## zusitess and extorat.

## The Oharge for Insertion under this head ts One Dollar

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Broad way, $\mathrm{N} . \mathrm{Y}$.
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illustrated ad vertisement, page 421 .

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serants and cosecants, table of proportional parts. In addition are ten sections devoted to instruction with regard to tables in general and the particular uses of the tables given.
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dominions must partake not only of his controlling dominions must partake not only of his controlling
power of gravitation, but also of the great controlling power of gravitation, but also of the great controlling power of rotation, which in connection with ethereal re-
sistance must determine their orbital paths, prescribe sistance must determine their orbital paths, prescribe
their annual periods, and point out their axial rota. tions.
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Samuel
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This excellent catalogue covers the entire range of scientific serials of all countries, including the transactions of learned societies in the natural, plysical, and mathematical sciences, from 1633 to 1876. There are
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funds fur the publication of such volumes it is to be hoped that this and similar ventures which it has in hand may somehow be made to pay their cost.
Elements of Differential Calculus, with Examples and Applications.
By W. E. Byerly, Ph.D. Boston: Ginn \& Heath. Price $\$ 2.50$.
A text book embodying the resnlts of Professor
Byerly's experience in teaching the calculus at Cornell and Harvard. It is practical throughout, and apparently well suited for the use intended. Its professed peculiarifies are the rigorous use of the doctrine of limits as a
foundation of the subject, and as preliminary to the adoption of the infinitesimal notation and nomencla ture; the early introduction o simple elaborate treat ment of the use of infinitesimals in pure geometry.
ect Lives; or, Born in Prison. By Julia
P. Ballard. Cincinnati: Robert Clarke $\mathrm{P} . \mathrm{Ba}$
$\& \mathrm{Co}$.
Designed toawaken in children an interest in the lives tbem how to study such lives scientifically and enter tainingly. The work is prettily done and admirably calculated to effect the author's purpose.
Foot Prints of Vanished Races in the Mississippi Valley. By A. J. Conant
St. Louis: Chancy R. Barnes. Gives an account of some of the monuments and
relics of prehistoric races scattered over the surface of the Mississippi Valley, with suggestions as to their origin and uses. Mr. Conant is an enthusiastic studen of American archæology in the field as well as in the
reports of other observers, and writes with unusual fullness of knowledge. His investigations lead him to the Autochthons original inhabitants of America wer found in Mexico were all branches of the great Nahus family, whose origin has not been clearly traced. In the advent of the Toltec domination the first gleams of ancient American history begin to be visible. The original seat of the Nahua race, he is inclined to believe
must be sought for in the Mississippi Valley. Th Indians are a later race, evidently of Asiatic origin. Industrial History of the United States, By Albert S. Bolles. Norwich, Conn.
Henry Bill Publishing Company. 8vo Henry
pp. 936.
This work occupies, and on the whole commendably,
decided gap in popular literature. Its most obvious a decided gap in popular literature. Its most obvious
faultis the lack of a good index, indeed an index of fault is the lack of a good index, indeed an index of
any sort: a lack which seriously diminishes its usableness and usefulness. Each great department of productive industry is taken up in a special book, sepa-
rate chapters being given to each important sub-dirate chapters being given to each important sub-di-
vision. Here under agriculture and hortculture, there is a chapter of general history followed by chapters on agricultural implements, cotton, wheat, corn, sugar,
tobacco, hay, minor crops, neat cattle, dairy products tobacco, hay, minor crops, neat cattle, dairy products,
the horse, sheep, swine, horticulture, nurseries, and the horse, sheep, swine, horticulture, nurseries, and
fruit raising. In like manner the historical develop ment of each of the various lines of manufacture is sketched with considerable fullness of detail, consider-
ing the vast breadth of the field covered. Shipping and railroads; mines, mining and oil; banking, insurance ment; and the industries of Canada are severally honored with a separate book. The work is copiously illustrated, the selection of the engravings being deter-
mined apparently by their availability oftener than by mined apparently by their availability oftener than by
theirsuperior merit. The author has taken no little pains to bring his history well down to the date of pub lication, and his work is one that should go into ever
school and family library. If it could take the plac of some of the political and military histories used as text books in our higher schools the change would be beneficial one to the country.

##  <br> HINTE TO CORRESPONDENTS.

No attention will be paid to communications unless aecompanied with the full name and adress of the
writer.
Names and addresses of correspondents will not be Names and adaresses of correspondents will not be
given to inquirers.
We renew o former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.
Correspondents whose inquiries do not appear after reasonable time should repeat them. If not then published, thes may conclude that, for good reasons, the Persons desiring
Persons desiring special information which is purely of a personal character, and not of general interest,
should remit from $\$ 1$ to $\$ 5$, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.
Any numbers of the Scientific American Supple ment referred to in these columns may be had at this Pricelo cents each
(1) H. P. G. asks (1) how to make a cheap and serviceable emery wheel. A. Turn wheels from well seasoned pine, of the form desired; place
emery upon an iron plate heated to $200^{\circ}$ to $212^{\circ}$; coat the wheels with glue prepared as for uniting wood dries, the surplus emery is brushed off and another coating of glue is applied and the wheels are again rolled in the warm emery. The wheels should be allowed to become thoroughly dry before use. 2. How
can Imake emery sticks? A. Prepare sticks of such forms as you may require, and coat them as directed for emery wheels, or attach to them emery paper by mean
of glue or paste.
(2) F. J. W. asks: 1. Why do we hear sound farthest just before a storm, when the atmo-
sphere is lightest? A. Two reasons are given for this phenomenon: one is, that the air beingmoist, has more than its normal conducting power; the other is, that the low. lying strata of clouds confine the sounds to the
arth. 2. If, as we are taught by philosophy and observation, cold contracts and heat expands the atmosphere, why does rarefied air prove to be so cold as to preserve snow and ice at a few thousand feet above sea
level? A. The rarefied air in which the snow level? A. The rarefied air in which the snow and ice xist is not rarefied by heat but by decreased pressure.
Rarefaction of air diminishes its heat-absorbing power Rarefaction cause which infuences the temperature at great heights is its removal from the ground which heats it by contact. And still another reason is that the air is rier, and therefore very diathermanous.
(3) A. H. asks how to make a cement for harpening knives. Composed of emery altogether
would be too expensive. A. Mix fine sharp furnace would be too expensive. A
sand with hydraulic cemenr.
(4) A. McC. writes: I notice in the number for December 13, 1879, on page 387 (11), J. S. P. ing fuid I muriatic acid for tinners work found the folng fluid I have in my laboratory work found the fol-
owing excellent. Dissolve 32 grammes zinc in sufficient muriatic acid, and add 22 grammes sal ammoniac (am-
monium chloride), and evaporate to dryness. Dissolve monium chloride), and evaporate to dryness. Dissolve the resulting salt in water, and filter. This will answer or tin, zinc, and brass excellently, the parts to be sol-
(5) H. L. S. asks which side of a belt should run in contact with the pulley? A. The grain (6) J. H. asks: Will you tell me the size of he cylinder of engine forboiler described bclow? Boiler orizontal, 7 feet long, 28 inches diameter, 164 -inch tubes 4 feet long, height of boiler 3 feet, dome 15 by 15 nch to burn wood. A. It depends in part on the speed
of the engine; probably a 5 inch cylinder and 6 to 8 ches stroke would answer.
(7) H: P. T. asks: Can sufficient gas be uad through an ordinary dwelling house gas pipe (16
inch), with three Bunsen barners, to evaporate (through inch), with three Bunsen barners, to evaporate (through the aid of a coil boiler) sufficient water to furnish steam
necessary for a $1-6$ to 14 horse power engine? A. Yes.
(8) W. L. writes: A blower being placed in a boat aft of a sail, blows hard against the same;
which way will the boat move? A. As action and reacwhich way will the boat move? A. As action and reaction are equal, we doubt if the
way from the mere blowing.
(9) J. W. D. asks: Was there an iron vesel or gun boat built or launched from or about the oot of 14th street, North River, by the Delamater Iron
Works, at or about the time of the war? A. Yes, the Works, at o
Matanzas.
(10) P. H. D. asks how to find the diameter of a small wheel of a given number of teeth to gear
ito a larger wheel of given diameter and given numinto a larger wheel of given diameter and given num-
ber of teeth. For example, what is the diameter of a wheel which has six teeth, to gear into a wheel, two nches in diameter, with sixty teeth? A. The ratio of
the diameters of the two wheels is the same as that of the number of their teeth. If one wheel has 6 teeth and the other 60 , the diameter of the small wheel is 1-10th the large one.
(11) J. V. asks for the rule for finding the low struck by a moving body. Is it the weight of the motion in seconds or in minutes, that is, the initial velocity? A. Formulagiven by Molesworth is $\mathrm{F}=\mathrm{V} \mathbf{W}$, $\mathrm{F}=$ force of blow in tons. $\mathrm{V}=$ velocity per second due fall. W=weight of ram in tons.
(12) R. B. S. asks: What is the difference between levigation and trituration? A. Levigation is the process by which substances are reduced to a state of minute division by rubbing them between two bard with water. Trituration is the comminution of subtances without the aid of a liquid.
(13) T. B. asks: 1. Can old Bessemer steel rails be worked over and made into new rails? A.
Yes, 2. Which side of a leather belt should be worked to the pulley. the rough or smooth side? A. The grain or smooth side.
(14) A. D. F. asks for a good recipe for waxing fioors, and how it is applied. A. Stir 25 parts of
hredded yellow wax into a hot solution of 12 parts of hredded yellow wax intc a hot solution of 12 parts of until effervescence ceases, then remove it from the fire t may now be poured into cans to cool. When ocher. or use one part of it is dissolved in five parts of boiling water. Apply warm with a paint brush. It dries in a few hours, when the fioor is polished with a floor brush and afterward wiped with a woolen cloth. It is said
that this wax coating will last for six months with ordithat this w
nary use.
(15) H. D. K. asks for a description of a powerful battery about the size of a thimble, to be used in some electric jewelry. A. The essential parts of such a battery are, two plates of carbon, one plate of
well amalgamated zinc, and a solution made by dissolvwell amalgamated zinc, and a solution made by dissolv-
ing 2partsof bichromate of potash in 20 parts of hot ing 2parts of bichromate of potash in 20 parts of hot
water, and when cold adding 1 part of sulphuric acid. The zinc plate is placed between the two carbon plates, leaving a space on each side. The carbon plates are onnected togetherand with one of the conducting wires, wire. The zinc and carbon plates may be attached to rubber stopper fitted to a small jar or bottle containing he bichromate solution at the bottom below the ends the plates, and the solution may be brought into conact with the plates by turning the bottle down on its but the solution soon becomes exfully for a short time, eplaced.
(16) F. Y. A. asks: How am I to judge pure lard oil? That which I usually get gums. A. Con-
pare color, smell, taste, specific gravity $(=0 \cdot 9003)$, and

