesday afternoon, January 26, at 4 o'clock, in room B, Miss Josephine Hammond will give a talk on "Dramatic Literature," recommending the best books on this subject.

"The Development of Japanese Civilization" will be the subject of Professor Latourette's lecture, to be given in Library Hall on Friday evening, January 28, at 8 o'clock.

COUPLE WEDDED 61 YEARS

Rev. and Mrs. A. J. Stover, of Ridgefield, Have 52 Descendants.

RIDGEFIELD, Wash., Jan. 29.—(Special)—Rev. and Mrs. A. J. Stover, of Ridgefield, celebrated the 61st anniversary of their wedding Friday. Mr. Stover was born December 14, 1855, and Mrs. Stover January 2, 1855. In 1882 they came to Grants Pass, Or., where they resided for several years, moving to Cascade Locks, Or., and in 1892 to Ridgefield. They have lived ten years on a farm. From this place they finally settled in Ridgefield. They have 52 descendants in 52. Both Mr. and Mrs. Stover are active and enjoy excellent health, which they attribute to regular habits and the use of simple food.



Here Is the First Breath of Spring

Smart Hats of Kid
In new colors. Priced at from \$3.45 to \$6.50

Novelty Jet Hats
In Exclusive Designs.
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Dainty Satin Hats
Untrimmed. In 12 new colors.
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The Wonder Millinery

At Sixth and Alder Streets

REED MOLDS POLICIES

FACULTY COMMITTEE NAMED BY PRESIDENT FOSTER.

Recommendations as to Likely Changes in Conducting Institution Are in Order.

For the purpose of definitely outlining the policies of Reed College, President W. T. Foster has appointed a faculty committee, composed of Professor Norman F. Coleman, chairman; Charles S. Botsford and Miss Malda Rosette. The function of this committee is to discuss the policies already being pursued, to consider the adoption of new policies, and to make recommendation to the faculty for unanimous action.

When President Foster began work at Reed College in 1910, it was necessary for him to make his own policies, because he had no faculty. Now that the faculty has been firmly established, he is desirous that the policies which he has put into operation be ratified by them, that in the future all the efforts of the administration may be unanimously supported.

Only as many students have been admitted as the resources of the college will care for. This has meant a thorough examination of candidates for admission and a selection of only those who are well equipped and interested in what the college aims to do.

Every effort has been made to provide work for students who are in need of help or desirous of earning part of their expenses. College government in regard to all student affairs has been left almost exclusively in the hands of the students themselves.

A. H. COCHRAN IS AT REST

Funeral Services Held in Boise for Former Portland Resident.

Funeral services for Arthur H. Cochran, who died January 18 at his home in Boise, Idaho, were held Friday, January 21, from his home under the auspices of the Brotherhood of Railroad Trainmen.

Women's Club to Entertain.

SANDY, Or., Jan. 29.—(Special).—The Women's Club of this place will entertain next Saturday night at Shelby's.

Household Economy

How to Have the Best Cough Remedy and Save \$2 by Making It at Home

Cough medicines, as a rule contain a large quantity of plain syrup. A pint of granulated sugar with 1/2 pint of warm water, stirred for 2 minutes, gives you as good syrup as money can buy.

Then get from your druggist 2 1/2 ounces Pinex (50 cents worth), pour into a pint bottle, fill the bottle with sugar syrup. This gives you, at a cost of only 64 cents, a full pint of really better cough syrup than you could buy ready made for \$2.50—a clear saving of nearly \$2. Full directions with Pinex. It keeps perfectly and tastes good.

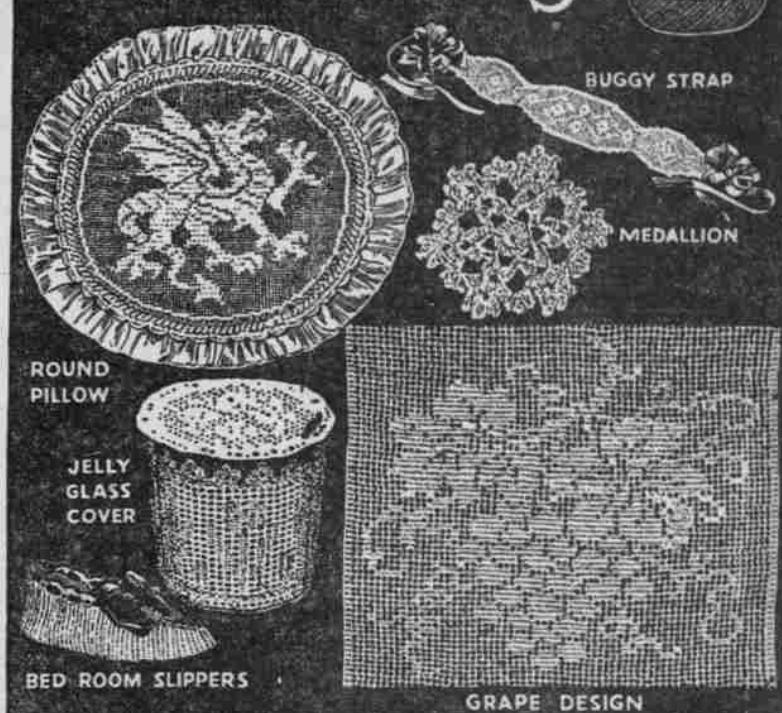
It takes hold of the usual cough or chest cold at once and conquers it in 24 hours. Splendid for whooping cough, bronchitis and winter coughs.

It's truly astonishing how quickly it loosens the dry, hoarse or tight cough and heals and soothes the inflamed membranes in the case of a painful cough. It also stops the formation of phlegm in the throat and bronchial tubes, thus ending the persistent loose cough.

Pinex is a highly concentrated compound of genuine Norway pine extract, combined with guaiacol, and has been used for generations to heal inflamed membranes of the throat and chest. To avoid disappointment, ask your druggist for "2 1/2 ounces of Pinex," and don't accept anything else. A guarantee of absolute satisfaction, or money promptly refunded, goes with this preparation. The Pinex Co., Ft. Wayne, Ind.

Hall, at which time two plays will be rendered by local talent. One play will be "An Emergency Call" and the other will be "The Sandy Women's Club," a local production. There will be a short programme of music and readings.

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There was a time when many needleworkers hesitated to start a crocheted yoke, edgings for underwear, blouses, towels and handkerchiefs, medallions and useful novelties—but today the work is made simple and easy by the use of Klostersilk Instructions and Klostersilk Crochet and Embroidery Cottons.

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Here is a special Free Offer to any woman who crochets and embroiders, or who wants to learn. Simply show this advertisement to your dealer and he will present to you absolutely free of charge our "20 Crochet Instructions"—illustrating and giving full details for working the latest ornamental and useful designs.

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