

7 N 15

International Rescue Committee

Science & Technical Training Programs for Afghans

IRC SCIENCE AND TECHNICAL TRAINING PROGRAMS FOR AFGHANS

ENGINEERING TRAINING PROGRAM

To help meet the high demand for Afghan professionals who can actively participate in the reconstruction of Afghanistan's irrigation systems, roads, bridges, houses and public buildings, IRC founded the Engineering Training Program for Afghans in 1987. The program is comprised of two components: the Civil Engineering Program and the Construction Supervision Program.

The Civil Engineering Program

The Civil Engineering Program offers a 36-month civil engineering degree course which parallels the curriculum offered at the Kabul University Faculty of Engineering before the war. To address any academic weaknesses the students may have when they enter the course, the program offers a remedial course in English, mathematics and physics. In addition, all students participate in a required summer field training program which enables them to apply the theory that they learned during the academic year. Upon completion of the program, the students receive an engineering degree and are qualified to provide engineering expertise for the construction of roads, canals, bridges, buildings, and other facilities. Since its inception in 1987, the Civil Engineering Program has graduated 24 students, 23 of whom found employment, while one continued his studies abroad. The program currently enrolls 71 students comprising three different graduating classes. One group of 20 students is to complete the program in April 1994, while the other two groups, comprising 26 and 22 students, are to graduate in December 1994 and November 1995 respectively, if the program finds funds to continue.

The Construction Supervision Program

The Construction Supervision Program offers two sequential nine-month courses: the Construction Supervisor Program and the Assistant Engineer Program. The Construction Supervisor Program trains Afghans to be construction foremen capable of supervising construction work sites and managing small rural projects. To be eligible for admission, candidates must have completed 12 years of education, and pass an entrance exam. In the fall of 1992, 552 students participated in two entrance exams, of which 67 students were found eligible for enrollment.

The Assistant Engineer Program is open to students who successfully complete the nine-month Construction Supervisor course and pass a screening test. The program provides participants nine more months of training in construction aspects of engineering projects. As assistant engineers, graduates are capable of managing entire projects of small to medium size and can perform a variety of technical tasks. Both courses include two three-and-a-half month theory sessions with a two-month practical session in between. During the practical component of the two courses, the program places students with organizations carrying out construction projects in Afghanistan and in refugee camps in Pakistan. Since 1989, a total of 165 students have completed the Construction Supervisor Program and 65 students have completed the Assistant Engineer Program. Over 80 percent of the graduates from both programs are currently employed or are pursuing further graduate studies abroad.

EXPERIMENTAL SCHOOL OF THE SCIENCES

Established in 1986, the Experimental School of the Sciences provides comprehensive secondary education, with a focus on math and sciences, for Afghan refugee boys from grades seven through 12. The curriculum, which includes courses in biology, chemistry, physics, mathematics, geometry and trigonometry, is designed to prepare and inspire students to pursue studies in engineering, agriculture, medicine, and research. The students also take courses in history, languages and Islamiat and have the option to take extracurricular courses in typing and computers.

High quality instruction, extensive laboratory equipment, limited class size and a comprehensive resource library all combine to set the Experimental School apart from other refugee schools. As opposed to the traditional teaching methods of rote memorization and chanting, the teaching staff at the Experimental School utilizes a variety of student-centered teaching techniques, including group work and question-and-answer sessions. Further, the school's diverse and extensive collection of laboratory equipment provides students additional opportunities to actively participate in class and to perform experiments in physics, biology, chemistry and geology. Each science class at the school has five full sets of laboratory equipment, allowing considerably more student participation than the standard one set per class in most refugee schools. In addition to the use of laboratory equipment, the teaching staff also encourages the use of locally available materials during class experiments and homework projects. In another effort to ensure quality education, the Experimental School strictly limits class size to no more than 40 students, while other refugee schools allow up to 60 or more students per class. Lastly, the Experimental School houses the only comprehensive resource library for refugee teachers and students in the Peshawar area, with over 400 science, math, history, Islamiat and language books and teachers' guides. Also available through the library are such teaching aids as charts and overhead projectors.

Admission to the Experimental School is very competitive; in the fall of 1992, over 900 students competed in an entrance exam for 145 openings. In 1993, 425 students took an exam, following which only 68 students were admitted. The school currently enrolls 270 students in grades seven through twelve. Of the 212 refugee students who graduated from the Experimental School between 1987 and 1993, 82 percent have continued on to enroll in higher academic and technical programs.

SECONDARY SCIENCE TRAINING PROGRAM

The IRC Secondary Science Training Program was established in 1985 to develop and produce math and science textbooks, laboratory manuals and teachers' guides for Afghan secondary schools and to train math and science secondary school teachers. Over the past nine years, the program's trainers have authored biology, chemistry, mathematics, geometry and physics textbooks for grades seven through twelve, and trigonometry books for grades eleven and twelve. They have also published lab manuals and teachers' guides to supplement the books. The textbooks, written in Dari or Pushto, are used by virtually every Afghan secondary school in Pakistan and Afghanistan. To the extent that funds are available, the books, manuals and guides are printed and distributed. In 1992, 80,732 textbooks were distributed in Pakistan and Afghanistan. In 1993, 21,000 books had been distributed in Pakistan and 76,000 books in Afghanistan by the end of June. The plans for 1994 include producing and distributing 400,000 textbooks, lab manuals and teachers' guides to Afghan schools in the two countries.

The staff has also developed four one-month math and science training seminars for Afghan middle and secondary school teachers. The seminars aim to upgrade both the teachers' subject-matter knowledge in biology, chemistry, physics, math and geometry, as well as their pedagogical techniques. The seminars focus on the effective use of student-centered teaching techniques and of textbooks, teacher guides and instructional aids. From 1985 through 1992, the program trained 1,498 teachers in Pakistan. In 1993, the program began training teachers in Afghanistan. By the end of 1993, the staff will have trained an additional 110 teachers in Pakistan and 70 teachers in Afghanistan. The program's 1994 goals are to train 90 math and science teachers in Pakistan and 200 teachers in Afghanistan.

PROFESSIONAL LEADERSHIP

Professor Zabihulla Hamidi, Director of IRC's Engineering Training Program, holds a Bachelor of Science degree in Civil Engineering from Kabul University's Faculty of Engineering (1962) and a master's degree in Hydraulic and Irrigation Engineering from the University of Roorkee, India (1967). He also completed post-graduate work in Hydraulic Engineering at the University of Cincinnati, Ohio. Professor Hamidi's professional experience includes 27 years as a civil engineering professor at Kabul University's Faculty of Engineering, during which he was appointed coordinator of the Civil Engineering Department and chair of the Center of Engineering Consulting Services and Applied Research Committee. Professor Hamidi took one year leave from Kabul University to accept a visiting professorship at Cornell University's Civil Engineering Department, where he taught courses in fluid mechanics, hydraulics and hydrology.

Throughout his career, Professor Hamidi has complimented his teaching with research and consulting for governmental and non-governmental organizations. He has managed or provided consulting services for over 50 engineering projects and has authored three textbooks and two laboratory manuals. Prior to his current position with IRC's Engineering Training Program, Professor Hamidi managed the Construction Supervision and the Refresher and Professional Development Programs.

Mr. Sayed Aqa, Manager of IRC's Civil Engineering Program, received his Bachelor of Science degree in Mechanical Engineering from Kabul University in 1979 and his master's degree in Energy Technology from the Asian Institute of Technology in Thailand in 1990. His professional career includes extensive engineering work in the fields of water supply and sanitation with such agencies as UNICEF, Pakistan Red Crescent Society and the Afghan Construction Unit of Kabul. Mr. Aqa first served with IRC as an instructor and assistant administrator of the Civil Engineering Program. He later returned to manage this same program, as well as to teach courses in fluid mechanics, inorganic chemistry, engineering management and economics, water supply and dynamics.

Mr. Bahader Khan, Manager of IRC's Construction Supervision Program, holds a Bachelor of Science degree in Civil Engineering from Kabul University's Faculty of Engineering (1982). His professional background includes several positions with Afghanistan's Ministry of Water and Power including that of irrigation engineer, design engineer and manager of the Engineering Department. Mr. Khan also held a teaching position at Kabul University's Faculty of Engineering, during which he taught courses in fluid mechanics, surveying and structure. In addition to managing the Construction Supervision Program, Mr. Khan presently teaches courses in road construction, concrete and masonry structure, irrigation, surveying and construction materials.

Mr. M. Hashim Shahidi, Director of IRC's Secondary Education Programs, received his secondary diploma from the Parwan Teacher Training College and went on to acquire a Bachelor of Science degree in Physics and Math from Kabul University's Faculty of Science in 1974. He spent eight years as an academic member of the Science Center in Kabul, where he provided physics and math training to provincial teacher supervisors and developed and revised science textbooks. Upon arrival in Pakistan, he accepted the position of principal of a secondary school for refugees, Sayed Jamaluddin Lycee. Mr. Shahidi began his tenure with IRC in 1985 as a teacher trainer in physics with the Secondary Science Training Program. While continuing his training responsibilities, he was promoted to manager of the Interparty School Program, which provided full support and supervision to five secondary refugee schools. Prior to his current position with IRC, Mr. Shahidi was again promoted to the position of manager of the Secondary Science Training Program and Interparty School Programs. While with IRC, Mr. Shahidi has authored two physics books for the ninth and twelfth grades and has carried out revisions of four additional physics books.

Mr. Mohad Rahman Rahimi, Principal of IRC's Experimental School of the Sciences, received his secondary diploma from the Parwan Teacher Training College and continued on to Kabul University's Faculty of Science, where he obtained a Bachelor of Science degree in Physics and Math in 1976. Prior to coming to Pakistan, Mr. Rahimi held two posts as a provincial teacher supervisor in physics and math for the Kabul Science Center, as well as instructor of physics and math at Lycee Sanaye in Kabul. In Peshawar, Mr. Rahimi continued to teach physics and math at Sayed Jamaluddin Lycee for refugees. In 1986, he came to IRC's Experimental School of the Sciences as a physics instructor, was promoted to the head of the Physics and Math Department and in 1990, was appointed principal of the school. While with the school, Mr. Rahimi has translated the seventh and eighth grade physics books and revised science textbooks in grades nine through twelve.

ESTIMATED BUDGET

**IRC Science and Technical Education for Afghans
Peshawar, Pakistan
1994-95**

**Engineering Training Program
May 1994 - April 1995**

\$220,000

(No Existing Financial Pledges)

90 Civil Engineering Students
30 Assistant Engineering Students
60 Construction Supervisor Students
13 Members of the Faculty
Administrative Staff
Materials, Equipment and Rent

**Experimental School of the Sciences
September 1994 - August 1995**

\$40,000

(An Additional \$40,000 Has Been Pledged)

250 Students (Grades 7-12)
15 Faculty
Principal
Administrative Staff
Materials, Equipment and Rent

**Secondary Science Training Program
January 1994 - December 1994**

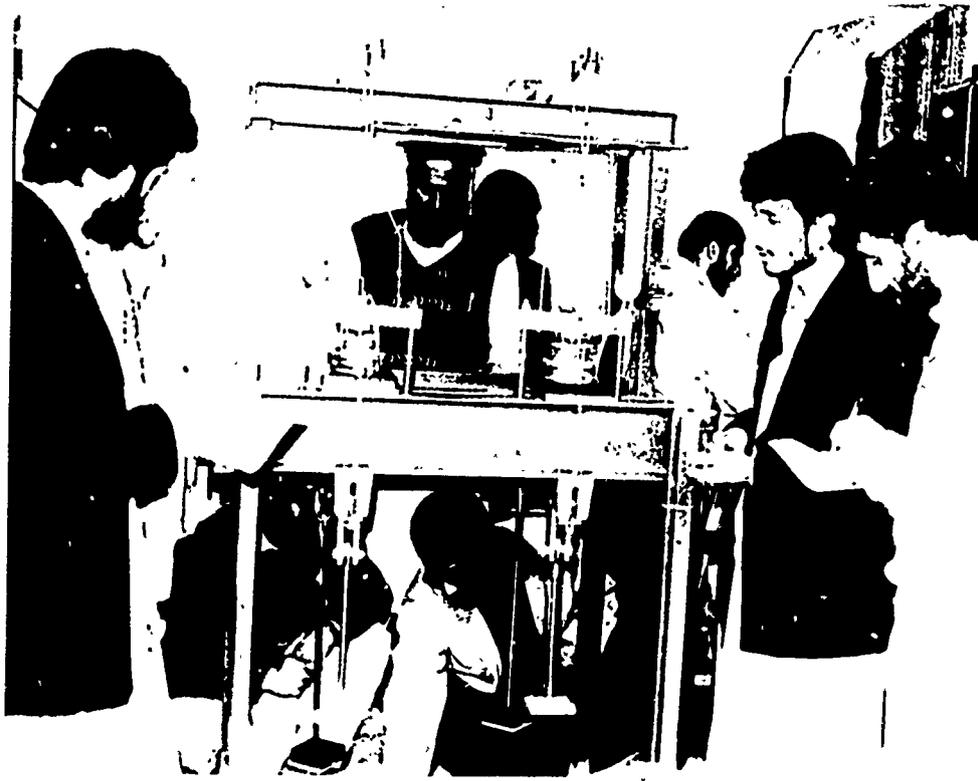
\$90,000

(An Additional \$90,000 Has Been Pledged)

150,000 Science and Math Textbooks
300 Teachers Trained in Seminars
40 Schools Regularly Monitored
50 Presentation Sets of School Lab Equipment

IRC Engineering Training Program

Activities on Campus



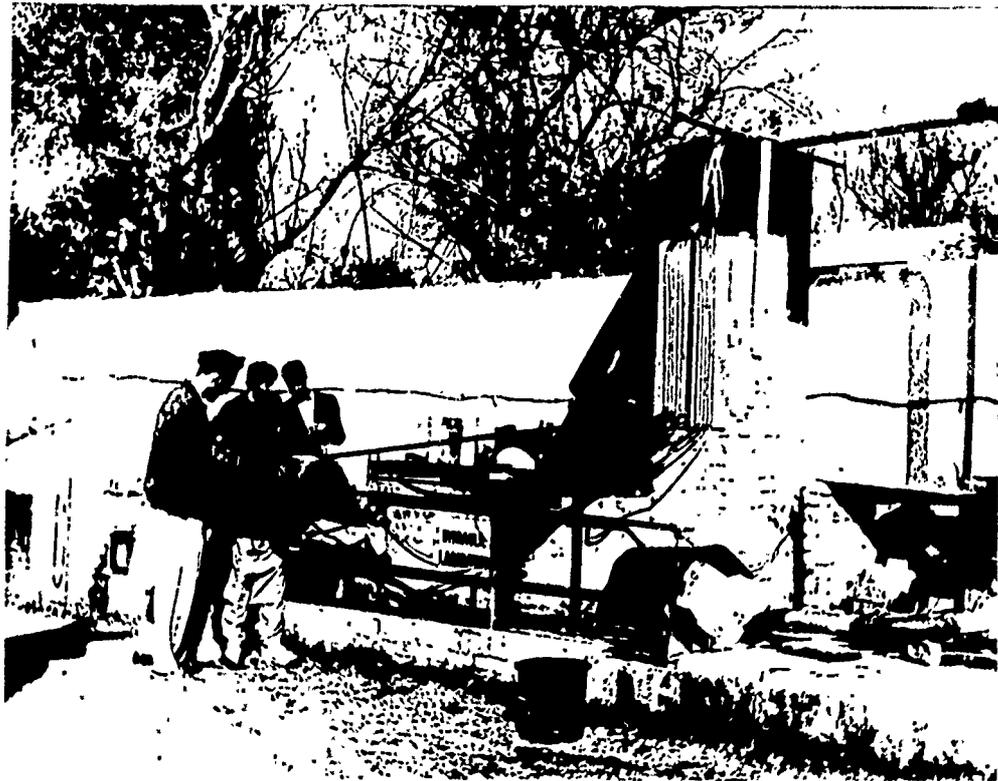
Students in the Civil Engineering Program use a consolidation machine to test soil samples in order to determine the bearing capacity and settlement of the soil under load.



Professor Hamidi assists students from the Construction Supervisor Program during a field exercise in the use of survey equipment.



Civil Engineering students mix concrete and prepare concrete cylinders in order to determine the crushing strength and the designed strength of a certain mix.



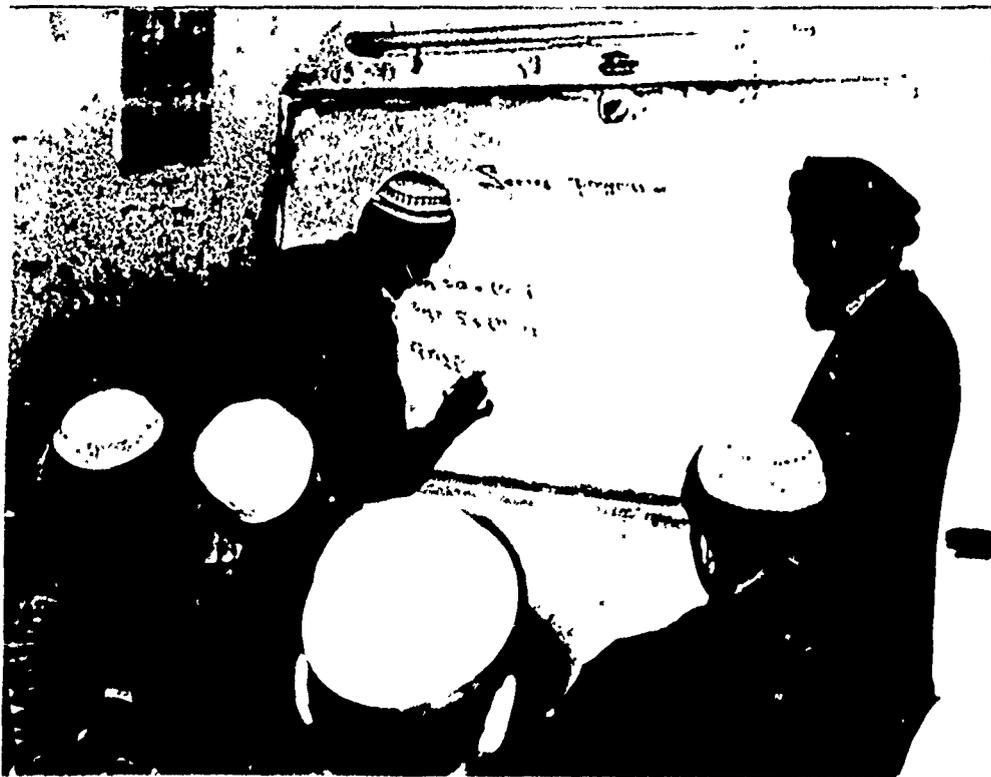
Students in the Civil Engineering Program perform an experiment on water flow measurement using the on-campus hydraulics laboratory. Students from both of IRC's engineering programs use this lab to gain experience for future work with irrigation and water supply projects.

IRC Experimental School of the Sciences

A Look Into the Classroom



Tenth-grade students at the IRC-sponsored Experimental School of the Sciences conduct a chemistry experiment with assistance from their instructor. During the 1991/92 academic year, over 400 chemistry, biology, physics and geology experiments were performed at the school.



The eleventh-grade mathematics instructor at the Experimental School looks on as a student participates in a lesson on series progressions.

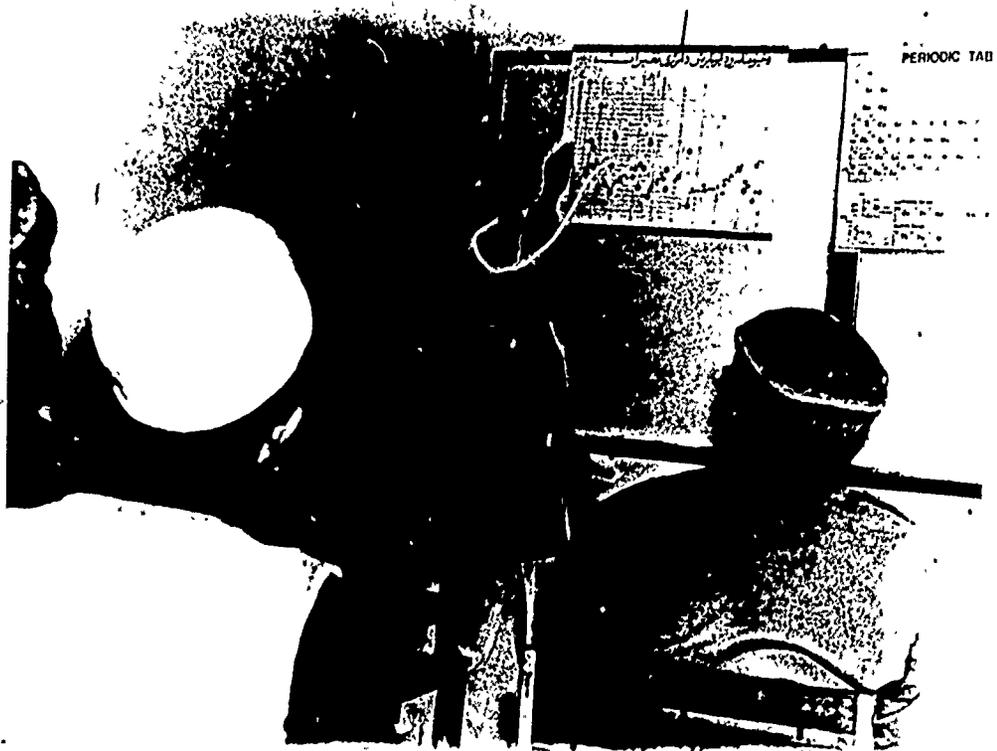


(Above and below) In a tenth-grade chemistry class, two different groups of students perform an experiment that combines potassium chlorate and manganese dioxide to make a catalyst for producing oxygen. The school is unique in making available five laboratory sets per class, allowing for maximum student participation.



IRC Secondary Science Training Program

Teacher Training Seminars



A teacher trainer with the Secondary Education Training Program explains the periodic table of elements to a group of secondary teachers who work in Afghan refugee schools. The one-month in-service math and science seminar offered by the program includes lessons on biology, chemistry, physics, math and geometry.



Using candles and concave and convex mirrors, secondary refugee school teachers discover the properties of light during a math and science training seminar. The program's teacher trainers emphasize the use of student-centered techniques, such as group work, during the subject-matter seminars.

IRC Secondary Science Training Program

Selected Pages from Secondary Science and Math Textbooks

$$A = b \times h \div 2$$

$$A = \frac{b \times h}{2}$$

اویا

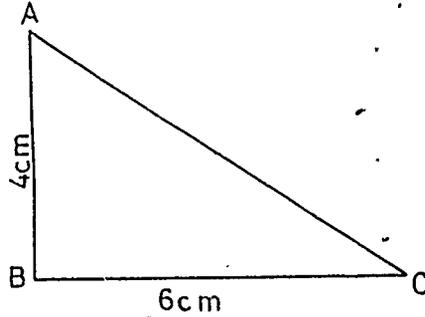
لمری مثال : د ABC د مثلث د قایمو ضلعو او زردوالی

6cm او 4cm وي دهغه مساحت پیدا کړئ .

حل : که د BC ضلع د ABC د قایم الزاویه مثلث قاعده

فرض شي نو دهغه مربوطه ارتفاع AB ده . د مثلث مساحت کولی

شوچي په لاندې ډول پیدا کړو :



$$A = \frac{b \times h}{2}$$

$$A = \frac{6 \text{ cm} \times 4 \text{ cm}}{2}$$

$$A = \frac{24}{2} \text{ cm}^2 = 12 \text{ cm}^2$$

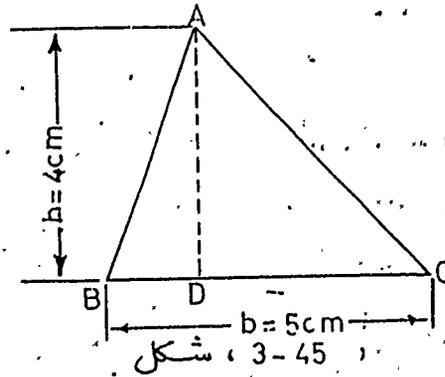
دوهم مثال : په د (3-45)

مشکل کې د ABC د مثلث

قاعده BC = 5cm او ارتفاع AD = 4cm دی (3-44) شکل

د نوموړي مثلث مساحت -

پیدا کړو .



$$A = \frac{b \times h}{2}$$

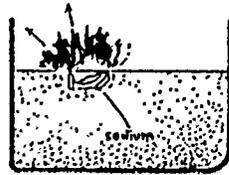
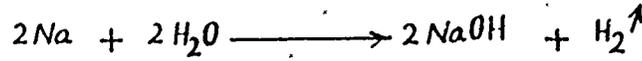
$$A = \frac{5 \times 4}{2} = 10 \text{ cm}^2$$

حل

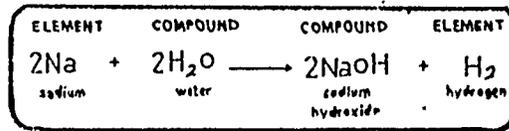
شکل (3-45)

۳۱

دشتوالی دثوت دپاخ کار اغستل کیدی . همدارنگه سودیم دهاید دجن د
استحصال دپاخ هم استعمالوی . لکه چه سودیم داوبوسره تعامل کوی هاید دجن
انادوی اوسودیم هاید د اکساید چه یوالقی مرکب دی جوړوی .



خطه



تجربه :- لږڅه سودیم ته په یوه کاشقه کې چه مسی اوپن دلاستی ولری دتو دوجنه

وړ کړی بیانوی په یو طشت کې .

اوبه واچوی اویوه بنسپه

استوانه چه دیوی سمه پائی

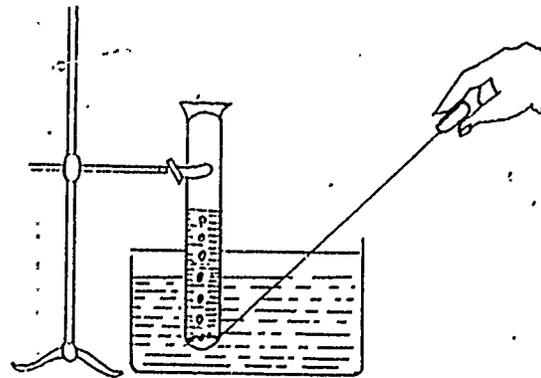
سره متوتینکه کړی ده په

طشت کې سرچسپه کړی اود

استوانی لاندی کاچخوساتی

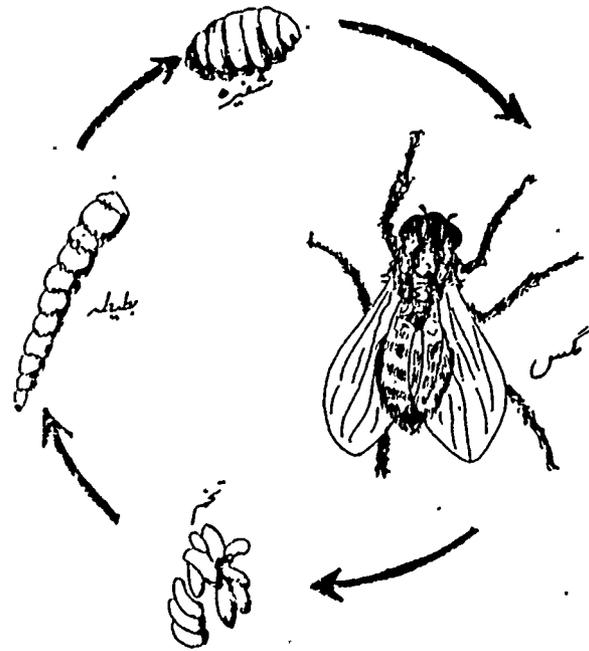
فوراً په بخارات پورته شی او

په استوانه کې به له ټول شی بیا نواستوانه له سمه پائی څخه جلا اوری سته یی کړی اویو



۶۷

عدد تخم میگذارد که از ۸ ساعت الی سه روز تخم ها انکشاف نموده به بطیله تبدیل می شود، لاروا کرم های خورد بوده و از مواد فضله به مدت ۴ تا ۵ روز تغذی می نمایند. بتدریج تغییر شکل نموده و از آن شفیره بوجود می آید که بالاخره به مگس بالغ تبدیل می گردد، قرار شکل (۵-۱۶).

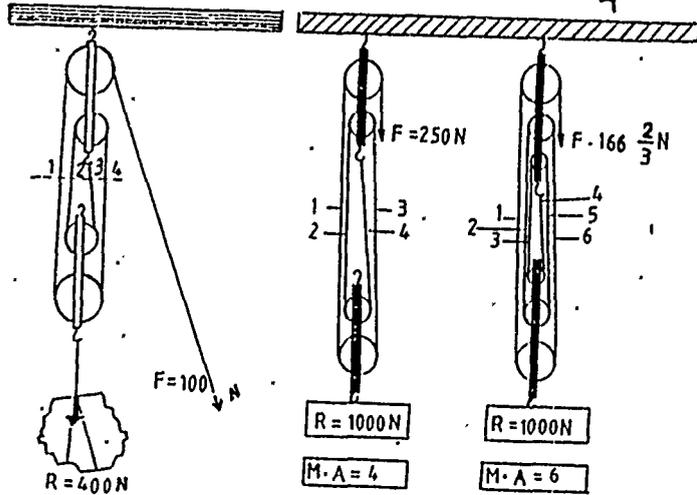


شکل ۵-۲: دوره استحال مگس.

ساختمانی ظاهری مگس: - مگس خانگی مانند پشه بک که با او ظاهراً اشتباه است که به وسیله آن مواد باج را میگیرد. یک جفت بال پرده مانند درشته و من آن برای مکیدن است. در پای مگس ساختمانی چوشتک مانند یا دکه های مکینه وجود دارد که بواسطه آن خود را روی دیوار و غیره جاده می چسباند. پای مگس سبب انتقال بسیاری از امراض مهلک چون موده، اهنال، بجهش، ... است. از تخم ویژه امراض می شود که از آنها بهتر است. در منظره و قایم در جمع این بریمی: - معرف از تبیل میره جسات، سبب بیماری است و سایر...

(۸۳)

از جانب دیگر چون تعداد چسب‌های آزاد و ثابت هم چهار است $F = \frac{R}{4}$ یا $R = 4F$



شکل (۱۶-۵)

پس به صورت عموم اگر تعداد چسب‌ها n باشد $R = nF$ می‌شود و $n = \frac{R}{F}$ می‌باشد.

(۱۵-۵) فایده میخانیکي :

در سیستم چسب‌های مرکب دارای ریسمان واحد فایده میخانیکي مساوی به تعداد چسب‌های آن می‌باشد

$$M \cdot A = \frac{R}{F} = n$$

(۱۶-۵) تمرین ۱۰: با محاسبه کار توسط قوه مقاوم ثمره را دریافت کرده می‌توانسیم:

مثلاً اگر کار قوه حاصل 800 Joule و کار قوه مقاوم 600 Joule باشد

$$\text{ثمره} = \frac{\text{کار انجام شده توسط قوه مقاوم}}{\text{کار انجام شده توسط قوه حاصل}} = \frac{600 \text{ Joule}}{800 \text{ Joule}} = 0,75 \text{ یا } 75\%$$

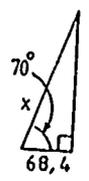
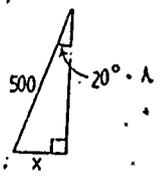
ثمره پولي با در اینجا 75% بوده زیرا $\frac{1}{4}$ حصه انرژی توسط اصطکاک پولي ضایع شده.

Eleventh-Grade Trigonometry Textbook

۱. $(3, 4)$ ۲. $(15, 8)$ ۳. $(1, 2\sqrt{2})$

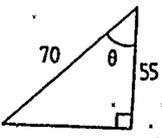
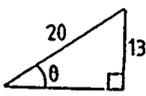
۴. $(\sqrt{5}, 2)$ ۵. $(12, 24)$ ۶. $(2, 20)$

که چیرې $\sin 20^\circ = 0,3420$ او $\cos 70^\circ = 0,3420$ وي په لاندې شکلونو



کېني x په لاس راوېرې .

په لاندې شکلونو کېني $\sin \theta$ يا $\cos \theta$ په لاس راوېرې

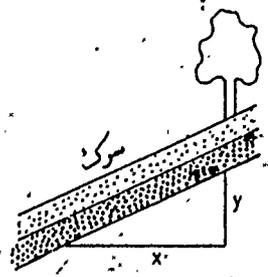


۲. تانجانټ (tangent)

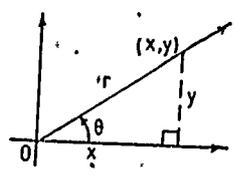
په ځينو حالاتو کېني مناسب ليدل کېږي د ساين او کوساين پرځای د $\frac{y}{x}$ نسبت

استعمال شي (۱۰-۲) شکل)

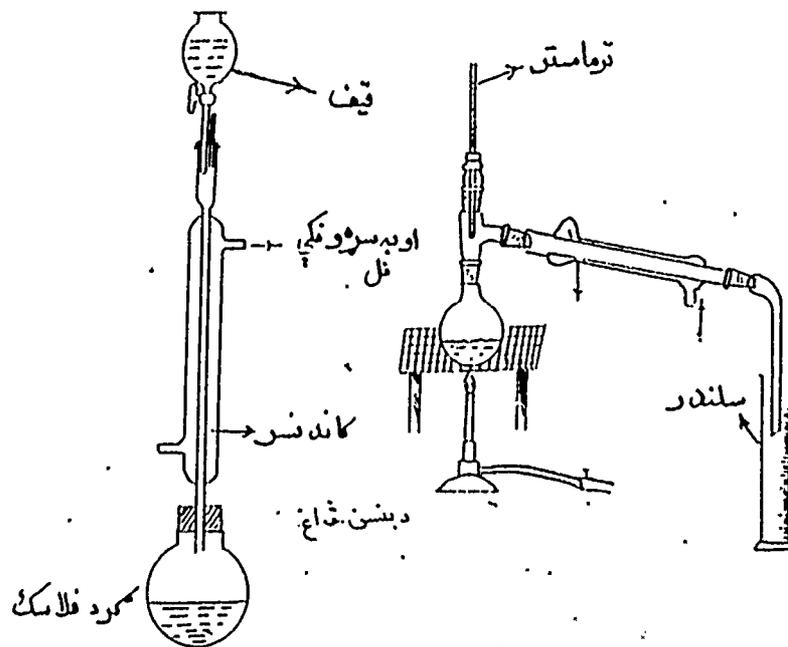
شلا ډيوې غونډۍ پر اړخ ډيو سرک د ميل د معلومولو لپاره د همدې نسبت څکار



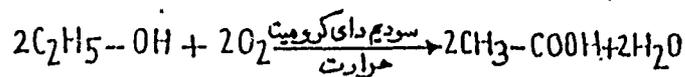
شکل (۱۱-۲)



شکل (۱۰-۲)



دسری تیزاب داستحصال معادله داده .



اثر موینه :

a- د فلاسک سرخلاص کړئ پوزه ورنژدی او بوی یې کړئ .

b- آبی لتمس پر کبڼې غوټه کړئ او د سرنګ تغیر یې مشاهده کړئ .

c- داسیتایک کلوراید او او بود تعامل څخه هم دسری تیزاب لاس ته راځئ .

