

A STUDY TO DETERMINE THE EFFECTS OF SIX WEEKS
OF CALISTHENICS UPON CARDIOVASCULAR
EFFICIENCY OF COLLEGE MALES

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CHAPTER I

INTRODUCTION

For many years physical educators have been searching for and experimenting with methods of developing cardiovascular efficiency. There is also the need for a good simple way of testing this efficiency in large groups.

Whether referring to cardiovascular efficiency as cardiovascular function, cardiovascular condition, organic condition, physiological efficiency, functional health, physical fitness, endurance or any other term describing a person's ability to perform physical tasks, is actually immaterial. The physical educator is interested in how one can attain cardiovascular efficiency and how it can be measured effectively.

Many methods have been used in an attempt to develop cardiovascular fitness, such as: running, jogging, walking, swimming, calisthenics, isometrics, isotonics, weight lifting, bicycling, horseback riding and various other forms of activity. This study has shown another method by which cardiovascular efficiency can be developed.

I. STATEMENT OF THE PROBLEM

The purpose of this study was to determine if a six-weeks period of calisthenics, four days a week, thirty

minutes a day, would significantly improve the cardiovascular efficiency of college males. The calisthenics used was the six-twelve plan of the Green Beret program.

II. DEFINITIONS OF TERMS

Green Beret. Green Beret refers to a group of calisthenics that was used to develop physical fitness in the United States Army. The complete program consisted of thirty-six exercises divided into six progressive steps with three exercises in each step. Diagrams and explanation of exercises are found in the Appendix.

Cardiovascular efficiency. Cardiovascular efficiency refers to the rapidity with which the heart can return to normal after having been subjected to a very strenuous exercise for a given length of time. A satisfactory estimate of a man's fitness can be obtained by exposing him to a standard exercise that no one can perform in a "steady state" for more than a few minutes and taking into account two factors: the length of time he can sustain it and the deceleration of the heart rate after exercise.¹

Harvard Step Test. The Harvard Step Test is a test to determine the cardiovascular efficiency. It is performed

¹Lucien Brouha, M.D., Research Quarterly, 14:13-6 March, 1943.

by having the subject step up on to a platform and then back down. The subject must make these steps up and down at the rate of thirty steps per minute for five minutes. After the test is completed, the subject's pulse is taken by two attendants. The pulse is taken one, two, and three minutes after exercise; and the pulse counts are tabulated. The sum of the pulse counts in recovery are then inserted into the formulae. The formulae and explanation of this test are found in the appendix.

III. IMPORTANCE OF THE PROBLEM

With physical training, the heart becomes more efficient and is able to circulate more blood while beating less frequently.² This insures a greater supply of fuel and oxygen to the muscles, thereby making man's work less difficult. It behooves physical educators to supply mankind with as efficient means as possible in which cardiovascular efficiency can be obtained and maintained throughout life.

The need for a valid way of developing and testing for cardiovascular efficiency that can be easily administered to large groups has been a concern of the physical educator for many years.

²Nancy Bagley and Lona M. Bayer, "The Assessment of Somatic Androgyny," American Journal Physical Anthropology, 433:462, 1946.

This study investigated the Green Beret program as a possible method of developing cardiovascular efficiency.

IV. SCOPE AND LIMITATION OF PROBLEM

The hypothesis being that the Green Beret program would not insure a significant increase in cardiovascular efficiency in college males; the null hypothesis was applied to the study. The critical probability levels for the rejection of the null hypothesis were set at the .01 level of confidence. This would require a t score of 2.00 for the .05 level of significance and a 2.66 t score for an .01 level of significance.

Should the t score be found to be significantly greater than 2.00 and 2.66, the null hypothesis would then be rejected.

The purpose of this study was to determine if a period of calisthenics, known as the Green Beret program, would significantly improve the cardiovascular efficiency. It did not attempt to establish any particular norm.

The study concerned itself with the male members of the freshman class, between the ages of seventeen and twenty-one years, who were full-time students at the Kansas State Teachers College of Emporia, during the fall semester of 1966. These students were enrolled in the Physical Education class specifically designed for development of

physical fitness. The study was not concerned with the height, weight, attitude, motivation, nationality or general background of the subjects. No other cardiovascular function besides the pulse rate was considered. The study was not concerned with any other activities of the subjects being tested such as eating, sleeping, forms of recreation, or emotional problems. It was felt that there was no means by which these factors could be adequately controlled.

CHAPTER II

REVIEW OF RELATED LITERATURE

Studies concerning the development of cardiovascular efficiency in college males. Alexander and Torpey made a study over a ten-weeks period consisting of the following activities: shuttle-run, squat-jump, crab-walk, basketball, backboard jumps, rope skipping, rowing, and bend, twist, and stretch exercises for a period of thirty minutes every day, four days a week.

During the sixth and tenth weeks, each participant ran one mile and was checked for time.

The cardiovascular fitness was assessed by the Harvard treadmill test. This consisted of running on a motor-driven treadmill at a speed of seven miles per hour at an 8.6 per cent grade for as close to five minutes as possible. Scores were based on recovery heart rate following the run, with the total time expressed as an index. Norms were established from the index to classify individuals as to their fitness levels.

The tests showed substantial increases in cardiovascular efficiency. There was also a mean gain of sixteen seconds on the mile run over the ten-weeks period.³

³John F. Alexander and James C. Torpey, Minnesota Journal of Education, October, 1967, pp. 12-15.

Garrett, Sabie, and Pangle worked with volleyball. They gave their group general instructions in volleyball for the first thirty-five minutes of a forty-minute period. The second part consisted of four minutes of different activities. These consisted of:

1. Running in place. This consisted of ten seconds running and ten seconds of resting for ten consecutive trials.
2. Rope skipping. Subjects participated in a regimen of rope skipping with alternating maximal and moderate effort. The instructor set the pace and asked the subjects to stay with it as closely as possible.
3. Bench stepping. Subjects stepped up and down on a seventeen inch-high bench at the rate of thirty steps per minute. Cadence of the stepping was controlled by a metronome.
4. Continued volleyball instruction. For the first three weeks, the duration of treatment period was three minutes and twenty seconds (to conform to Carlson spot-running technique). The second three weeks, it was extended twenty seconds.

From the results of the tests, one may conclude that cardiovascular efficiency increased significantly over the experimental period. The Harvard Step Test was used as the

criterion of measurement of the cardiovascular fitness. The tests were given every three weeks during the winter quarter. Performance for all subjects increased significantly at the .05 level of confidence. In terms of "absolute values" of gain score, the treatment groups ranked: (a) running in place (+15); (b) rope skipping (+13); (c) bench stepping (+8); and (d) continued volleyball instruction (+4). Regardless of approach, each population achieved equally in terms of volleyball instruction.⁴

Glad made a study to determine cardiovascular efficiency by isometric and isotonic exercises. The cardiovascular efficiency of sixty-three male college students was measured by recording their working pulse rates while they rode a bicycle ergometer for five minutes at a rate of 1200 kilogram meters per minute.

On the basis of pulse test information, the subjects were assigned to three matched groups. Two of the groups engaged in twelve weeks of training, one using isometric exercises and the other isotonic exercises, while the third group remained inactive except for normal routine student life.

The statistical treatment revealed that both exercise groups increased their fitness levels at the .05 level

⁴Leon Garrett, Mohammed Sabie, and Ray Pangle, Research Quarterly, XXXVI, December, 1965.

of confidence. There was no significant difference between the two exercising groups.⁵

A study by Milton to determine the effects of three programs of distance running and a program of isometric exercises upon the development of cardiovascular efficiency.

This consisted of distance running by 463 college males at the Kansas State Teachers College of Emporia. The group was divided into four sub-groups as follows: Group I ran for ten minutes each day; Group II ran twenty minutes each session; Group III ran thirty minutes each session; and Group IV engaged in thirty minutes of isometric exercises each session.

All groups trained four days each week, Monday through Thursday, for seven weeks. Each group was given the Harvard Step Test as the initial measure of cardiovascular efficiency.

They were again given the Harvard Step Test at the end of the training period. The significance of the mean gain between initial and final Harvard Step Test scores was established for each group. Analysis of variance and orthogonal comparisons were used to compare the effectiveness of the four programs on cardiovascular efficiency improvement. Regression was employed to determine any relationship

⁵Harold L. Glad, Abstracts of Research Papers, A.A.H.P.E.R., 1967 National Convention, p. 19.

between amount of running and cardiovascular fitness among running groups. The effects of the training programs were further analyzed for subject of high and low initial cardiovascular condition.

The findings were as follows:

1. Cardiovascular efficiency may be significantly improved by participation in running programs, and also by isometrics.
2. The running programs will bring about more improvement than isometrics.
3. Increasing running during training does not bring about proportionate increases in cardiovascular efficiency.
4. For subjects of high initial cardiovascular efficiency, running programs of ten and/or twenty minutes a day are most effective in producing cardiovascular fitness. Also, an isometric exercise program is as effective as a program of running for thirty minutes a day in regard to changes in cardiovascular efficiency for subjects of high initial status.
5. For subjects of low initial cardiovascular fitness, all four training programs are equally effective in improving cardiovascular efficiency.
6. An isometric exercise program is significantly more effective in improving cardiovascular

efficiency for subjects of low initial fitness than for subjects of high initial cardiovascular fitness.⁶

Bartels, Billings, Fox, Mathews, O'Brian, Tanzi, and Webb experimented with interval training with respect to cardiorespiratory conditioning at Ohio State University.

Matched groups were trained at different frequencies for thirteen weeks. Groups, trained four times per week, were compared to those who trained twice a week. Before training, each subject was given the long form of the Harvard Step Test and rides of five-minute intervals on a bicycle ergometer with ten-minute rests between. The work load was arbitrarily set and adjusted so as to reach each subject's maximum VO_2 .

During the training period, time intervals were held for the 880-yard and 220-yard runs at two-week intervals. Statistical analysis of the variable t method was performed.

It was concluded that training twice a week was as beneficial as four times per week for cardiovascular conditioning.⁷

⁶George C. Milton, Kansas State Teachers College, Abstracts of Research Papers, Presented Central District Association for Health, Physical Education, and Recreation Convention, Denver, March 30, 1967.

⁷Robert Bartels, Ohio State University, "Interval Training and Cardiorespiratory Conditioning," Abstracts of Research Papers, 1968.

In a study made by Cunningham in 1938, he states,
" . . . It is indicated, however, that low pulse and latent recovery is indicative of outstanding performance in the middle and long distance events but not in the sprints."⁸

In order to examine the possible effects of strength training on cardiovascular condition, Nagle and Irwin trained forty college men on a high-and-low resistance weight lifting program for eight weeks. Using the bicycle ergometer as a work capacity test, they demonstrated that no change occurred in cardiovascular condition relative to a control group who engaged in mild recreational activity only.⁹

An investigation by Hamrick was designed primarily to compare the improvements made by subjects meeting conditioning classes two times a week (Tuesday and Thursday) with subjects meeting conditioning classes three times a week (Monday, Wednesday and Friday). Two groups of male college freshmen (N = 122) were formed and tested for eight components of fitness: cardiovascular endurance, agility, flexibility, speed of movement, arm strength, leg strength,

⁸Glenn Cunningham, "The Relationship of Selected Cardiovascular and Strength Measure to Physical Fitness of Outstanding Athletes" (unpublished Ph.D. thesis, New York, 1938).

⁹R. E. Nagle and T. Irwin, Research Quarterly of American Association of Health, Physical Education, and Recreation, 32:221, 1961.

abdominal strength, and grip strength. Subjects of both groups participated in an eight-week circuit training program which consisted of three hours of conditioning per week.

Analysis of variance was used and it was found that the three-times-a-week group was significantly superior to the twice-a-week group in developing cardiovascular endurance.¹⁰

Studies concerning the development of cardiovascular efficiency in the middle-aged. Cureton tested fifty middle-aged former athletes. Among them were Paavo Nurmi, a French tennis star; Henri Cochet and the American, Gil Dodds. On the average, the former champs were forty-five years old and had won their titles ten years before. Cureton declared that the athletes had less fat, better circulation and more efficient heart action than non-athletes of the same age. As for the occasional athlete who deteriorated in middle-age, Cureton believes it is because the champion quits exercising, takes up a sedentary life and eats and drinks to excess. Appetite, not exercise, is his downfall.¹¹

What can a man--a still young man--do when he gets heart disease? At Lackland Air Force Base, Texas, a

¹⁰Michael H. Hamrick, Memphis State University, Abstracts of Research Papers, A.A.H.P.E.R. Convention, 1968.

¹¹Look Magazine, December 14, 1954, pp. 18, 99-103.

thirty-one-year-old pilot was removed from flying status when a routine electrocardiogram test indicated heart disease of the type that could lead to a heart attack. When the test was repeated with the same result, he was removed permanently from flying duties. Unwilling to accept this passively, he decided to enter a progressive-exercise program under medical supervision. Over an eighteen-month period he trained until he became able to run twenty-five miles without stopping. By this time, tests revealed unusually good coronary-artery health and no sign of heart disease. He was returned to full flying duty, flying combat missions in Vietnam, reports Dr. K. H. Cooper of the USAF Hospital at the base.¹²

The following study, made by Bird and Alexander from the University of Minnesota, was to determine the effects an individually geared exercise program of sports activities participated in ad libitum has on certain cardiorespiratory functions of selected adult men:

Ten male subjects, ages 23-55 years, were recruited from the University of Minnesota faculty. Each subject was interviewed concerning his medical history and habits of physical activity. The Balke treadmill test was used to evaluate changes in fitness and was administered to each subject four times: (T_{1a}) preliminary familiarization, (T₁) preexercise, (T₂) after 11 weeks, (T₃) after 23 weeks. Following T₁ each subject embarked on a program of activity which was participated in ad libitum with no restrictions on the types of activities,

¹²Aerospace Medicine, XXXVIII, p. 964.

participation time, or intensity of activity. The only requirement was that the subject keep a log of every activity session recording the types of activities performed, minutes of participation in each activity, and a self-evaluation of the severity of each work-out.

Major findings: Paddleball, handball, squash, running, swimming, basketball, and the 5 BX program of exercise were participated in either singly or in combination, with the 5 BX program, paddleball, and running being the most popular activities. Over the 23 weeks the group averaged 1,525 minutes of activity (range 151-3, 955, SD 929) and 1.31 workouts per week (range 0.39-6.70, SD 0.73). Results showed significant increases in Balke score, maximum O_2 consumption, and cardiorespiratory efficiency. There were positive, significant rank order correlations between total minutes of activity, and O_2 consumption, and Balke score. Rank order correlations between age and other variables were not significant (range $r = -.32$ to $r = .285$).¹³

Studies concerning cardiovascular measurement. In speaking of cardiovascular efficiency, cardiovascular function, or cardiovascular respiratory measurement, we are concerned with the entire cardiovascular system. It would also include the elements of the system which are descriptive of the normal, during exercise, and after exercise functions.¹⁴

The history of cardiovascular measurements may be divided into two periods: (1) pre-1930, and (2) post-1930.¹⁵

¹³Patrick J. Bird, University of Minnesota, "Effects of an Individually Geared Exercise Program on Physical Fitness and Cardiorespiratory Efficiency of Adult Men," Abstracts of Research Papers, 1968.

¹⁴Leonard A. Larson and Michael L. Yocom, Measurements and Evaluation in Physical, Health, and Recreation Education (St. Louis: The C. B. Mosby Company), pp. 42-45.

¹⁵Ibid., pp. 42-45.

Cardiovascular tests were conducted by McCurdy, Barach, Barringer, Meylan, Schneider and Stone between 1910 and 1920. All of these tests made use of blood pressure as one of the main factors in determining fitness.¹⁶

One of the earliest tests was conducted by E. C. Schneider during World War I to test the fitness of soldiers. The items comprising the test were as follows:

1. Reclining pulse rate.
2. Increase in pulse rate standing.
3. Standing pulse rate.
4. Pulse rate increase immediately after exercise.
5. Return of pulse rate to standing normal after exercise.
6. Increase in systolic blood pressure standing compared to reclining.¹⁷

The Tuttle pulse-ratio test was another early test that utilized the cardiovascular function. This test is based on the ratio of the normal pulse rate before exercise and the pulse rate after two minutes of exercise.

The subject steps up and down on a thirteen-inch platform at a rate of from eighteen to forty steps per

¹⁶Ibid., pp. 42-45.

¹⁷E. C. Schneider, "A Cardiovascular Rating as a Measure of Physical Fatigue and Efficiency," Journal of the American Medical Association, LXXIV (May 29, 1920), p. 1507.

minute. The subject's normal pulse rate is determined, and then it is taken again after a two-minute period of exercise at the designated rate. The ratio of the two is then determined.

Example: Normal pulse rate is 70. Pulse rate after two minutes of thirty steps per minute is 196. Pulse ratio would then be 2.80. Low ratios constitute desirable scores; high ratios, undesirable scores.

Cardiovascular tests may be used as supplements to the medical examination, especially as checks on the condition of the circulatory system itself.¹⁸

The Stine Cardiac-Function test is another test designed to show how the heart reacts to work. In performing this test, Stine had the subject perform deep-knee bends to the point of "exhaustion." During the interval, the subject had a Bowles Stethoscope with a 5-cm. bowl and six feet of rubber tubing bandaged over the precordia. The deep-knee bends were performed at a rate of thirty-five per minute. Exhaustion was indicated by flushed face, breathlessness, and stumbling. The pulse was taken before the test, every ten seconds during exercise, with five second-intervals to record the rate. This gave a cardiac notation every five

¹⁸W. W. Tuttle, "The Use of the Pulse-Ratio Test for Rating Physical Efficiency," Research Quarterly, 2:5, May, 1931.

seconds. The results were then placed on a graph to give characteristic responses to the test.

The study showed that the normal heart had an average pulse rate of seventy-five before exercise, that at the end of five seconds of exercise it increased to 120 beats per minute then increased again from ten to thirty beats per minute when subject was allowed to rest for five seconds. With subjects who were in poor physical condition, the increase would be as much as fifty beats per minute increase.

The Stine test has a fair degree of accuracy, although it has not been expressed in correlation coefficients as is commonly done in educational measurements. The method used was to graph the results and make comparisons between what was considered well-trained, poorly-trained, and untrained subjects.¹⁹

McCurdy and Larson also constructed an organic efficiency test in which they selected five items from a total of twenty-six with which they experimented. An Organic Efficiency Index was established by combining the weighted scores of the five tests.²⁰

¹⁹Dan G. Stine, "Method of Testing Cardiac Function," Annals of Internal Medicine, 13:807, November, 1939.

²⁰J. H. McCurdy and L. A. Larson, "Measurements of Organic Efficiency for Prediction of Physical Condition," Research Quarterly, 6:11, May, 1935.

The five test elements were: (1) sitting diastolic blood pressure, (2) breath-holding for twenty seconds after stair climbing, (3) difference between standing normal pulse rate and pulse rate two minutes after exercise, (4) sitting pulse pressure, and (5) standing pulse pressure.

McCurdy and Larson found in another study that age-to-age variations may be significant when a number of years, considered as one period, are compared with a second group of years. Therefore, they set up age groups for testing as follows: eighteen to thirty-four, thirty-five to forty-nine, and fifty to eighty.²¹

In both tests cited above, the equipment necessary to perform the tests and time and personnel needed makes them rather difficult to use in general physical education classes. Besides the need for blood pressure equipment and Flarimeter's, it required from eight to ten minutes per subject to administer the test under very favorable conditions.

The evidence found in most cardiovascular tests seems to indicate the pulse ratio type test can be used to indicate the presence of organic heart defects.

In 1940, The Step Test was becoming popular as a means of determining physical fitness. As Murphy points out, "Cardiovascular tests have been generally considered

²¹J. H. McCurdy and L. A. Larson, "Age and Organic Efficiency," The Military Surgeon, 85:93, August, 1939.

useful in the fields of physical education for the purpose of evaluating physical fitness."²²

The need for a simple test that could be administered and scored easily was developed by Brouha while working at the Harvard fatigue laboratory during World War II. This test, known as the Harvard Step Test, became one of the most valid tests in determining cardiovascular efficiency. In 1943, Brouha, in his study, had this to say, "Large amounts of data prove conclusively that the Step Test can be used successfully in scoring general physical fitness in a given individual."²³

H. C. Carlson made a study called the Fatigue test, in which he had the subjects run in place as fast as they could for ten seconds, rest ten seconds, then run ten seconds. This was continued until they had completed ten innings of running and resting. The subjects would count the number of times their right foot hit the floor and would record it on a card during the rest period. During the test five pulse rates taken (1) before exercise, (2) ten seconds after exercise, (3) two minutes after exercise, (4) four

²²Mary Agnes Murphy, "A Study of the Primary Components of Cardiovascular Tests," Research Quarterly, 11:57-71, March, 1940.

²³Lucien Brouha, M.D., "Step Test - A Simple Method of Measuring Physical Fitness for Muscular Work in Young Men," Research Quarterly, March, 1943, p. 31.

minutes after exercise, and (5) six minutes after exercise. The subject counts his own pulse. By observing the number of times that the subjects right foot hits the floor and the rapidity with which the pulse rate returns to normal, one can determine condition. A high level of production and a rapid return of pulse rate to normal indicates a good condition.²⁴

In 1963, a study was made by Hodkins and Skubic in which they used a modified version of the Harvard Step Test to determine cardiovascular efficiency in college women. This test proved to be a valid and reliable measure of cardiovascular efficiency.²⁵

In a study made by Cureton, he obtained low coefficients varying between (.002) and (.31) with over two dozen tests of strength and endurance when compared with the results of the Harvard Step Test.²⁶

Bookwalter obtained similar results after comparing the scores of the same tests used by Cureton when

²⁴H. C. Carlson, "Fatigue Curve Test," Research Quarterly, 6:169-175, October, 1945.

²⁵Jean Hodkins and Vera Skubic, "Cardiovascular Efficiency Test Scores for College Women in the United States," Research Quarterly, 15:211-224, October, 1944.

²⁶Thomas K. Cureton, Physical Fitness Appraisal and Guidance (St. Louis: The C. B. Mosby Company, 1947), p. 288.

administered to 1,269 cadets in the Army Specialized Training Program.²⁷

Although Taddonio and Karpovich obtained a higher rank-difference correlation between the short form of the same cardiovascular test and intramural cross-country running (.61), the score was still too low to be significant.²⁸

However, in studies on Harvard under-graduates, it was found that the Harvard Step Test produced higher scores which varied least on athletes in training, and that scores improved under training and decreased after termination of training.²⁹

²⁷Karl W. Bookwalter, "A Study of the Brouha Step Test," The Physical Educator, 5:76, May, 1948.

²⁸A. A. Taddonio and P. V. Karpovich, "Harvard Step Test as a Measure of Endurance in Running," Research Quarterly, 22:381-384, October, 1951.

²⁹Lucien Brouha, Norman Fradd and Beatrice M. Savage, "Studies in Physical Efficiency of College Students," Research Quarterly, 15:211-224, October, 1944.

CHAPTER III

PROCEDURES OF STUDY

Subjects used in study. The college males used in this study were freshmen between the ages of seventeen and twenty-one, enrolled in the fall semester of 1966 at Kansas State Teachers College at Emporia.

Nature of physical education program from which they were selected. All subjects were enrolled in Physical Education Course No. 101. These classes were designed for development of physical fitness.

Method of selecting groups. The subjects were randomly assigned to three groups with forty to each group.

I. TESTING PROCEDURES

The initial and final tests were exactly alike. The test used was a modified Harvard Step Test. The steps used in the modified Harvard Step Test were the stadium bleachers, which were eighteen and one-half inches high. A tape recorder was used to give directions and cadence in the step test. Each subject was given a card with his name and the name of the tester. The card also had a place to record the three pulse rates for both pre and post-tests.

The 120 subjects were taken to the stadium and numbered off into groups of three. Each man had a card with

his name on it. Two men acted as pulse counters while the third man took the test. The subjects were told that when the tape recorder was turned on, that instructions would be given over the public address system from the press box.

The tape recorder was turned on and it stated that all men are numbered from one to three. All number ones were asked to face the steps and prepare to take the test. On the command "up," each subject placed his right or left foot upon the seat in front of him, whichever was most natural and convenient. He used either foot as a lead foot, and changed not more than three times during the five-minute exercise. On the count of two, he brought his opposite foot upon the seat with both legs straight. On the count of three, the first foot returned to the starting position and, on the count of four, the second foot returned to the starting position. This cadence of up, two, three, four, continued at a rate of thirty steps each minute for a duration of five minutes. Each subject was expected to keep up with the cadence of the recorder.

At the end of five minutes, the tape recorder asked all number ones to sit down on the stadium seat. The recorder then instructed the other two subjects to prepare to count the pulse of number one by checking the pulse rate at the right and left wrist respectively. They had one minute to make the necessary adjustments and find the pulse

on the inside of the wrist next to the thumb. On the command "count," the pulse was counted for twenty seconds. The time was determined by the command from the tape recorder as to when to start and when to stop. The counters then multiplied their count by three to convert pulse rates to beats per minute. This number was then recorded on the subjects' cards. Forty seconds later, the tape recorder again gave the command, "count," and a second period of counting of pulse took place. This procedure was repeated three times at one minute intervals. In like manner, each subject was tested by following the directions of the tape recorder. Number twos became the subjects and subjects one and subjects three acted as pulse counters. Should any subject fail to finish the five minutes, this was noted on his card and his pulse was counted for one minute after stopping along with the two succeeding counts. This was done with the use of an extra stop-watch and helper provided for such an emergency. It was not expected that there would be many who could not complete the test.

Time required for testing. Three class periods were used to administer the tests.

II. TRAINING PROCEDURE

Time required for orientation. Two periods were used to familiarize the participants with the six-twelve plan of

the Green Beret program. Each calisthenic and the method of progression was explained in detail.

Selection of leaders for groups. A leader for each group was selected and assigned. These leaders were upper-classmen who were majors in Physical Education from Kansas State Teachers College at Emporia.

Calisthenics selected for study. The calisthenics used in this study consisted of the six-twelve plan of the Green Beret physical fitness program. (Refer to Appendix for diagrams and explanation of the program.)

There are six groups of exercises with six exercises to each group. Each group becomes progressively more difficult and the subjects spent one week of four days on each set.

CHAPTER IV

ANALYSIS OF DATA

There was only one statistical analysis computed in studying the effects of the calisthenics program on the development of cardiovascular efficiency. This statistical method was the significance of the mean gain between the correlated means.

The data found in this study were gains made between the initial and final scores on the Harvard Step Test.

Significance of the mean gain for the group in the Harvard Step Test performance. To establish the significance of the mean gains in the Harvard Step Test performance, the t test was computed, comparing the initial and final mean cardiovascular efficiency scores for the total group. These data are presented in Table I for the group. In order to reach significance, a t of 2.00 was needed for the .05 level of probability and a t of 2.66 was required to be significant at the .01 level of significance.

From Table I, it can be seen that a significant t of 7.17 was found for the group.

The group had a mean difference between the initial and final cardiovascular efficiency scores of 16.66, resulting in a t of 7.17 which was highly significant at the .01 level of confidence. This obtainment of significance by the

group requires the rejection of the null hypothesis. The rejection of the null hypothesis thus allows the researcher to say with confidence that a similar group of subjects would be expected to have a significant increase in cardiovascular efficiency with the administration of the Green Beret six-twelve training program.

TABLE I

THE SIGNIFICANCE OF INITIAL AND FINAL CARDIOVASCULAR
SCORES OF THE TRAINING GROUP

<u>N</u>	Initial Mean	Final Mean	Mean Diff.	SD Diff.	<u>t</u>	P
61	172.79	156.13	16.66	2.60	7.17	.01

t needed: 2.00 for .05 level of probability
2.66 for .01 level of probability

CHAPTER V

SUMMARY

It was the purpose of this study to determine if a six-weeks program of calisthenics would significantly improve the cardiovascular efficiency of unselected college freshmen males.

By having the subjects take part in the six-twelve Green Beret program for thirty minutes, four times a week, Monday through Thursday, for six weeks, it was shown that it would significantly improve the cardiovascular efficiency of college males between the ages of 17-21.

I. FINDINGS

The findings of the study were as follows:

1. The training program produced a significant cardiovascular efficiency gain at the .01 level of confidence.

II. CONCLUSIONS AND ASSUMPTIONS

Within the limits of this study, the following general conclusions are justified:

1. We can conclude that the Green Beret six-twelve plan can produce a high level of cardiovascular efficiency.

2. Since it is more difficult to increase the cardiovascular efficiency in well-trained subjects, it was assumed that the subjects treated were not well trained. It was further assumed that the Harvard Step Test was a valid and reliable indicator of cardiovascular efficiency.

III. RECOMMENDATIONS FOR FURTHER STUDY

Since the American public will continue to have more leisure time, it behooves the physical educator to consider more ways in which people can develop strong, healthy bodies.

A vast amount of research must be continually carried on to answer the many questions that will be asked by the thousands who are seeking ways of keeping fit.

The following are just a few suggestions for research:

1. Make a comparison between grade school children who walk to school and do a considerable amount of hunting and outside activities with another group who ride to school and are not interested in outside activities such as hunting, fishing or games.
2. Compare a group of boys who have paper routes that are delivered by bicycle with a group of boys

who do not have any after-school job and who do not take part in active physical activities.

3. Make a study as to how long a high degree of cardiovascular efficiency can be maintained after a week's period of calisthenics, by comparing one group that stops training completely, a group that trains twice a week, and a group that trains three times each week.
4. Make a study as to methods of maintaining cardiovascular efficiency by various methods such as running a mile each day, swimming for ten minutes without stopping, or riding a bicycle for a distance of two miles in five minutes. All of the above should be performed six times each week.
5. Make a comparison between a group of boys participating in the varsity football program and a group who are considered the least active on the campus.
6. Make a study to determine how cardiovascular efficiency declines after a compulsory training period is ended.

BIBLIOGRAPHY

BIBLIOGRAPHY

Aerospace Medicine, 38:964.

Alexander, John F. and James E. Torpey. Minnesota Journal of Education, October, 1967, pp. 12-15.

Bagley, Nancy and Lona M. Bayer. "The Assessment of Somatic Androgyny," American Journal Physical Anthropology, 433:462, 1946.

Bartels, Robert, Ohio State University. "Interval Training and Cardiorespiratory Conditioning," Abstracts of Research Papers, 1968.

Bird, Patrick J., University of Minnesota. "Effects of an Individually Geared Exercise Program on Physical Fitness and Cardiorespiratory Efficiency of Adult Men," Abstracts of Research Papers, 1968.

Bookwalter, Karl W. "A Study of the Brouha Step Test," The Physical Educator, 5:76, May, 1948.

Brouha, Lucien, M.D. "Step Test - A Simple Method of Measuring Physical Fitness for Muscular Work in Young Men," Research Quarterly, March, 1943, p. 31.

_____, Norman Fradd, and Beatrice M. Savage. "Studies in Physical Efficiency of College Students," Research Quarterly, 15:211-224, October, 1944.

Carlson, H. C. "Fatigue Curve Test," Research Quarterly, 16:169-175, October, 1945.

Cunningham, Dr. Glenn. "The Relationship of Selected Cardiovascular and Strength Measures to Physical Fitness of Outstanding Athletes," Unpublished Ph.D. thesis, New York University, New York, 1938.

Cureton, Thomas K. Physical Fitness Appraisal and Guidance. St. Louis: The C. B. Mosby Company, 1947.

Garrett, Leon, Mohammed Sabie, and Ray Pangle. Research Quarterly, XXXVI (December, 1965).

Glad, Harold L. Abstracts of Research Papers. A.A.H.P.E.R., 1967 National Convention, p. 19.

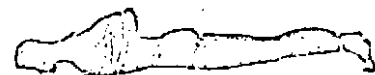
Hamrick, Michael H., Memphis State University. Abstracts of Research Papers. A.A.H.P.E.R., Convention, 1968.

- Hodkins, Jean and Vera Skubic. "Cardiovascular Efficiency Test Scores for College Women in the United States," Research Quarterly, XXXIV.
- Larson, Leonard A. and Rachael D. Yocum. Measurements and Evaluation in Physical, Health, and Recreation Education. St. Louis: The C. B. Mosby Company, pp. 42-45.
- Look Magazine, December 14, 1954, pp. 18, 99-103.
- McCurdy, J. H. and L. A. Larson. "The Measurement of Organic Efficiency for the Prediction of Physical Condition in Convalescent Patients," Research Quarterly, December, 1935, p. 78.
- McCurdy, J. H. and L. A. Larson. "Age and Organic Efficiency," The Military Surgeon, 85:93, August, 1939.
- Milton, Dr. George C., Kansas State University. Abstracts of Research Papers. Presented Central District Association for Health, Physical Education, and Recreation Convention, Denver, March 30-31, 1967.
- Murphy, Mary Agnes. "A Study of the Primary Components of Cardiovascular Tests," Research Quarterly, March, 1940, pp. 57-71.
- Nagle, R. E. and T. Irwin. Research Quarterly of American Association of Health, Physical Education, and Recreation, 32:221, 1961.
- Schneider, E. C. "A Cardiovascular Rating as a Measure of Physical Fatigue and Efficiency," Journal of the American Medical Association, 74:1507, May 29, 1920.
- Stine, Dan G. "Method of Testing Cardiac Functioning," Annals of Internal Medicine, 13:807, November, 1939.
- Taddonio, A. A. and P. V. Karpovich. "Harvard Step Test as a Measure of Endurance in Running," Research Quarterly, XXII, October, 1951.
- Tuttle, W. W. "The Use of the Pulse-Ratio Test for Rating Physical Efficiency," Research Quarterly, 2:5, May, 1931.

APPENDIX

PROGRESSION GUIDE					YOUR PROGRESS	
AGE GROUP	LEVEL	EXERCISES			DATE STARTED	DATE FINISHED
		1	2	3		
17 to 29	A	15	13	14	LEVEL A	9-19 9-22
	B	13	16	13		
	C	11	14	12		
30 to 39	A	13	14	12	2	
	B	11	13	11	3	
	C	9	12	10		
40 to 44	A	11	11	10	LEVEL B	1
	B	9	10	9		
	C	7	9	8		
45 to 49	A	9	8	8	LEVEL C	2
	B	7	7	7		
	C	5	6	6		
50 to 59	A	7	6	6	LEVEL D	3
	B	5	5	5		
	C	3	4	4		
60 and over	A	4	5	4	LEVEL E	1
	B	3	4	3		
	C	2	3	2		
Minutes for each exercise		2	1	1	3	

Started at 10-1-68 for one day, then went to 10-1-68 for next 3 days

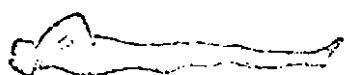


2. Kneeling front rest, hands shoulder width apart. The weight is supported on the knees and by the arms.

— Bend elbows and lower body until chest touches the floor. Keeping knees on the floor, raise body by straightening the arms.

— Down and up is one repetition.

EXERCISE 3



3. Supine position, fingers interlaced and placed behind the head.

— Maintaining the heels on the floor, raise the head and shoulders until the heels come into view. Lower the head and shoulders until fingers contact the floor and head rests on the hands.

— Up and down is one repetition.

EXERCISE 1



1. Side straddle, arms overhead and straight, palms facing.

— Turn trunk to the left and bend forward over the left thigh, attempt to touch the fingertips to the floor outside the left foot, keep the knees straight. Alternate the movement to the opposite side.

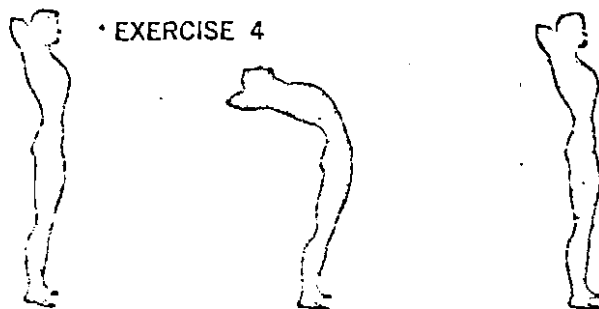
— Down and up to one side is one repetition.

6-12 PLAN

TABLE 1
(Continued)

PROGRESSION GUIDE					YOUR PROGRESS	
AGE GROUP	LEVEL	EXERCISES			DATE STARTED	DATE FINISHED
		4	5	6		
17 to 29	A	15	15	250	LEVEL A	
	B	13	13	235		
	C	11	11	215		
30 to 39	A	13	13	200	LEVEL A	
	B	11	11	185		
	C	9	9	165		
40 to 44	A	11	11	150	LEVEL A	
	B	9	9	135		
	C	7	7	120		
45 to 49	A	9	9	100	LEVEL B	
	B	7	7	90		
	C	5	5	80		
50 to 59	A	7	7	75	LEVEL B	
	B	5	5	70		
	C	3	3	60		
60 and over	A	4	4	50	LEVEL C	
	B	3	3	40		
	C	2	2	30		
Minutes for each exercise		1	2	5		

EXERCISE 4

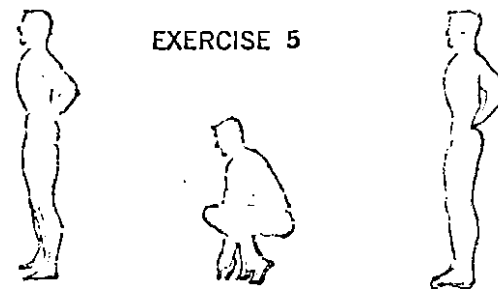


4. Body erect, feet slightly spread, fingers interlaced and placed on rear of neck at base of the head.

— Bend the upper trunk backward, raise the chest high, pull the elbows back, and look upward. Keep the knees straight. Recover to the erect position, eyes to the front.

— Bending backward and recovery is one repetition.

EXERCISE 5

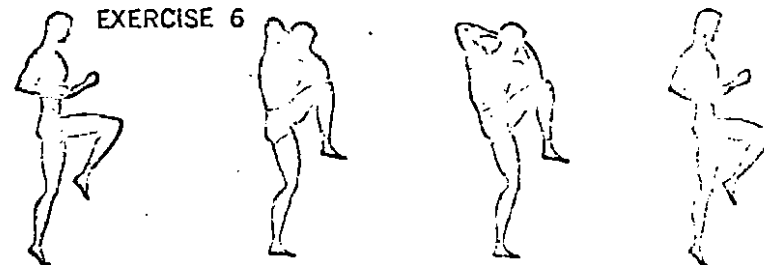


5. Body erect, feet spread less than shoulder width, hands on hips, elbows back.

— Do a full knee bend, at the same time bend slightly forward at the waist. Touch the floor with the extended fingers, keeping the hands about six inches apart. Resume the starting position.

— Down into the touch position and return to the starting position is one repetition.

EXERCISE 6



6. Run in place, lift feet 4 to 6 inches off floor. At the completion of every 50 steps do 10 "Steam Engines". Repeat sequence until the required number of steps is completed.

— Count a step each time left foot touches the floor.

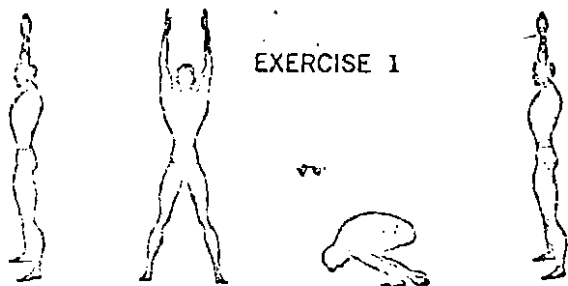
Steam Engines — Lace the fingers behind the neck and while standing in place raise the left knee above the waist height, at the same time twist the trunk and lower the right elbow to the left knee. Lower the left leg and raise the right leg touching the knee with the left elbow thus completing the movement to that side. Continue to alternate the movement until the sequence is completed.

6-12 PLAN

TABLE 2

(See pp. 20-21 for remainder of exercise set)

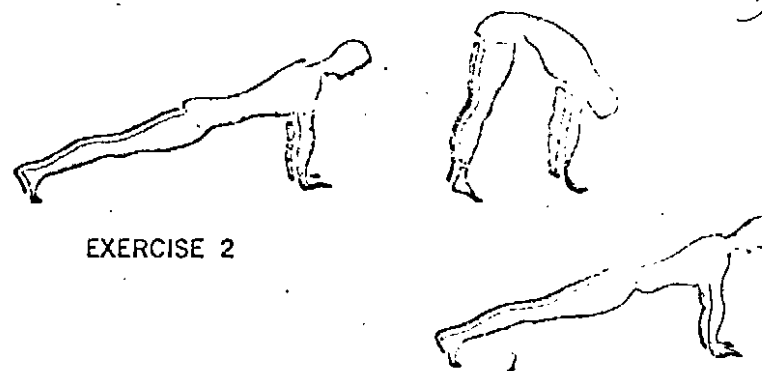
PROGRESSION GUIDE					YOUR PROGRESS		
AGE GROUP	LEVEL	EXERCISES			DATE FINISHED	DATE STARTED	
		1	2	3			
17 to 29	A	17	17	17	LEVEL A	9-26	9-29
	B	15	15	15		2	
	C	13	13	13		3	
30 to 39	A	15	15	15	LEVEL B		
	B	13	13	13			
	C	11	11	11			
40 to 44	A	13	13	13	LEVEL C		
	B	11	11	11		1	
	C	9	10	9		2	
45 to 49	A	11	11	11	LEVEL D		
	B	9	9	9		3	
	C	7	7	7			
50 to 59	A	9	9	9	LEVEL E		
	B	7	7	7		1	
	C	5	5	5		2	
60 and over	A	6	7	7	LEVEL F		
	B	5	5	5		3	
	C	4	4	4			
Minutes for each exercise		1	1	1			



EXERCISE 1

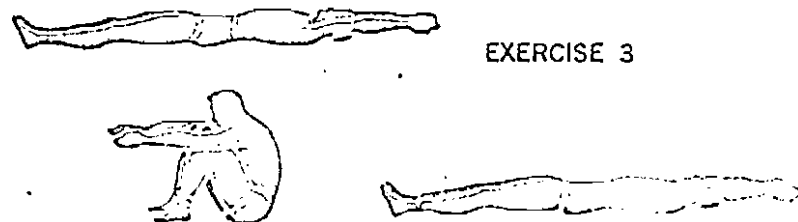
1. Wide side straddle, arms overhead and straight, palms facing.

- Bend at the knees and the waist, swing the arms down, and reach between the legs as far as possible, looking at the hands. The thighs are parallel to the floor during the bend.
- Recover to the starting position with a sharp movement.
- Down and up is one repetition.



EXERCISE 2

2. Front leaning rest position with body straight from head to heels.
- Bending at the waist and keeping the knees locked, jump forward to a jack-knife position bringing the feet as close to the hands as possible. With the weight on the hands, thrust the legs to the rear resuming the front leaning rest position.
 - Up into the jack-knife position and return to the front leaning rest position is one repetition.



EXERCISE 3

3. Supine position with arms straight overhead, palms facing.
- With a sharp movement sit up, bringing the heels as close to the buttocks as possible and the knees to the chest. Swing the arms in an arc overhead to a position outside the knees and parallel to the floor. To recover, swing the arms overhead keeping them straight. At the same time move the legs forward until they are straight.
 - Sitting up and returning to the supine position is one repetition.

6-12 PLAN

TABLE 2
(Continued)

PROGRESSION GUIDE				YOUR PROGRESS	
AGE GROUP	LEVEL	EXERCISES			
		5	5	6	
17 to 29	A	9	19	300	LEVEL A
	B	8	17	270	
	C	7	15	245	
30 to 39	A	8	17	235	LEVEL A
	B	7	15	210	
	C	6	13	190	
40 to 44	A	7	15	175	LEVEL A
	B	6	13	155	
	C	5	11	135	
45 to 49	A	6	13	125	LEVEL B
	B	5	11	110	
	C	4	9	100	
50 to 59	A	5	11	95	LEVEL B
	B	4	9	85	
	C	3	7	75	
60 and over	A	4	9	70	LEVEL C
	B	3	7	60	
	C	2	5	50	
Minutes for each exercise		1½	1½	6	

EXERCISE 4



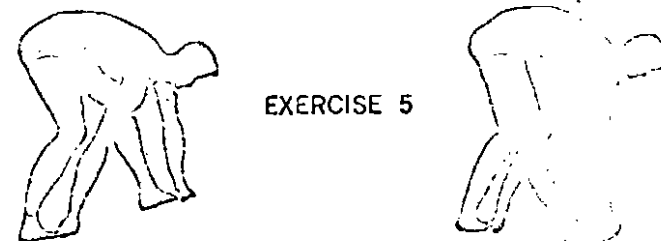
4. Feet spread more than shoulder width apart, fingers laced behind the neck and elbows back.

— Bend forward at the waist vigorously, then twist the trunk to the left, then to the right and return to the erect position.

— Keep the knees locked and back straight.

— Bend forward, twist left, twist right, and return to the erect position is one repetition.

EXERCISE 5

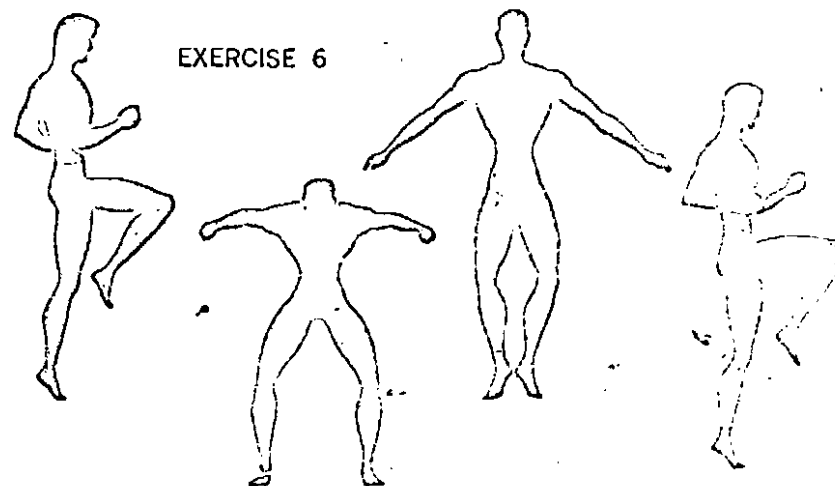


5. Bend forward at the waist, grasping the right toes with right hand, left toes with left hand. Knees are slightly bent.

— Walk forward retaining this position.

— Count a repetition each time a foot contacts the floor.

EXERCISE 6



6. Run in place, lift feet 4 to 6 inches off floor. At the completion of every 50 steps do 10 "Heel Clicks". Repeat sequence until the required number of steps is completed.

— Count a step each time left foot touches the floor.

Heel Clicks — Jump upward about 12 inches and bring the heels together. Before landing on the floor, separate the feet 15 to 18 inches. Immediately upon contact with the floor repeat the jump and heel click.

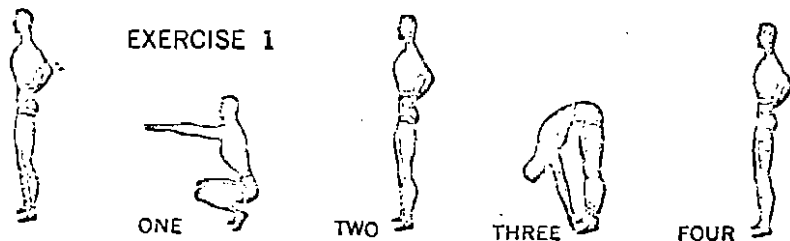
6-12 PLAN

TABLE 3

(See pp. 24-25 for remainder of exercise set)

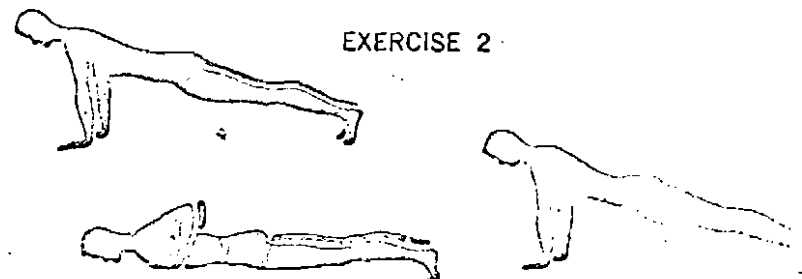
PROGRESSION GUIDE				YOUR PROGRESS	
AGE GROUP	LEVEL	EXERCISES		DATE STARTED	DATE FINISHED
17 to 29	A	10	19	10-3	10-7
	B	9	17		
	C	8	15		
30 to 39	A	9	17	LEVEL A	
	B	6	15		
	C	7	13		
40 to 44	A	8	15	LEVEL B	
	B	7	13		
	C	6	11		
45 to 49	A	7	13	LEVEL C	
	B	6	11		
	C	5	9		
50 to 59	A	6	11	LEVEL D	
	B	5	9		
	C	4	7		
60 and over	A	5	9	LEVEL E	
	B	4	7		
	C	3	5		
Minutes for each exercise	1 1/2	1	1	3	

EXERCISE 1

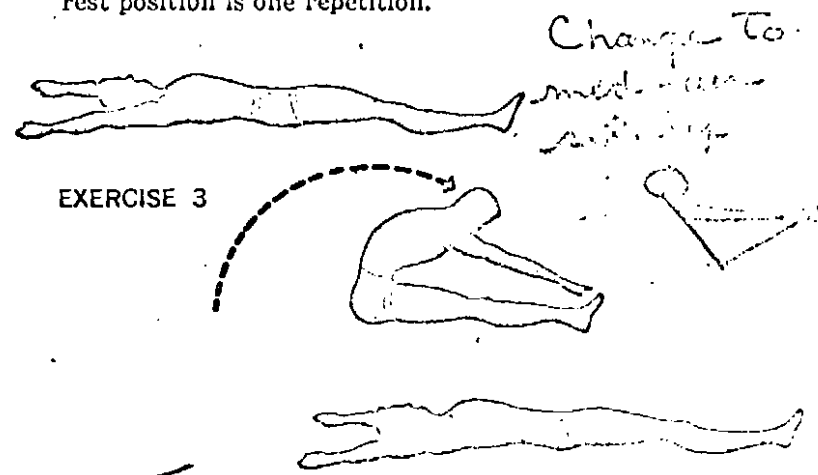


1. Feet spread less than shoulder width apart, hands on hips, elbows back.
 - Do a full knee bend, trunk erect and thrust the arms forward. Recover to the erect position, and with knees locked, bend forward at the waist and touch the toes and recover to the erect position.
 - Down into the full knee bend, recover, touch toes and recover is one repetition.

EXERCISE 2



2. Front leaning rest position with body straight from head to heels:
 - Lower the body until the chest touches the floor, keep body straight. Recover by straightening the arms and raising the body.
 - Down and touch the floor and recovery to the front leaning rest position is one repetition.



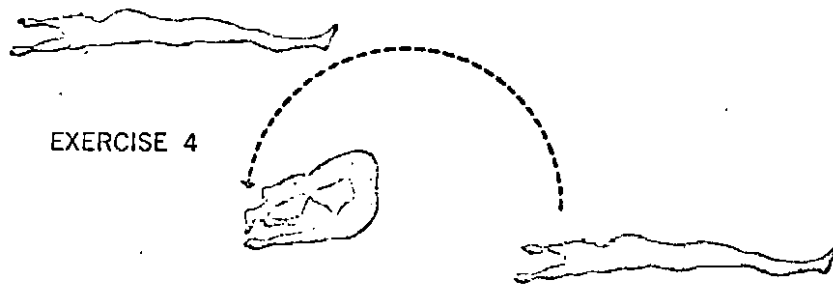
EXERCISE 3

3. Supine position, arms overhead, palms facing.
 - With a sharp movement sit up, thrust the arms forward and touch the toes.
 - Keep the legs straight and the heels in contact with the floor.
 - Sit up, touch toes, and resume the supine position is one repetition.

6-12 PLAN

TABLE 3
(Continued)

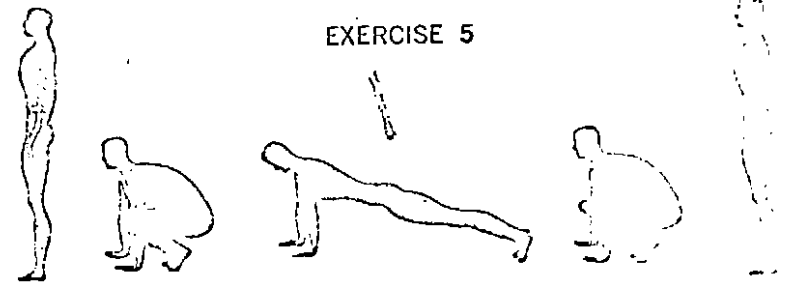
PROGRESSION GUIDE				YOUR PROGRESS	
AGE GROUP	LEVEL	4	5	6	
17 to 29	A	16	10	350	LEVEL A
	B	15	9	315	
	C	14	8	280	
30 to 39	A	14	9	270	LEVEL A
	B	13	8	240	
	C	12	7	210	
40 to 44	A	12	8	200	LEVEL A
	B	11	7	180	
	C	10	6	160	
45 to 49	A	10	7	150	LEVEL B
	B	9	6	135	
	C	8	5	120	
50 to 59	A	8	6	115	LEVEL B
	B	7	5	105	
	C	6	4	95	
60 and over	A	7	5	90	LEVEL C
	B	6	4	80	
	C	4	3	70	
Minutes for each exercise		1½	1	6	



EXERCISE 4

4. Supine position, arms overhead, palms upward.

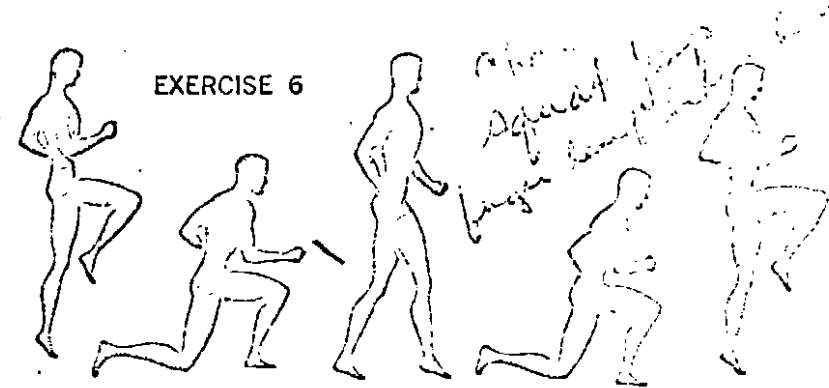
- Raise the legs and swing them backward over the head until toes touch the floor. Recover by returning legs to the starting position.
- Touch toes overhead and recover to supine position is one repetition.



EXERCISE 5

5. Erect position, feet together.

- Bend knees and place hands on floor, shoulder width apart. Thrust legs to the rear, body straight from head to heels. Move legs forward assuming squat position, elbows inside of knees. Assume erect position.
- Down into full squat, legs to the rear, back to full squat and return to the erect position is one repetition.



EXERCISE 6

6. Run in place, lift feet 4 to 6 inches off floor. At the completion of every 50 steps do 10 "Knee Touches". Repeat sequence until the required number of steps is completed.
- Count a step each time left foot touches the floor.

Knee Touches — From a stride position, bend the knees and touch the knee of the rear leg to the floor, straighten legs, jump upward and change position of the feet. Again bend knees and touch the opposite knee. Continue alternately touching each knee.

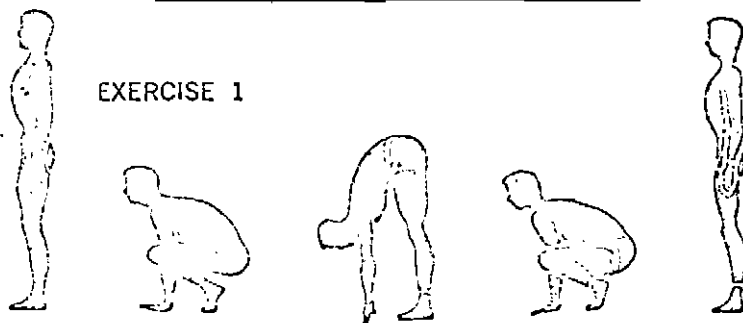
6-12 PLAN

TABLE 4

(See pp. 28-29 for remainder of exercise set)

PROGRESSION GUIDE					YOUR PROGRESS	
AGE GROUP	LEVEL	EXERCISES			DATE STARTED	DATE FINISHED
		1	2	3		
17 to 29	A	12	9	12	LEVEL A	
	B	11	8	11		
	C	10	7	10		
30 to 39	A	11	8	11	LEVEL A	
	B	10	7	10		
	C	9	6	9		
40 to 44	A	10	7	10	LEVEL A	
	B	9	6	9		
	C	8	5	8		
45 to 49	A	8	6	8	LEVEL B	
	B	7	5	7		
	C	6	4	6		
50 to 59	A	6	5	6	LEVEL B	
	B	5	4	5		
	C	4	3	4		
60 and over	A	5	4	5	LEVEL C	
	B	4	3	4		
	C	3	2	3		
Minutes for each exercise		1	2	1	3	

EXERCISE 1



1. Erect position, hands at sides, feet spread slightly.

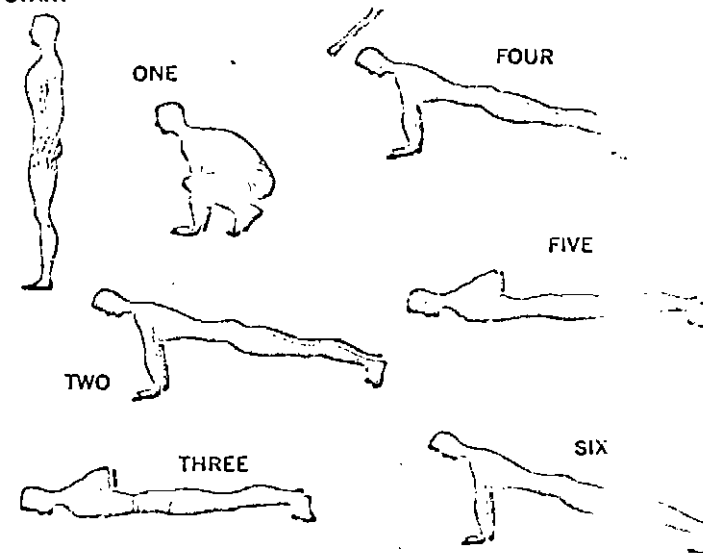
— Bend knees, incline trunk forward, and place hands on floor between legs. Straighten knees, keeping feet in place and fingers touching floor. Again bend knees and resume the first position. Recover to the erect position.

— The above sequence is one repetition.

START

EXERCISE 2

SEVEN

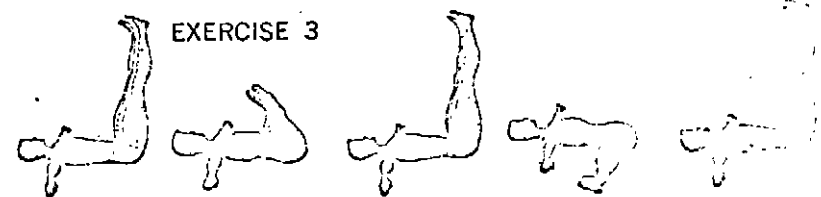


2. Erect position, hands at sides, feet together.

— Bend knees, place hands on floor between legs. Thrust legs to the rear. Execute two complete push-ups and then thrust the legs forward bending the knees with arms between the knees. Recover to the erect position.

— The completion of all eight counts is one repetition.

EXERCISE 3



3. Back position with arms out to sides and legs raised to the vertical.

— Lower legs to the left, raise legs to the vertical, lower to the right, again raise to the vertical.

— Keep legs together and the head and hands in contact with the floor throughout the exercise.

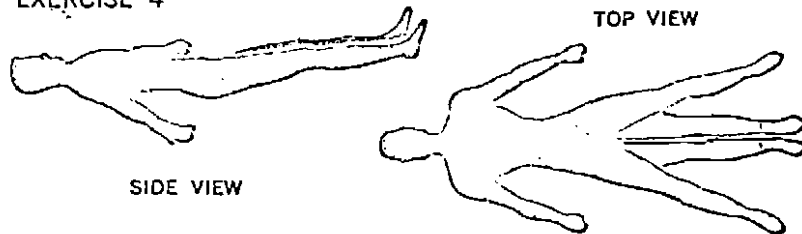
— The above sequence is one repetition.

6-12 PLAN

TABLE 4
(Continued)

PROGRESSION GUIDE					YOUR PROGRESS	
AGE GROUP	LEVEL	EXERCISES			DATE STARTED	DATE FINISHED
17 to 39	A	24	25	400	LEVEL A	
	B	22	23	320		
	C	21	21	360		
30 to 39	A	23	23	305	LEVEL A	
	B	21	21	290		
	C	20	20	275		
40 to 44	A	20	21	225	LEVEL A	
	B	18	18	215		
	C	16	16	205		
45 to 49	A	16	16	175	LEVEL B	
	B	14	14	165		
	C	12	12	155		
50 to 59	A	13	13	135	LEVEL B	
	B	11	11	130		
	C	10	10	120		
60 and over	A	10	10	100	LEVEL C	
	B	9	9	95		
	C	8	8	90		
Minutes for each exercise	1	1	6			

EXERCISE 4

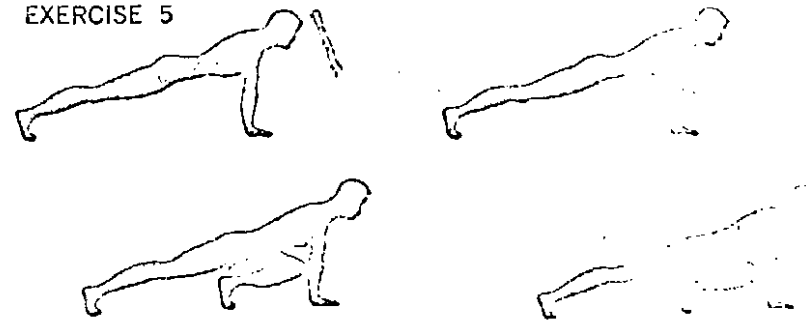


- From back position, raise legs with heels 10 to 12 inches from the floor.

— Spread legs as far as possible, close them together. Continue to open and close legs until required repetitions have been completed.

— Opening and closing legs is one repetition.

EXERCISE 5

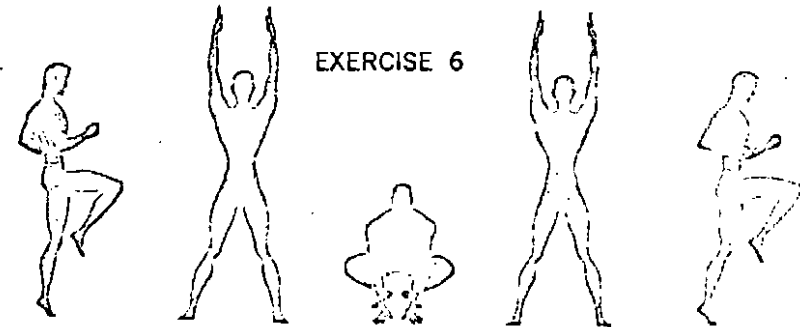


- Front leaning rest position, body straight from head to heels.

— Bend the left knee and bring the left foot as far forward as possible, return left leg to original position. Repeat movement with the right leg. Continue exercise alternating left and right legs.

— A leg thrust forward and returned to the rear is one repetition.

EXERCISE 6



- Run in place, lift feet 4 to 6 inches off floor. At the completion of every 50 steps do 10 "Jumping Jacks". Repeat sequence until the required number of steps is completed.

— Count a step each time left foot touches the floor.

Jumping Jacks — Feet spread shoulder width apart, arms extended overhead. Jump upward, bring heels together and at same time squat to a full knee bend position, bring the arms downward and place hands on the floor elbows inside of knees, directly under the shoulders. Jump to the side straddle and swing the arms sideward overhead.

TABLE 5

(See pp. 32-33 for remainder of exercise set)

PROGRESSION GUIDE					YOUR PROGRESS		
AGE GROUP	LEVEL	EXERCISES			DATE STARTED	DATE FINISHED	
		1	2	3			
17 to 29	A	14	13	28	LEVEL A	1	10-1
	B	13	12	27		2	
	C	12	11	26		3	
30 to 39	A	12	12	25	LEVEL B	1	
	B	11	11	24		2	
	C	10	10	23		3	
40 to 44	A	11	11	23	LEVEL C	1	
	B	10	10	21		2	
	C	9	9	19		3	
45 to 49	A	9	9	20	LEVEL D	1	
	B	8	8	18		2	
	C	7	7	16		3	
50 to 59	A	7	7	16	LEVEL E	1	
	B	6	6	14		2	
	C	5	5	12		3	
60 and over	A	6	6	12	LEVEL F	1	
	B	5	5	11		2	
	C	4	4	9		3	
Minutes for each exercise		2	1	1			



EXERCISE 1

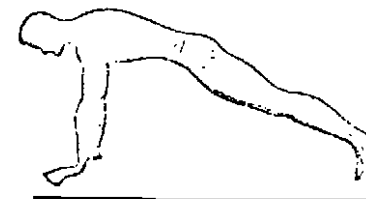
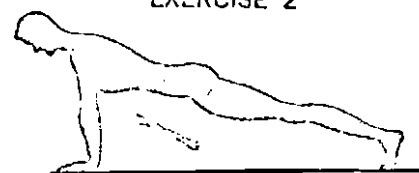
1. Feet spread more than shoulder width, arms sideward at shoulder level, palms up.

— Turn trunk to the left as far as possible then recover slightly, repeat to the left and recover slightly. Turn trunk to the right as far as possible, recover slightly, repeat to the right and recover slightly.

— The head and hips remain to the front throughout the exercise.

— The above sequence is one repetition.

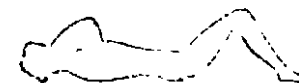
EXERCISE 2



2. Front leaning rest position, body straight from head to heels.
 - Bend the elbows slightly and push with the hands and toes, bouncing the body upward and completely off the floor. In contact with the floor resume the front leaning rest position.
 - Propelling the body upward and the return to the floor is one repetition.



EXERCISE 3



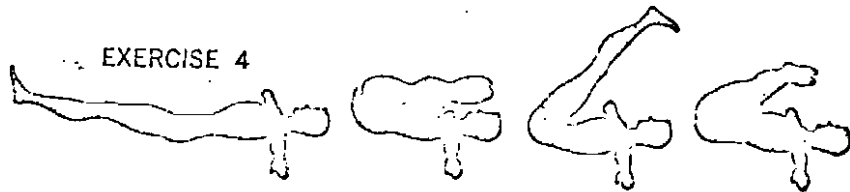
3. Back position, hands interlaced and placed under head, knees bent with feet flat on the floor.

— Sit up bending the trunk forward and attempting to touch the chest to the thighs. Recover to the back position without moving the feet.

— Sit up, and recovery to the back position is one repetition.

TABLE 5
(Continued)

PROGRESSION GUIDE				YOUR PROGRESS	
AGE GROUP	LEVEL	EXERCISES			
		4	5	6	
17 to 29	A	14	30	450	LEVEL A
	B	13	28	430	
	C	12	26	410	
30 to 39	A	12	26	350	LEVEL A
	B	11	24	330	
	C	10	22	310	
40 to 44	A	11	23	250	LEVEL A
	B	10	21	240	
	C	9	19	230	
45 to 49	A	9	20	200	LEVEL B
	B	8	18	190	
	C	7	16	130	
50 to 59	A	7	16	170	LEVEL B
	B	6	14	155	
	C	5	12	140	
60 and over	A	6	12	115	LEVEL C
	B	5	10	110	
	C	4	9	105	
Minutes for each exercise		2	1	5	



EXERCISE 4

4. On back, arms sideward, feet raised 12 inches from the floor, knees straight.

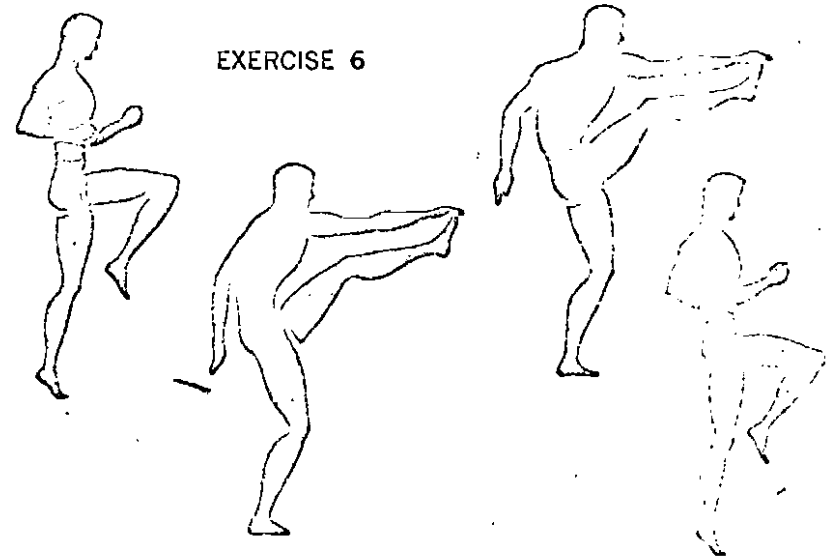
- Keeping the legs together, swing legs as far to the left as possible, swing legs overhead, then to the right as far as possible and recover by swinging legs to the front.
- Legs stop momentarily at each position and do not contact floor until all repetitions are complete.
- One repetition is completed when legs make the complete circle.



EXERCISE 5

5. From a stride position do a deep knee bend and grasp the right ankle with the right hand, left ankle with the left hand, arms outside knees.

- Walk forward maintaining the grasp of the ankles.
- One repetition is counted each time the left foot contacts the floor.



EXERCISE 6

6. Run in place, lift feet 4 to 6 inches off floor. At the completion of every 50 steps do 10 "Hand Kicks". Repeat sequence until required number of steps is completed.

Hand Kicks — Stand in place and kick left leg upward, at the same time extend the right arm touching the toe and hand. Repeat with right leg, extending left arm.

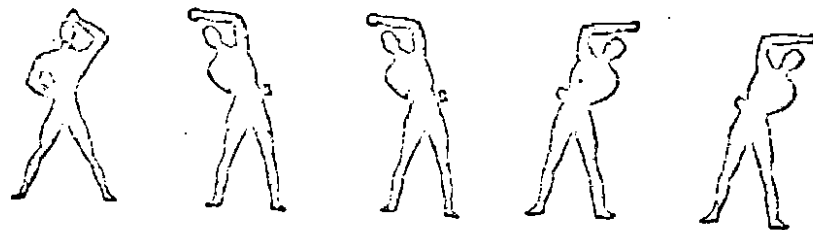
6-12 PLAN

TABLE 6

(See pp. 36-37 for remainder of exercise set)

PROGRESSION GUIDE					YOUR PROGRESS	
AGE GROUP	LEVEL	EXERCISES			DATE STARTED	DATE FINISHED
		1	2	3		
17 to 29	A	17	15	32	LEVEL A	
	B	16	14	30		
	C	15	13	28		
30 to 39	A	15	13	30	LEVEL A	
	B	14	12	28		
	C	13	11	26		
40 to 44	A	13	10	27	LEVEL A	
	B	12	9	25		
	C	11	8	23		
45 to 49	A	11	9	23	LEVEL B	
	B	10	8	21		
	C	9	7	19		
50 to 59	A	9	8	19	LEVEL B	
	B	8	7	17		
	C	7	6	15		
60 and over	A	8	7	15	LEVEL C	
	B	7	6	13		
	C	5	5	10		
Minutes for each exercise		2	1	1	3	

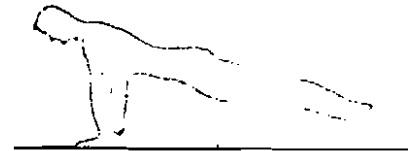
EXERCISE 1



1. Feet spread shoulder width apart, left fist clenched and overhead, right fist clenched at waistline in rear of body.

— Simultaneously thrust the left fist as far to the right as possible and the right fist as far to the left as possible. Recover and repeat. Reverse the hands with the right fist above the head and the left in rear at the waistline. Repeat the movement to the opposite side by thrusting the upper body to the left with the arm motion.

EXERCISE 2



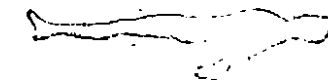
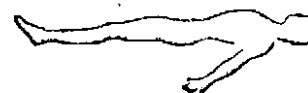
— The above sequence is one repetition

2. Front leaning rest position

— Bend elbows slightly and push with the hands and toes, bouncing the body upward and completely off the floor. At the height of the bounce, clap the hands and quickly return them to a position directly under the shoulder to catch the body weight.

— Push off the floor, clap hands, and return to the front leaning rest position is one repetition.

EXERCISE 3



3. Back position, arms extended to the side at 45 degrees.

— Raise the legs and the trunk into a V position bringing the trunk and legs as close as possible. Return to back position.

— Raising the legs and trunk and recovery to the back position is one repetition.

6-12 PLAN

TABLE 6
(Continued)

PROGRESSION GUIDE					YOUR PROGRESS	
AGE GROUP	LEVEL	EXERCISES			DATE STARTED	DATE FINISHED
		4	5	6		
17 to 29	A	32	35	500	LEVEL A	1
	B	30	33	480		
	C	28	31	460		
30 to 39	A	30	31	400	LEVEL A	2
	B	28	29	380		
	C	26	27	360		
40 to 44	A	27	27	310	LEVEL A	3
	B	25	25	285		
	C	23	23	265		
45 to 49	A	23	23	250	LEVEL B	1
	B	21	21	230		
	C	19	19	210		
50 to 59	A	19	19	200	LEVEL B	2
	B	17	17	190		
	C	15	15	175		
60 and over	A	15	17	140	LEVEL C	3
	B	13	15	130		
	C	10	12	120		
Minutes for each exercise		1	1	6		

EXERCISE 4



4. Prone position with hands clasped in small of the back.

— Arch the body, holding the head back and rock forward, relax and repeat the movement.

— Arch the body, rock forward, and relax is one repetition.

EXERCISE 5

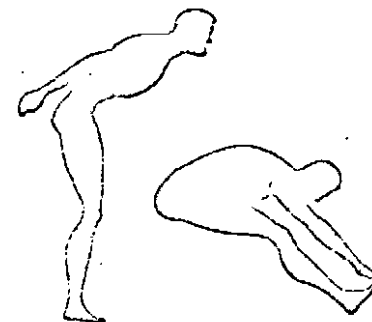


5. From a sitting position lift the hips, supporting the body on the hands and feet.

— By moving the arms and legs walk on all fours either forward or backward.

— A repetition occurs each time the left hand contacts the floor.

EXERCISE 6



6. Run in place, lift feet 4 to 6 inches off floor. At the completion of every 50 steps do 10 "Pike Jumps". Repeat sequence until required number of steps is completed.

Pike Jumps — Jump forward and upward from both feet, keeping the knees straight. Swing the legs forward and touch the toes with the hands at the top of each jump.