ASTRONOMY

Total Lunar Eclipse Due

A total eclipse of the moon, visible in the U. S., will occur through March 12-13. The full moon will fade to a dull red as it passes over the earth's shadow.

By JAMES STOKLEY

A TOTAL ECLIPSE of the moon, the first visible generally in the United States and Canada in more than three years, is the main event on the celestial calendar for March. During the night of March 12-13 the full moon will fade to a dull red as it passes through the shadow of earth.

Over most of North America the eclipse will occur early Sunday morning, but on the Pacific Coast the beginning will come before midnight.

The planets can be observed in the early morning hours. None of those visible to the naked eye arise before midnight in March.

However, the stars and constellations of late winter shine in their full glory during the evening. These are indicated on the accompanying maps, which show the sky as it looks about ten p.m., your own kind of standard time, about March 1, an hour earlier at the middle of the month and two hours earlier at the end.

The brightest star is Sirius, the dog star, in Canis Major, the great dog, toward the south. A little higher is the lesser dog, Canis Minor, with the star called Procyon. Toward the right is the brilliant constellation of Orion, the warrior, with two stars of the first magnitude. Betelgeuse is above and Rigel below; between them are the three stars that form Orion's belt.

Taurus, the bull, is farther to the right. This contains the star Aldebaran, distinctly red in color, which is part of a V-shaped group called the Hyades. These outline the bull's face, as it was shown on the old star maps, which depicted the imaginary figures around the stars.

Auriga Is Right of Gemini

Well above Taurus are Gemini, the twins, with Castor and Pollux, but only the latter star is of the first magnitude. And a little farther to the right, shown on the northern sky map, is Auriga, the charioteer, with brilliant Capella.

The familiar figure of the great dipper, which is part of Ursa Major, the great bear, is high in the northeast. At the left are the pointers, whose direction, down and to the left, leads to Polaris, the pole star, which always stands over the North Pole of the earth. The line of the dipper's handle curves toward the right, to another first-magnitude star, Arcturus, in Bootes, the bear-driver.

There are also two first-magnitude stars in the southeastern sky. Well up toward the zenith is Leo, the lion. The western part of this constellation forms a sub-group called the sickle, because it has the shape of that agricultural implement. In the downward-pointing handle of the sickle is Regulus. Farther to the left is Denebola, a second-magnitude star in the lion's tail. Virgo, the virgin, is below it with Spica, close to the horizon. Spica is a star of the first magnitude, but here its low altitude very much dims its light.

As for the planets, Jupiter is now of magnitude minus 1.7. It rises about four hours ahead of the sun, to become prominent in the southeastern sky. About an hour later it is followed by Saturn, about a tenth as bright although still of the first magnitude. Both planets are in the constellation of Sagittarius, the archer. Mars comes up a little later, in the next-door constellation of Capricornus, the sea goat. By that time morning twilight has begun, making Mars a rather difficult object to observe.

Venus rises still later, and is about ten degrees above the horizon at sunrise. Its magnitude is minus 3.3, or more than four times as bright as Jupiter. Thus it is fairly easy to locate Venus, aided by a clear view low in the southeast.

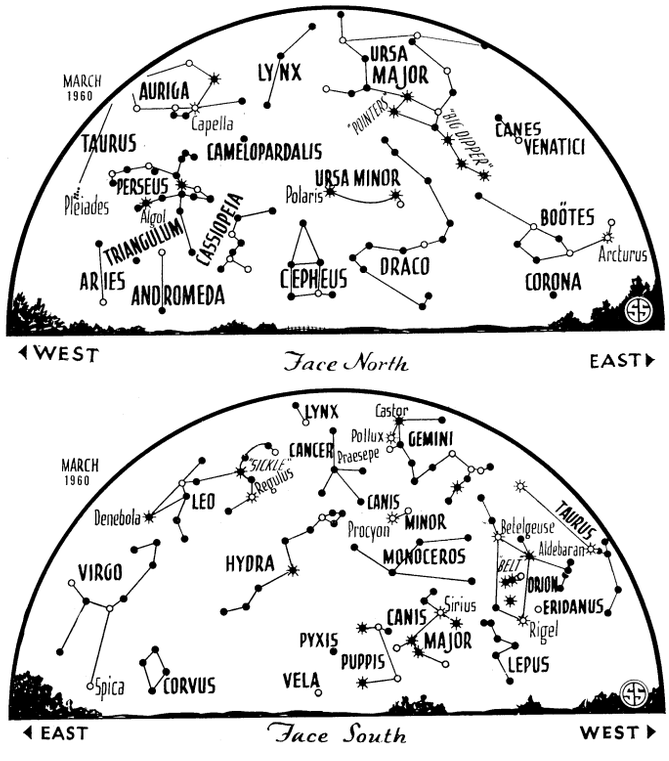
The total eclipse of the moon on the night of March 12-13 is the first of four eclipses this year, and the first of two this month. On March 27, the moon will pass partly in front of the sun, producing a partial solar eclipse. That will be visible, however, only from Antarctica, Australia and certain parts of the Indian Ocean.

The moon will be new at that time, for a solar eclipse can occur only at new moon. That is when the moon is in the same direction as the sun; and only then can it pass in front.

When the moon is full it is in the opposite direction from the sun and its sunlit hemisphere is turned completely toward us. Only then, of course, can it enter the earth's shadow, so a lunar eclipse always occurs at full moon. Thus it will be in this phase on the evening of March 12.

Soon after midnight by Eastern Standard Time, or one, two or three hours earlier, in the Central, Mountain and Pacific time belts, the moon enters the outer part of the earth's shadow, the penumbra. Then a lunar observer would see the earth beginning to hide the sun, but looking from the earth, little effect can be seen on the moon.

At 1:38 a.m., EST, March 13 (12:38 a.m., CST; 11:38 p.m., MST, March 12, or 10:38 p.m., PST) the eastern edge of the moon begins to enter the dark inner shadow, the umbra, where the earth is completely hiding the sun. For about an hour the curved edge of the shadow will slowly creep across the moon. At 2:41 a.m., EST, March 13, the moon will be completely shaded, and the total eclipse will commence. This is shown



Science Service, Inc. is collaborating with JSTOR to digitize, preserve, and extend access to The Science News-Letter. www.jstor.org

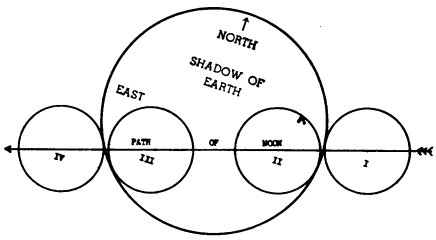
in the accompanying diagram, where I is the first contact of the moon with the shadow, and II the beginning of the total phase.

The moon will remain in the shadow for 95 minutes, but it will not disappear from view. The earth's shadow is not completely dark, because the atmosphere surrounding our planet acts as a prism to bend sunlight around into the shadow. On the way through the air, some of the blue rays of light are scattered, and that gives the sky its blue color in daytime. With the proportion of blue thus reduced, the light that passes into the shadow is reddened, and that falls on the eclipsed moon, to give it a coppery red hue.

Position III, as shown on the diagram, is the end of the total eclipse. This happens at 4:15 a.m., EST, March 13, as the southeastern edge of the lunar disc begins to emerge from the shadow. As at the beginning, you will again see the shadow creeping across the moon. Then comes the end of the total phase, at 5:18 a.m., EST (IV), as the moon is clear of the umbra. It will remain in the penumbra for more than an hour and then the moon will shine with its full brilliance, unless it has set.

During a total eclipse the moon cools off rapidly. When it is full, the center of the disc, where the sun has been shining continually for a week, is at a temperature of about 212 degrees Fahrenheit, the boiling point of water. But during the eclipse, it drops to about 160 degrees below zero Fahrenheit. Unlike the earth, the moon has no atmopshere to serve as a protective blanket.

Since last December, the sun has been moving northward in the sky. It reaches the halfway point, when it stands directly over the equator, on Sunday, March 20, at 9:43 a.m. EST. This is the vernal equinox, the beginning of spring in the Northern Hemisphere. In countries south of the equator, it is the beginning of autumn.



Total Eclipse of Moon— Night of March 12-13, 1960

The large circle represents the shadow of the earth, and the small circles, I, II, III and IV, indicate the successive positions of the moon as it passes through the shadow. The four phases shown occur at the following times:

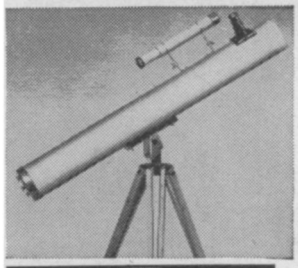
	EST	CST
I	1:38 a.m. 3/13	12:38 a.m. 3/13
II	2:41 a.m. 3/13	1:41 a.m. 3/13
III	4:15 a.m. 3/13	3:15 a.m. 3/13
IV	5:18 a.m. 3/13	4:18 a.m. 3/13
	MST	**PST**
I	11:38 p.m. 3/12	10:38 p.m. 3/12
II	12:41 a.m. 3/13	11:41 p.m. 3/12
III	2:15 a.m. 3/13	1:15 p.m. 3/13
IV	3:18 a.m. 3/13	2:18 a.m. 3/13

(Continued on p. 141)

GET READY FOR THE SPACE and SCIENCE ERA! SEE SATELLITES, MOON ROCKETS

AMAZING OPTICAL BUYS and OTHER SCIENTIFIC BARGAINS

WRITE FOR FREE CATALOG "Q"



See the Stars, Moon, Planets Close Up!

Photographers! Adapt your camera to this Scope for excellent Telephoto shots and fascinating photos of moon!

3" ASTRONOMICAL REFLECTING TELESCOPE

Famous Mt. Palomar-Type

60 to 180 Power—An Unusual Buy!

You'll see the Rings of Saturn, the fascinating planet Mars, huge craters on the Moon, Star Clusters, Moons of Jupiter in detail, Galaxies! This is a fine quality, American-made telescope engineered and built for clear definition and resolution. Equatorial mount with lock on both axes—you automatically follow stars across the heavens. Aluminized and overcoated 3" diameter high-speed 3/10 mirror. Each mirror Focault tested. Telescope comes equipped with a 60X eyepiece and a mounted Balow Lens, giving you 60 to 180 powers. Accessory eyepieces available for higher powers. An Optical Finder Telescope, always so essential, is also included. Sturdy, hardwood portable tripod.

FREE with Scope: Valuable **STAR CHART** plus 272 page **"HANDBOOK OF HEAVENS"** plus **"HOW TO USE YOUR TELESCOPE"** BOOK.

Stock No. 85,050-Q.....$29.95 Postpaid

This is an actual photograph of the moon, taken through our Astronomical Telescope by a 17-year-old student.

Terrific Buy! American Model OPAQUE PROJECTOR

Projects illustrations up to 3" x 3½" and enlarges them to 4 ft. wide. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-and-white. Operates on 115 volt, A.C. current. 6-ft. extension cord and plug included. Operates on 60 watt bulb not included. Size 12" x 8" x 4¼" wide. Weight 1 lb., 2 oz. Plastic case with built-in handle.

Stock No. 70,199-Q.....$7.95 Postpaid

GIANT HEAVY DUTY GYROSCOPE TOP

Larger, heavier and smoother-running than the ordinary Gyroscope, this sturdy 4" diameter instrument is ideal for classroom or amateur physical experiments in demonstrating the principles of rotation, attraction and equilibrium of moving bodies, centrifugal forces, centripetal forces. Made in France. It is made to spin longer and to stand hard usage. Weight is ½ pound. Has a heavy gyro motor with 5/16" steel shaft, main rotor bearing support is ¼" thick. Metal stand, booklet, FUN WITH GYROS and instructions included.

Stock No. 50-224-Q.....$4.95 Postpaid

ASTRO COMPASS AND STAR FINDER

Govt. Cost $75—Price $14.95 Pstpd.

Determines position of stars quickly. Shows various celestial coordinates. An extremely useful star finder which can be rotated through 60° angles along calibrated degree scale. Has single eye lens with viewing stop, two spirit levels for aligning, tangent screw with scale for five precision readings, azimuth scale graduated in two-degree intervals, adjustable tilting azimuth scale for angle reference of stars on distant objects. War Surplus. Gov't. cost $75. Instructions, carrying case included.

Stock No. 70,200-Q.....Only $14.95 Postpaid

D-STIX CONSTRUCTION KITS

Great Teaching Aid!

Newest, handiest visualizing and demonstration tool for teachers—elementary, high school or college. Colored wood sticks ⅛" thick and "easy-on" rubber joints approx. 3/16" diam. fit together quickly to form all kinds of simple or complex shapes, structures. Ideal for teaching mathematics, chemistry, physics, design, engineering, architecture, abstract art—or for developing children's interest in form and structure. Work out geometric figures, molecular structures, structural members, configurations and perspectives, models of many types. 3-dimensional visualization adds interest—speeds understanding. Used by professional planners, designers, architects. Money-back guarantee.

Stock No. 70,209-Q (230 pcs.).....$3.00 Pstpd.
Stock No. 70,210-Q (370 pcs.).....$5.00 Pstpd.
Stock No. 70,211-Q (452 pcs.).....$7.00 Pstpd.

INSTRUCTION BOOKLETS

	Stock No.	Price Pstpd.
How to Built Projectors	9014-Q	30¢
Homebuilt Telescopes	9006-Q	40¢
All About Telephoto Lenses	9036-Q	60¢
Ultra Close-Up Photography	9042-Q	60¢
Infra-red Light and Its Uses	9040-Q	75¢
Homemade Stereo-Adapters	9032-Q	30¢
Homemade Stereo-Viewers	9034-Q	30¢
Time in Astronomy	9054-Q	60¢
FUN WITH OPTICS	9050-Q	50¢
The Camera Lucida	9059-Q	20¢
Photography with your Telescope	9058-Q	25¢
How to use your Telescope	9035-Q	60¢

(Includes directions on how to take photographs thru your telescope)

STEREO MICROSCOPE

Over 50% Saving. Up to 3" Working Distance — Erect Image — Wide 3 Dimensional Field. Used for inspections, counting, checking, assembling, dissecting. 2 sets of objectives on rotating turret. Standard pair of wide field 10X Kellner Eyepieces give you 23 power and 40 power. Helical rack and pinion focusing. TEN-DAY TRIAL!

Order Stock No. 85,056-Q

Full price.....$99.50 f.o.b. Barrington, N. J.

NOTICE: EDMUND IS NOW HEADQUARTERS FOR MATH LEARNING AND TEACHING AIDS! SEE DOZENS OF OFFERINGS IN OUR **FREE** CATALOG Q.

NEW! CIRCULAR SLIDE RULE!

POCKET SIZE — FAST — EASY TO USE!

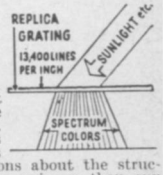
Be a Math Whiz! New Circular Slide Rule multiplies, divides, figures fractions, percentages, squares, cubes, roots, proportions, circumferences, areas, retail prices, fuel consumption. Eliminates the confusions of ordinary slide-rules. Priced far lower. Faster, easier to learn and use. Constructed of 2 aluminum discs with plastic indicator. 3½" diameter. Directions included.

Stock No. 30,336-Q.....$4.95 postpaid

REPLICA GRATING

Low, Low Cost

Take Unusual Color Photos at Night



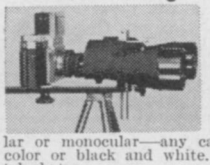
It's here—after decades of effort. Replica Grating — on film — at very low price. Breaks up white light into full spectrum colors. An exciting display. 13,400 lines per inch. Diffraction Grating has been used to answer more questions about the structure of the material world and the universe than any other single device. Use it for making spectroscopes, for experiments, as a fascinating novelty. First time available such large size—so cheaply. Comes in clear plastic protector.

Stock No. 50-202-Q....Includes 2 pieces 8"x5½" —1 transmission type, 1 reflecting type. $2.00 Pstpd.

NEW BINOCULAR-TO-CAMERA HOLDER

For Exciting Telephoto Pictures

Will Fit Any Camera



Bring distant objects 7 times nearer with a 35mm. camera. 7x50 binocular and our NEW BINOCULAR-TO-CAMERA HOLDER. Ideal for long-range shots of wild life, flying birds, nests, etc. Camera and binoculars attach easily. Use any binocular or monocular—any camera, still or movie. Take color or black and white. Full directions for making telephotos.

Stock No. 70,223-Q.....$11.50 Postpaid

FREE CATALOG-Q

128 Pages! Over 1000 Bargains!

America's No. 1 source of supply for science experiments, hobbyists. Complete line of Astronomical Telescope parts and assembled Telescopes. Also huge selection of lenses, prisms, war surplus optical instruments, parts and accessories . . Telescopes, microscopes, satellite scopes, binoculars, infra-red sniper-scopes . . . items for making "Science Fair" projects, math learning and teaching aids.

Request Catalog-Q

Order by Stock No.—Send Check

Satisfaction Guaranteed.

ORDER BY STOCK NUMBER . SEND CHECK OR MONEY ORDER . SATISFACTION GUARANTEED!

EDMUND SCIENTIFIC CO., BARRINGTON, N. J.

Covers material related to obtaining a patent and enforcing the rights granted under it.

PARKINSON'S DISEASE: Its Meaning and Management—Lewis J. Doshay—*Lippincott,* 224 p., illus., paper, $1.45. Popular account of current concepts of the nature of the disease, and the value of medication and therapy.

PERSPECTIVES ON GOVERNMENT AND SCIENCE: The Annals, January 1960—Norman Wengert, Ed.—*Am. Acad. of Political and Social Science,* 204 p., $3; paper, $2. Analyzes space research, science and foreign policy, scientific manpower, and other aspects of government and science.

PLANNING AMERICA'S SCHOOL BUILDINGS—AASA School Building Commission—*Am. Assn. of School Administrators,* 229 p., illus., $6. Presents advanced thinking among school architects, superintendents and people concerned with today's school curriculum.

PLASTICS ENGINEERING HANDBOOK—Society of the Plastics Industry—*Reinhold,* 3rd ed., 565 p., illus., $15. Up-to-date reference on plastics materials, methods and fabrication.

THE POLITICAL ECONOMY OF NATIONAL SECURITY: A Study of the Economic Aspects of the Contemporary Power Struggle—James R. Schlesinger—*Praeger,* 292 p., $5. Analysis of the "cold war."

POLYSACCHARIDES IN BIOLOGY: Transactions of Fourth Conference—George F. Springer, Ed.—*Macy,* 326 p., illus., $5.95. Discussion on chondroitin sulfates, heparin, the mast cell, and sulfated polysaccharides.

PRACTICAL PHOTOGRAPHY—Robert A. McCoy—*McKnight,* 291 p., illus., $4. For beginners.

PROGRESS IN INORGANIC CHEMISTRY, Vol. I—F. Albert Cotton, Ed.—*Interscience,* 566 p., illus., $14.50. Articles on leading research in the field.

THE RADIO AMATEUR'S HANDBOOK—Staff of American Radio Relay League—*Am. Radio,* 37th ed., 584 p., index, $6; paper, $3.50. Standard manual of amateur radio communication.

THE SEA OFF SOUTHERN CALIFORNIA: A Modern Habitat of Petroleum—K. O. Emery—*Wiley,* 366 p., illus., $12.50. Brings together material on various aspects of the sea floor, the water, and marine life.

Science News Letter, February 27, 1960

Total Lunar Eclipse

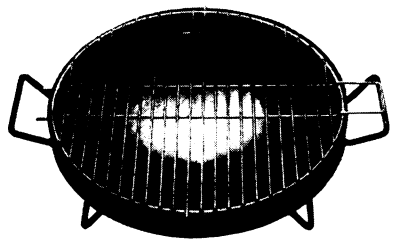
(Continued from p. 139)

Celestial Time Table for March

2	7:32 p.m.	Algol (variable star in Perseus) at minimum brightness
5	6:06 a.m.	Moon in first quarter
	9:00 p.m.	Moon farthest, distance 251,300 miles
10	4:00 p.m.	Mercury in same direction as sun
13	3:26 a.m.	Full moon, total lunar eclipse
17	3:38 a.m.	Algol at minimum
19	2:00 a.m.	Moon nearest, distance 229,800 miles
20	12:27 a.m.	Algol at minimum
	1:41 a.m.	Moon in last quarter
	6:00 a.m.	Moon passes Jupiter
	9:43 a.m.	Sun over equator; spring commences in Northern Hemisphere
21	9:00 a.m.	Moon passes Saturn
22	9:17 p.m.	Algol at minimum
23	11:00 p.m.	Moon passes Mars
25	7:00 a.m.	Moon passes Venus
	6:06 p.m.	Algol at minimum
27	2:38 a.m.	New moon, partial solar eclipse

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, February 27, 1960



SUR-A-BAKI

The indoor-outdoor, table model

CHARCOAL COOKER

Grill at home all year round. No need to wait for Bar-B-Que time. Little Sur-A-Baki has a 12" diameter and will fit on top of your stove, indoor fireplace or what have you. Steaks, chops, franks, etc., with that real charcoal flavor. Solid heavy metal insures top quick-cooking quality.

Sur-A-Baki is a bargain you will look far and near to get at this new low price. **$4.95**

Be one of the first to enjoy SUR-A-BAKI **Shipping Charge 50¢**

John Surrey, Ltd., 11 West 32nd St., Dept. SN-58, New York 1, N. Y.

MAIL NOW FOR **Sample Record**

START SPEAKING FRENCH OR SPANISH ALMOST OVERNIGHT!

HERE'S the easiest way to learn FRENCH, SPANISH, Russian, German, Italian, Japanese or Brazilian. Listen to 2-sided non-breakable Sample Record. Let your eyes follow words in Sample Lesson. Almost at once you'll be chatting in a new language **with a perfect accent! That's all you hear!** No dull, tedious work. Just listen—imitate! It's that easy! Offer may end soon. Rush 25c to help cover cost of special packaging, shipping. State language you want. We'll also send free information on full Cortina Course. No obligation. **CORTINA ACADEMY, Dept. 602, 136 W. 52nd St., New York 19.**

BOOK OF 15 PARADOXES *in Math and Logic*

Only 25¢

HERE'S a wonderful way to sharpen your mind. 15 great paradoxes in math and logic. 2 equals 1; a+b does **not** equal b+a, the distance between two points inside a square inch is longer than the distance from Earth to Sun! 12 more stumpers, compiled by noted Prof. Aubrey Kempner. Paper bound, over 40 pages, pocket size. Only 25¢—no further obligation, nothing more to buy. To get your copy of "Paradoxes and Common Sense" mail this ad with 25¢ and your name and address TODAY to:

D. Van Nostrand Company, Dept. 262, 120 Alexander St., Princeton, N. J. (Est. 1848)

MICRO-ADS

Equipment, supplies and services of special interest to scientists, science teachers and students, science-minded laymen and hobbyists.
25¢ per word, payable in advance. Closing date 3 weeks prior to publication (Saturday).
SNL, 1719 N St., N.W., Washington 6, D. C.

ATOMIC THEORY

THE STRUCTURE OF THE ATOM—23 PAGES with many diagrams. A new concept of the atom, based upon the Kraff-Higenberg theory of particle structure. Price 25 cents pp. C. F. Kraff, 218 Columbia Road, Annandale, Virginia.

BOOKS AND MAGAZINES

POPULAR, TECHNICAL, BUSINESS BOOKS . . . postpaid direct to you. Magazine subscriptions. Bookletter Free. Your complete Bookstore. Reader-Services Co., Drexel Hill, Pennsylvania.

GOVERNMENT SURPLUS

GOVERNMENT SURPLUS RADIOS, RECEIVERS, transmitters, gadgets, parabolic reflectors, infra-red snoperscopes, aircraft camera lenses. Amazing catalog 10¢. John Meshna, Malden 48, Mass.

MICROSLIDES

MICROSLIDES: INSECTS, MARINE LIFE Zoological, Botanical, British Fresh Water Algae. Send for complete list. Free. Esbe Laboratory Supplies, 459 Bloor St., W., Toronto, Ontario, Canada.

MISCELLANEOUS

BINDERS FOR SALE—BUFF-COLORED BUCKram. Snap-in metal strips hold 52 copies. $4.00 pp. Send orders with remittance to Science News Letter, 1719 N Street, N.W., Washington 6, D. C.

RADIOACTIVE ISOTOPES

RADIOACTIVE ISOTOPES—AS LOW AS $3.00. Free Price List #14C. Also, Radioactive Isotope Experiments, $1.00. Atomic Research Laboratory, 10717 Venice Boulevard, Los Angeles 34, California.

Free catalogues of SCIENCE BOOKS!

State your interest! Mathematics, physics, history of science, general science, biology, social sciences, earth sciences, chemistry, languages, philosophy, engineering. Dover publishes over 75 books per year; quality production standards, priced for your budget. Dept. SNL, Dover Publications, 180 Varick, N. Y. 14, N. Y.

TO MEN WHO JUST "CAN'T LEARN" MATH!

More and more in our dynamic economy, a knowledge of basic mathematics pays off!

Whether in Engineering, Electronics, Mechanics, Construction, Pure Science, etc. — or in Estimating, or Trade and Finance, or Buying and Selling, etc.—the man who gets there fustest with the mostest, MATH-WISE, is likely to be rewarded *handsomest!*

Fortunately, there now exists, in a single volume of 240 fact-packed pages (including 195 clarifying illustrations), a basic course in mathematics, from arithmetic to the calculus, arranged logically and in order of difficulty. Explanations of principles are followed by worked examples.

This one-volume math "library" economizes not only your money but, more important, your *time.* Amazingly, the author, with a rare talent for simplifying the complicated, covers the whole gamut: treatment of fractions, decimals, square root and cube root, logarithms, progression averages, interest, algebra, equations, graphs, plane and solid geometry, trigonometry, differential and integral calculus; useful mathematical tables; summary of mathematical formulas, etc., etc.

This remarkable work, which already has aided thousands, will be of enormous help not only to those who have forgotten their mathematics but also to those now acquiring it. You may try it out at our risk. *ORDER NOW.*

A REFRESHER COURSE IN MATHEMATICS
by F. J. Camm
240 Pages • 195 Illustrations
2.95 Postfree • 10-Day Money-Back Guarantee
EMERSON BOOKS, Inc., Dept. 918-L
251 W. 19th Street, New York 11