MEASUREMENT OF THE RELATION OF INTELLIGENCE TO CREATIVE ABILITIES: CASE STUDY OF POST PRIMARY STUDENTS IN KADUNA STATE.

by

BASHIR KOLAWOLE OLORUKO-OBA

BA(HONS).(A.B.U) P.G.D.E..M.A.

DISSERTATION

Presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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AHMADU BELLO UNIVERSITY,
ZARIA.
1981.

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PROFESSOR S. IREIN WANGBOJE,
External Examiner.

Date 6/2/82

PROFESSOR SALIHU SULEIMAN.
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Title of Thesis: Measurement of the relation of Intelligence to Creative Abilities: Case Study of Post-Primary School Pupils in Kaduna State.

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TO:

BOLA

BOLAJI

BUKOLA

BIOLA

BUSOLA, AND

THE ENTIRE OLORUKOOBA FAMILY,

THROUGH WHOSE INSPIRATIONS,

THIS STUDY HAS GERMINATED.

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For the ultimate aim of education is nothing other than the creation of human beings, in the fullness of their capacities. Through the making of human beings, of men and women generous in aspiration, liberal in thought, cultivated in taste, and equiped with knowledge and competent method, society itself is constantly remade, and with this remaking the world itself is re-created.

_____John Dewey.

CHAPTER I

I N T R O D U C T I O N

Statement of the Problem:

This research will measure the relation of intelligence to creative abilities in some selected post-primary institutions in Kaduna State.

Intelligence is a psychological construct which has many concepts as well as multiple dimensions. The concepts that are appropriate for our purpose here are those given by Hudson (1974)[1], Binet (1916)[2], Thurstone (1938, 1943)[3], Guilford (1967)[4], and

[1]Hudson, L. (ed.). Ecology of Human Intelligence, London: Penguin. 1970.

[2]Binet, A.S. In Tuckman, Bruce. Measuring Educational Outcomes. Harcourt Brace Jovanovich international Edition New York, Toronto. 1978.

[3]Thurstone, L.L. and Thurstone, T.G. The Chicago Tests of Primary Mental Abilities, Manual of Instructions. Chicago: Science Research Associates, 1943.

[4]Guilford, J.P. The Nature of Human Intelligence. New York: McGraw-Hill 1967.

Piaget (1950, 1952)[5]. The multiple dimensions of intelligence merely refer to intelligence types, such as artistic intelligence, scholastic intelligence, social intelligence, and military intelligence to mention a few. Also, intelligence as a concept has attracted many definitions and postulations from various psychologists and educators.

Concept of Intelligence:

According to Hudson (1974)[6], early notions of intelligence were based on what was thought to be the distinctive and unique nature of intelligent behaviour in human as contrasted to the non-intelligent behaviour of 'animals,' i.e. the infra-human animals. This notion probably led Linnaeus (1758)[7], to refer to 'sapiens' as denoting our species of the genus 'Homo'.

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[5]Piaget, J. The psychology of intelligence. New York: Harcourt Brace, 1950.

[6]Hudson, L. (ed.). Ibid

[7]Linnaeus In Stenhouse, David., The Evolution of Intelligence. London: George Allen and Unwin Ltd. 1974.

Binet (1916)[8], observed that intelligence is a general intellectual capacity which consists of the following abilities: (1) to reason and judge well, (2) to comprehend well, (3) to take and maintain a definite direction of thought, (4) to adapt thinking to the attainment of a desirable end, and (5) to be self-critical. Binet viewed intelligence as a complex mental process which is capable of being measured.

Thurstone (1938, 1943)[9], construed intelligence as a combination of groups of traits or factors. This he referred to as 'group-factor' theory. Each of the traits within a group has more in common with other traits within that group than with traits outside the group. Thurstone referred to this 'group-factor' theory as 'primary' mental abilities in the sense that these abilities are a collection of different factors which could be found in the early stages of human development. These group-factors are six in number and they are identified as:

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[8] ibid.

[9] ibid.

(1) The number factor (N); i.e., viz. ability to do numerical calculations rapidly and accurately.

(2) The verbal factor (V); ability which involves verbal comprehension.

(3) The space factor (S); ability which is required in any task in which the subject manipulates an object imaginatively.

(4) The word fluency factor (W); involves whenever the subject is requested to think of isolated words at a rapid rate.

(5) The reasoning factor (R); ability found in tasks which require the subject to discover a rule or principle involved in a series or group of letters.

(6) The rote memory factor (M); ability to memorize quickly.

Also, Guilford (1959)[10], propounded a theoretical framework on the 'structure of intellect' model. He conceived of intelligence as consisting

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[10] Guilford, J.P. 'The Three faces of Intellect,' American Psychologist, vol. 14. 1959, pp 469 - 479

of three 'factors,' i.e. 'factors of operations,' 'factors of contents' and 'factors of products.' Guilford disinguishes between 5 groups of abilities as constituting the first classification - 'operations,' thus: factors of cognition, memory, convergent thinking, divergent thinking, and evaluation. Further, a second way of classifying intellectual factors is according to the kind of 'content' involved. For examrle, figural content may be as concrete material which can be perceived through the senses like shapes and diagrams. Symbolic content may be represented by letters or numbers. Semantic content takes the form of verbal meanings or ideas, while behavioural content may be referred to as ' social intelligence.'

Guilford contends that when 'operations' act on 'content' they generate the six types of 'products.' The 'products,' - six of them, represent ways of classifying ideas and concepts, or, as Guilford writes, 'they may serve as basic classes into which one might fit all kinds of

information psychologically.'[11]

Also, Piaget (1950, 1952)[12], defines intelligence in terms of assimilation and accommodation. Assimilation refers to changes which occur as a result of learning which are capable of being incorporated into our daily activities while accommodation refers to changes which occur within a person as a result of acquiring new experiences. Piaget contends that these two processes occur together to enable a person to learn and grow.

The various concepts point to the fact that intelligence may be seen as a set of developed skills with which a person copes in any environment. These skills have to be learned, and indeed, one of them — a fundamental one — is learning how to learn.

From birth, a baby learns from his environment, and how to react to it. He learns from one experience how to cope with other similar experiences and then with different ones. It could be said therefore,

---

[11] ibid.

[12] ibid.

that any built-in mechanism for learning needs to be sustained and encouraged. Piaget (1969)[13], argues that a child must play an active part in regulating his own development; he must be allowed to do his own learning because full intellectual development will not occur if his role is a passive one. Piaget went on further to say that the more new things the child has seen and heard, the more interested he is in seeing and hearing; the more different things he has coped with himself, the greater his capacity for coping. It is in this way that the developed skills which culminates in intelligence are built up.

The Multiple dimensions of intelligence:

Having examined the various concepts of intelligence, it is essential to review in some detail, some of the multiple dimensions of this psychological construct that we earlier mentioned on page one.

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[13]Piaget, J. Piaget's Theory of Intellectual Development: An Introduction. London, Sydney, N.Y. 1969, Prentice - Hall Inc.

These multiple dimensions include 'scholastic,' 'artistic,' 'social and military intelligence.'

Scholastic: Scholastic aptitude tests of intelligence are intended to measure aptitude for school work. Scores on these tests do not indicate aptitude for artistic tasks, creativity, social adaptability, or any of a great number of other abilities. They are measures of a limited type of aptitude — that required for predicting performance in tasks of an academic nature under instructional conditions. Measures of scholastic aptitude may be useful to teachers in many ways. It can be helpful whenever it is necessary to predict something about a pupil's potential for academic success.

Artistic: standardized tests of artistic intelligence have concentrated on a few aptitudes considered to be basic to artistic activities. Also, the multiple aptitudes

and skills required in the visual arts are probably responsible for the difficulty in constructing various tests of artistic abilities. To draw or paint a picture, or submit a piece of completed work does not appear to make for a standardized comparison. Whearas, to standardize e.g. in drawing by requiring everyone to draw or paint from the same model appears to leave little room for creativeness. However, Horn and Smith (1945)[14], attempted to solve the problem of standardization through the use of the Horn Art Aptitude Test, though without significant success. Also, Meier and Tiebout (1936)[15], as well as Terman and Goodenough (1926)[16], made similar attempts with no significant success. We could

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[14]Horn, C.C., and Smith, L.F. The Horn Art Aptitude Inventory. Journal of Applied Psychology, 1945, 29. pp. 350 - 355.

[15]Meier, N.C., and Tiebout, C.E., "Artistic Ability and General Intelligence." Psychological Monographs, iii, 1936, No. 213, p. 123.

[16]Goodenough F.L., and Terman, L.M. The Measurement of Intelligence by Drawings, Yonkers, N.Y.: World Book Company, 1926, pp. xi - 117.

therefore conclude that there is some justification in the assertion of Cronbach (1970), when he claimed that:

> "Research on artistic abilities is still in a most primitive stage. No systematic research has been done using modern tests and adequate criteria. Most of the tests have been left as they were ... thirty years ago without revision. The nature of artistic aptitude remains an unsolved — and neglected — problem,"[17]

Social: Thorndike (1949)[18], in the early days of testing was the first to suggest the idea of devising a social intelligence test. However, this idea did not survive because all the tests devised for this purpose correlated highly with academic ability and therefore seemed not to measure anything independent. Guilford (1958)[19],

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[17] Cronbach, Lee, J., Essentials of Psychological Testing. 3rd ed. A Harper International Edition. Harper and Row. N.Y., London. 1970. p. 403.

[18] Thorndike, R.L. Personnel selection. New York: Wiley, 1949.

[19] Guilford, J.P. A system of the psychomotor abilities, American Journal of psychology, 1958, 71, 164 - 174.

building upon this idea attempted to separate behavioral from academic abilities in order to obtain social intelligence, Again, (Guilford, O'Sullivan and deMille, 1965)[20], designed tests of social intelligence presenting faces, cartoons, verbal expressions of mood etc. Cronbach (1970)[21], states that while this test is still at its experimental stage, considerable work is still required to refine it.

Military: As mentioned earlier in this study, the development of group tests of intelligence was accelerated during the World War I. The reason was to produce intelligence tests that could provide quickly and easily a measure of the aptitudes of the numerous armed forces recruits. This resulted in the production of two tests known as the Army Alpha and Army Beta. The Army Alpha was used for the general testing of recruits, while the Army Beta was for testing non-literate and non-English-speaking recruits.

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[20] Guilford, et al. The nature of human intelligence. New York: McGraw - Hill. 1965.

[21] ibid.

Definition of Intelligence:

For a stipulative definition of intelligence as it will feature in this study, the student would like to adopt that given by Wechsler — as it is considered to be one of the most comprehensive.

> "Intelligence is the aggregate or global capacity of the individual to act purposefully, think rationally, and deal effectively with his environment. It is global because it characterizes the individual's behaviour as a whole; it is an aggregate because it is composed of elements or abilities which, though not entirely independent are qualitatively differentiable."[22]

Definition of Creativity:

The diverse ways by which 'creativity' has often been used makes it necessary to construct a working definition for this research. Read (1945), saw 'creativity' as something of a myth. He wrote:

> 'It is an anomalous word, for strictly speaking there can only be a creation out of nothing, as in the myth of the creation. Otherwise, creation always involves the use and adaptation of existing materials, and therefore the difference between invention and creation can only

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[22]Wechsler, D. The Measurement of Adult Intelligence 3rd ed. Baltimore: Williams and Wilkins, 1944. p. 3.

> be one of degree. It would be best, therefore, to avoid the words create, creative, and creation unless the context makes it clear that we are not using them in a literal sense.'[23]

Baron (1969)[24], defined creativity simply as the ability to bring something new into existence.

According to Torrance (1965), creativity may be defined as:

> '... the process of becoming sensitive to problems, defficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results.'[25]

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[23]Read, Herbert. Education Through Art. New York: Pantheon, 1945.

[24]Baron, Frank. Creative Person and Creative Process. New York: Hold, Rinehart and Winston, Inc., 1969. pp. 9-12.

[25]Torrance, E.P. "Scientific Views of Creativity and Factors Affecting Its Growth." Journal of the American Academy of Arts and Sciences, Boston, Massachusetts. Summer 1965. pp. 663 - 681.

Also, McFee (1961),[26] in defining creativity stated that the term 'creativity,' refers to people's behaviour when they do such things as (1) invent a new pattern, form, or idea, (2) rearrange already established objects, patterns, or ideas, and (3) integrate a new or borrowed factor in an already established situation.

MacKinnon (1961)[27], holds the view that creativity has three phases or aspects. It involves a response that is novel or at least statistically infrequent. He added that it must be adaptive to reality; it must serve to solve a problem.

May (1959)[28], has defined creativity as the process of bringing something new into birth.

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[26]McFee, June King. Preparation for Art. San Francisco: Wadsworth Publishing Co., 1961. p. 129.

[27]MacKinnon, Donald W. "Characteristics of the Creative Person: Implications for the Teaching - Learning Process." In G. Kerry Smith (ed.), Current Issues in Higher Education, Washington: 1961.

[28]May, Rollo. "The Nature of Creativity" Educational Testing Services, N.Y.: 1959, vol. XVI, pp. 261 - 288.

Lowenfeld (1957)[29], defines creativity as the ability to explore and investigate. He added that creative growth for instance, manifests itself in the independent and original approach shown in any work.

Also, Mednick (1962)[30], stated that creativity involves the forming of associative elements into new combinations which either meet specified requirements or are in some way useful.

From the review of pertinent literature on some specific definitions of 'creativity,' it seems reasonable to assume that most of these definitions emphasize the production of something new. This position is further justified by the assertion of Torrance (1962), when he said that:

> "In examining a large number of definitions of creativity and creative thinking, it was observed that almost all of these involved the production of something new or original."[31]

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[29] Lowenfeld, Viktor and Brittain, L. Creative and Mental Growth. New York: McMillan, 1957. p. 59.

[30] Mednick, S.A. "The associative basis of the creative process." Psychological Review. 1962. Vol. 69, pp. 220 - 232.

[31] Torrance, E. Paul. Guiding Creative Talent. Englewood, Cliffs. N.J.: Prentice-Hall. 1962. p. 16.

The student would therefore adopt Drevdahl's definition of creativity which is considered to be one of the most comprehensive as it will feature in this study.

> "Creativity is the capacity of person to produce compositions, products or ideas of any sort which are essentially new, or novel, and previously unknown to the producer. It can be imaginative activity, or thought synthesis, where the product is not mere summation. It may involve the forming of new patterns and combinations of informations derived from past experiences, and the transplanting of old relationships to new situations and may involve the generation of new correlates. It must be purposeful or goal - directed, not idle fantasy - although it need not have immediate practical application or be a perfect and complete product. It may take the form of an artistic, literary or scientific production or may be of procedural or methodological nature."[32]

Moustakas (1961)[33], reminds us that until recently this concept of creativity as a learning goal as defined above, played no real significant role

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[32]Drevdahl, J.E., In the Prediction of Achievement and Creativity, Raymond B. Cattell and John. Butcher, Indianapolis: New York, 1968, Bobbs - Merrill Company, Inc., p. 240.

[33]Moustakas, C. 'Creativity, Conformity and the self,' Creativity and Psychological Health, Michael, F. Andrews, ed. N.Y. Syracuse University Press. 1961. pp. 77 - 78

in education. Expatiating further, Moustakas states that before now, the needs of the society were related to the necessities of the workaday world where men might be considered as efficient and perhaps skillful, and only a few, referred to as 'genuises', were thought to have the "God-given gift for invention". Prominent among these few referred to as 'genuises' were men like Thomas A. Edison[34], Eistein,[35]

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[34]Edison, Thomas Alva: He was born at Milan, Ohio on February 11th 1847. He received a rudimentary education from his mother because he was slow at school and poor in mathematics. During the Civil war, he was a telegraph operator. He came to New York in 1869 and with a friend set up a firm of 'electrical engineers'. In 1874, he made his first major invention in wireless (telegraphy). He invented the gramaphone in 1877. In 1881, he constructed the first central power station in New York. He died on 18th October, 1931.

(From: Trevor, I. Williams, (ed.) A Biographical Dictionary of Scientists. Adam and Charles Black. London. 1974. pp. 158 - 159.

Eistein, Albert: He was born at Ulm, Wurttenberg (Germany), on March 14th 1879. He was a physicist. His major contribution was the theory of relativity. His education was irregular. In 1915, he put forward the general theory of relativity. He died in 1955 at Princeton, New Jersey.

[35]idem. pp. 161 - 163.

Michael Faraday[36] and others who were believed to have been specially created by God. However, it is the contention of the student that these men referred to as geniuses could be produced by education. This is the more so because, if certain developed skills which culminate in intelligence can be built up through education; and education as previously stated can play a powerful role in developing intelligence; and if creativity is capable of making people '... produce compositions,

[36]Faraday, Michael: An English physicist and chemist. He was born on September 22, 1791 at Newington, Surrey. He was an apprentice to a bookbinder. He later proved himself an outstanding chemist when in 1823 he devised methods of liquefying gases. Also in 1825, he discovered benzene, a compound. In 1821, he formulated Faraday's laws of electrolysis. 'Faraday was uneducated ... he made up for this through his intuitive ability to pictorialize: an ability perhaps unequalled in scientific history'. Faraday also discovered electrical induction. He died on August 25, 1867 at Hampton Court, near London.

(From: Asimov, Isaac. Asimov's Biographical Encyclopedia of Science and Technology. London: George Allen and Unwin Ltd. 1964 pp. 201 - 203).

products or ideas of any sort which are essentially new ...', then, we could claim that 'geniuses' could be produced through education. In fact, our stand could be further justified by the fact that it is claimed that some of these geniuses never had any formal education. For instance, Schwartz (1970),[37] reminds us that Edison was a 'noteworthy reject,' an early drop out from the system of public schools.

Intelligence and Creativity Tests:

We should recognize the fact that these multiple dimensions of intelligence as mentioned above are usually aimed at measuring performance. From the performance measured, we may make one or more of a variety of different inferences.

Feuerstein (1968)[38] saw intelligence as some kind of learning ability which is capable of being

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[37]Schwartz, Fred. R. Structure and Potential in Art Education. Ginn - Blaisdell - A Xerox Company, Waltham, Massachussetts, Toronto, London. 1970. pp. 125 - 126.

[38]Feuerstein, R. A procedure to Improve the intellective performance of Young children. Rutgers University. New Brunswich, N.J., 1968.

measured in terms of one's ability to improve as a result of instruction. For example, we may want to infer how effective a programme of school instruction has been in teaching new knowledge or skills; how well each individual will do in learning some new tasks; and why individuals fail or succeed with a particular task. In every case, the basic evidence is performance on a set of test tasks. However, performances may be seen from two angles. On the one hand are knowledge and skills which are the direct outcome of organized teaching, particularly in schools though sometimes on the job; and on the other are abilities that are developed through general experiences of life quite apart from formal instructions.

Today, educators are primarily interested in individual's overall capacity to learn, i.e., scholastic ability. It is believed that given enough time and the necessary facilities and encouragement, all children would be capable of developing certain skills. The student has argued at the beginning of this chapter that the original idea of separating

pupils into groups according to their innate potential was to offer a seemingly unbiased means of regulating and organizing pupils so as to enable them develop the necessary skills which are commensurate to their capabilities.

Today, teachers are being constantly assured through their classroom experiences that this idea (of grouping pupils according to their abilities) is apparently sound because a system which groups children according to their innate potential is desirable. Teachers and parents are becoming increasingly aware of the need to provide pupils not only with the skills of learning but also with the necessary facilities and encouragement. Unfortunately, the whole approach to our educational system in Nigeria today is not geared towards training the child in the skills of learning. The student had earlier expressed a similar opinion in a survey conducted in 1977, concerning the nature of teaching - learning in Nigeria when he

stated that:

> "... the nature of teaching - learning evaluation in Nigeria reduces the essence of teaching to mere storage of facts and methods and the regurgitation of these facts and methods on demand - e.g., during examinations or other forms of assessments. This infers that only those who remember these facts and methods normally "pass", while those who forget "fail"."[39]

Vernon (1964), lending credence to Olorukooba's (1977) assertion, also clearly stated that:

> "The present system is criticized for favouring the conformist mentality - the pupil or student who is good at accepting and learning what his teachers and lecturers tell him, and thinking and writing along conventional lines, whereas it discourages spontaneous independent thought"[40]

On the other hand, Guilford (1950, 1959)[41],

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[39]Olorukooba, B.K. "An Evaluation of Art Education programmes in selected Secondary Schools and Teacher Training Colleges in Kaduna State." (Unpublished M.A. Art Education Thesis, Ahmadu Bello University, Zaria - 1977). p. 14.

[40]Vernon, P.E. 'Creativity and Intelligence,' Educ. Res. g: 16 3-9. Intelligence and Cultural Environment, London: Methuen. 1969.

[41]Guilford, J.P. 'Creativity.' American Psychologist. 5, pp. 444 - 454. 1950. The Three faces of of intellect. American Psychologist, 1959, vol. 14. pp. 469 - 479.

Getzels and Jackson (1962)[42], and Torrance (1963)[43], proposed that intelligence as variously discussed in this study contain a separate aspect of mental functioning which has not yet been discussed. However, Guilford (1960)[44], sharing the same view with Getzels, Jackson, and Torrance, advanced a possible reason for the existence of this separate aspect of intellectual functioning. Guilford argued that for intelligence to be measured, we would require 'conventional' tests. Whereas, according to him, these 'conventional' tests are mainly loaded with 'convergent thinking' skills which take little account of 'divergent thinking'

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[42]Getzels, J.W., and Jackson, P.W. Creativity and Intelligence, New York: Wiley, 1962.

[43]Torrance, E.P. Education and the Creativity Potential. Minneapolis: University of Minnesota Press. 1963.

[44]Guilford, J.P. and Merrifield, P.R. 'The Structure of intellect Model: Its Uses and Implication.' (Report of the Psychological Laboratory, No. 24. Los Angeles: Univ. of Southern California Press 1960.

skills. Expatiating on 'convergent and divergent' thinking skills, Guilford states that:

> 'In divergent thinking operations we think in different directions, sometimes searching, sometimes seeking variety. In convergent thinking the information leads to one right answer or to a recognized best or conventional answer.'[45]

He went further to say that this separate aspect of intellectual functioning can only be defined in terms of tests which elicit a 'divergent' type of thinking. By this we mean, tests involving the capacity to invent new responses rather than merely reproduce those previously learned which as mentioned elsewhere in this study is the practice in most schools in Nigeria today.

These tests (involving the capacity to invent new responses) are usually labelled 'creativity tests.' These tests of creativity are believed to be independent of the intellectual mode elicited by 'convergent' tests. Their importance has been emphasized by many psychologists and educators.

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[45] ibid.

For example, Brunner (1962)[46], and Toynbee (1962)[47], both claim that creativity test is not only 'lending dignity to the human being in a computer-dominated age', but is also '... a vital aspect of human resources'. Barron (1963)[48], described creativity tests as an important element in mental health. Nevertheless, before we proceed to further examine the importance of creativity as psychologists and educators claim, we would examine the status of testing for creativity and intelligence in Nigeria.

Intelligence Testing in Nigeria:

So far, it appears that no intelligence test has been developed and standardized for the whole of Nigeria, or for any other country in tropical

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[46]Brunner, J.S. The conditions of creativity. In Gruber, H.E., Terrell, G., and Wertheimer, M. (Eds.) Contemporary Approaches to Creative Thinking. New York: Atherton Press. 1962.

[47]Toynbee, A.J. 'Has America neglected its creative minority?' Calif. Monogr., 1962, Vol. 72 pp. 7 - 10.

[48]Barron, F. Creativity and Psychological Health, New York: Von Nostrand. 1963.

Africa. Attempts have been made however, to apply some foreign-developed intelligence tests in research projects involving some African children.

Yoloye (1973)[49], studied the predictive validity of the Lorge - Thorndike Intelligence tests for Nigerian children. This test was found to correlate positively and significantly with all school subjects except History where correlations were generally negative.

Ohuche and Ohuche (1973)[50], correlated the Goodenough - Draw - A - Man test with scholastic achievement using Teachers grades with significant results.

McCarthy (1973)[51], adopted the Wechsler

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[49]Yoloye, E.A. 'The Performance of Bilingual Nigerian Students on Verbal and Non-verbal tests of Intelligence.' (Unpublished Ph.D. thesis. New York: Columbia University, 1965).

[50]Ohuche, N.M., and Ohuche, R.O. 'The Draw-A-Man Test as a predictor of Academic Achievement.' The West African Journal of Ed. and Voc. Measurement. Vol. 1. No. 1., Feb. 1973 p. 20.

[51]McCarthy, M. 'Wechsler Adult Intelligence Scale: A Pilot Study in a Nigerian Technical College.' West African Journal of Education Vol. XVIII. No.2. June 1973. p. 221.

Adult Intelligence Scale in a pilot study at Ile-Ife with significant results.

Bakare (1972)[52], studied the intellectual maturity of Nigerian children through drawings as conceived by Goodenough (1968), with significant results.

Also, Bakare (1972)[53], adapted the Raven's Progressive Matrices - a non-verbal, perceptual test of intelligence. His subjects were Secondary School pupils. This test has been standardized and validated for use on Nigerian subjects.

Durojaiye (1974)[54], conducted a survey on the predictive validity of the Wechsler Adult Intelligence Scale and school achievement of some post-primary school pupils at Ibadan. He found a low positive correlation between the test and pupils' achievement.

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[52] Bakare, C.M.G. The Standard Progressive Matrices, Sets A,B,C,D,E, and Manuel. University of Ibadan, 1972.

[53] ibid.

[54] ibid.

Testing for Creativity in Nigeria:

Attempts have also been made to develop and standardize creativity tests in Nigeria.

Abiola (1965)[55], studied Nigerian Children's pictorial representation of objects and the extent of their creativity. His subjects were two groups of school children drawn from various schools in the present Oyo State.

Akinboye (1974, 1975, 1976 and 1977), has so far contributed most significantly to the development and standardization of various creativity measuring instruments in Nigeria. In 1974[56], he developed the Personal Motivation Creativity Inventory, (PMCI). In 1975[57], Akinboye also developed a Work book for Creativity Experiments.

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[55]Abiola, E.T. The Nature of Intellectual and Creative development in Nigeria Children — "Acomparative Study of Two Groups of Children." Teacher Education, Vol.1, No. 1, 1968. pp.37 - 48

[56]Akinboye, J.O. Personal Motivation Creativity Inventory. Institute of Education, University of Ibadan, 1974.

[57]Workbook for Creativity Experiments. Institute of Education, University of Ibadan, 1975.

His 1976[58] contribution was an experimental study of the differential effectiveness of three methods of Fostering Creativity; and in 1977[59], the Ibadan Creativity Assessment scale came into being. This scale has been widely used to sample patterns of creativity in many areas of educational pursuit. Akinboye's subjects have been pupils in post-primary institutions in Oyo State, and undergraduates of the University of Ibadan.

Presently, this scale has been used on various subjects in post-primary and other higher institutions of Nigeria. This scale is also a used in this study.

W.A.E.C. (Tedru) tests and selection process in Kaduna State:

The organization chiefly responsible for aptitude testing in Nigeria today is the 'Tedru'

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58 An Experimental Study of the differential effectiveness of three methods of Fostering Creativity. University of Ibadan. 1976.

59 Ibadan Creativity Assessment Scale: University of Ibadan, 1977.

(Tests Development and Research Unit), of the West African Examinations Council (W.A.E.C.). Tedru started originally as the Nigerian Aptitude Testing Unit (N.A.T.U); an independent body operating with twenty one tests called the I.D. (International Developed) tests.

These tests were developed by the American Institute for Research (AIR), in 1964 - for use in Nigeria and other parts of tropical Africa, following region wide experimental studies in: Nigeria, Liberia, Ghana, Tunisia, Kenya and Mali.

These tests are regularly used by various institutions like the shell Oil Company, Nigeria Railway Corporation and Schools in Kano and Kaduna States to mention a few.

Objective of the Study:

The student will attempt to find out the relationship (if any) of intelligence to creative abilities in selected post-primary school pupils in Kaduna State.

Specifically this research will, among others, focus attention on and answer such questions as:

(a) Whether intelligence as measured by intelligence test and creativity as measured by creativity test are possitively related.

(b) Whether there will be any significant difference between the performance of female pupils as compared to the performance of male pupils in creativity.

(c) Whether there is any significant difference in the intelligence test scores of male pupils as compared to the female pupils.

(d) Whether there will be significant difference between the intelligence test score of pupils in secondary schools as compared to the scores of pupils in Technical and Teachers' colleges.

(e) Whether 'high' performers in intelligence test will necessarily be 'high' performers in creativity tests.

(f) Whether there will be any significant difference between those scoring 'high' or 'low' on both tests of intelligence and creativity.

(g) Whether there will be significant difference between the performance of pupils in Technical institutions in creativity test when compared with other institutional type - i.e. secondary and Teachers' Colleges.

Research design and Methodology:

The student used stratified sampling method in collecting data for this study. It should be noted, as Tuckman puts it, that -

> '... stratification represents a good operational strategy for screening members of the population into and out of the study and for reducing the variability of the sample.' (Tuckman 1978).

(i) The tests were administered to a random sample of 1687 Form IV students drawn from 21 schools drawn from fourteen Local Government Areas (L.G.A.) in Kaduna State. (Fig. 1). These pupils in Form IV must have taken W.A.E.C. (Tedru) Aptitude Tests which is believed would have placed them in appropriate institutions best suited to their abilities. Only one third of population of Form IV pupils

in each School has been used.

(ii) Schools selected for research are those established for not less than five to six years prior to the time of the research. They are also those having adequate compliment of staff and teaching facilities.

(iii) On the basis of the method of selection, it was also found that fifty (out of 80) post-primary institutions were qualified. Twenty-one schools out of this number (fifty) were eventually used for the research. Those selected include 13 Secondary Schools, 5 Teachers' Colleges and 3 Technical Schools.

(iv) Where it is necessary to choose more than one school in a Local Government Area, the hat-trick ballot was used to determine which Local Government will supply the extra number.

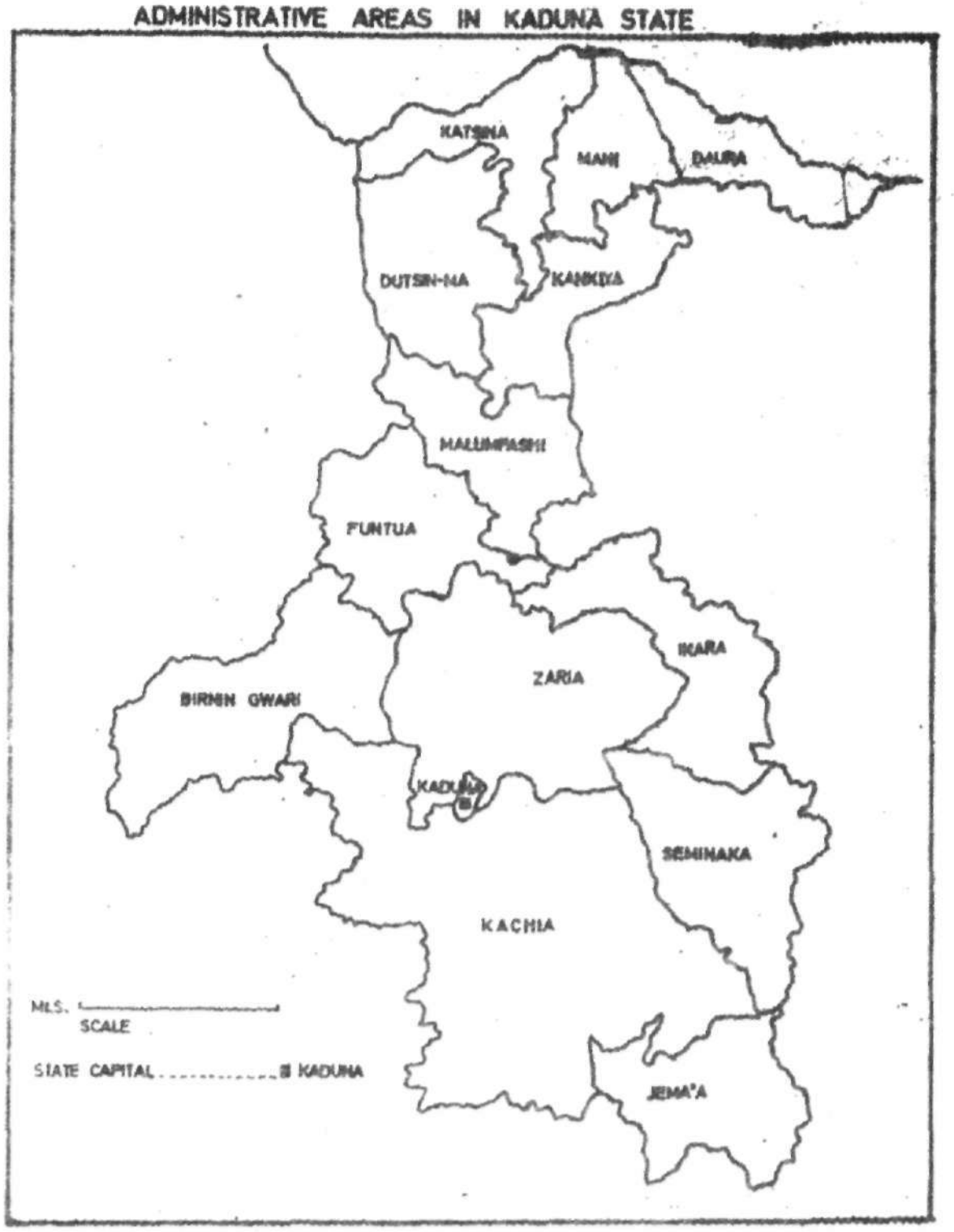


Fig.1

MAP OF KADUNA STATE SHOWING THE
14 LOCAL GOVERNMENT AREAS

(v) W.A.E.C. (Tedru) 'Guidance Testing Project Results' in the Ministry of Education Kaduna was examined, as well as (Tedru) files on tests administration.

(vi) Kaduna State Ministry of Education files on Guidance and Counselling in post-primary institutions were also examined.

(vii) The C.I.E.'s (Chief Inspector of Education for the various type of institutions as well as the C.I.E. (Planning and Inspectorate Divisions), were all interviewed in order to obtain among others, relevant data on: staffing, facilities, funding, and other relevant informations which will be mentioned later.

(viii) Pupils' personal assessment forms in the various institutions as well as their summary sheets were inspected.

(ix) For this study, the student used 'The Standard Progressive Matrices in Measuring intelligence and the Ibadan Creativity Assessment Scale in measuring creativity. (see Appendix 3)

Significance of the study:

The findings in this study may be varied but mention may be made of the following:
Davis (1667)[60] while examining early research relating to the visual arts expressed dissatisfaction and dismay that much of the research activities so far were conducted by individuals who are non-art educators. He observed that these researchers have been mainly psychologists and sociologists who, in most cases only used art as a means to an end without fully understanding certain important and fundamental areas in art like aesthetics, creativity and artistic processes.

[60] Davis, Donald J. 'Research Trends in Art and Art Education.' Journal of the National Art Education Association, Vol. 20., No. 7., Oct. 1967. pp. 13 - 16.

This study will increase knowledge of the relation of intelligence to creative abilities by using art as an end to a means.

It is hoped that the research would throw some light on development of attitudes and programmes in creative activities.

Survey of Literature:

For this study, the student has acquinted himself with literatures on the origins and types of intelligence testing. These literatures include those reviewing history of intelligence testing (such as Chauncey and Doblin, 1963[61]; Lewis, 1976;[62] Stenhouse, 1974,)[63] and those measuring sensory or

[61]Chauncey, J. and Doblin, J.B. Testing: It's place in Education today. New York: Harper and Row, 1963.

[62]Lewis, M. Origins of Intelligence: Infancy and Early Childhood. New York: John Wiley & Sons, Ltd. 1976.

[63]Stenhouse, David. The Evolution of Intelligence: A General Theory and Some of its Implications. London: George Allen & Unwin Ltd. 1974.

Perceptual characteristics (viz; Galton,[64] 1863; Cattell, 1890;[65] Binet, 1904;[66] Terman, 1916;[67] Vernon, 1974;[68] Guilford, 1959;[69] Getzels and Jackson, 1962)[70] to mention a few.

According to Tuckman (1975),[71] early measurement of individual differences dates back to about 1796. Galton (1863),[72] through his study of human

[64] ibid.

[65] Cattell, R.B. The Prediction of achievement and creativity. New York: Bobbs - Merrill Company, Inc., 1968.

[66] ibid.

[67] Terman, L.M. The Measurement of Intelligence. Boston: Houghton Mifflin, 1916.

[68] Vernon, E.P. Intelligence and cultural Environment. London: Methuen, 1974.

[69] Guilford, J.P. 'Three faces of intellect,' American Psychologist, No. 14, 1959 pp. 468 - 479.

[70] Getzels, J.W. and Jackson, P.W. ibid.

[71] ibid.

[72] Galton, F., in Lewis, M. Origins of Intelligence: Infancy and Early Childhood. London: John Wiley & Sons. Ltd., 1976.

individual differences invented some tests. Among such tests were - 'Galton Whistle,' a device for determining a person's highest audible pitch; the 'Galton bar', a measure of visual judgement; an instrument with weights to measure muscle sense, and a series of other tests. These tests were intended to measure sensory or perceptual characteristics.

Cattell (1890),[73] a contemporary of Galton also studied human individual differences. He developed a series of tests, which are considered more 'biological' than today's mental tests.

Binet (1904),[74] France's premier psychologist and expert in human invidual differences studied the differences between 'bright' and 'dull' children. When Paris School Officials became concerned about

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[73] ibid.

[74] Binet, A.S. in Tuckman, Bruce. Measuring Educational Outcomes. Harcourt Brace Jovanovich Int., Ed. New York: 1975.

non-learners and therefore decided to set up special schools with simplified curriculums, they turned to Binet. In 1905, Binet and Simon produced the 'Binet-Simon' scale, sometimes regarded as the first 'Intelligence Test.'

Terman (1916),[75] and his associates at Stanford University, brought intelligence test into the United States. They prepared the Stanford revision of Binet - Simon Scales which came to be known as the Stanford - Binet. The Stanford-Binet was also revised in 1937, and again in 1960 and 1972. Many other intelligence tests have been devised.

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[75] ibid.

CHAPTER 2

RESULTS AND ANALYSIS OF DATA

In this chapter, the findings of the two tests (measuring the relation of intelligence and creativity), which were administered on the one thousand six hundred and eighty seven pupils in post-primary institutions in Kaduna State are reported.

These findings were analysed using three statistical methods - Pearson Correlations, Crosstabulations and T-tests. T-test was used to determine whether or not there is any significant correlation between the two traits measured. It was also used to determine other variables; viz; relation of sex to intelligence, sex to school types and the effect of intelligence on creativity.

Analysis of Findings

Finding 1.1

Intelligence and creativity as measured by these tests seem to have low positive relationship.

The scores of the 1,687 students on both tests were computed. The results are presented in Table 1.

Table 1 shows a crosstabulation of intelligence and creativity test scores using Pearson Correlation. It has established the relationship between the test scores of intelligence as related to sex, school types and the various dimensions of creativity, viz: flexibility, originality, fluency and motivation. As indicated, intelligence, school type and the four dimensions of creativity are reported in terms of the t - value obtained, total population (N = 1687) and level of significance.

This finding is supported by Cave (1970),[76] and McNemar (1964)[77] when they stated that most studies have reported small possitive correlations between intelligence and creativity.

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[76]Cave, Richard L., "A Combined Factor Analysis of Creativity and Intelligence, "Multivariate Behavioral Research, 1: pp. 245 - 276, 1970.

[77]MacNemar, Q. Lost: Our Intelligence: Why? American Psychology. 19: pp. 871 - 882, 1964.

	V1	V2	V3	V4	V5	V6	V7
V1	1.0000 (1687) S= .001	-.1062 (1687) S= .001	.0911 (1687) S= .001	.0938 (1687) S= .001	.2728 (1687) S= .001	.0936 (1687) S= .001	.2469 (1687) S= .001
V2	-.1062 (1687) S= .001	1.0000 (1687) S= .001	-.2666 (1687) S= .001	.1515 (1687) S= .001	.0514 (1687) S= .017	.1757 (1687) S= .001	.1375 (1687) S= .001
V3	R .0911 N(1687) S= .001	-.2666 (1687) S= .001	1.0000 (1687) S= .001	.1477 (1687) S= .001	.2080 (1687) S= .001	.1683 (1687) S= .001	.1716 (1687) S= .001
V4	.0938 (1687) S= .001	.1515 (1687) S= .001	.1477 (1687) S= .001	1.0000 (1687) S= .001	.1475* (1687) S= .001	.3517* (1687) S= .001	.3466 (1687) S= .001
V5	.2728 (1687) S= .001	.0514 (1687) S= .017	.2080 (1687) S= .001	.1475 (1687) S= .001	1.0000 (1687) S= .001	.3661* (1687) S= .001	.4345* (1687) S= .001
V6	.0936 (1687) S= .001	.1757 (1687) S= .001	.1683 (1687) S= .001	.3517 (1687) S= .001	.3661* (1687) S= .001	1.0000 (1687) S= .001	.4892* (1687) S= .001
V7	.2469 (1687) S= .001	.1375 (1687) S= .001	.1716 (1687) S= .001	.3466* (1687) S= .001	.4345* (1687) S= .001	.4892* (1687) S= .001	1.0000 (1687) S= .001

Level of significance = .01
** Critical Value = 2.326
* Moderately Correlated.

NB: Where V1 = Sex; V2 = Intelligence;
V3 = School; V4 = Flexibility;
V5 = Originality; V6 = Fluency
V7 = Motivation.

TABLE 1

RELATIONSHIP BETWEEN INTELLIGENCE AND CREATIVITY.

However, a comparison of the scores obtained in the various dimensions of creativity, i.e., flexibility, originality, fluency and motivation, seem to indicate that there is a strong relationship between these scores. For example, three out of these dimensions of creativity, (originality, fluency and motivation) are moderately correlated as follows: originality = .4475, fluency = .3661, and motivation = .4892.

Finding 1.2

There is significant difference between the performance of female pupils as compared to the male scores on creativity. The result of the T-Test on the performance of male and female pupils on creativity test can be seen in Table 2.

Components of Creativity	Sex	No Tested	Maximum Possible Score Per Pupil	Mean	Std. Dev	T-Value	Deg. of Freedom
Flexibility	Male	1233	189**	105.06	20.05	-4.03*	875.49
	Female	454	189	109.23	18.37		
Originality	Male	1233	225**	124.14	24.66	-11.75*	822.07
	Female	455	225	139.82	24.18		
Fluency	Male	1233	234**	138.65	24.31	- 4.05*	891.71
	Female	455	234	143.67	21.85		
Motivation	Male	1233	225**	147.97	24.88	-11.17*	925.26
	Female	455	225	151.77	21.54		

Level of Significance = .01
* Critical Value = 2.326
** See Appendix 3.

Table 2
SEX EFFECT ON CREATIVITY

At .01 level of significance, the T-value is as follows: Flexibility = -4.03; Originality = -11.75; Fluency = -4.05, and Motivation = -11.17. There is marked difference between the mean scores of both male and female pupils, with the female group having higher scores in all cases. It appears that the highest mean score among the dimensions of creativity is in Motivation (151.77), followed by Fluency with a mean score of 143.67, Originality (139.82), and Flexibility (109.23). However, there appears to be some difference too in the mean score on Flexibility (Male = 105.06), and female (109.23).

It could be said therefore that comparing these values and the degrees of freedom for each creativity dimension, female pupils are significatly higher on creativity tests than their male counterparts for the population studied.

Finding 1.3

There is a significant difference in the intelligence test scores of male pupils as compared to their female counterparts as indicated in Table 3.

SEX	NO TESTED	MEAN	STD. DEV.	T-VALUE	DEGREE OF FREEDOM
MALE	1233	31.74	11.13	4.55*	867.44
FEMALE	454	29.17	10.29		

Level of significance = .01 *Critical value = 2.326.

TABLE 3

COMPARISON OF MALE AND FEMALE TEST SCORES ON INTELLIGENCE TEST.

The table indicates a mean score of 31.74 for male and 29.17 for female with a standard diviation of 11.13 for male and 10.29 for female pupils. The t-value is 4.55 with 867.44 degrees of freedom. This indicates that male pupils are significantly better than their female pupils in intelligence test.

To further confirm this position, the researcher carried out crosstabulations of intelligence scores as compared to sex and institutional types. Table 4 explains the results as compared to sex, while Table 7 explains the results as compared to other institutions.

Intelligence score Range*	Sex	% Score	No
10 -1	Male	3.2	39
	Female	6.4	29
11 - 29	Male	36.6	451
	Female	41.6	189
30 - 44	Male	47.2	582
	Female	47.4	215
45 - 60	Male	13.1	161
	Female	4.6	21

*See Appendix 2

TABLE 4

CROSSTABULATIONS OF MALE AND FEMALE TEST SCORES ON INTELLIGENCE

As indicated in the comparison Scale for this test, it appears that Male pupils are intellectually inferior by 3.2% while female pupils are inferior intellectually by 6.4%. 36.6% of the males are below average intellectual capacity while 41.6% of females fall in this group. Also, 47.2% of all males possess average intellectual capacities while 47.4% of female also fall in this group. However, it is interesting to note that male pupils who are of above average intellectual capacity and also intellectually superior are 13.1% as against 4.6% of female pupils. On the whole, it could be said that this table has confirmed the position of Finding 1.3. (Table 3), that male pupils are significantly better on intelligence test score than female pupils.

However, from the tables presented, it seems that there is great disparity in the ratio of male to female pupils. There were 1,233 males as against 454 female pupils according to our sampling procedure.

The student is of the view that it is quite possible that this disparity in ratio could affect this finding. In the light of this, it is suggested that further research should be conducted in this area.

Finding 1.4

There is a significant difference between the intelligence score of pupils in secondary schools as compared to the scores of pupils in the Teachers' Colleges in this study as shown in Table 5.

School Type	No Tested	Mean	Std. Dev.	T-Value	Deg. of Freedom
Secondary	1127	33.16	11.11	10.28*	
Teachers' College	408	27.19	9.62		825.29

Level of significance = .01 *Critical Value = 2.326

TABLE 5

ANALYSIS OF INTELLIGENCE TEST SCORES BETWEEN SECONDARY AND TEACHERS' COLLEGES.

This result seem to suggest a mean score of 33.16 for Secondary pupils, as against 27.19 for pupils in the Teachers' Colleges. Similarly, the T-value of 10.28 and degree of freedom of 825.29 is an indication of the fact that Secondary pupils' performance in intelligence test is significantly better than those of the Teachers' Colleges.

Finding 1.5

Table 6 shows that the performance of secondary pupils is significantly better than those of the Technical Colleges.

School Type	No Tested	Mean	Std. Dev.	T-Value	Deg. of Freedom
Secondary	1127	33.16	11.11		
Technical Colleges	152	25.62	8.42	9.92*	228.41

Level of significance = .01 *Critical Value = 2.326

TABLE 6

ANALYSIS OF INTELLIGENCE TEST SCORES BETWEEN SECONDARY AND TECHNICAL COLLEGES.

As shown in the table, the mean score for the secondary is 33.16 as against a mean score of 25.62 for the Technical pupils. The T-value of 9.92 at 228.41 degrees of freedom appears to confirm the fact that secondary pupils scored higher than Technical pupils. This Table has confirmed the stand that secondary pupils scored higher on tests of intelligence than pupils in Technical and Teachers' Colleges.

Intelligence Score Range*	School Type	% Score	No Tested
10 - 1	Secondary	3	34
	Teachers' Colleges	6.6	27
	Technical	4.6	7
11 - 29	Secondary	30.3	342
	Teachers' Colleges	51.2	209
	Technical	58.6	89
30 - 44	Secondary	51.6	581
	Teachers' Colleges	39.5	161
	Technical	36.2	55
45 - 60	Secondary	15.1	170
	Teachers' Colleges	2.7	11
	Technical	.7	1

*See Appendix 2.

TABLE 7

COMPARISON OF INTELLIGENCE TEST SCORES IN IN INSTITUTIONAL TYPES.

To further confirm the findings on Tables 5 and 6, crosstabulations of intelligence tests scores in institutional types were carried out. The result is presented in Table 7.

Here again, 3% of Secondary pupils fall in the intellectually inferior group as against 6.6% recorded by Teachers' College and 4.6% by Technical pupils. While 30.3% of Secondary pupils are below average, 51.2% of Teachers' Colleges and 58.6% of Technical pupils fall into this group. Also, Secondary pupil's are found to possess average intellectual capacities by 51.6% while pupils in Teachers' Colleges recorded 39.5% and Technical pupils, 36.2%. Those found above average and intellectually superior capacities in the Secondary represent 15.1% as against 2.7% for pupils in the Teachers' Colleges and .7% for the Technical pupils. It seems clear from this result therefore that the findings on Tables 5 and 6 are justified by this finding that secondary pupils performed significantly better on tests of intelligence when compared to pupils in other institutions.

Although Tables 5, 6 and 7 indicated that secondary school pupils performed significantly better than pupils in Technical and Teachers' Colleges on intelligence tests, there is nothing in this study to tell us the specific reason for this significant difference. However, as mentioned in chapter 1, selection of pupils into institutional types (secondary, Technical and Teachers' Colleges), is based on pupils' performances in the W.A.E.C. (Tedru) scholastic aptitude tests, from the results of these tests, pupils considered to have performed well were posted to secondary schools. Therefore, we could infer, that this selection exercise probably account for the significant difference found in this study.

Finding 1.6

Table 8 shows that 'high' performance in intelligence test are not necessarily 'high' performers in creativity test. In order to determine the 'high' and 'low' performers in both tests, the student decided to obtain a cut-off point for

both scores thus:

(a) for the test of creativity, a cut-off point for high performers was determined by adding the mean score of the frequencies plus that of the standard deviation in the computed table. Scores above the mean were regarded as 'high', while those below the mean were regarded as 'low'.

(b) Similarly, to determine 'high' and 'low' performers in intelligence test, the comparison Scale for scoring this test was used. This scale for scoring this test (see Appendix 2) is divided into five levels. The first two levels, i.e. scores between 0 - 29, also described in the scale as 'Below Average and intellectually inferior' were regarded as the scale for 'low' performers. Scores in the last two regions of this scale(45-60), also described as

'above average and intellectually superior,' were regarded as the scale for 'high' performers.

Both scales (high and low) for the two type of tests (intelligence and creativity), were then subjected to a T-Test in order to determine whether or not there is any significant difference among those scoring high and those scoring low as indicated in Table 8.

Creativity	Intelligence	Mean	Std. Dev.	No	T-Value	Deg. of Freedom
Flexibility	Low	115.99	29.94	245	-.19	151.19
	High	116.45	17.39	77		
Originality	Low	146.95	25.06	245	1.71	132.07
	High	141.53	24.02	77		
Fluency	Low	153.82	24.62	245	-2.46*	160.56
	High	160.45	19.30	77		
Motivation	Low	157.98	25.13	245	-2.47*	181.06
	High	164.34	17.63	77		

Level of Significance = .01 *Crtitical Value = 2.326.

TABLE 8
COMPARISON OF PUPILS SCORING 'HIGH' AND 'LOW' IN INTELLIGENCE AND CREATIVITY TESTS.

Table 8, shows that there is no significant difference between those scoring high or low on both tests of intelligence and creativity. Even among the dimensions of creativity, with a mean of 115.99 for those scoring low and 116.45 for those scoring high in Flexibility, the T-Value of -.19 and 151.19 degrees of freedom gives us an indication of no significant difference between high and low performers. For originality, the T-Value = 1.71 with 132.07 degrees of freedom, Fluency shows a T-Value of -2.46 and 160.56 degrees of freedom. Similarly, motivation indicates a T-Value of -2.47 and with 181.06 degrees of freedom. It appears then that there is no significant difference between those scoring 'high' or 'low' in intelligence test as compared with the scores obtained from the other dimensions of creativity. At .01 level of significance, in all cases, these scores are less than the critical value of 2.326.

Finding 1.7

There is a significant difference between the performance of Technical pupils in creativity test when compared to other types of institution in this study. Table 9 represents the pattern of scores obtained.

Creativity	Sch. Type	Mean	Std. Dev	No Tested	T-Value	Deg. of Freedom
Flexibility	Technical	121.92	22.94	152	-9.35	238.10
	Secondary	105.47	18.20	1127	-8.49	206.98
Originality	Technical	143.55	21.68	152	-5.53	334.18
	Secondary	125.25	24.56	1127	-9.61	206.98
Fluency	Technical	152.18	23.18	152	-4.69	282.70
	Secondary	137.75	23.11	1127	-7.21	193.75
Motivation	Technical	155.64	23.67	152	-5.68	279.96
	Secondary	139.42	24.38	1127	-7.90	196.78
Flexibility	Technical	121.92	22.94	152	-9.35	238.10
	T. C.	102.29	19.64	408	-9.35	238.10
Originality	Technical	143.55	21.68	152	-5.53	334.18
	T.C.	131.33	26.98	408	-5.53	334.18
Fluency	Technical	152.18	23.18	152	-4.69	282.70
	T.C.	141.70	24.32	408	-4.69	282.70
Motivation	Technical	155.64	23.67	152	-5.68	279.96
	T.C.	142.74	24.58	408	-5.68	279.96

Level of significance = .01 *Critical value = 2.326.

TABLE 9
T-TEST ON CREATIVITY SCORES IN SECONDARY, TECHNICAL AND TEACHERS' COLLEGES.

At the .01 level of significance and a critical value of 2.326, the T-value for the Technical pupils on the various creativity dimensions are: Flexibility (t = 9.35), Originality (t = -5.53), Fluency (t = 4.69) and Motivation (t = -5.68). From these scores, we could infer that pupils in the Technical colleges performed significantly better than pupils in Secondary and Teachers' Colleges in tests of creativity. It is interesting to observe too that the mean scores of the Technical pupils for the four dimensions of creativity are higher in each case when compared to the mean scores of both the Secondary and Teachers' Colleges. The hierarchy of creative expression in the Technical pupils may be diagrammed thus:

MOTIVATION > FLEXIBILITY > ORIGINALITY > FLUENCY.

This result, i.e., the hierarchy of creative expression is also reported by Akinboye (1970),[78] using the same test of creativity. The overall result therefore indicate that pupils in Technical institutions scored higher both in terms of the four dimensions of creativity and also in the overall performance.

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[78] ibid.

Perhaps this finding may be justified. For instance, pupils posted to Technical institutions in Kaduna State are expected to have performed significantly well in certain aspects of the W.A.E.C. (Tedru) aptitude tests. Some of these aspects include: I.D. tests number 7; (mechanical information); No. 9 (three-dimensional visualization); No. 10 (test of flexibility), and No. 19 (manual dexterity). See Appendix 1.

Summary:

One thousand, six hundred and eight seven (1,687) pupils drawn from all the 14 Local Government Areas of Kaduna State and from the three institutional types - Secondary, Teachers' and Technical Colleges took part in this study. The result of the study seem to indicate that in the first instance, there is a low possitive relationship between intelligence and creative abilities.

Secondary school pupils scored higher in intelligence tests than any other institutional type. This is probably due to the fact that a good

proportion of them were selected for secondary type of education on the basis of their high performance on W.A.E.C. (Tedru) Scholastic Aptitude Test which is also sometimes refered to as intelligence test. Also, it is not altogether surprising that Technical school pupils scored higher on creativity. This significant difference could be due to the fact that pupils selected into Technical institutions are expected to have performed significantly well in the Technical and Commercial Aptitude Test series of W.A.E.C. (Tedru), which in some respects contain test items similar to those found in creativity tests. (see Appendix 1).

Finding 1.1 showed that there is a low positive relationship between intelligence and creativity. Finding 1.2 indicated that there is a significant difference between the performance of female pupils as compared to the male scores on creativity. Finding 1.3 also indicated that there is a significant difference in the intelligence test scores of male pupils as compared to the

female pupils. Also, Finding 1.4 showed a significant difference between the intelligence score of pupils in secondary schools as compared to the scores of pupils in the Teachers' Colleges. Finding 1.5, indicated that the performance of Secondary pupils is significantly better than those of the Technical Colleges. Finding 1.6 showed that there is no significant difference between those scoring high or low on both tests of intelligence and creativity. Finding 1.7 indicated that there is a significant difference between the performance of Technical pupils in creativity test when compared to other institutional types - secondary and Teachers' Colleges.

CHAPTER 3

SUMMARY OBSERVATIONS AND CONCLUSIONS

The main theme of the study was to find out the extent to which intelligence is related to creative abilities in certain selected post-primary institutions in Kaduna State. This chapter draws from the preceeding chapters, some important issues of the study's findings. Some general conclusions will be formulated, based on the data obtained. The implications arising from these conclusions viewed, first, in light of the study findings, and second, in the student's view will be stated. Finally, some recommendations for further study, research, and possible action will be delineated.

This research has identified certain barriers to the development of intelligence and creativity; as well as some of the most important functions of tests and measurements procedures; functions such

as selection, certification, curriculum development, formulation of objectives, the construction of learning experiences, Guidance and Counselling and educational research. The study has shown the important functions of WAEC (Todru) in the selection processes of pupils into various types of school in Kaduna State.

The study has analysed various methods of fostering creativity and intelligence in Nigerian pupils. It has also suggested specific methods which have been employed with considerable success in Nigeria. These include, Brainstorming, Direct Creativity Training and Problem-Solving.*

As a bye-product of the main portion of the study, two results seem important to mention. First, apart from the low positive correlations between intelligence and creativity, it is curious to note that female pupils are more creative. This is not to suggest that there were no relationships between measures of creativity and both sexes,

*See Appendix 4.

Rather, the position is that whereas the relationships were moderate among both sexes and among the dimensions of creativity tests, they are stronger among the females than the male pupils. Secondly, worthy of note, is the fact that male pupils are more intelligent by this result than female pupils.

Among the dimensions of creativity, the results consistently indicated motivation as the main attribute of the pupils. This is an interesting observation as it corroborates the observations of other workers, like Offner (1967)[79], Whitefield (1975)[80] and Sprecher (1959, 1963, 1964)[81].

In the institutions studied, the rank order of scores obtained in the dimensions of creativity are not the same, e.g. the scores in Technical

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[79] Offner, D.H. Energizing the creative potential. Journal of Creative Behaviour. 1967, 1, pp. 15-21.

[80] Whitefield, P.R. Creativity in Industry. Pelican Books, 1975.

[81] Sprecher, T.B. Criteria for Creativity. Journal of Applied Psychology in Taylor, C.W. and Barron, F. (eds.). John Wiley & Sons, Inc., 1964.

schools ranked from highest scores for motivation through lowest scores in flexibility; but in Secondary schools, the rank order of scores ranked from highest scores for fluency through lowest scores for originality. This is probably explained by the selection exercise of W.A.E.C. (Tedru). However, the identical scores observed, in Technical institutions in creativity as state earlier, probably suggests that they are expected to be inventive, full of many insightful imaginations as they attempt to adapt, modify, magnify, substitute rearrange, reverse and combine objects in their particular area of study.

The observed differences in the rank order of scores in the dimensions of creativity of these institutions could also be due to individual differences in those human subjects studied.

The findings of this study finally have important implications for society which has the over-all responsibility for the upbringing of its pupils. Both at and during the time of

training and the time of employment, our pupils should be well motivated.

A possible limitation of this research might be the difference in age, of pupils in the Teachers' Colleges as compared with the age of pupils in the other institutions — i.e. Secondary and Technical schools. From the students' observation, it seems that pupils in the Teachers' Colleges are older (physically), as compared with pupils in the other institutions. For this reason, the student found it difficult to include the possible effect of age on the performances of pupils in the two tests used.

Another possible limitation might be the sample size of Technical Colleges. Technical colleges are few. Infact, they accounted for only 9% of the population sampled. However, this is due to the fact that Technical colleges are very few in Kaduna State. In fact, there are only three of them and the three were included in this study because they met the criteria of our sampling procedure.

In any case, it is against the background of the above peculiarities and limitations that the findings and conclusions of this study should be viewed.

Suggestions for further Research:

The results of the present study has revealed several areas requiring further investigations. First, there is need, as with all studies, for a repeat performance of this testing exercise to see if the present findings will be supported by additional evidence.

Furthermore, art educators should conduct further research into various aspects of creativity as it affects the field of art in order to break the monopoly hitherto enjoyed by Sociologists and Psychologists who have been using art as a means to an end.

Although it was seen in this study that male pupils are significantly better than their female pupils in intelligence tests, there is nothing to tell us the reason for this difference.

It is therefore suggested that further research may throw light on the difference.

Finally, it would also be very interesting to carry out further research into why female pupils performed significantly better than male pupils in creativity test.

Throughout the course of this study, and indeed at virtually every point, the Student has exercised great care. Nevertheless, it is quite possible that some techniques employed need some improvement. However, if this study can gear up art educators into conducting further research in this area (in Nigeria), if parents and teachers can employ the various methods of improving the intelligence and creative abilities of pupils at home or in our schools, then this study would have fulfilled it's mission.

Recommend tions:

As a result of the findings of the study, the following recommendations are made:-

(i) Continuation of WAEC (Tedru) Aptitude Test:

The wider educational implication of these findings is that if WAEC (Tedru) Aptitude Test results and recommendations for selection into the various institutional types were strickly adhered to, we would most likely succeed in producing highly creative and intelligent pupils for Kaduna State and infact for Nigeria as a whole. It is therefore recommended that this testing exercise should not only continue, but also that the results should be properly utilized in selection processes.

(ii) Rewarding Hardworking Teachers:

It is regretable that we cannot draw into and retain some of our most vital, energetic and capable teachers who are today constantly moving to the private sector for personal, professional and renumerative rewards. It is recommended that ways and means be deviced by the government to reward such teachers in order to avoid further drainage to the private sector.

(iii) More research in Creativity:

Art educators have not been showing sufficient interest in research activities in creativity. For this reason, art has always been used as an end to a means by some psychologists and sociologists. It is therefore recommended that art educators should show more concern by conducting more research in this vital area.

(iv) Staffing of the Planning and Guidance Section of the Ministry:

The Planning Section, as well as the Guidance Section of the Ministry of Education should be better staffed. It is regretable to note that in the Guidance Section, the old and experienced hands have been reassigned to various post primary schools. The only competent hand left (as at the time of compiling this report) seemed to be over-worked. The situation is even worse in the Planning Section where a lot of statistical data from all schools, (Primary and Post Primary), are left in the hands of one man.

It is here recommended that in view of the importance of these sections to the educational aspirations of this state, more hands should be employed or posted to assist these people. In addition, the Planning Section is not provided with basic materials which will facilitate the work of the section. It is also recommended that adequate materials should be given to this section.

(v) Submission of Returns from Principals, C.I.E.S. and the Inspectorate Division to the Planning Section:

It is regretable to note that there are a lot of missing data about certain schools in the Planning Section. From informal discussions with the officer in charge of the planning section, data collected on the field are expected to be returned to that section for inclusion in the 'Data Processing Sheet'. In view of the importance of statistical data in planning, it is here recommended that Principals, C.I.E.S., and the Inspectorate Division should endeavour to be sending and promptly the normal returns.

(vi) Provision of adequate working materials and a Favourable Environment:

While the efforts of the Ministry of Education at opening as many post-primary schools as possible is laudable, we would like to say that in the light of our findings, lack of adequate materials to experiment with as well as overcrowded classrooms as the researcher observed, would not help us in producing the type of creative and intelligent people we desire.

The researcher is aware of the fact that this opening of many post-primary schools is an innovation, and like any innovation, it would require time to mature. Nevertheless, we are recommending to the Ministry of Education that as soon as practicable, these schools (old and new) should be provided with adequate working materials and space.

A P P E N D I C E S

THE 21 I.D. TESTS OF WAFC (Tedru)

I-D Test No.1, SIMILARITIES (SIM).

A non-verbal test of concept formation, used as an index of "general intelligence" for examinees with minimal education.

I-D Test No.2, VERBAL ANALOGIES (VAL).

A verbal reasoning test for people with 6-8 years of formal education, used to predict success in school or in a job requiring formal studies e.g. air and bird.

water and .....? Fish, man, cow, monkey, pig.

I-D Test No.3, VERBAL ANALOGIES HIGH (VAH).

A more advanced form of the above test intended for people with 9 - 12 years of formal education.

I-D Test No.4, READING COMPREHENSION (RDL).

A test of ablility to read and understand written material, used to predict academic potential for examinees with 6 - 8 years of formal education e.g. Fill in blanks.

This is a test of your ability to 1 and understand sentences written in English. A number of 2 have been left out of each sentence, but if you .....

1. know, write, read, learn, copy.
2. spaces, words, sentences, letters, things.

I-D Test No.5, READING COMPREHENSION (RDH)

More advanced form of the above test requiring reasoning as well as comprehension. It can be used up to the University level.

I-D Test No.6, MEMORY (MEM).

A test of the ability to learn and remember material organized in a meaningful way, used mainly for selection into secondary schools. (Candidates are given a chart to be quickly studied. The chart is then removed and questions followed), e.g.

Chart:

ABC 12	DEF 11	GH 10	IJK 9
LM 8	NO 7	PQ 6	RS 5
TUV 4	WX 3	Y 2	Z 1

Questions: Select the number that goes with each letter

H: 1 2 3 4 5 6 7 8 9 10 11 12

T: 1 2 3 4 5 6 7 8 9 10 11 12

I-D Test No.7, MECHANICAL INFORMATION (MEC)

An interest and aptitude test for technical occupations. Infers technical inclinations by measuring how much the examination has learned from the mechanical and scientific phenomena in his everyday life.

I-D Test No. 8, CHECKING (CHK)

A test of speed and accuracy in perceptual discrimination, used in the selection of certain types of operative or semi-skilled personnel.

I-D Test No.9, BOXES (BOX)

A test of three-dimensional visualization (3-D), used to determine aptitude for the skilled trades and higher-level technical occupations.

I-D Test No.10, FIGURES (FIG).

A test of flexibility in responding to changing perceptual cues, used in determining aptitude for the skilled trades and higher-level technical occupations.

I-D Test No.11, GRAPHS (GPH).

A test of facility in working with a complex graph and thereby of the more general ability to cope with a problem in which a number of variables must be considered and interrelated. Used to predict success in post-secondary training and education.

I-D Test No.12, CODING (COD).

A test of speed and accuracy in encoding data, used for clerical occupations.

I-D Test No.13, NAMES (NAM).

A test of speed and accuracy in checking written material. Used for clerical jobs and others requiring attention to detail.

I-D Test No.14, ARITHMETIC (RTH).

Atest of speed and accuracy in doing simple computations, used whenever general facility with numbers is required.

I-D Test No.15, TABLES (TAB).

A test of speed and accuracy in obtaining data presented in tabular form. Used for selection into the clerical occupations.

I-D Test No.16, SPOKEN ENGLISH (SPK).

A test of ability to understand simple oral instructions, used for low-level screening when the job requires communication in English.

I-D Test No.17, SCIENCE INFORMATION (SCI).

A test of interest in science, as shown by the examinee's knowledge of basic facts about a wide range of scientific topics. Used mainly for selection or guidance into post-secondary science training.

I-D Test No.18, WORLD INFORMATION (WLD).

A test of interest in business or public affairs, shown by the examinee's knowledge of current events, civic affairs, and elementary economics. Useful for selection or guidance into commerce, government, and similar fields.

I-D Test No.19, MANUAL DEXTERITY (MAN).

A test of speed and coordination in arm and hand movements, used as an index of potential for the skilled trades.

I-D Test No.20, FINGER DEXTERITY (FIN).

A test of speed and dexterity in precise finger movements, used to predict potential for certain of the skilled trades.

I-D Test No.21, MARKING (MRK).

A test of speed in performing a simple repetitive task. Intended for the selection of operatives and other semi-skilled personnel.

These twenty-one tests were treated as "building blocks" from which a series of tests could be assembled for any selection or guidance project, subject to trials and empirical validation. The test manual gave a list of 10 basic I-D Test Series already developed for tapping Scholastic, technical, commercial, clerical and scientific abilities at various educational levels.

APPENDIX 2

THE STANDARD PROGRESSIVE MATRICES SCALE OF INTELLIGENCE

The Standard Progressive Matrices Test* was originally developed in Great Britain by J.C. Raven** in 1938. It was designed as a test of an individual's intellectual capacity and has been widely used as such in Europe and the United States.

In recent years, the Progressive Matrices have become popular in other countries and in cultures which are quite different from that in which it was first developed. The test's widespread use in Africa, for instance, can be said to be due to its relatively easy mode of administration and to the fact that being non-verbal in nature, it does not penalize subjects mainly on the grounds of their inability to read or understand the English Language.

Description of The Progressive Matrices:

The scale consists of 60 matrices items divided into five sets (A, B, C, D, E) of 12 items each. Each item consists of adesign from which a part has been removed. The subject is required to select the missing part from six or eight alternatives provided below each design . Each set consists of matrices of increasing difficulty. While the earlier series require accuracy of visual discrimination, the later ones involve two-dimensional analogies which demand permutation, alteration of pattern and perception of other logical relations for successful solution.

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* The researcher thankfully acknowledge the sincere efforts and assistance of Professor C.M.G. Bakare of the University of Ibadan for providing this test as well as granting him audience on several occasions to discuss the subject of this study.

** Raven, J.C. "Standardization of Progressive Matrices, 1938", British Journal of Medical Psychology, Vol.19, Part I, 1941, pp. 137-150.

Uses of The Progressive Matrices:

As a test of general Mental Ability, the Progressive Matrices can be used (i) for Diagnosis, (ii) for Research and (iii) for Counselling.

(i) For Diagnosis:

The test can be used to identify the basic intellectual capacity of an individual student or of a group of students. Thus, a rough comparison of an individual's score or of a group's mean score with the Norm provided can identify the comparative level of intellectual capacity-average, below average or above average. Alternatively, local norms could be obtained from the raw scores of a group by calculating the mean score of the group and comparing an individual student's score with the mean score of his group.

(ii) For Research:

The Progressive Matrices has also been found useful in research investigations such as in studies of the sources of academic success and failure, the correlates of child rearing practices and the individual requirements of various occupations. The test can also be used in studies of the effect of old age, emotional disturbance and certain personality traits on intellectual ability.

(iii) For Counselling:

In the area of Guidance and Counselling, the Progressive Matrices will be useful for academic and vocational guidance. In academic guidance, for instance, scores on the test will be found useful when choosing subjects for the School Certificate Examination, when investigating the causes of a student's failure or when taking decisions on promotion o non-promotion to the next class. Likewise in making vocational decisions, a student's scores on the Progressive Matrices can be compared with the intellectual demands of the proposed occupation.

Administering The Progressive Matrices:

The Progressive Matrices can be administered (a) As an Individual Test, (b) As a Group Test and (c) As a self-Administered Test.

Materials: In all the three types of administration, the materials required are (i) Pencils (ii) The Test Booklet(s) entitled 'The Standard Progressive Matrices Test', and (iii) The Answer Sheet(s).

Scoring The Progressive Matrices:

The test is scored using the key provided in (Table). One score is given for every item got correctly.

Interpreting The Scores on the Test:

The raw scores on the Progressive Matrices can be used for computations and for comparisons within the same class or group - just like the scores on an achievement test. For comparison on a national level, it is necessary to refer to a Table of Norms. Table gives the scale derived from a random sample of 95. Form IV students (55 boys, 40 girls). This scale is however only useful for comparing Forms IV and V students with this norming sample.

Table

Comparison Scale for Scores on the Progressive Matrices

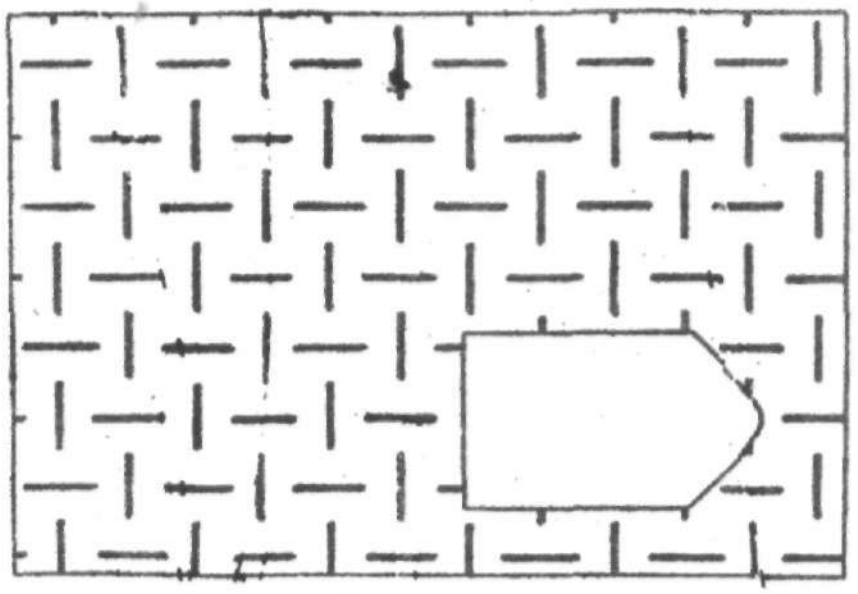
SCORE	DESCRIPTION
55 and above	Intellectually Superior
45 - 54	Above Average Intellectual Capacity
30 - 44	Average Intellectual Capacity
11 - 29	Below Average Intellectual Capacity
10 and below	Intellectually Inferior.

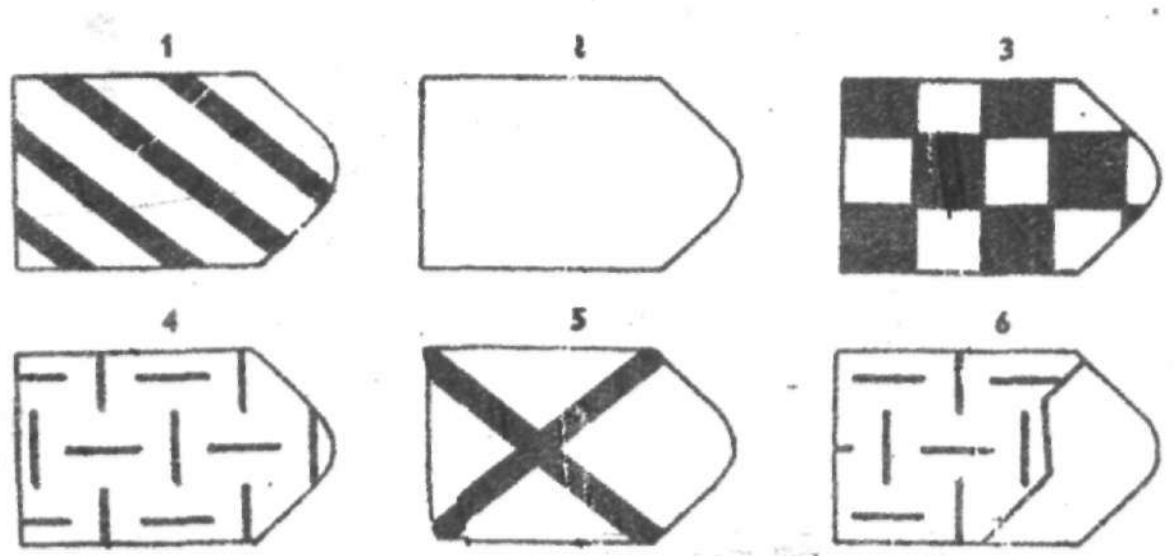
* (This Scale was derived by Professor G.M. Bakare, Professor and Head of Department of Guidance and Counselling - University of Ibadan - Nigeria, 1972).

SET A

80 +

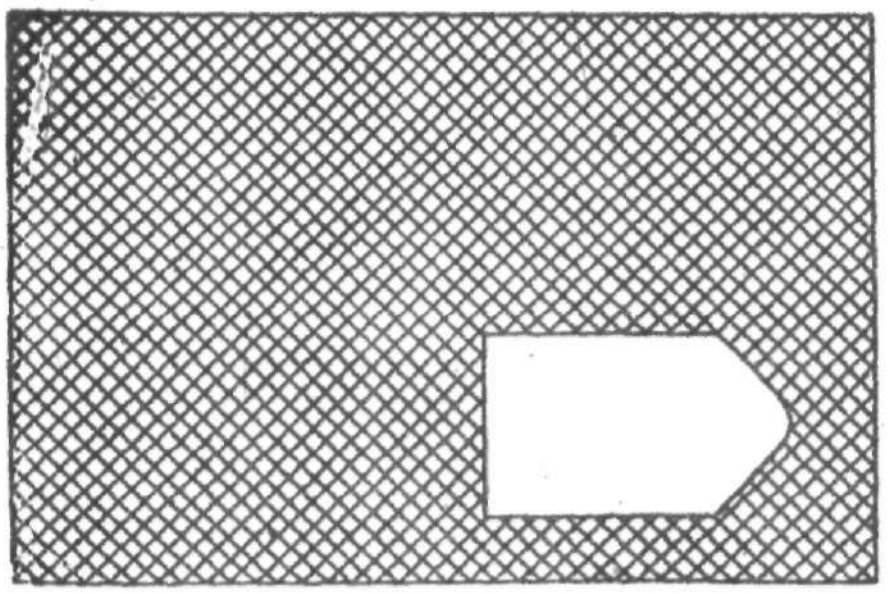
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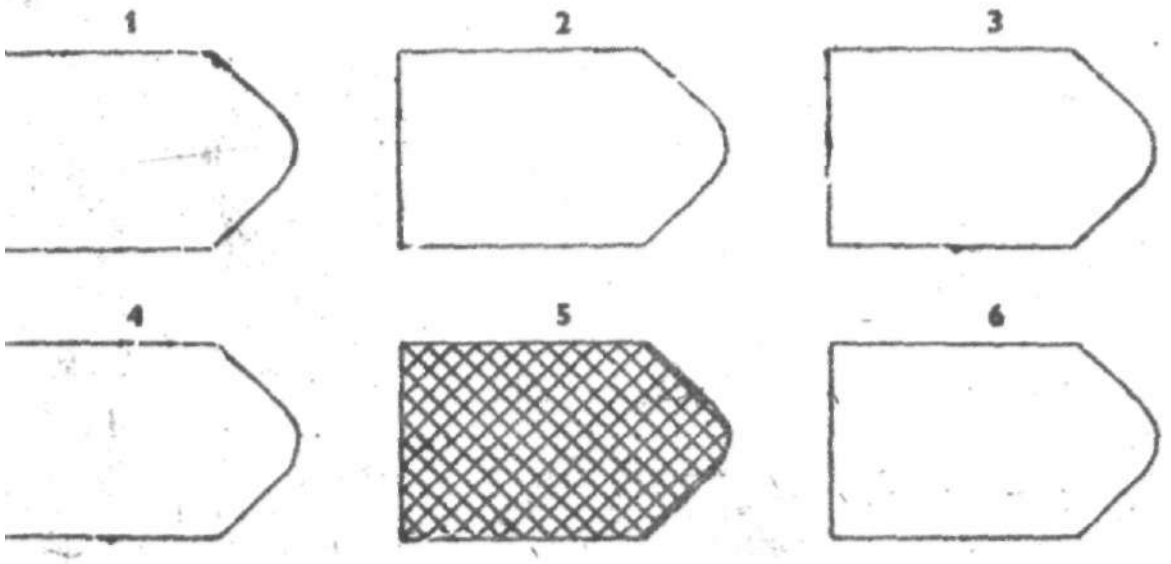




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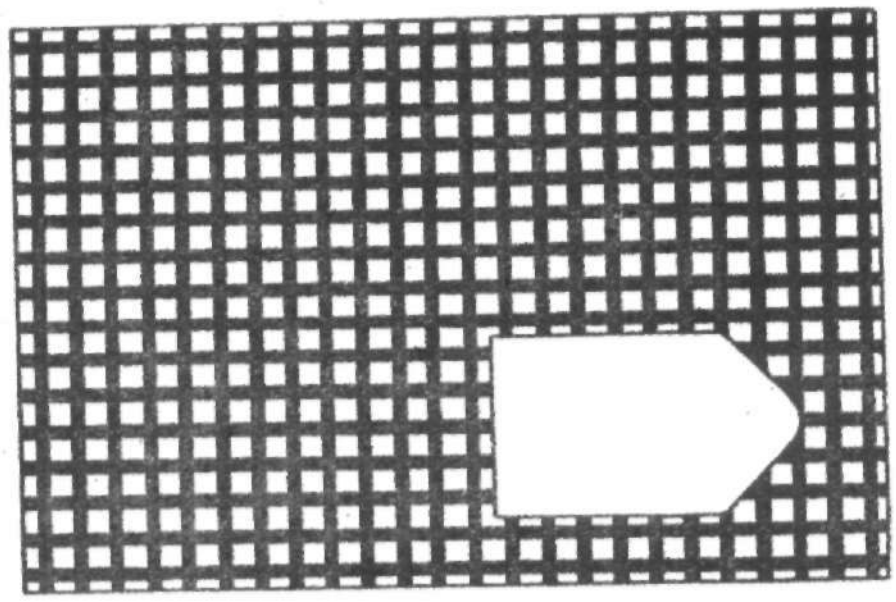
A 2.

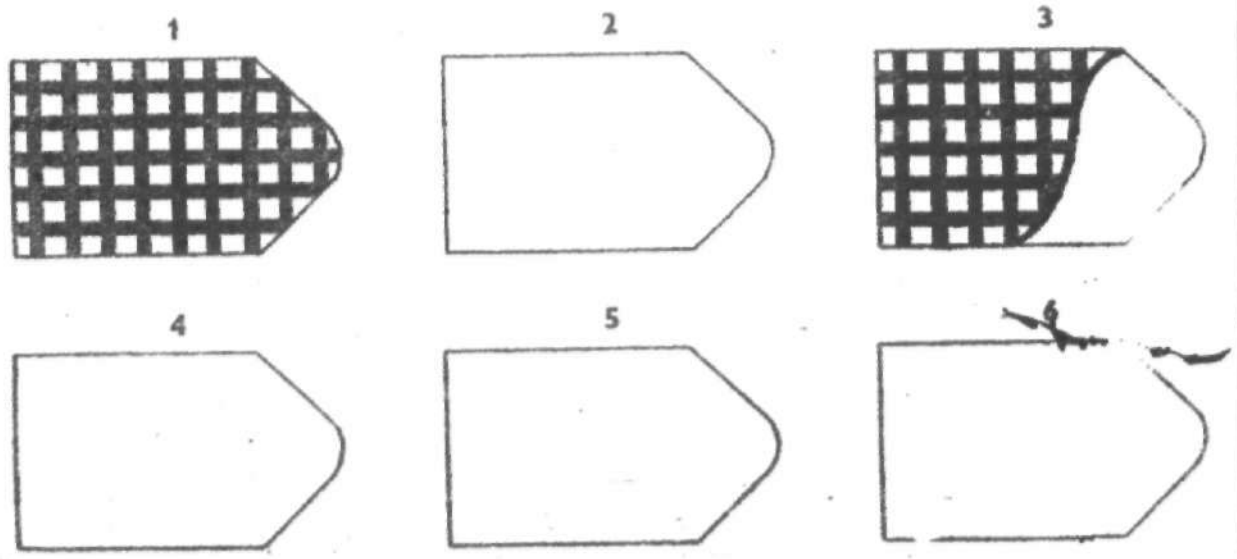




82 B

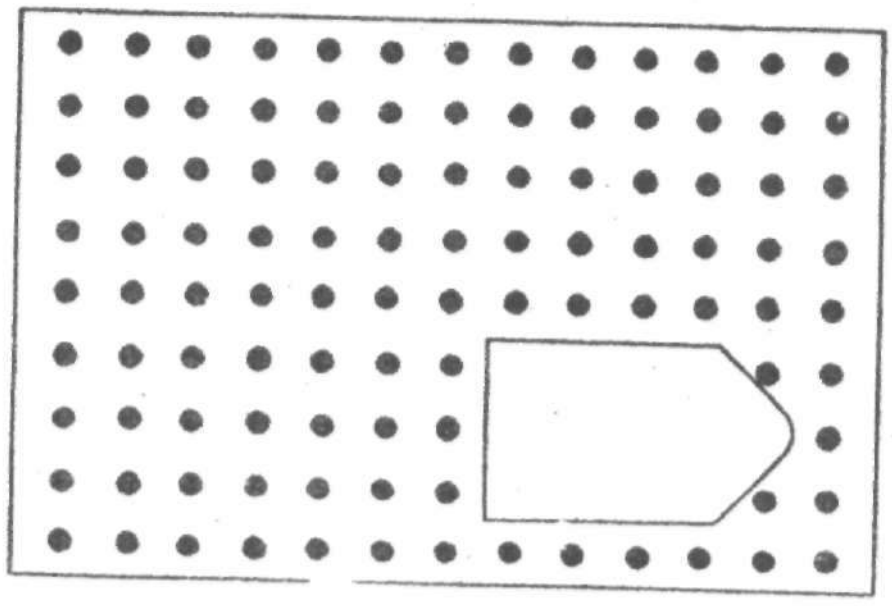
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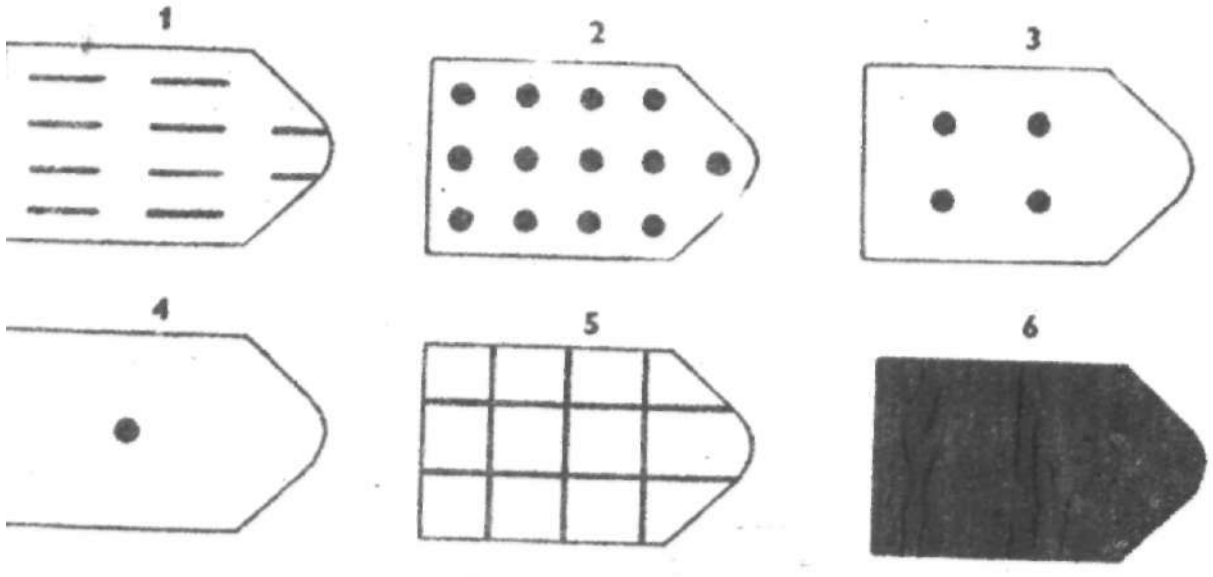




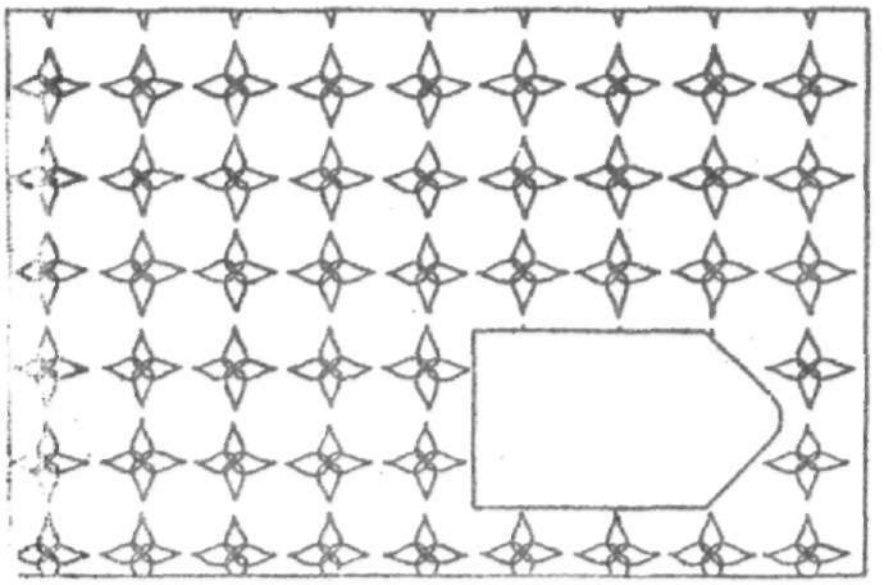
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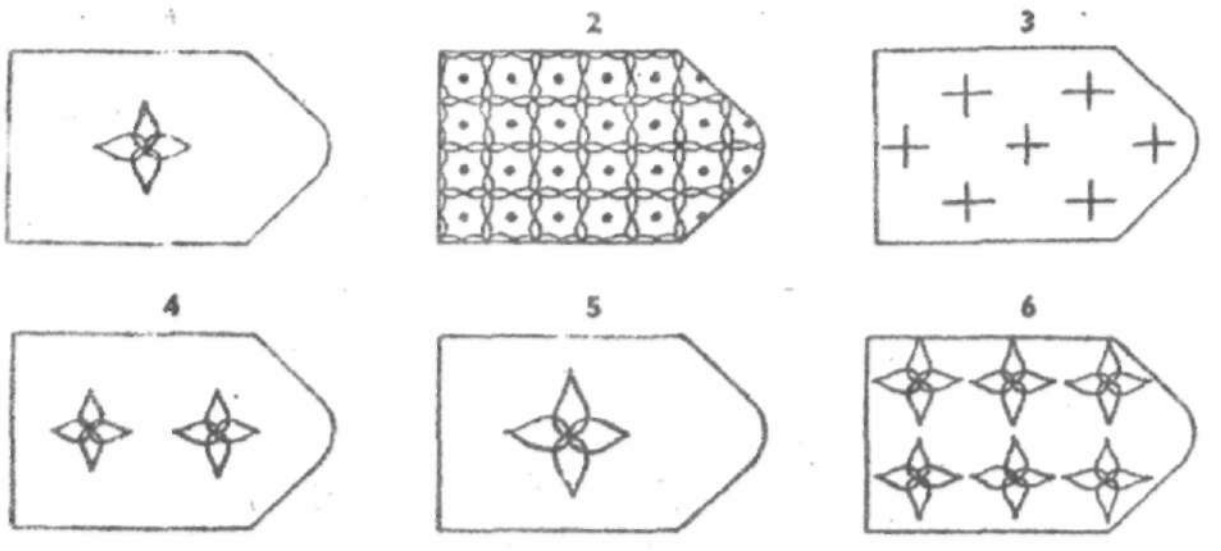
83 A



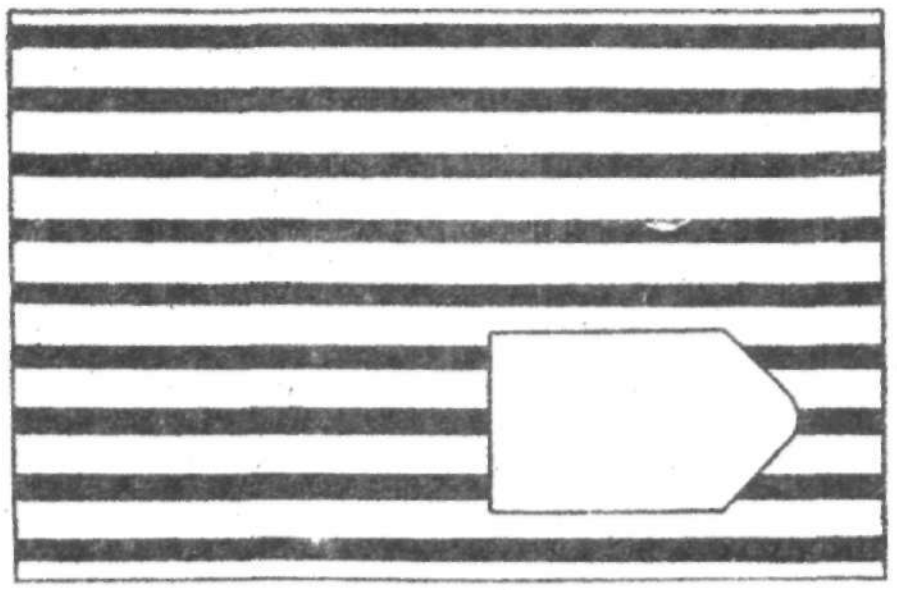


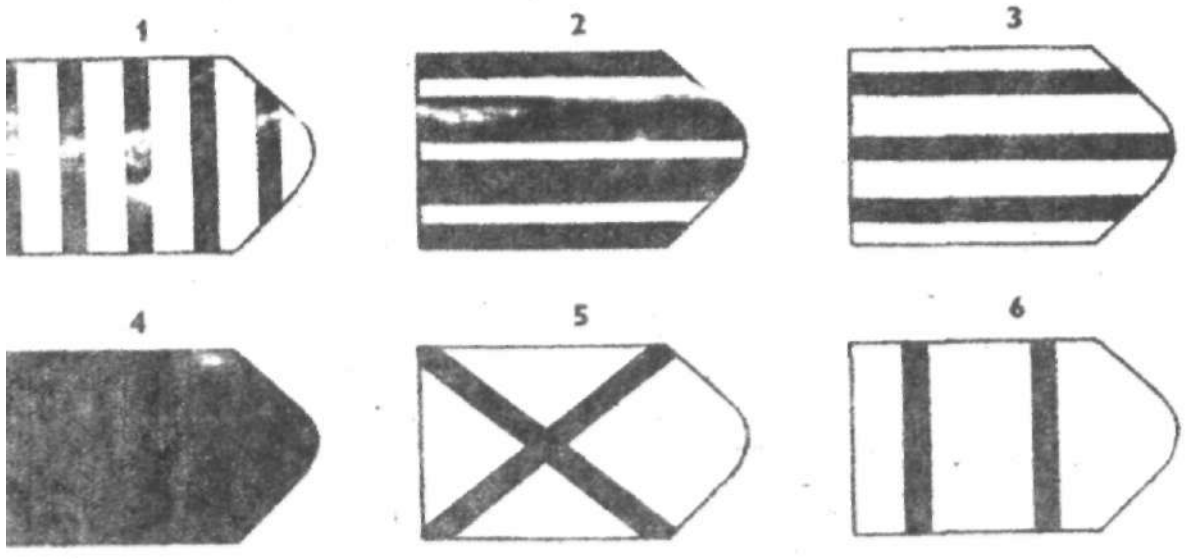
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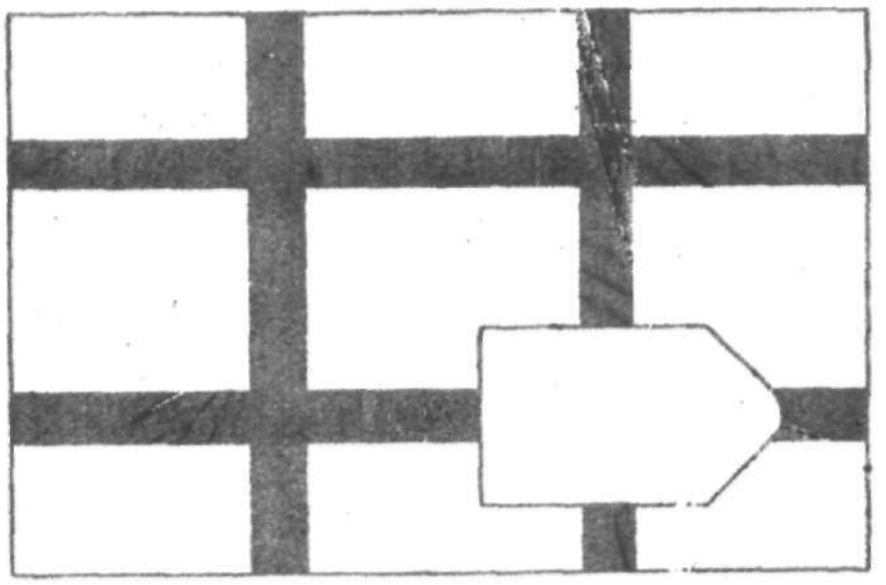


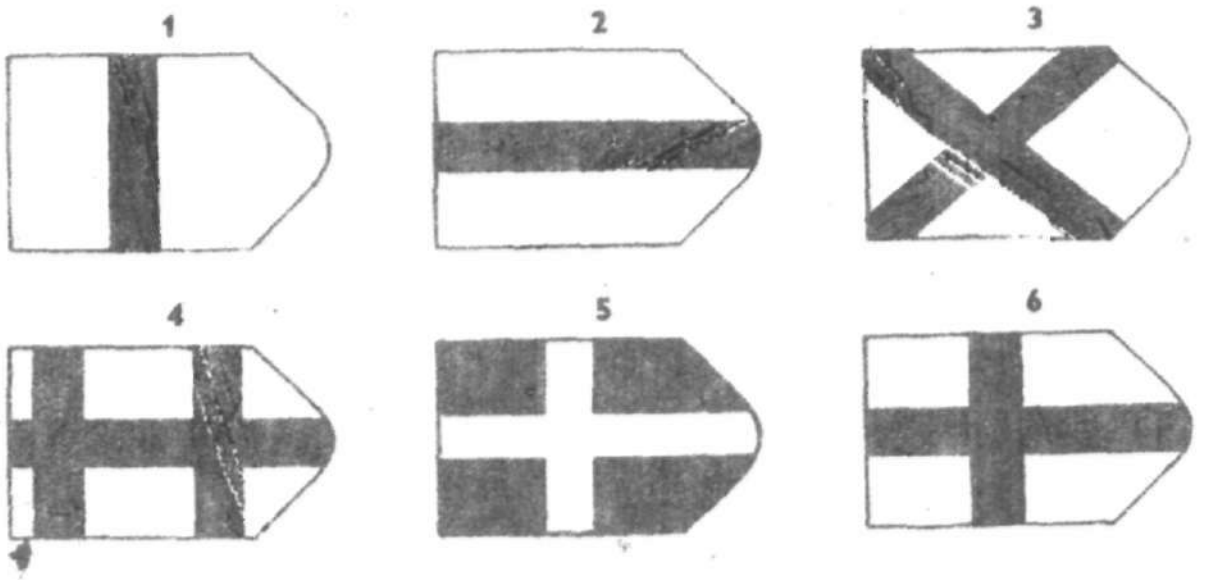
A6



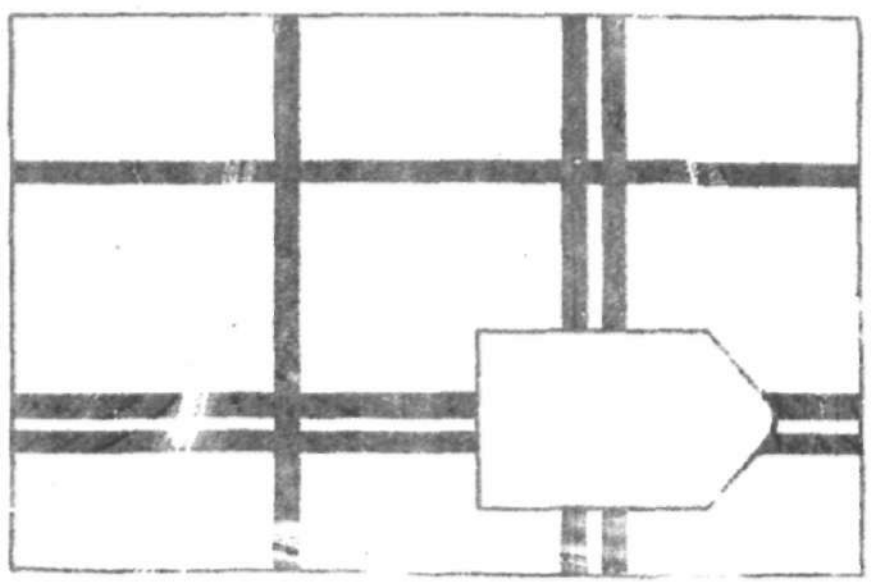


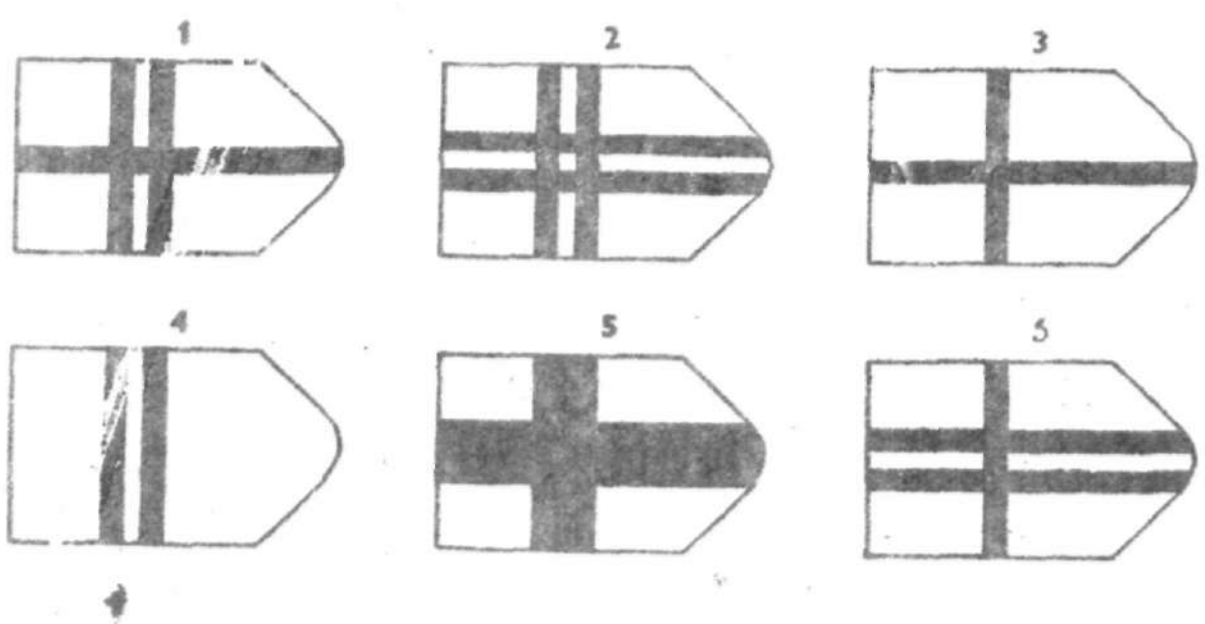
A 7

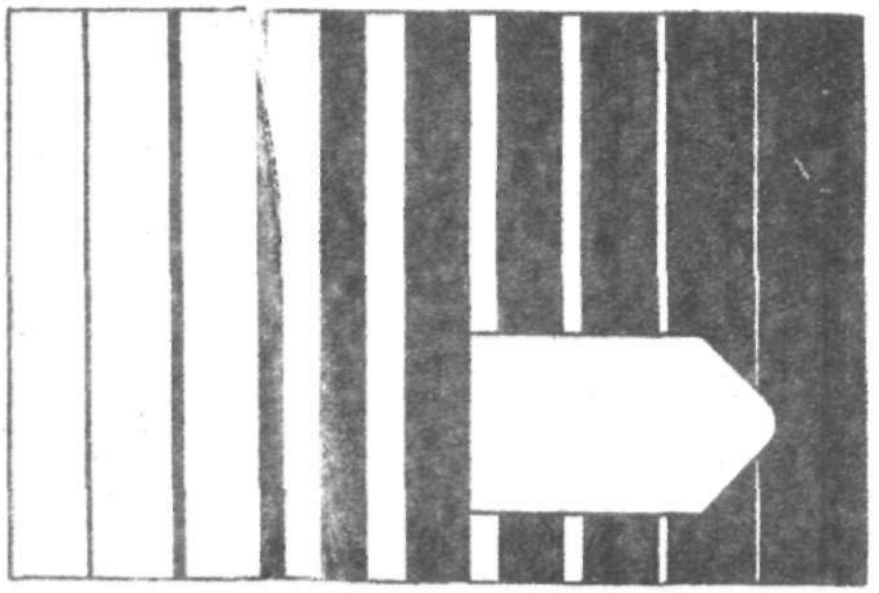


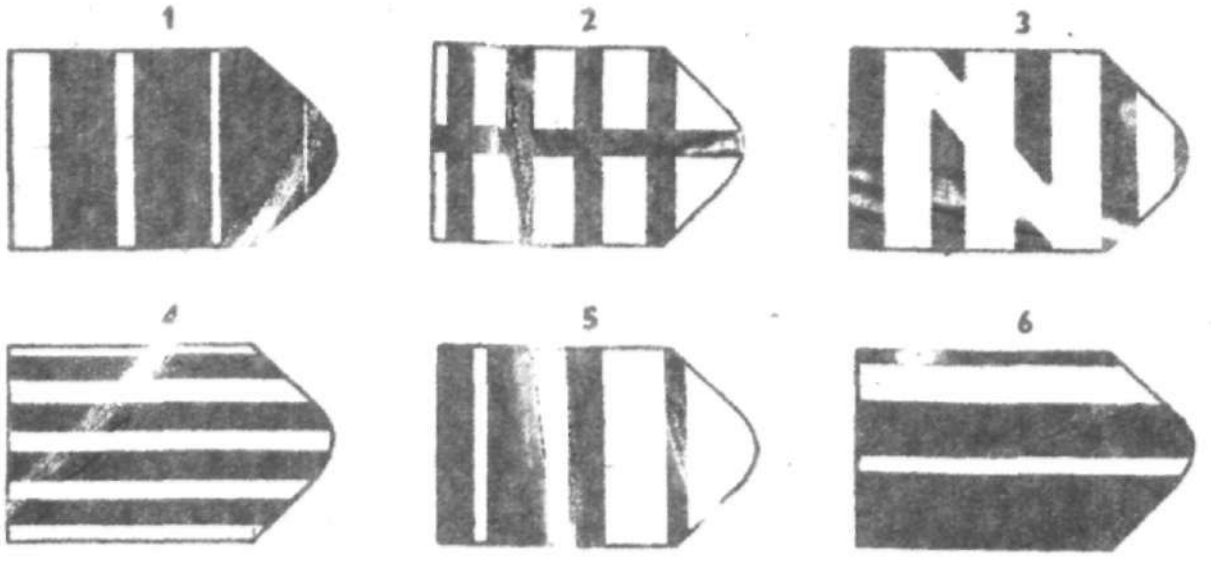


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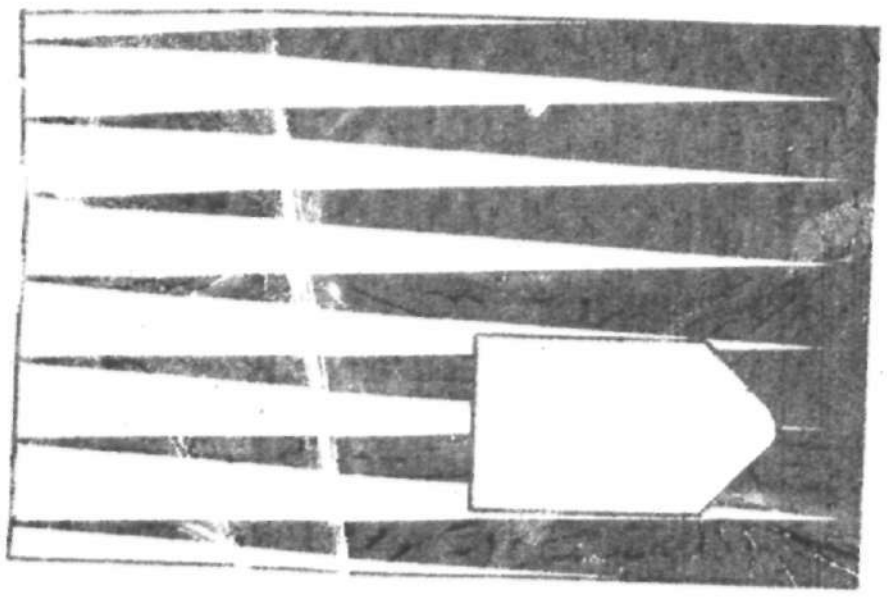


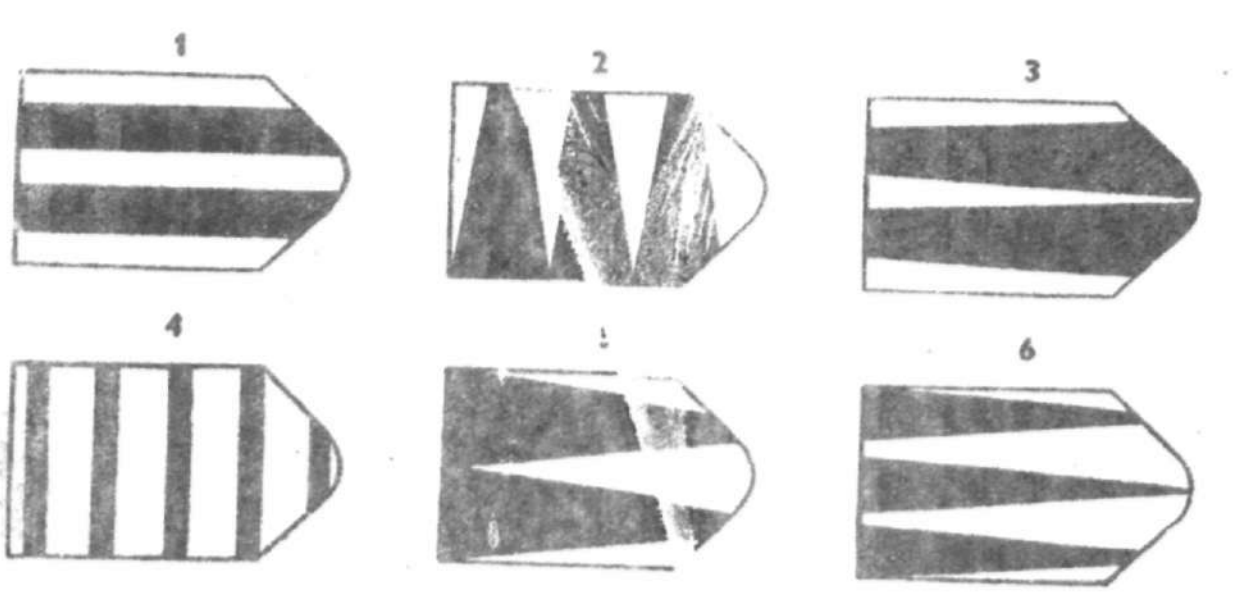




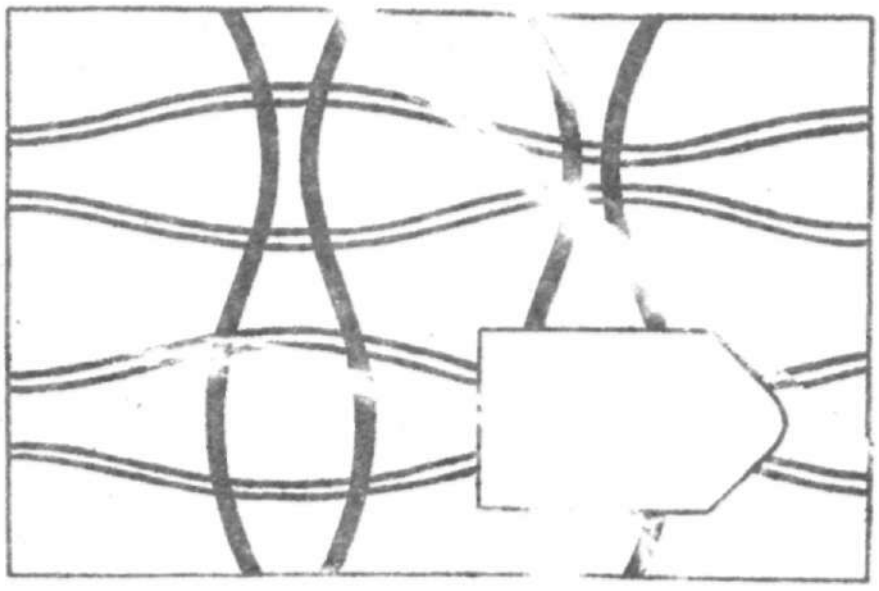

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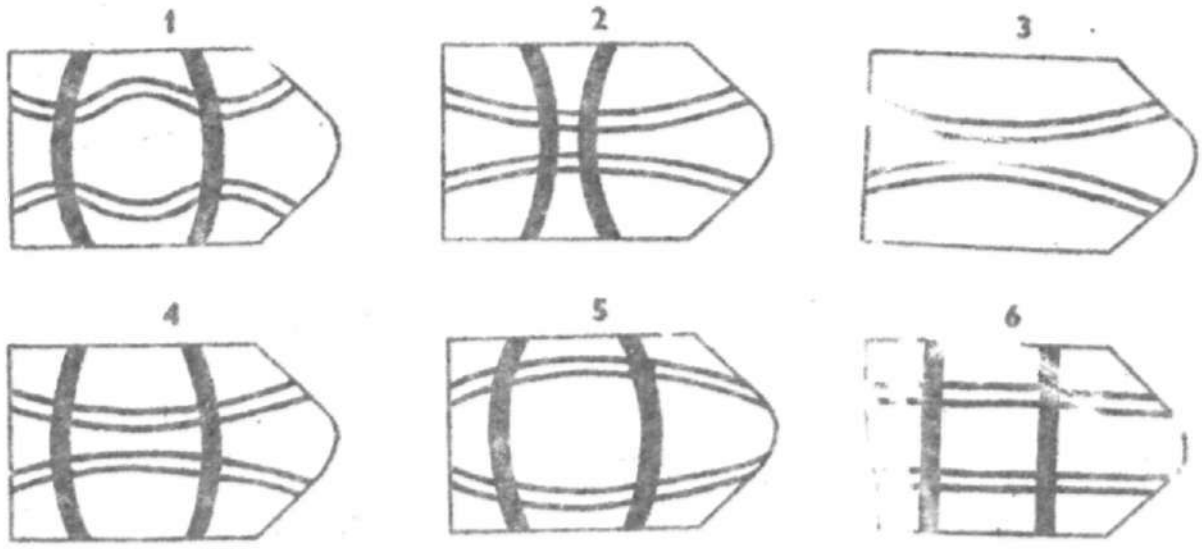
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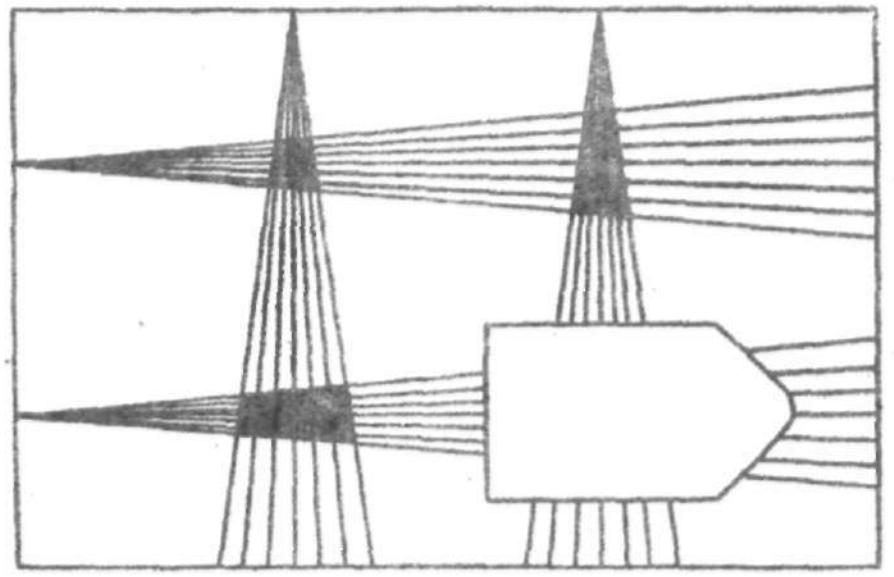


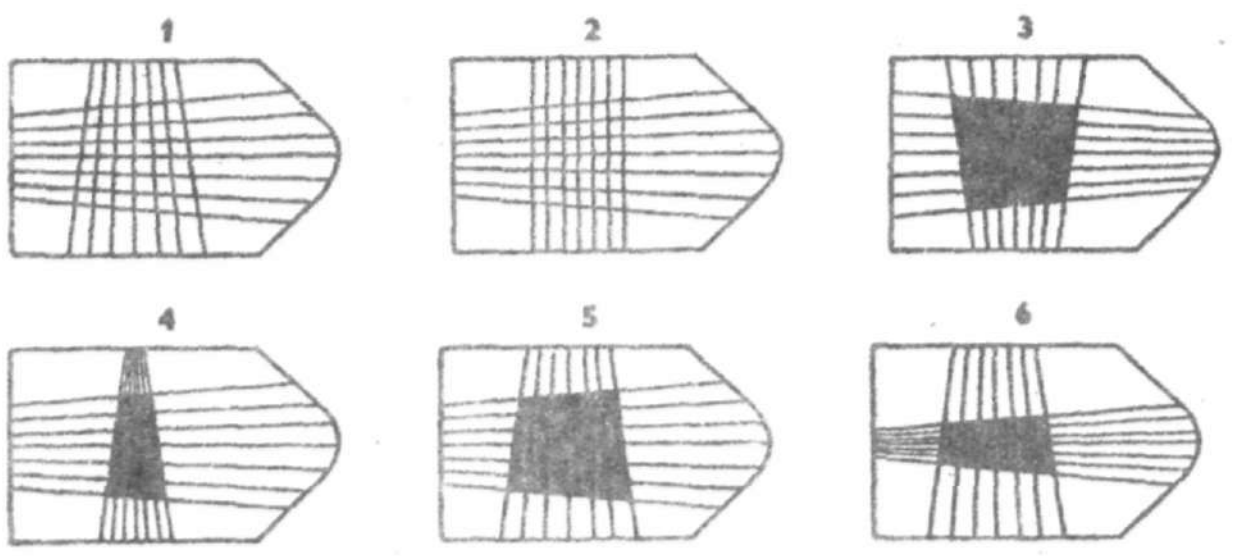
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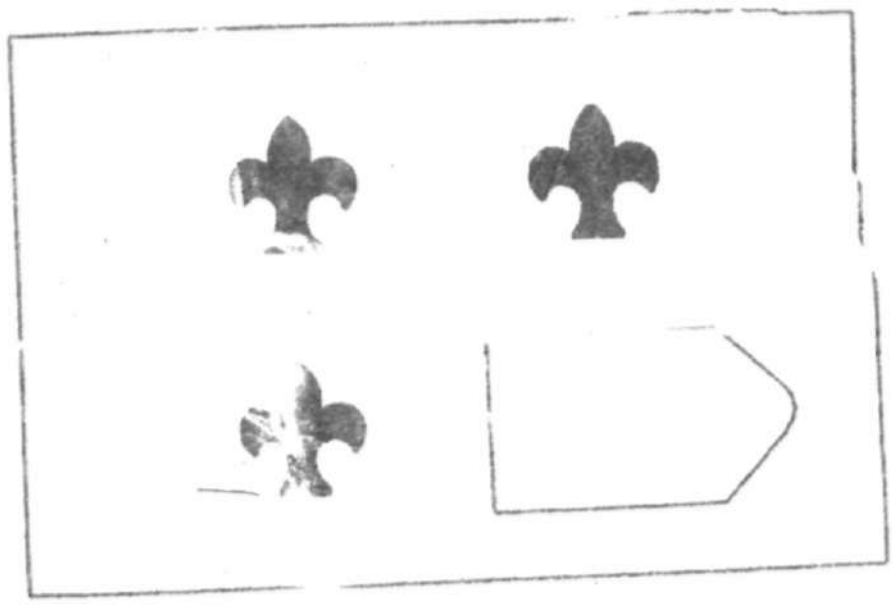
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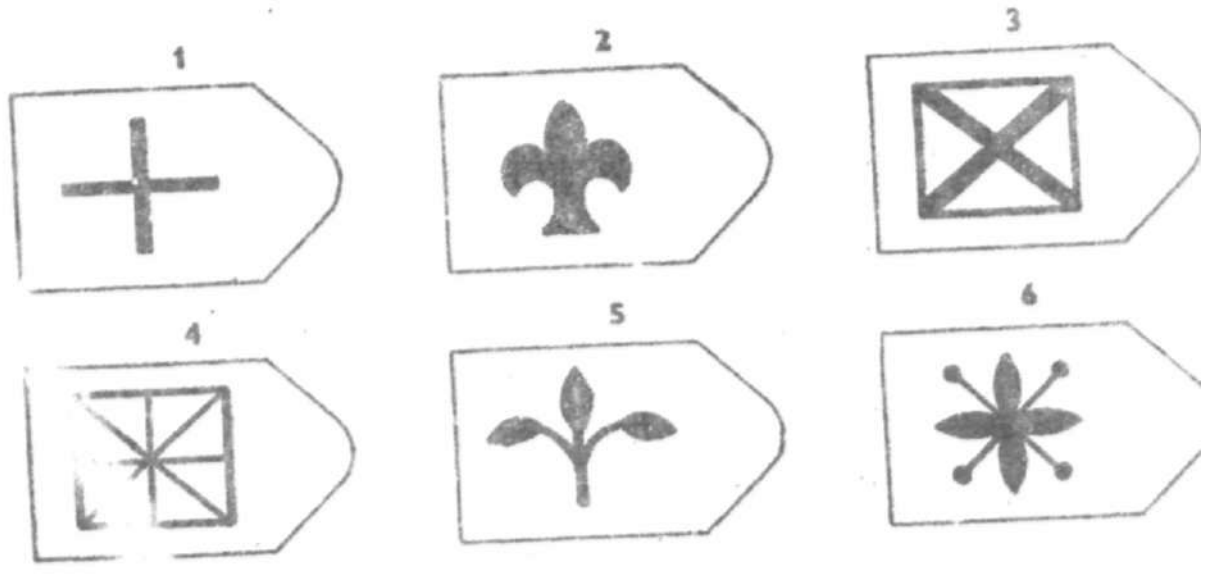




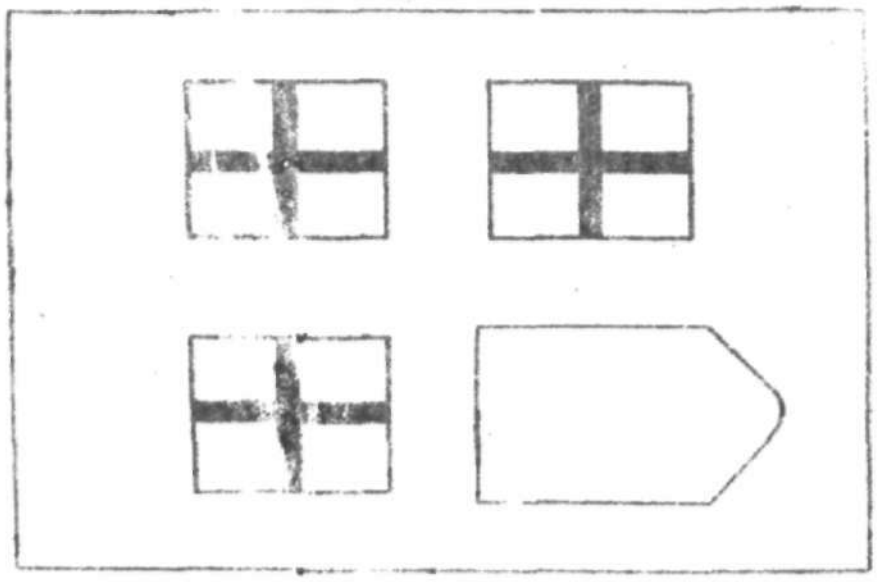
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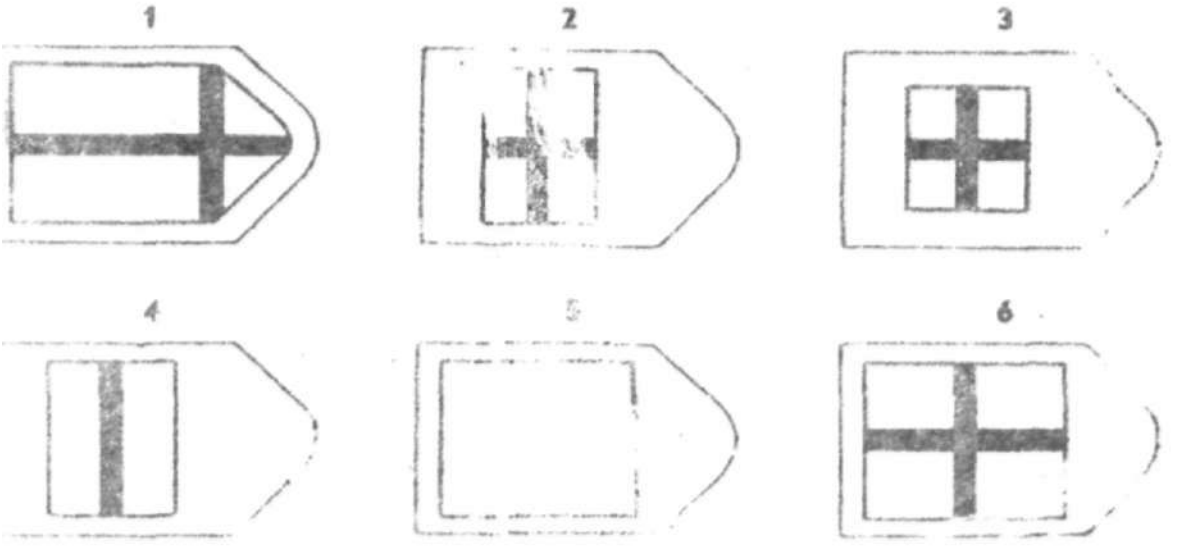
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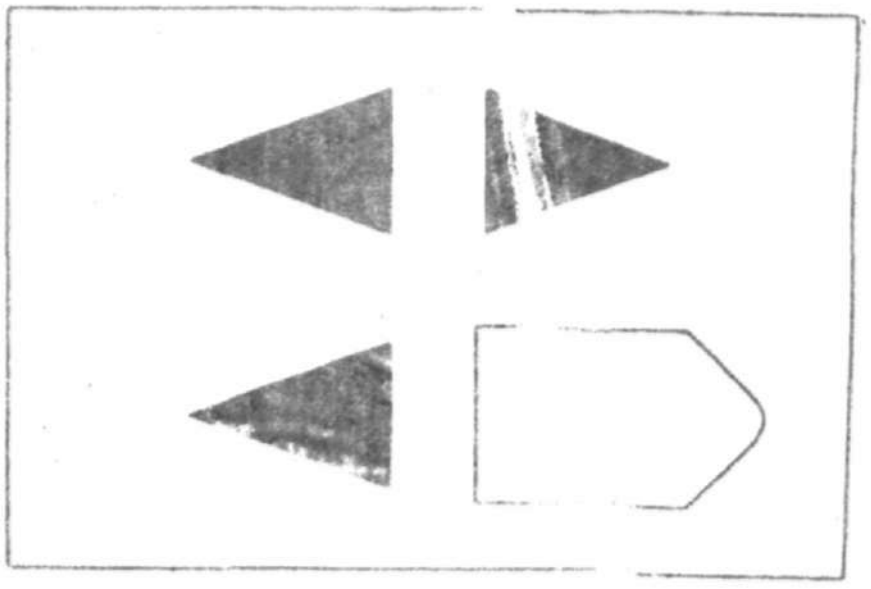


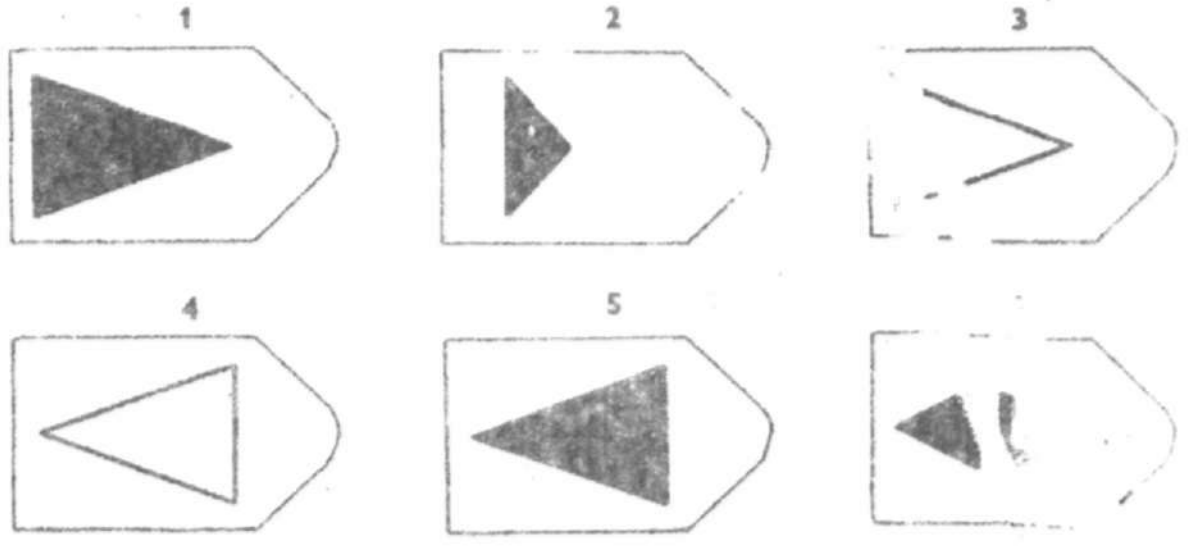
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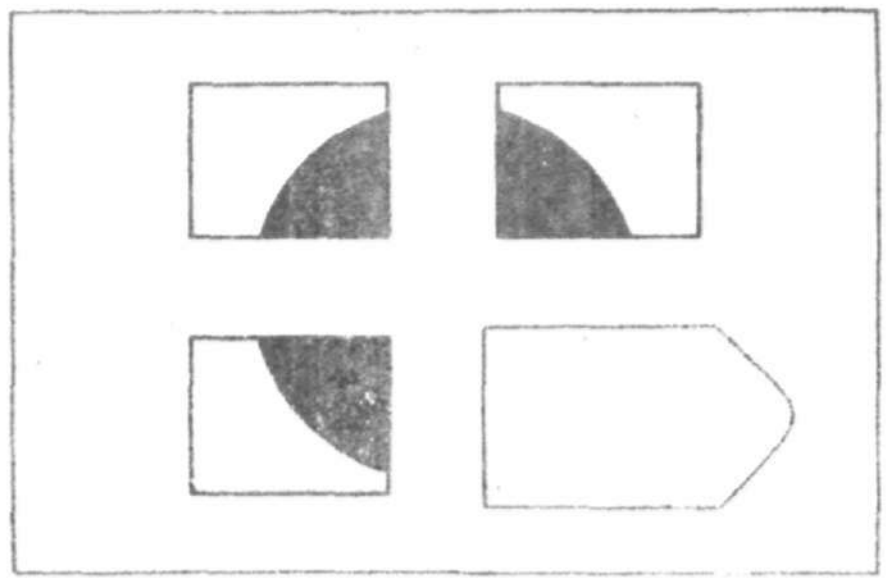


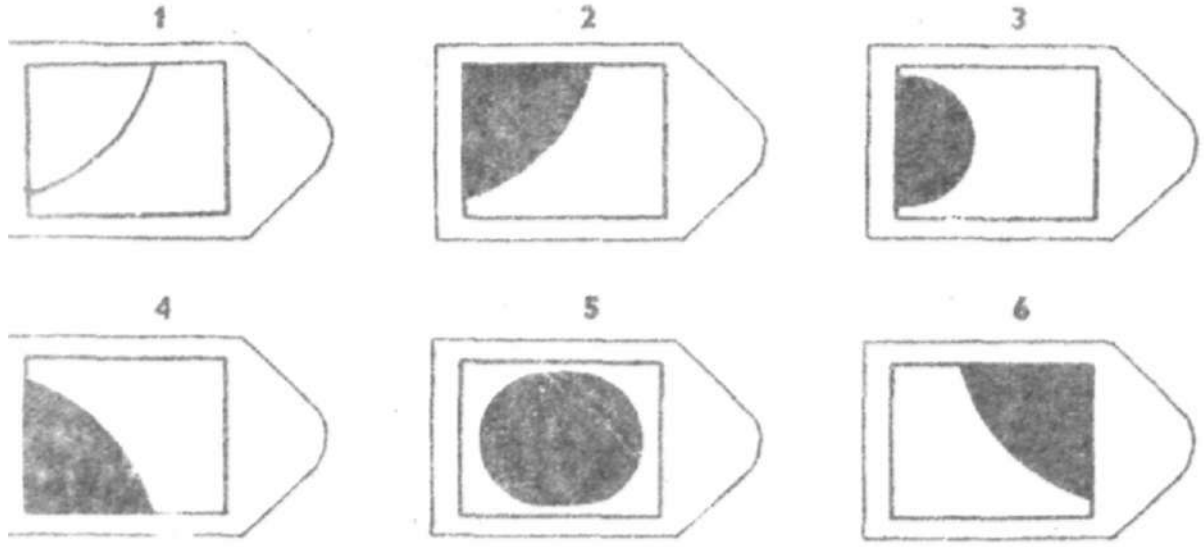
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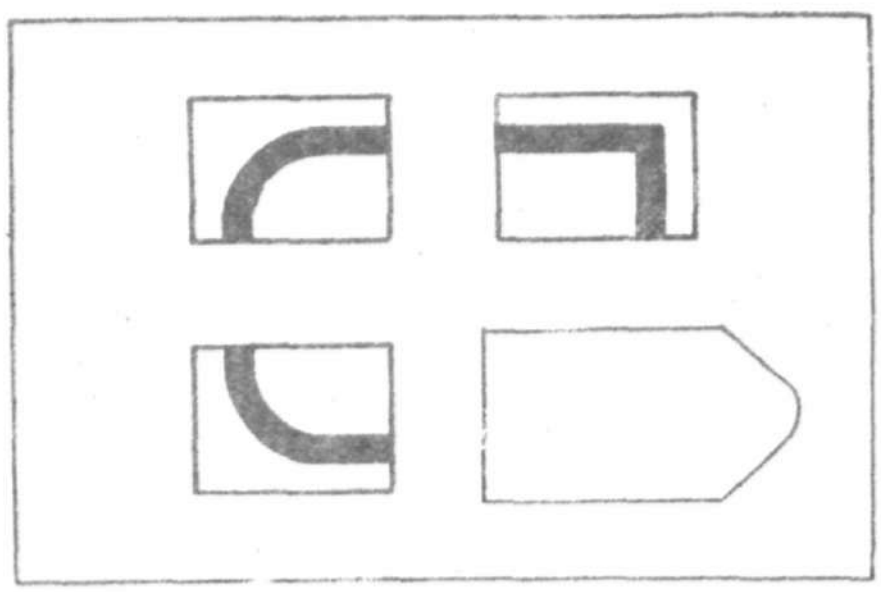


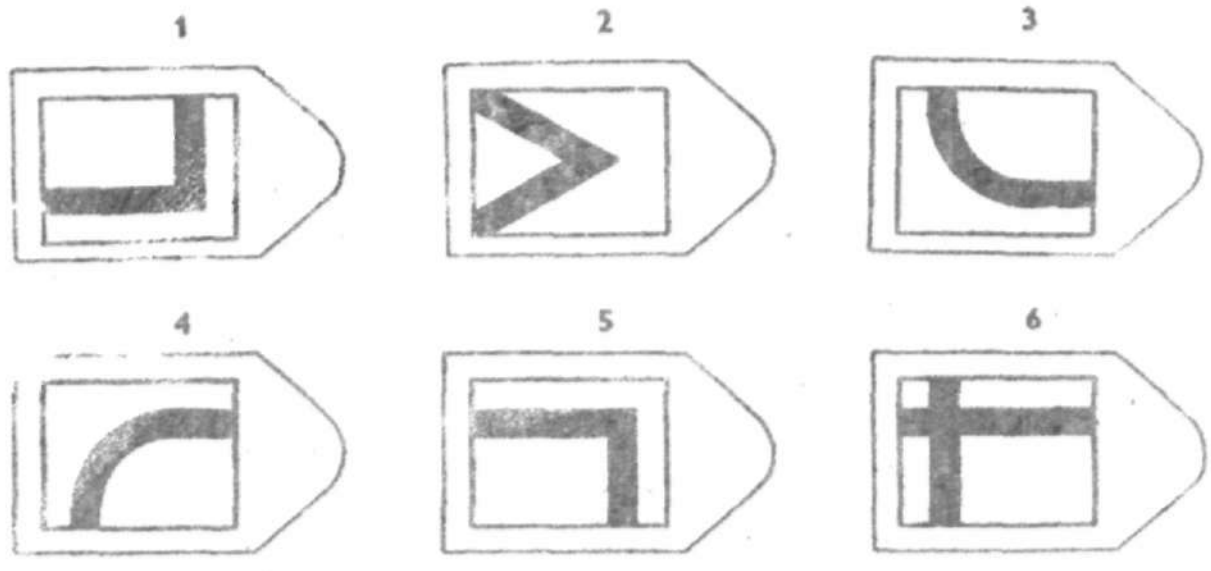
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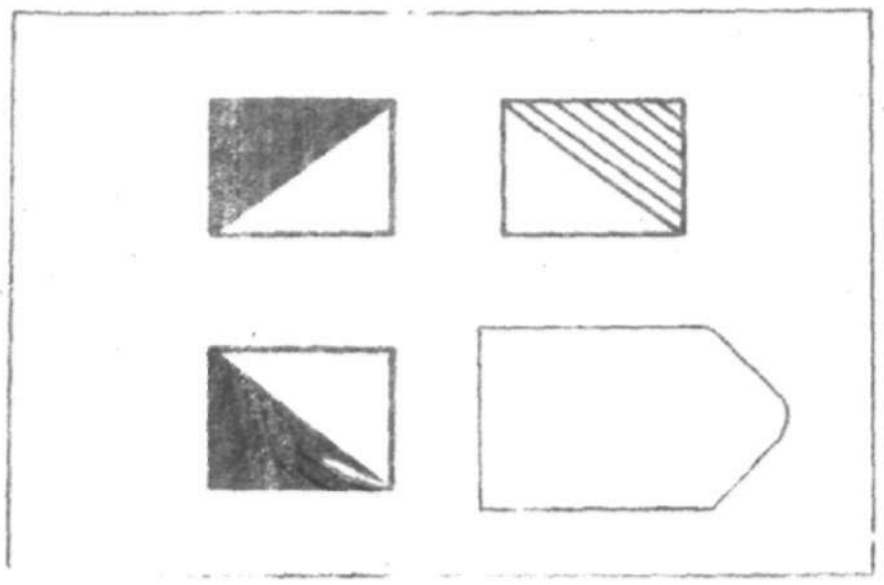


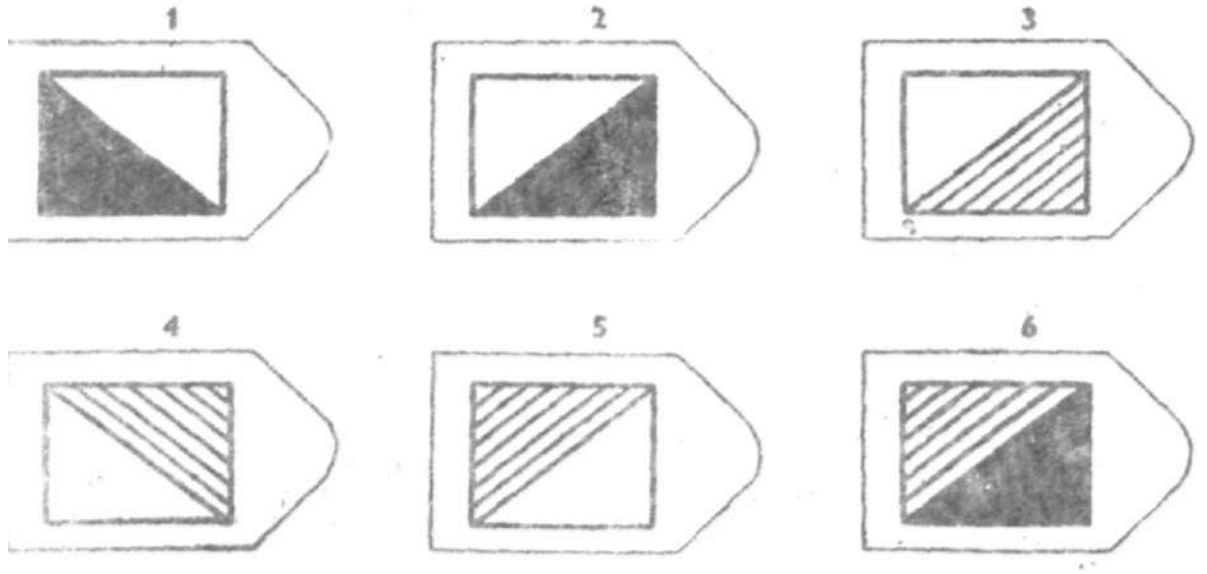
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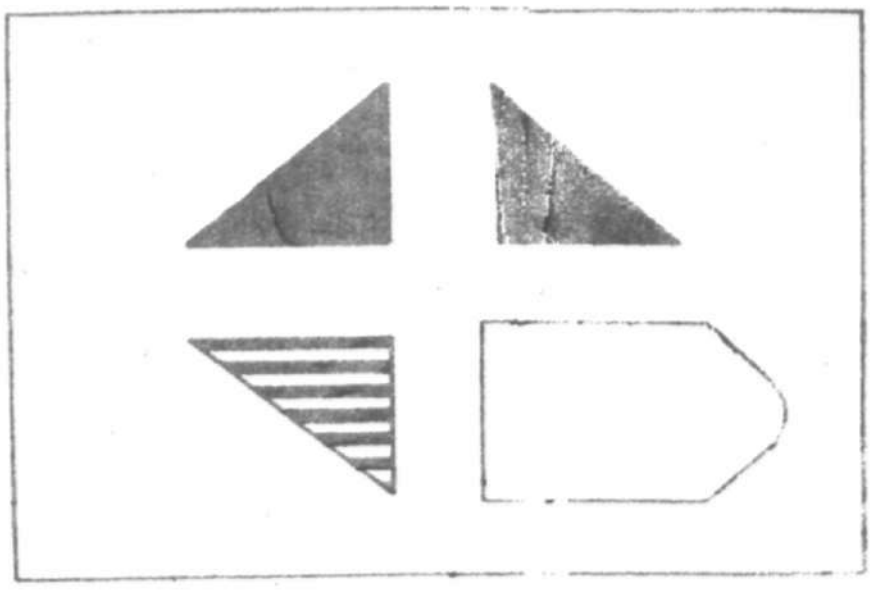


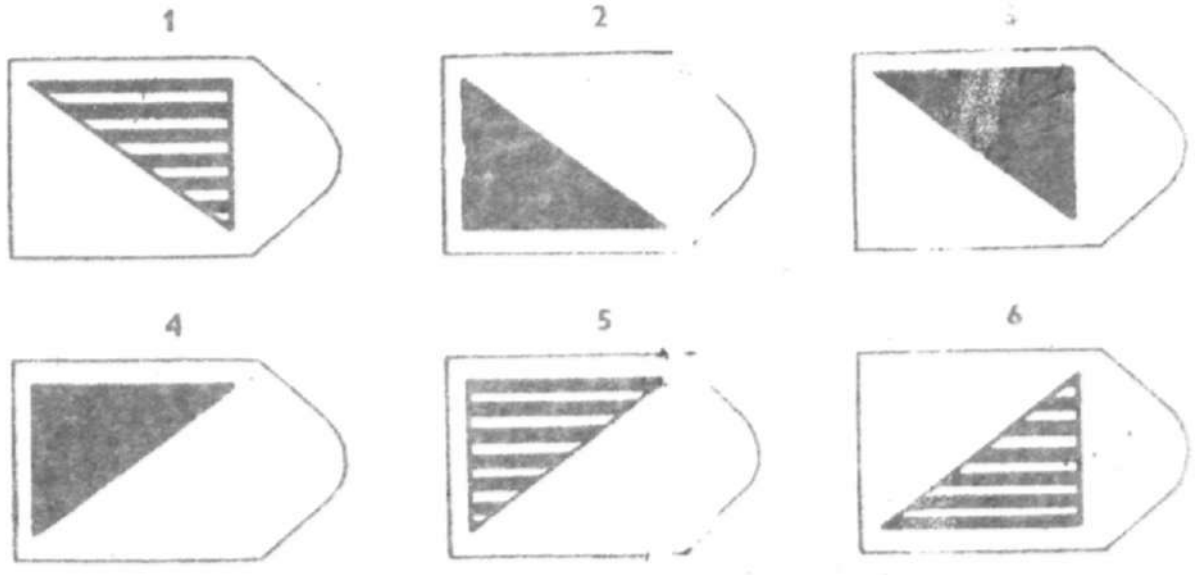
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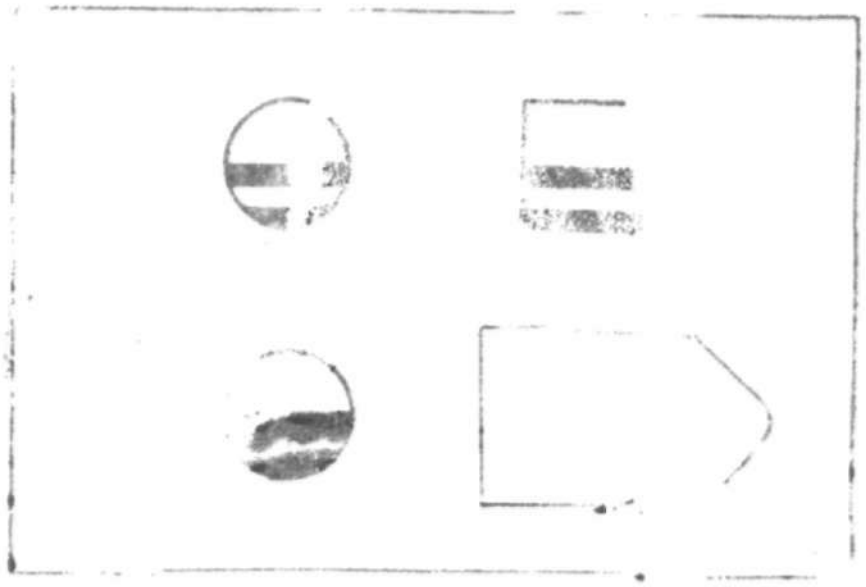


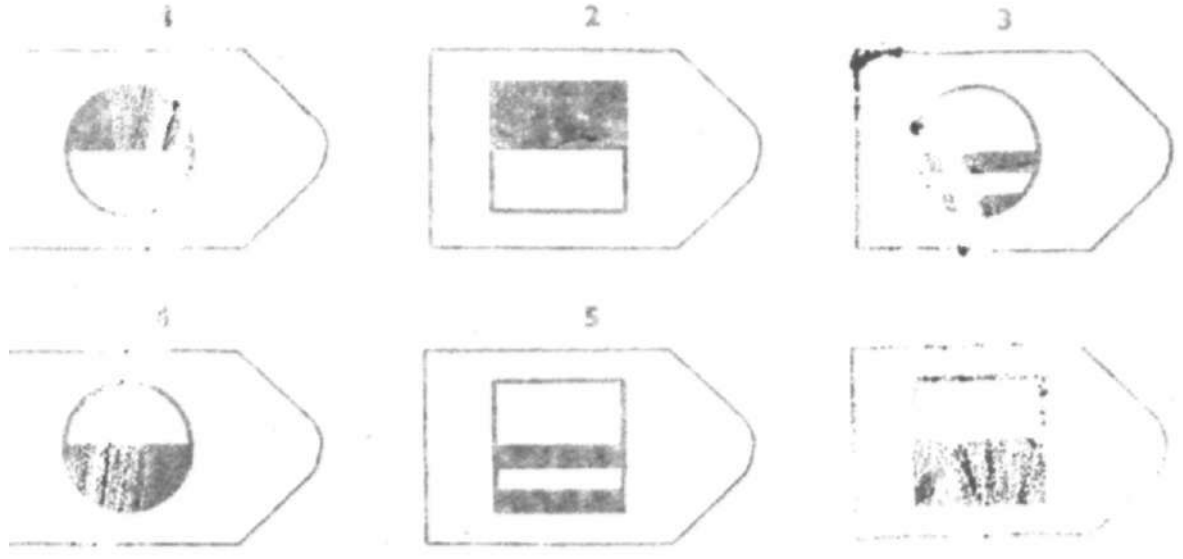


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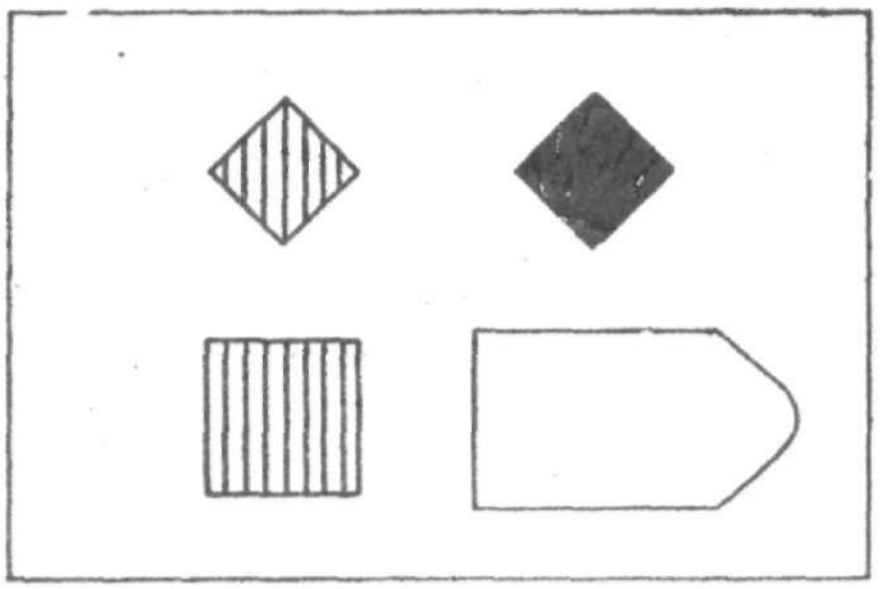


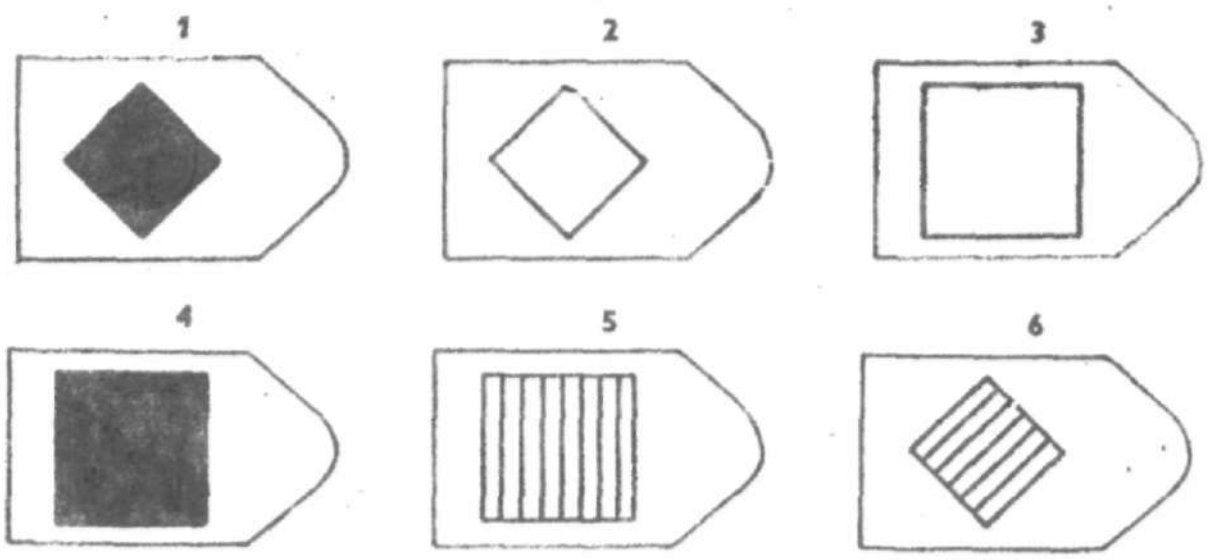




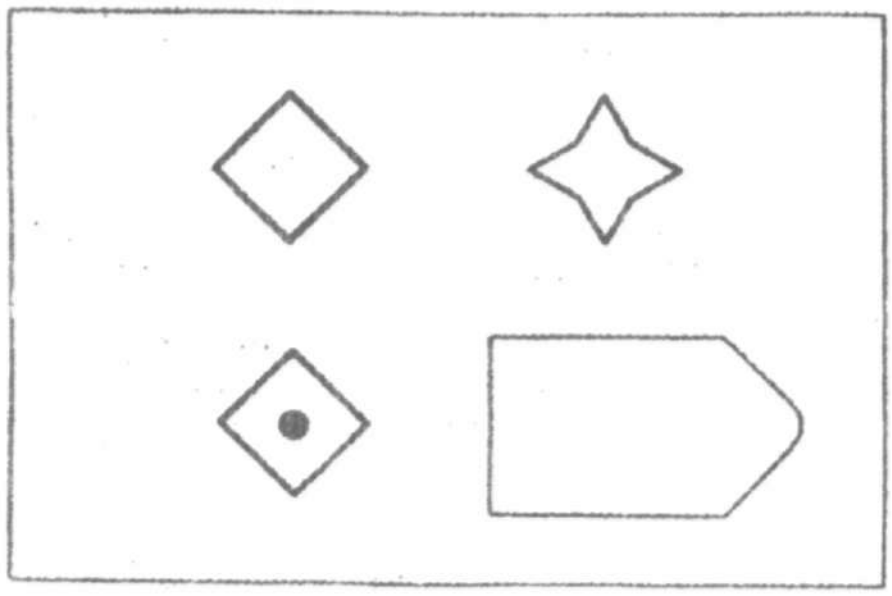

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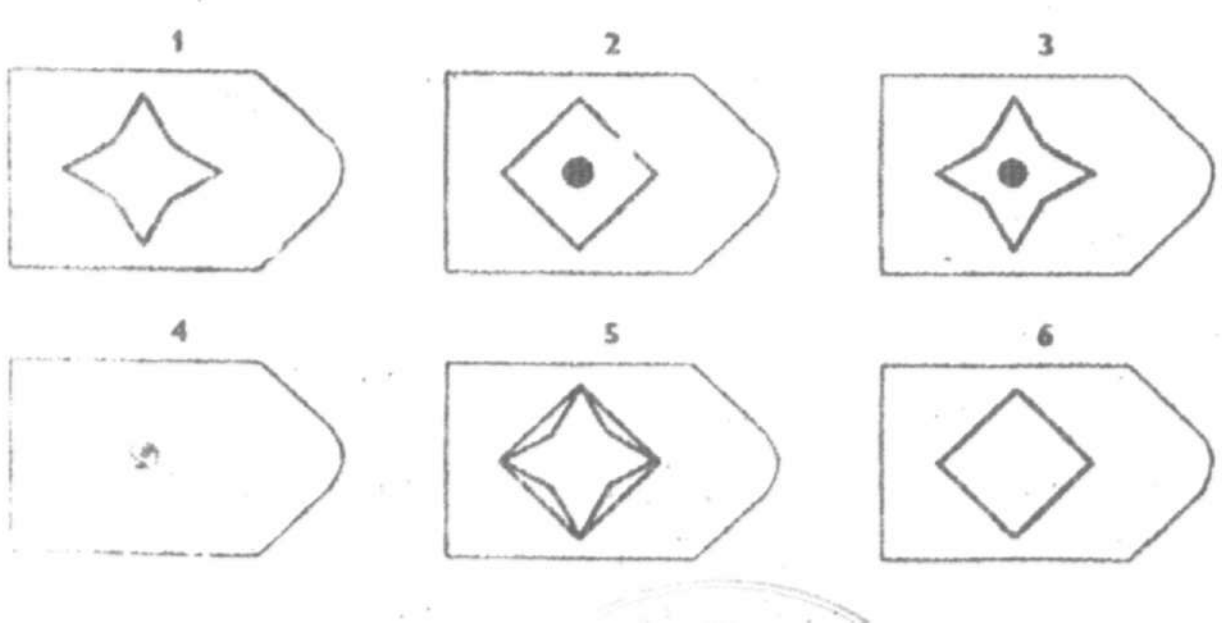
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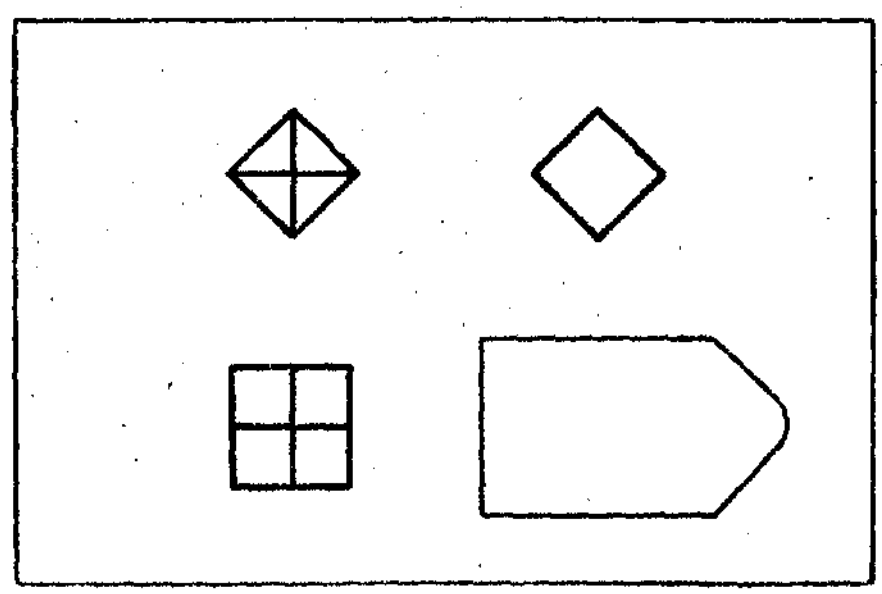


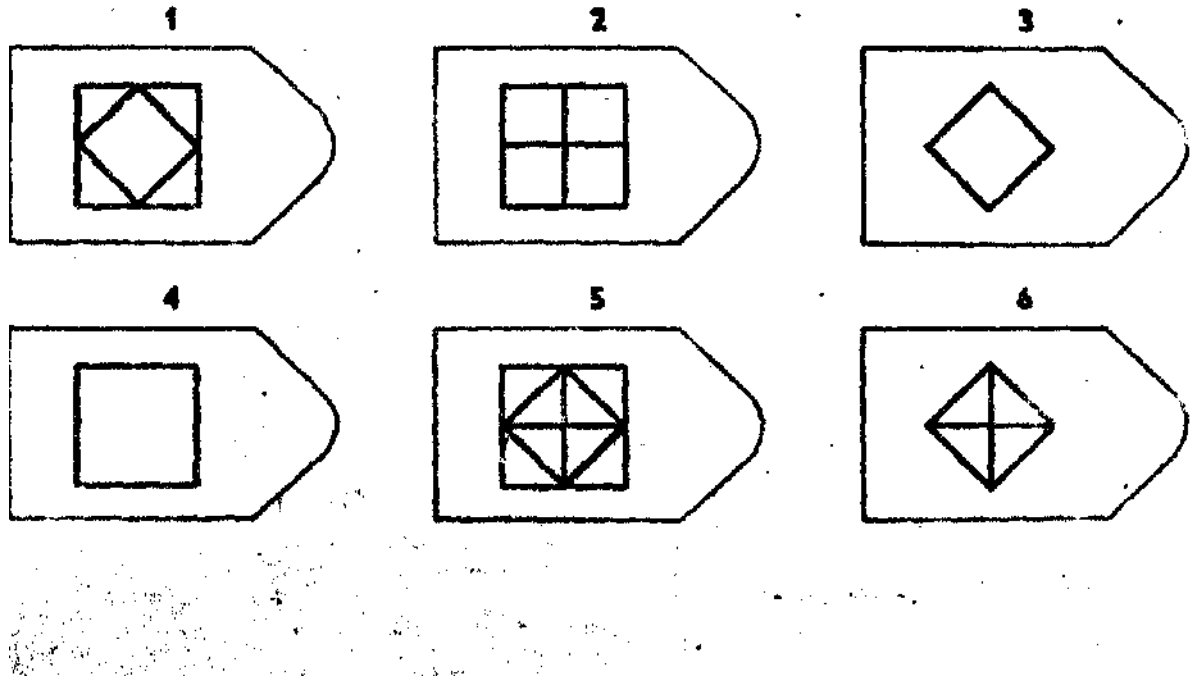
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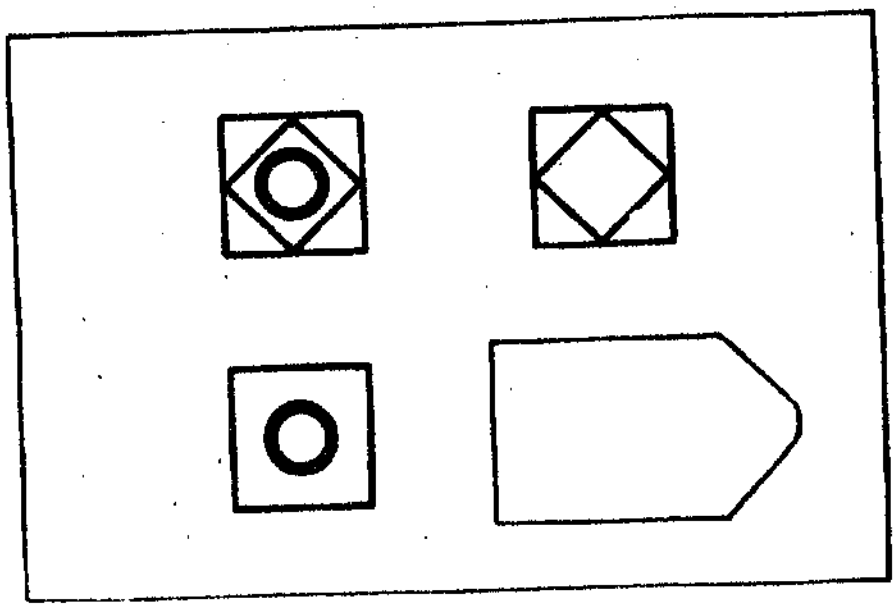


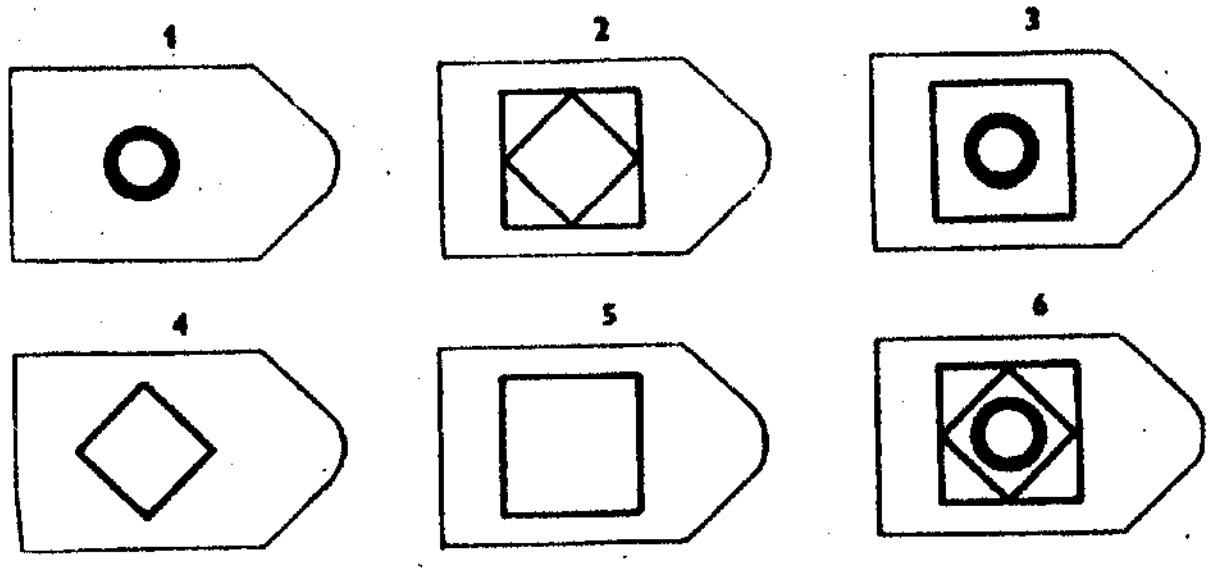
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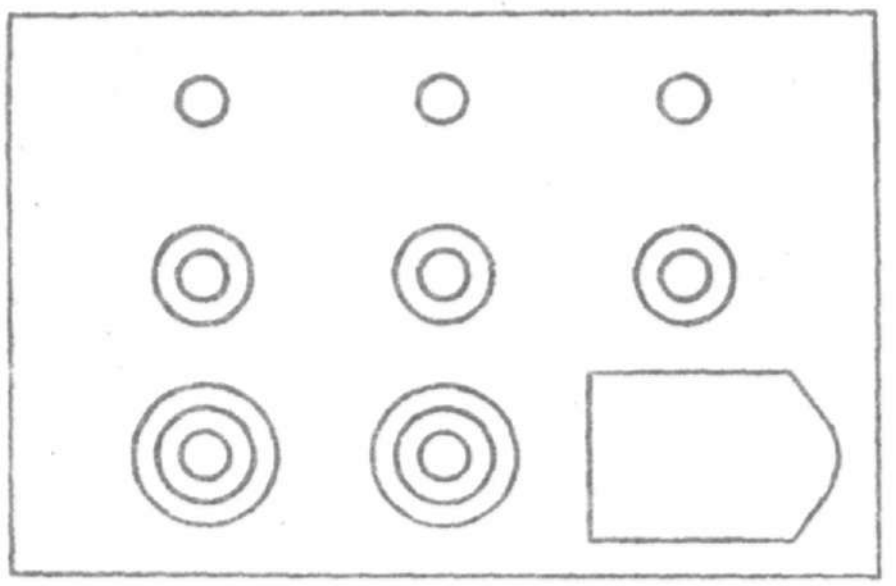
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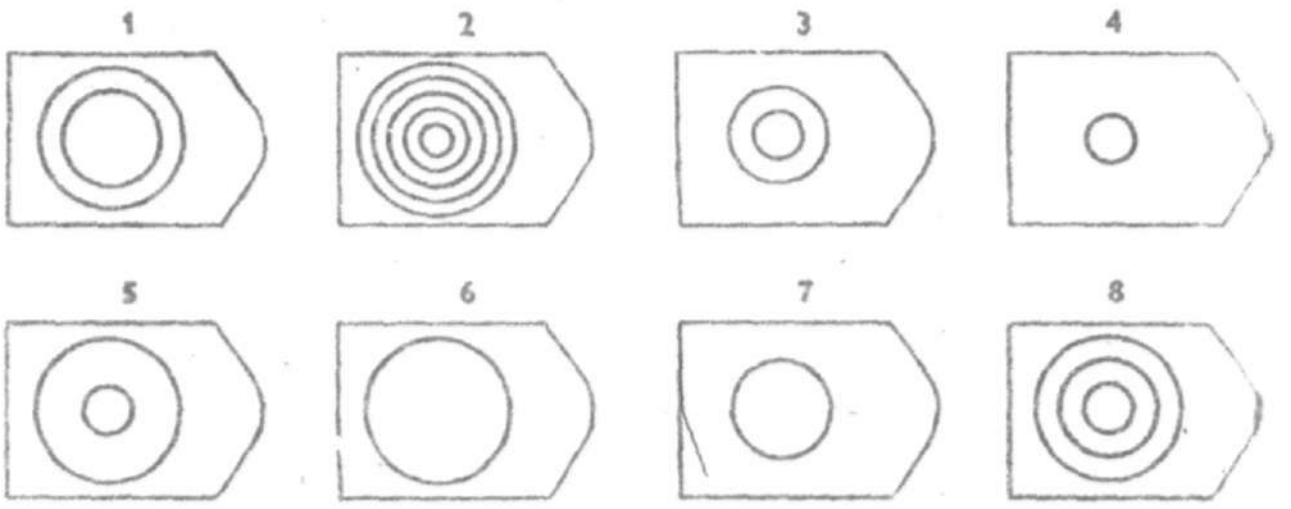




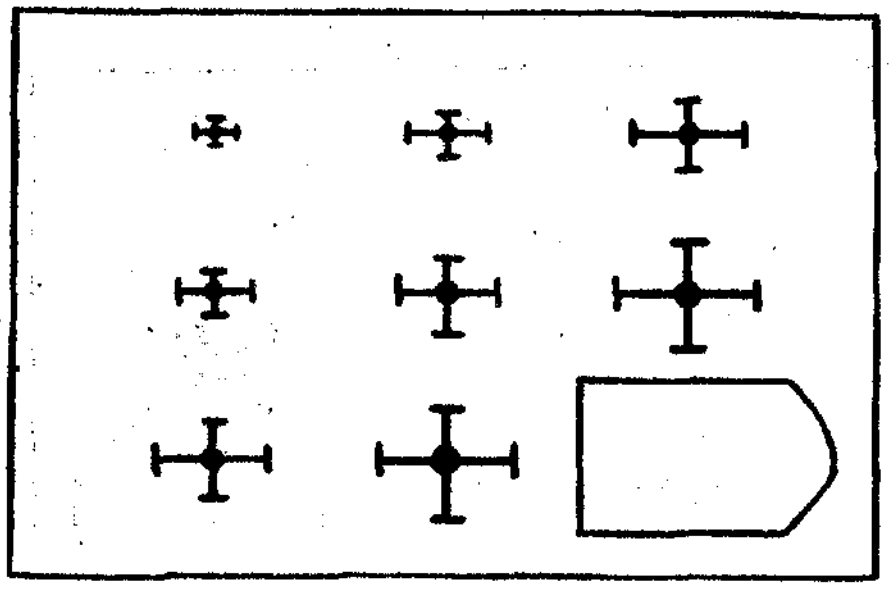
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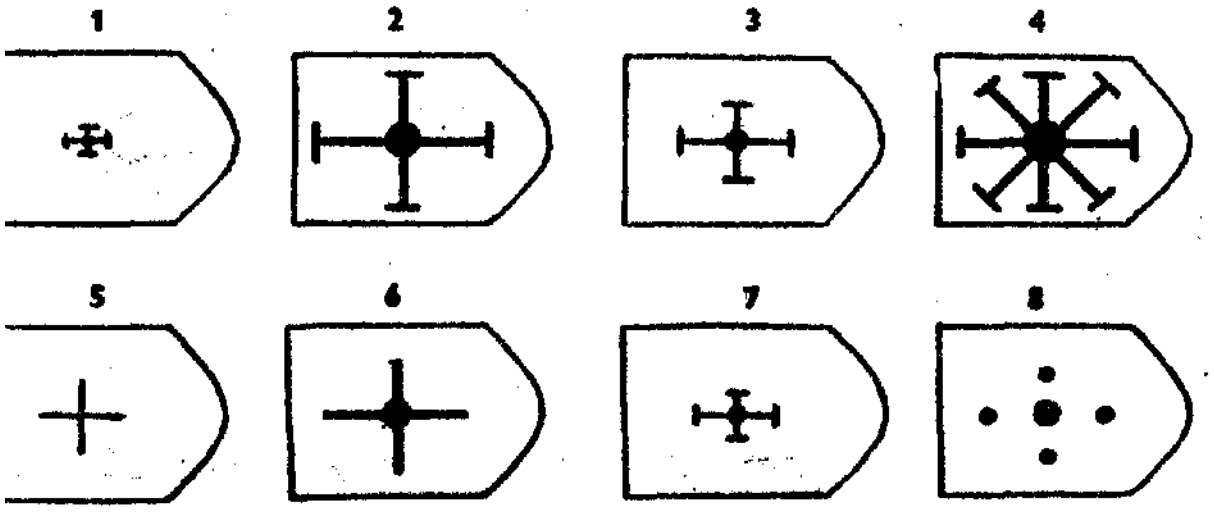
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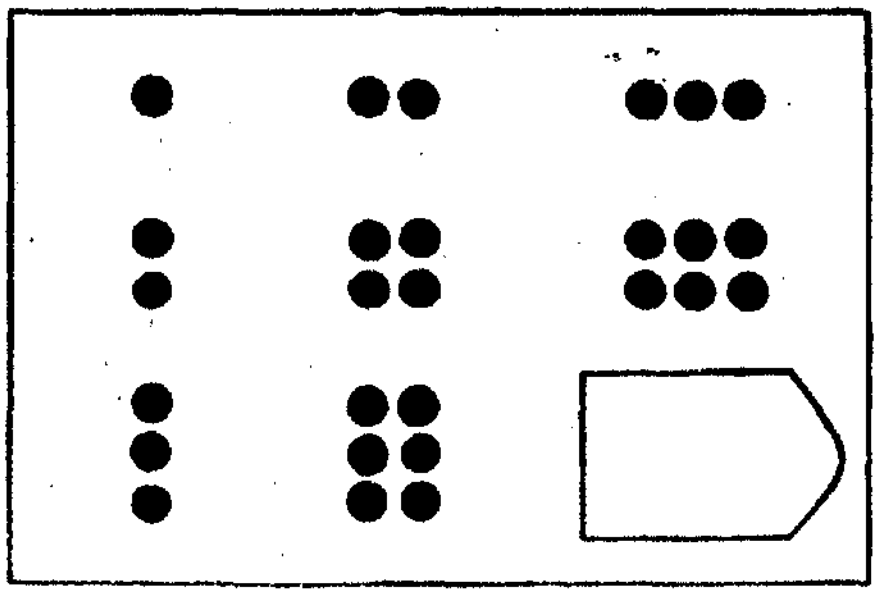


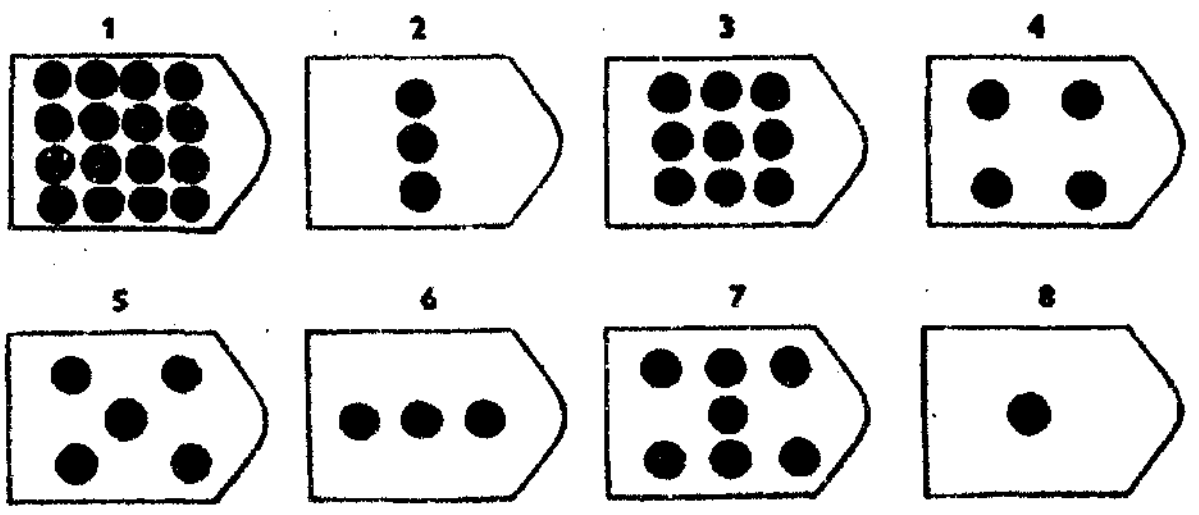
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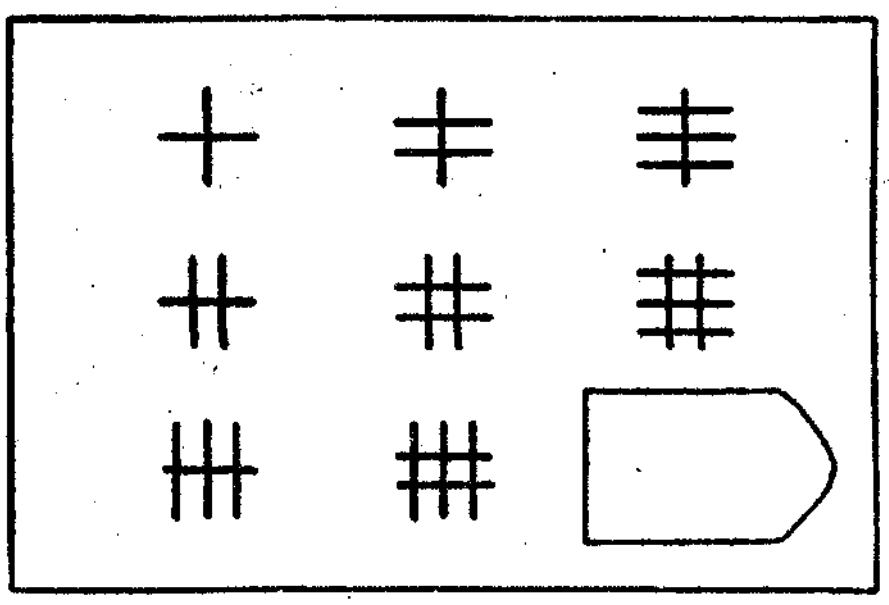


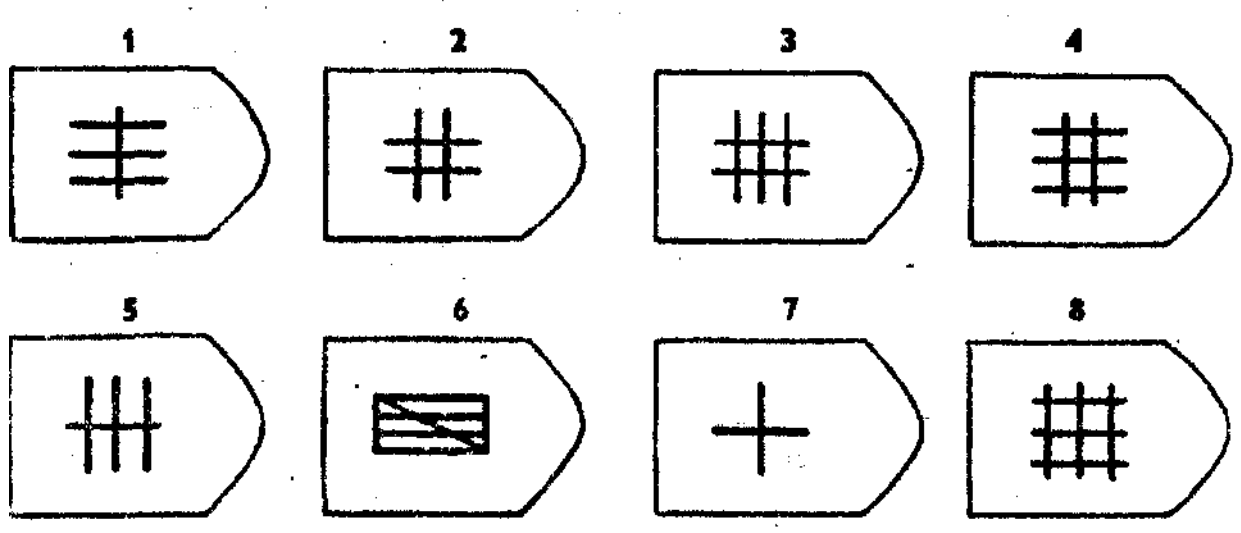
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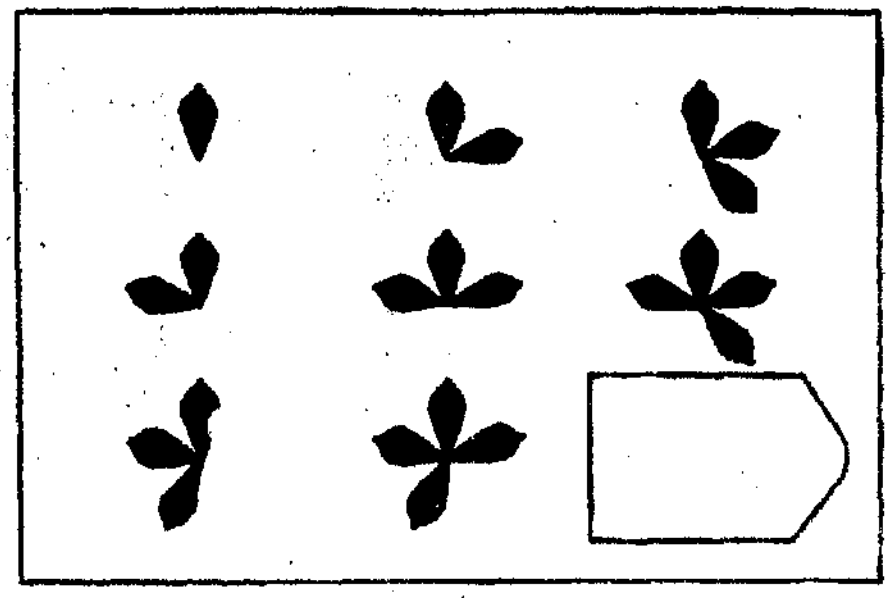


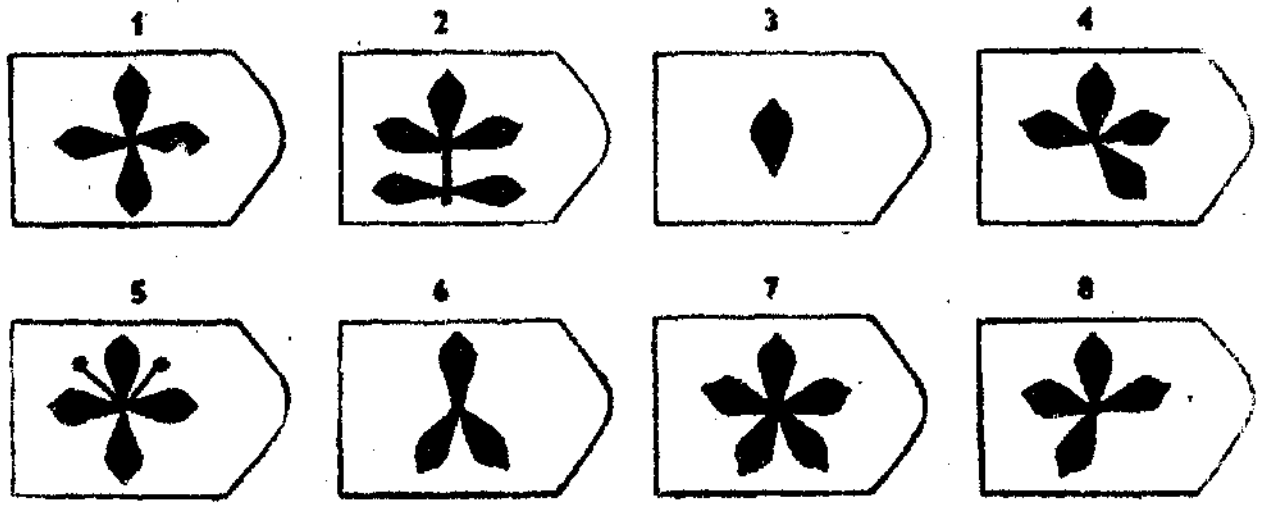
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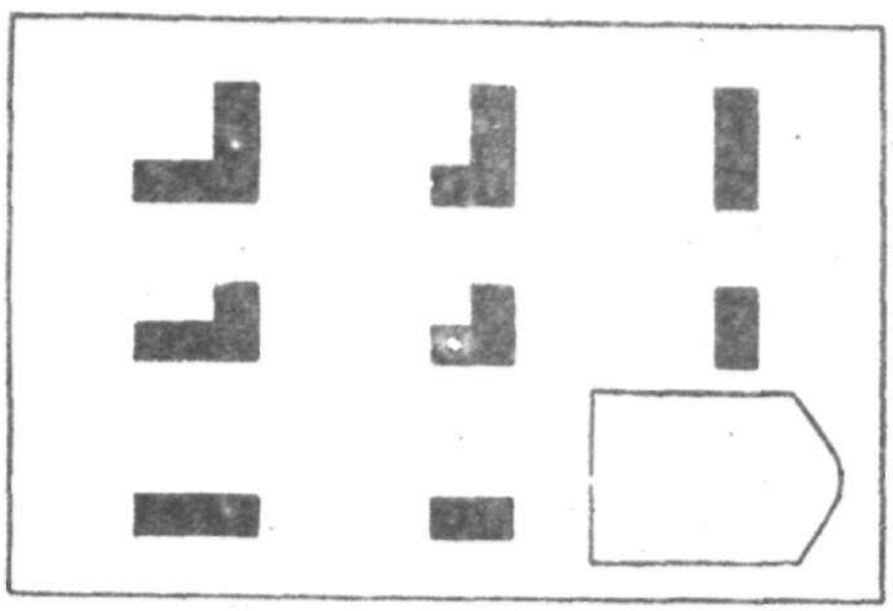


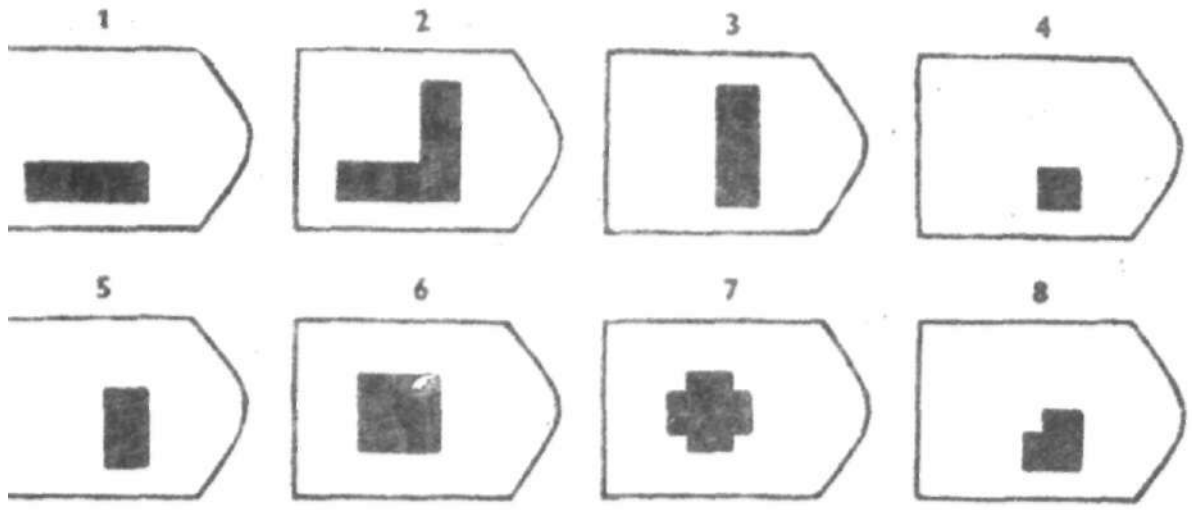
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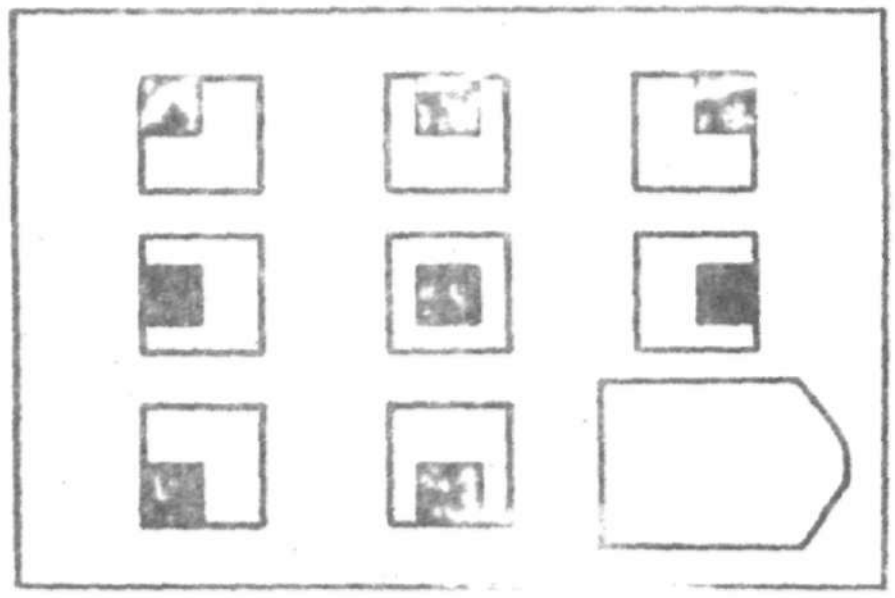


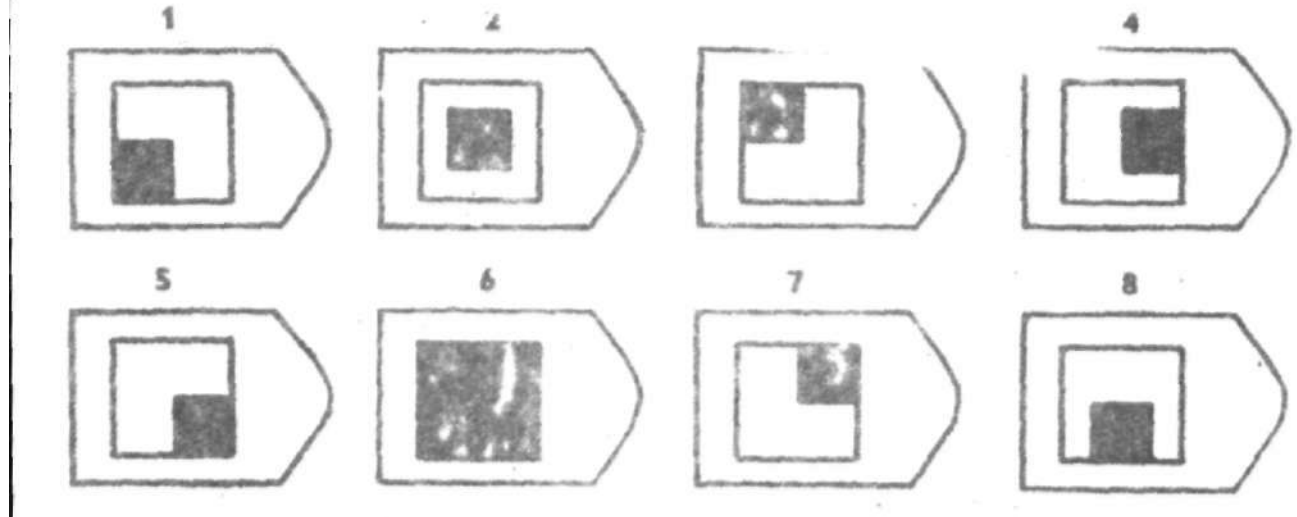
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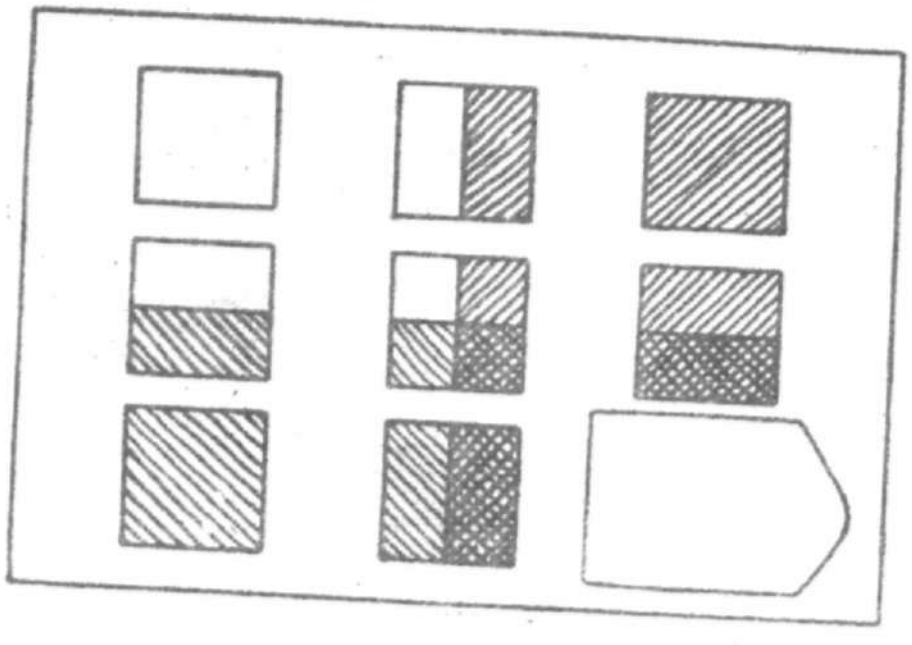


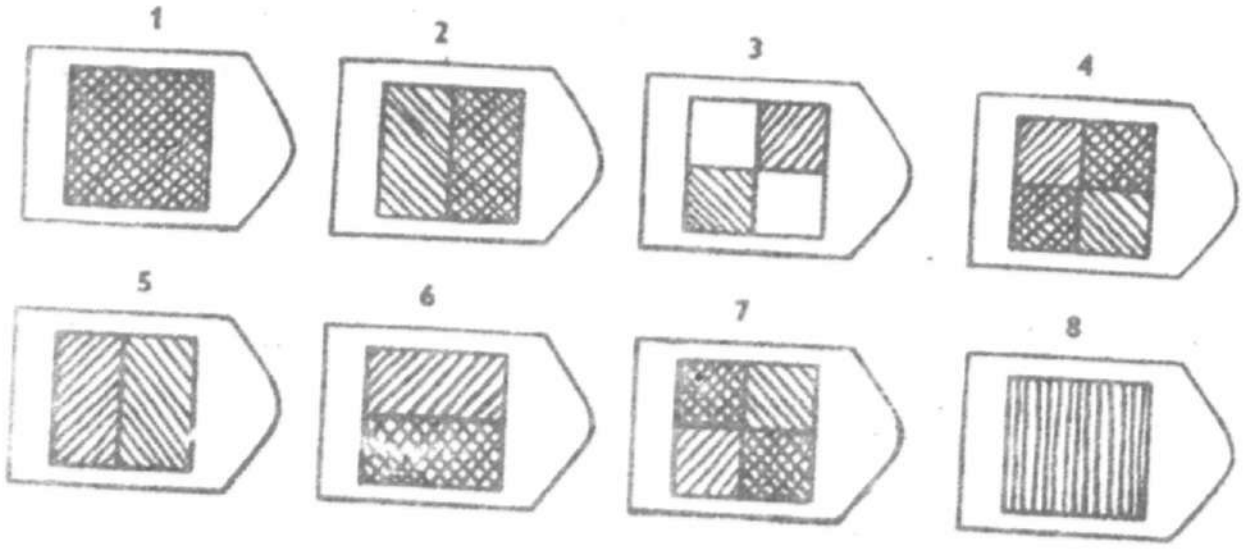
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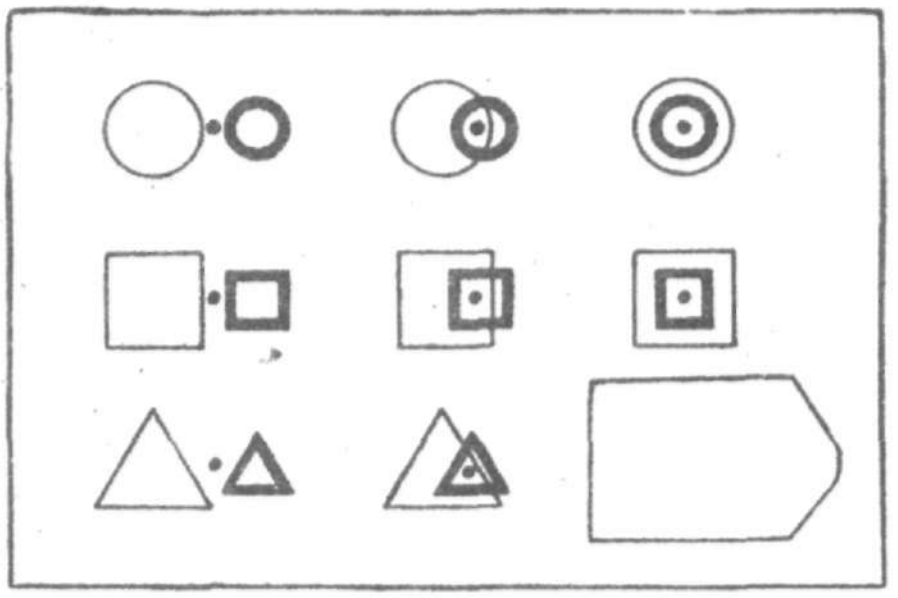


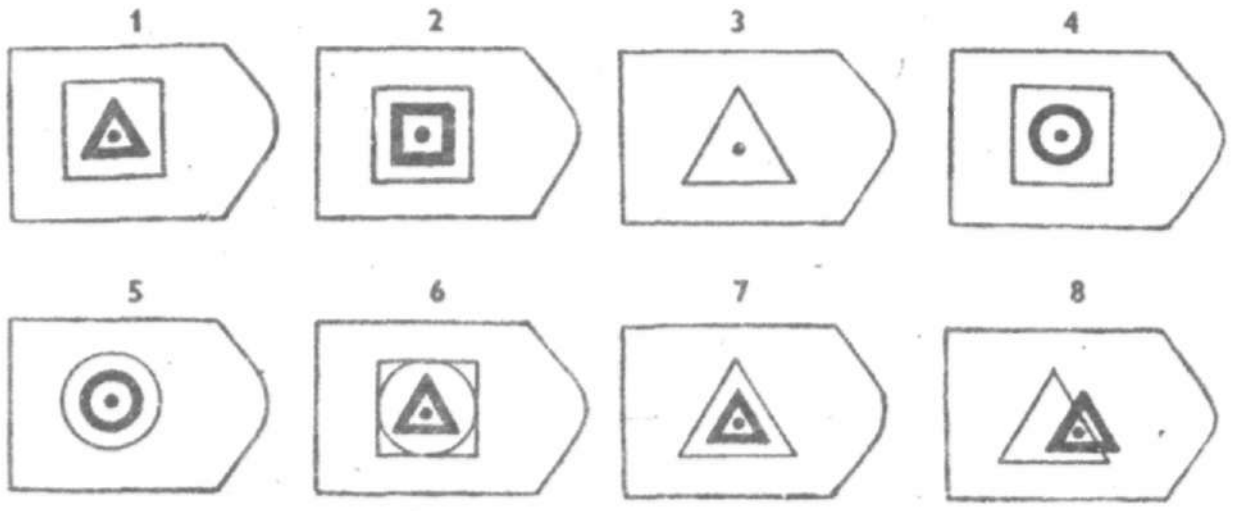


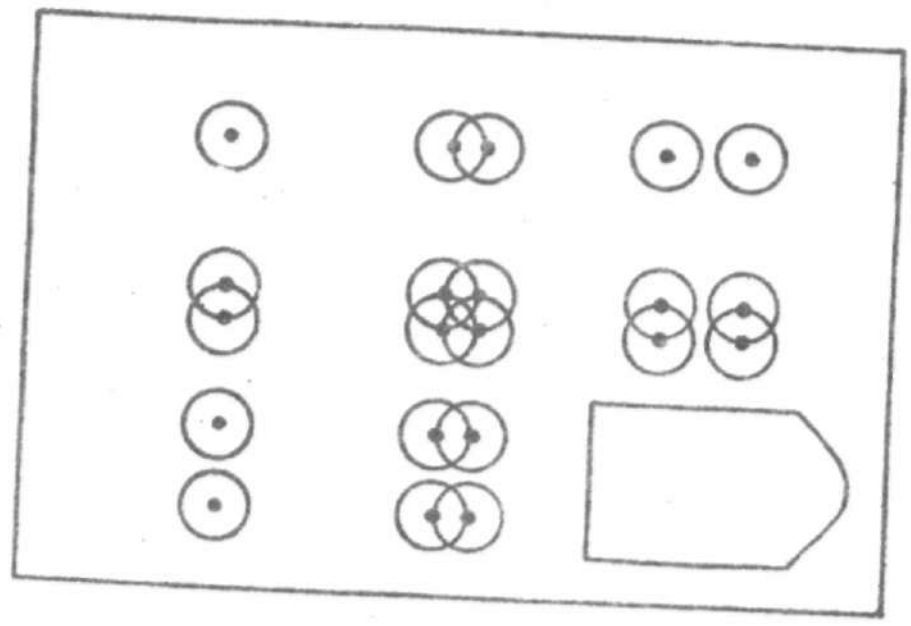
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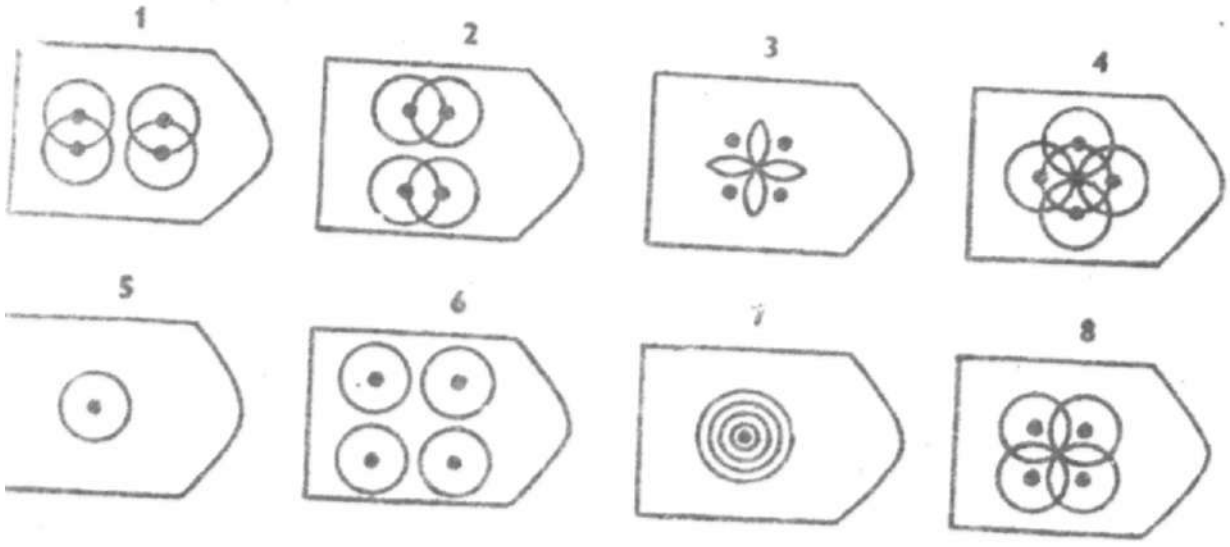


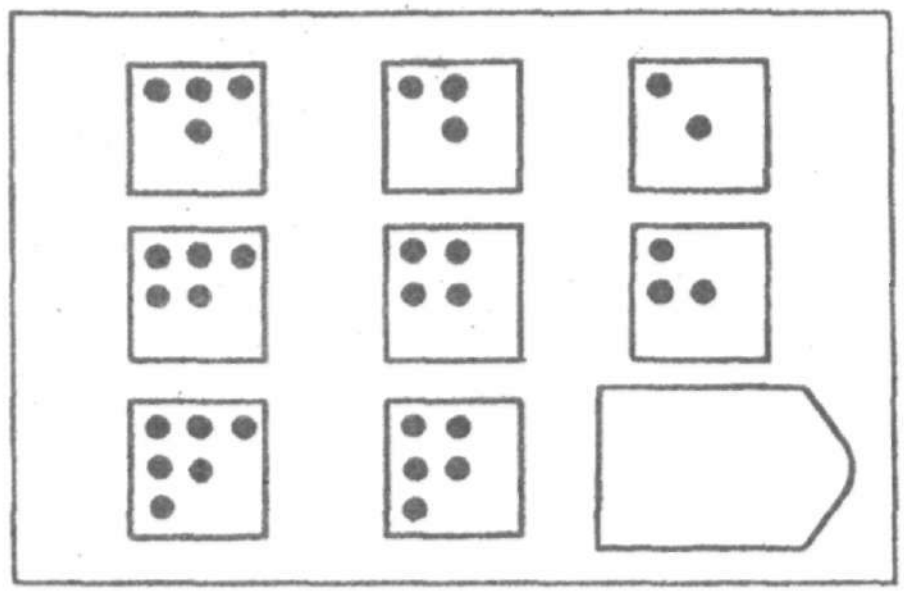


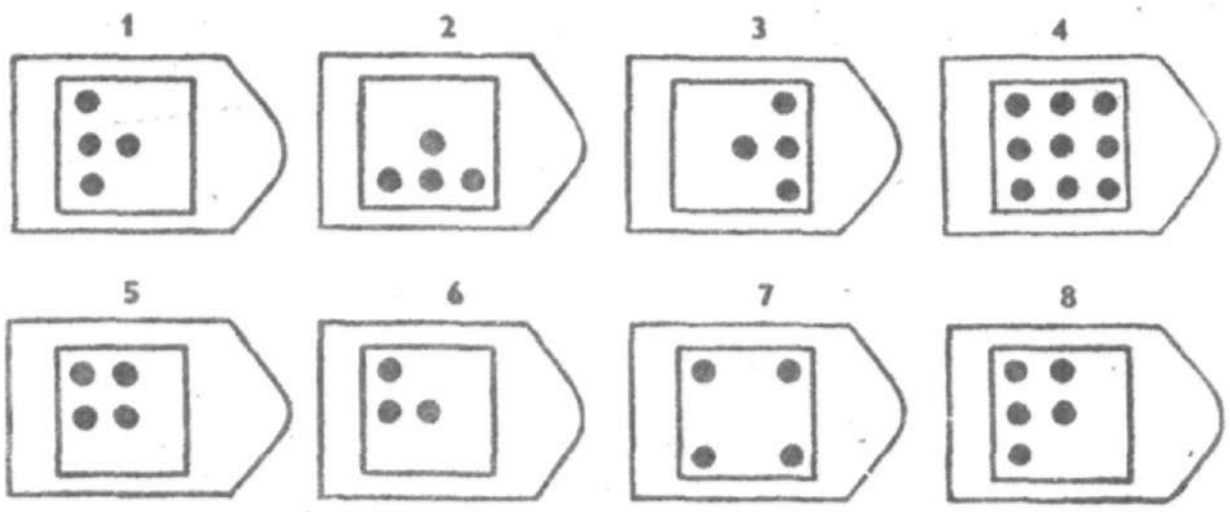



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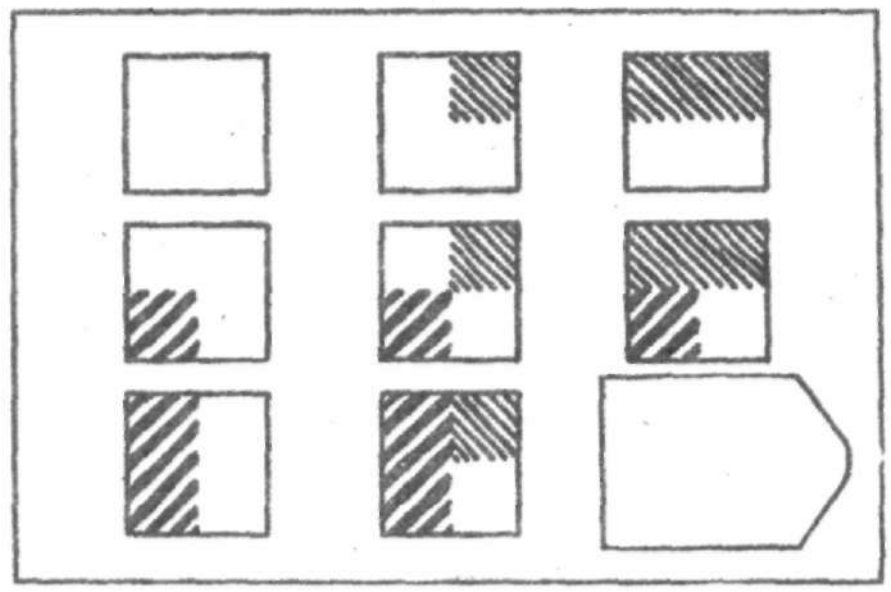


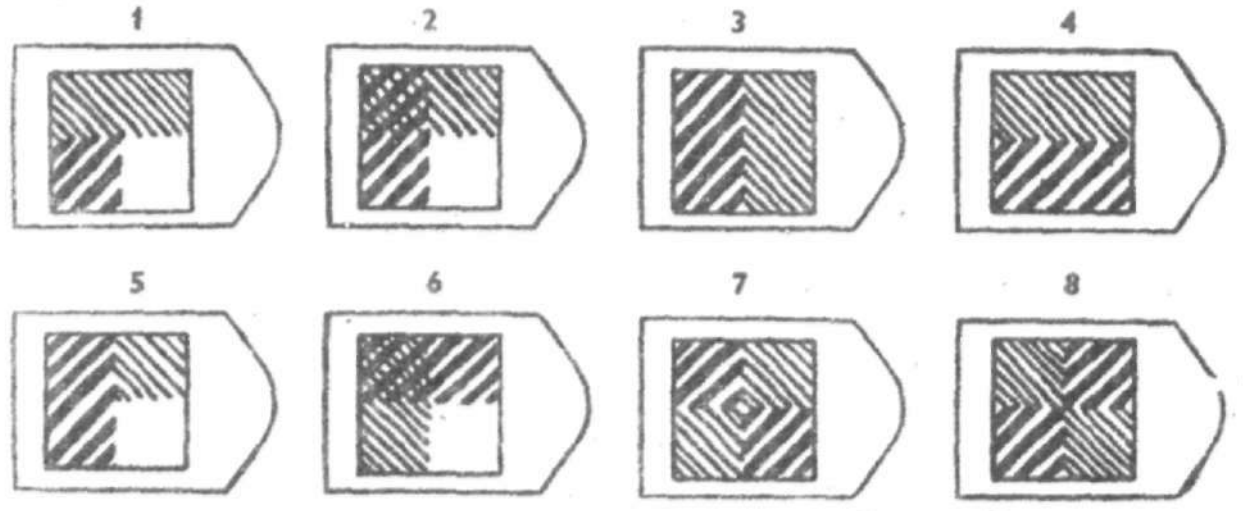

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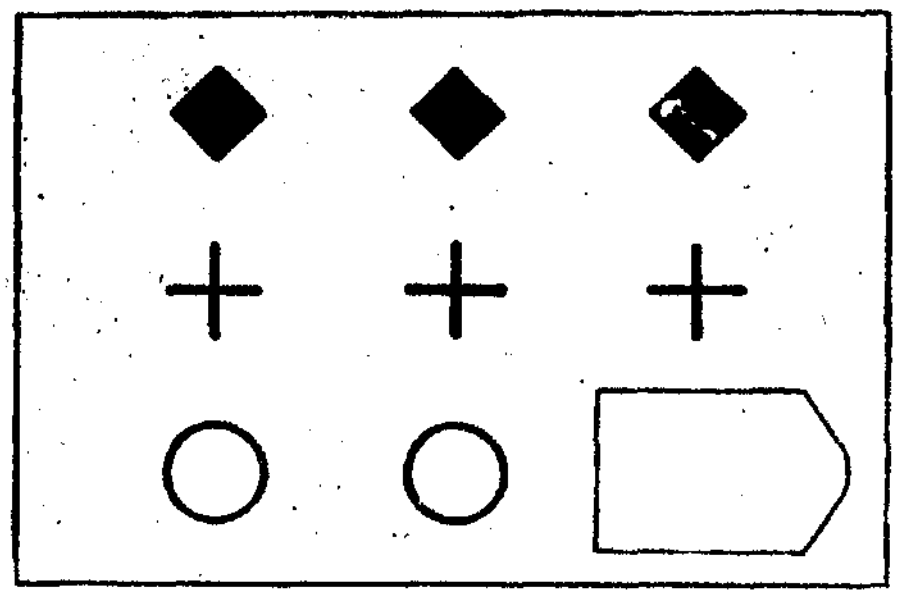
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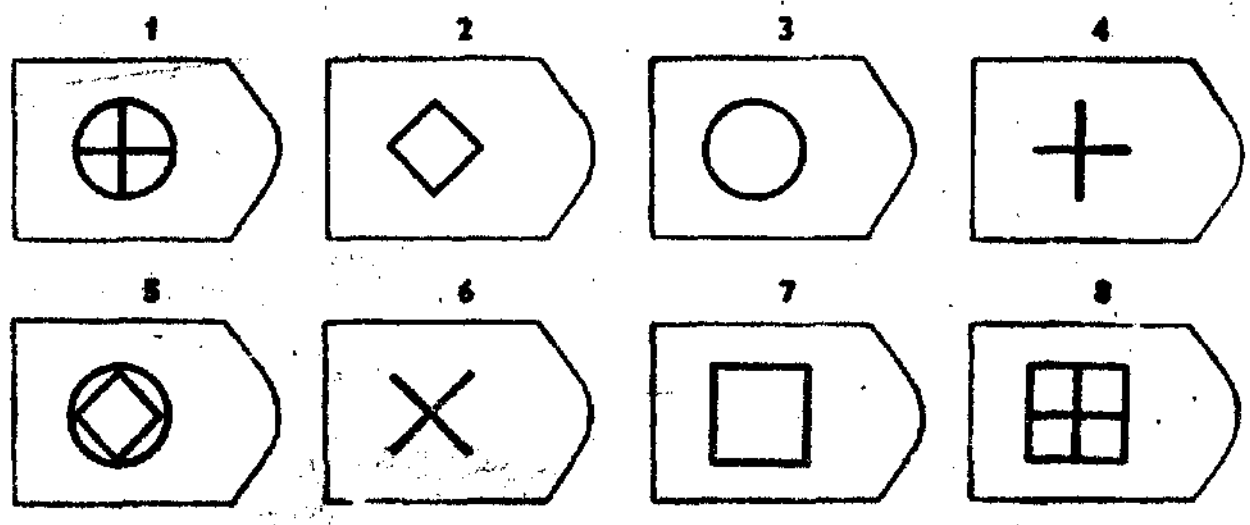




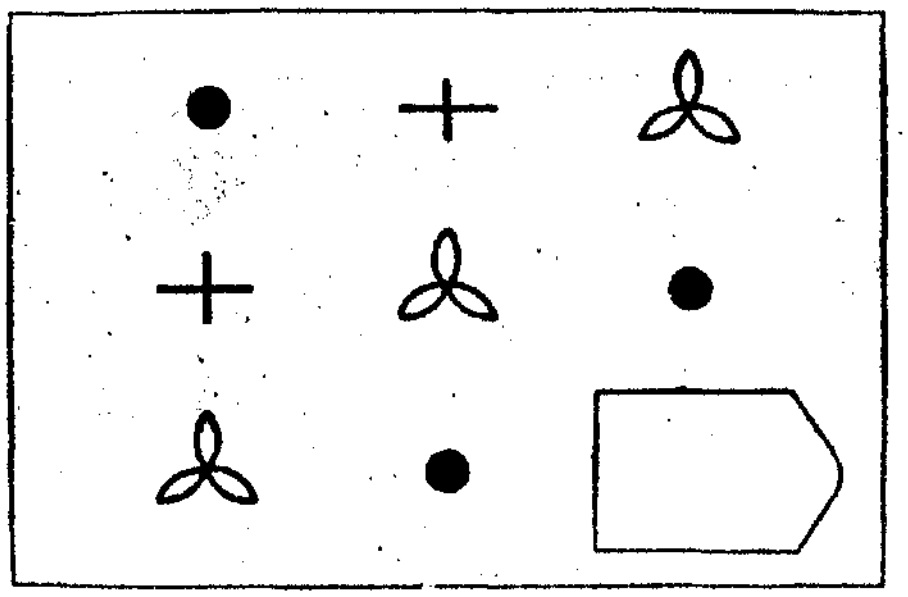
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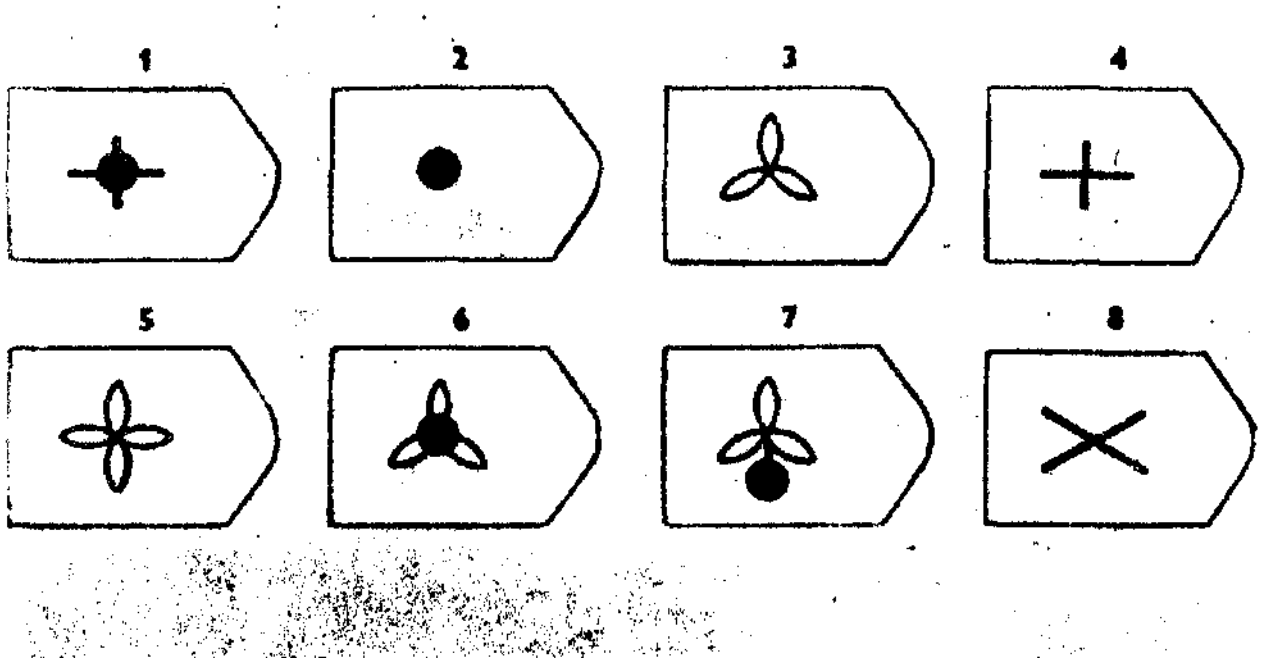
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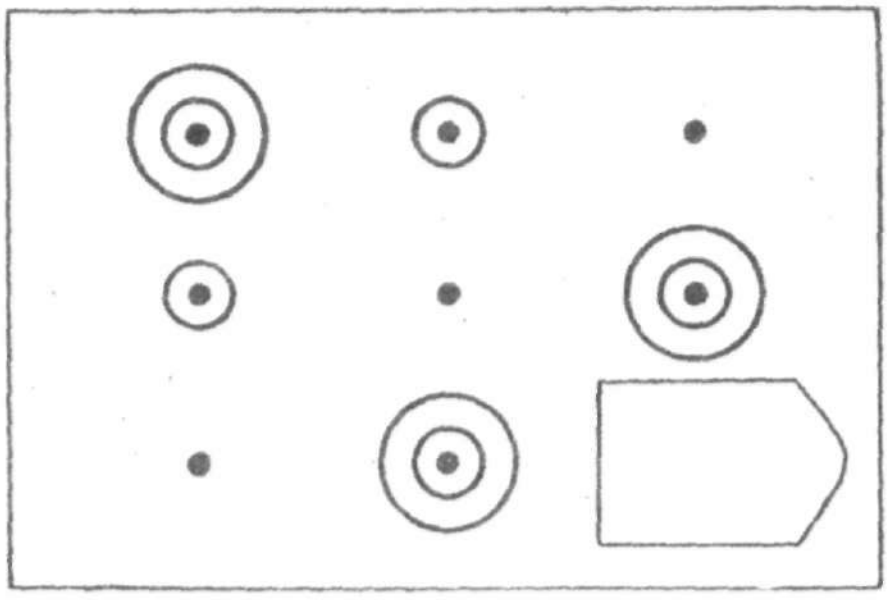


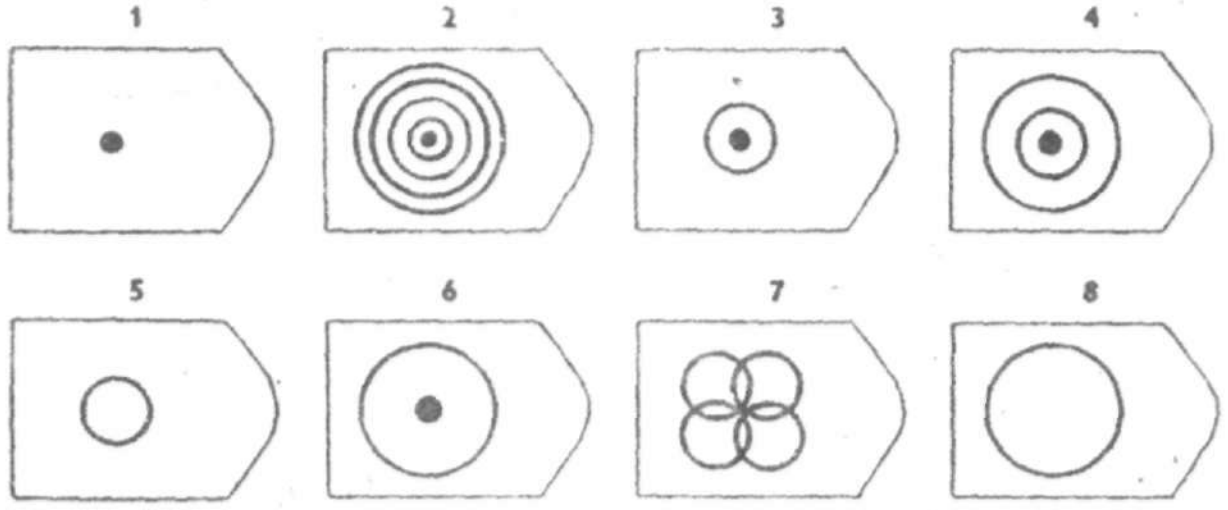


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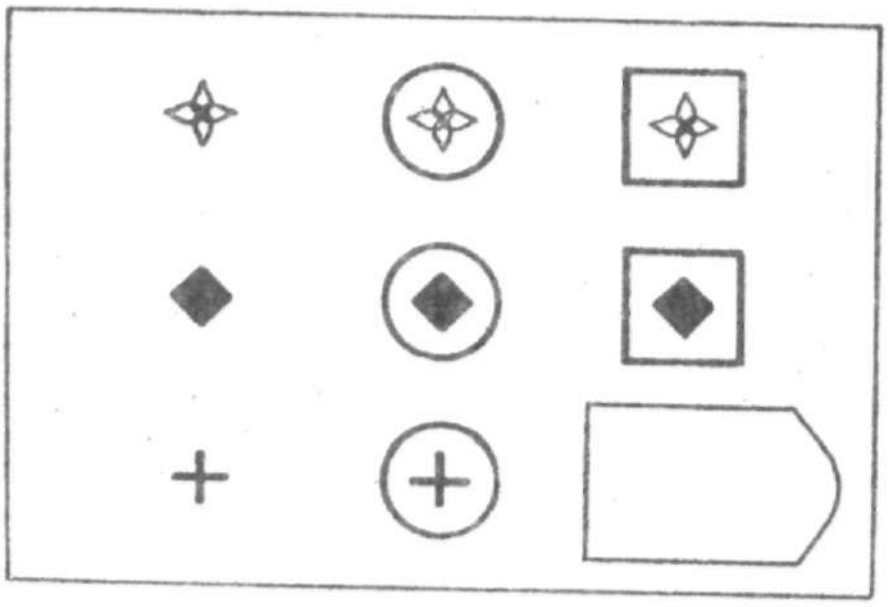


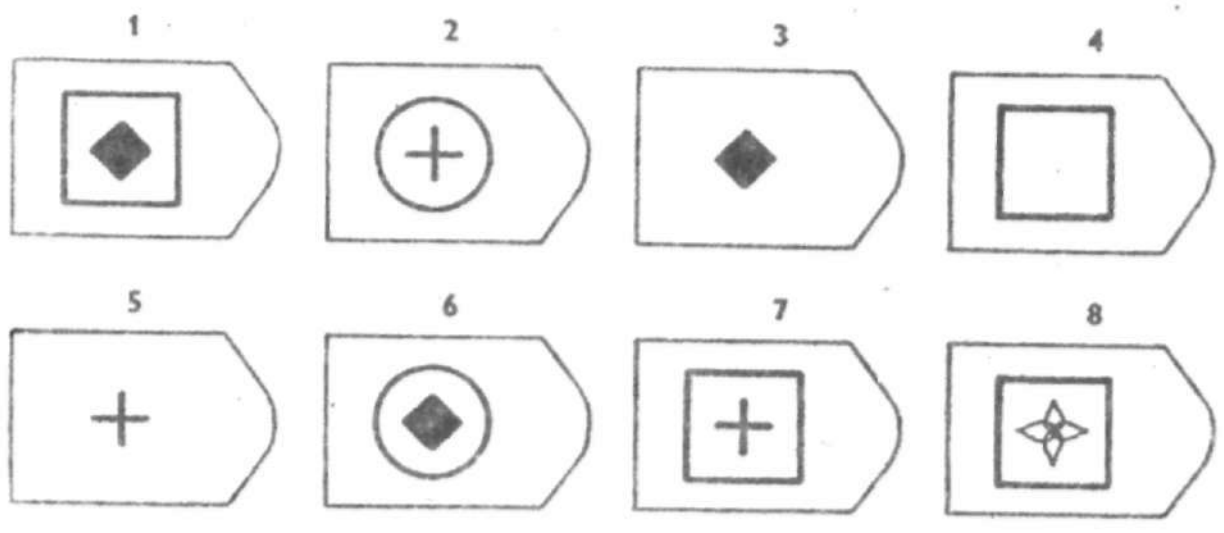


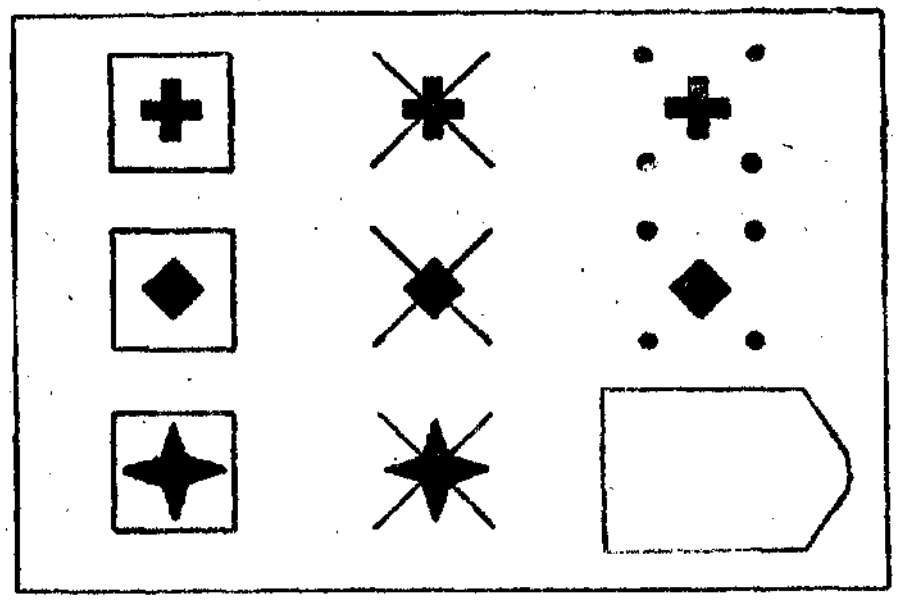


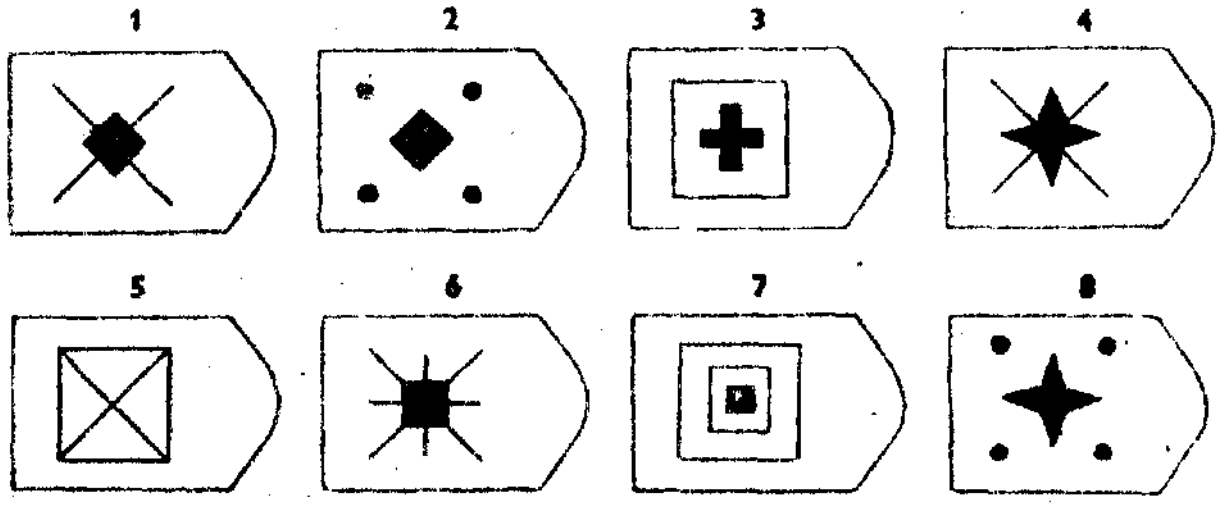

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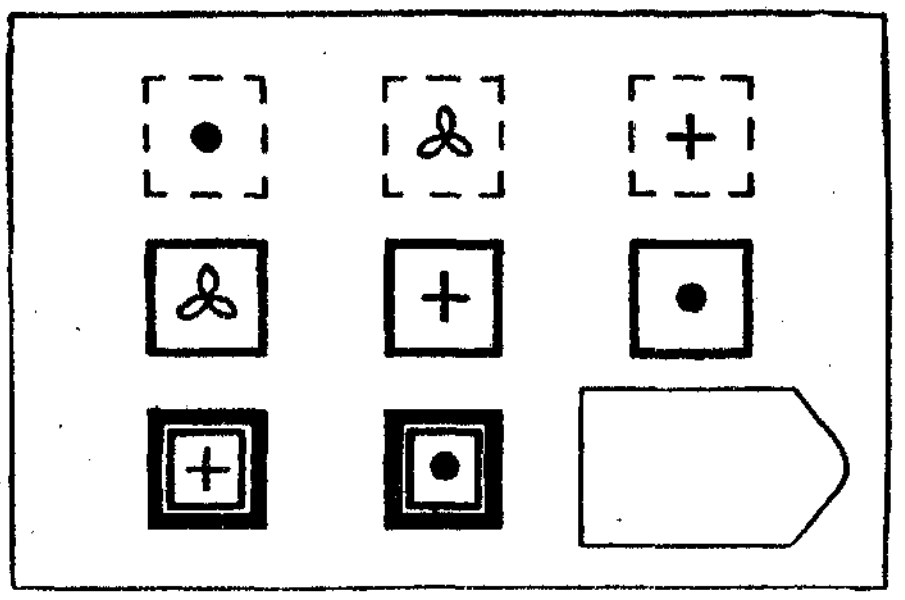


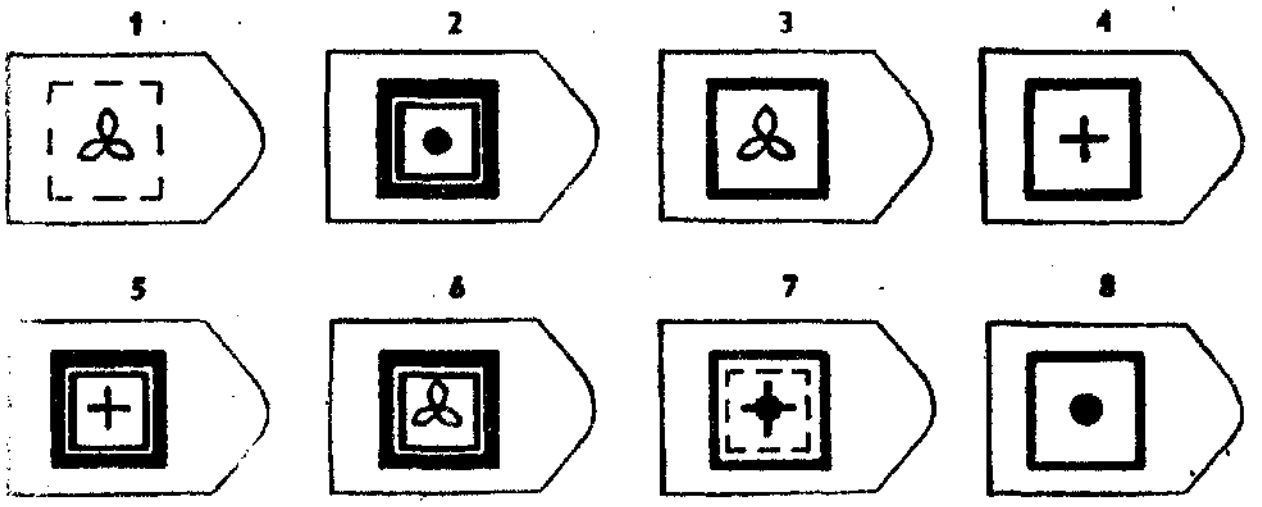




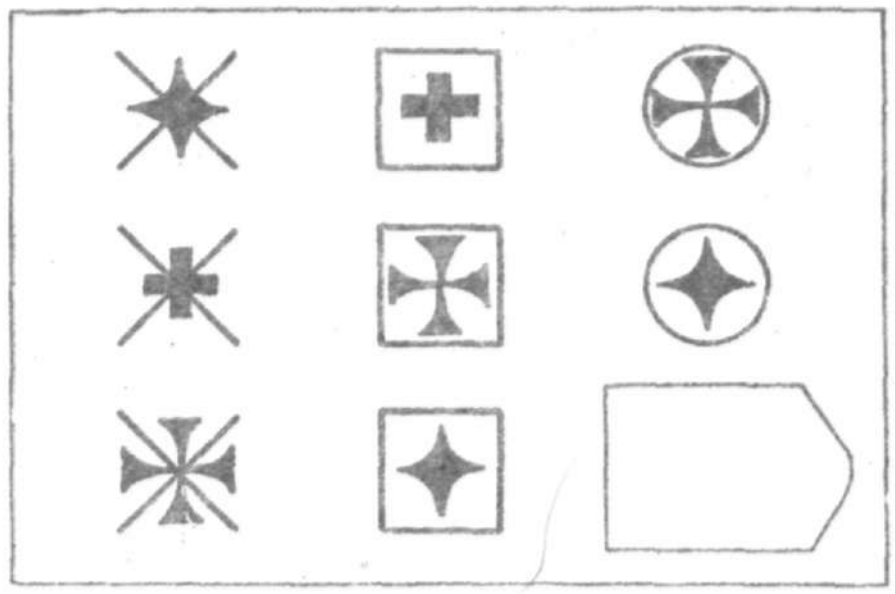

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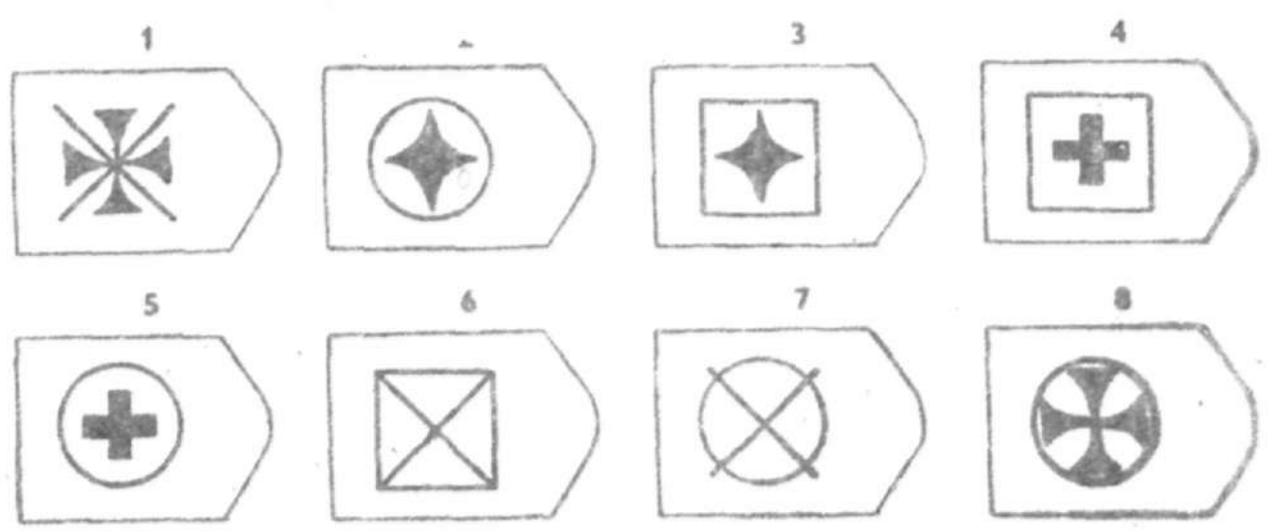
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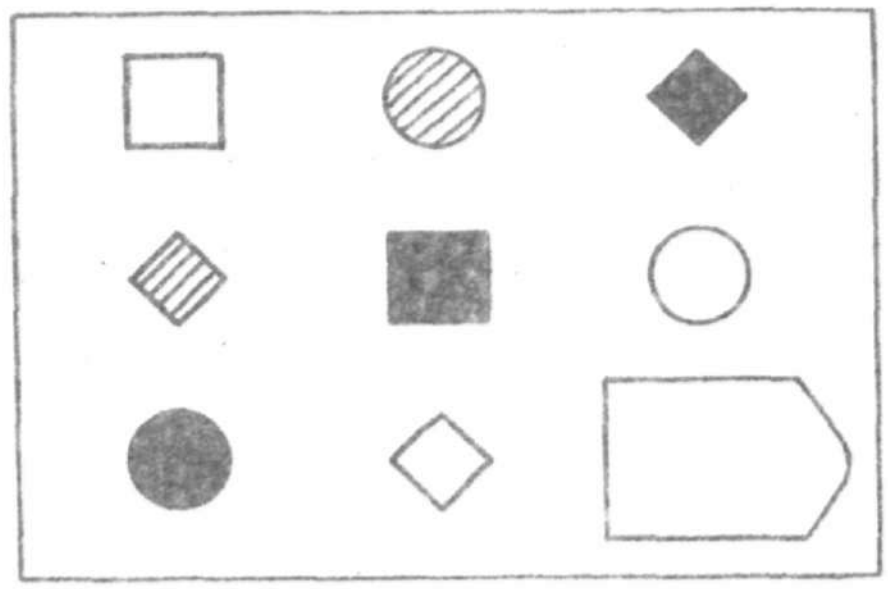


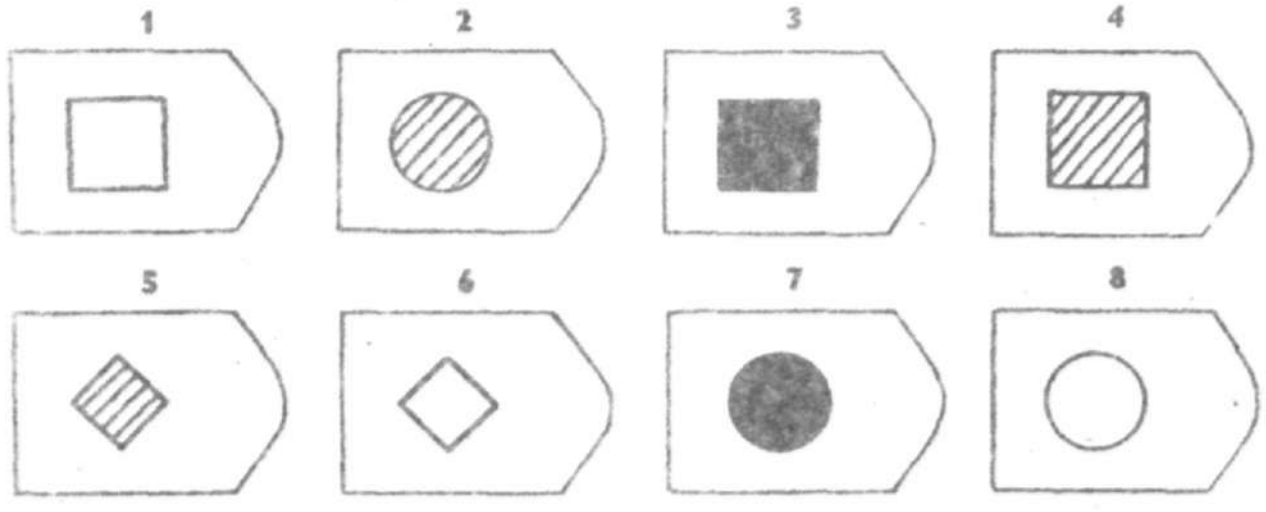
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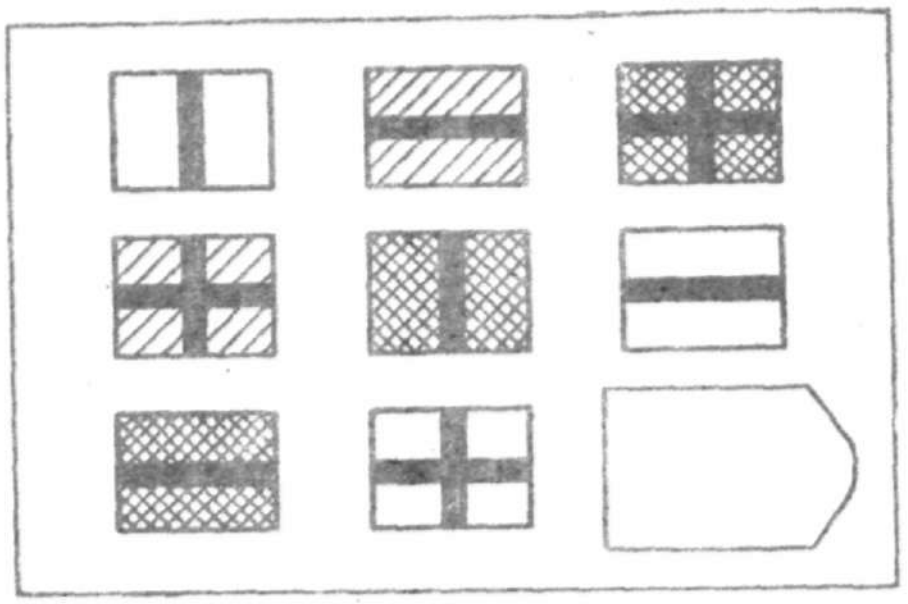


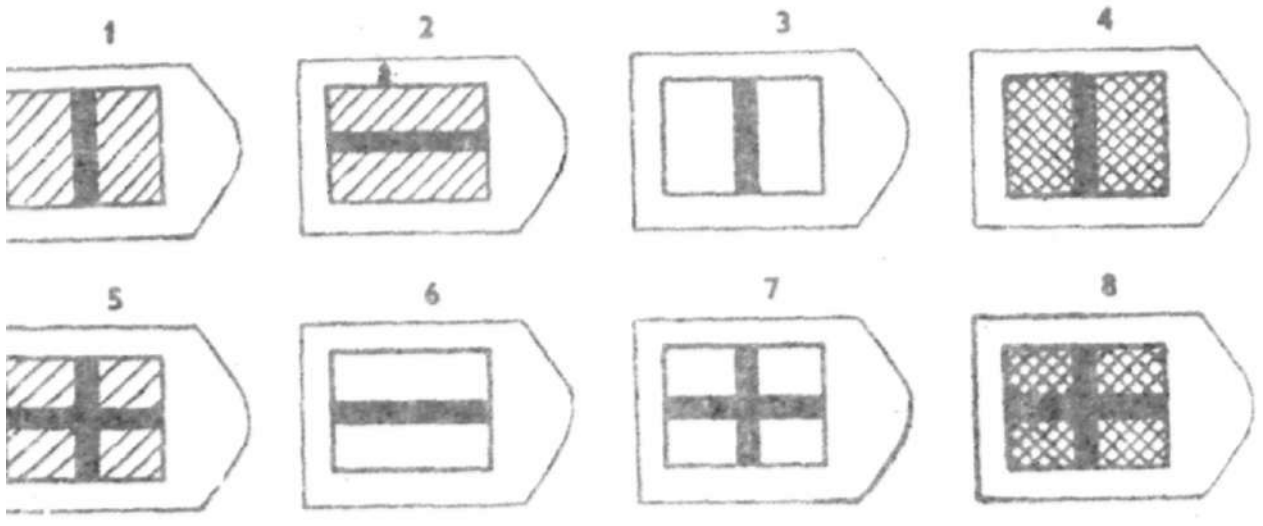
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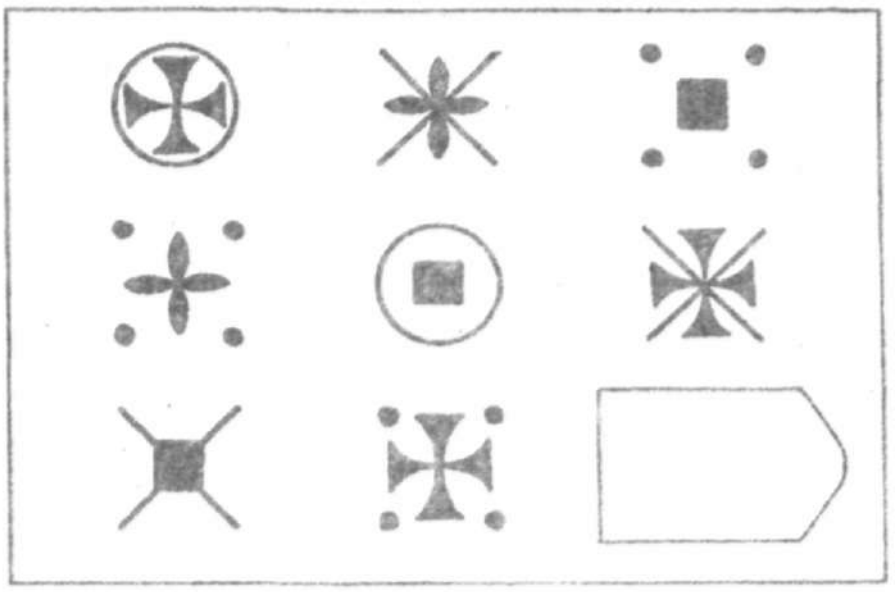


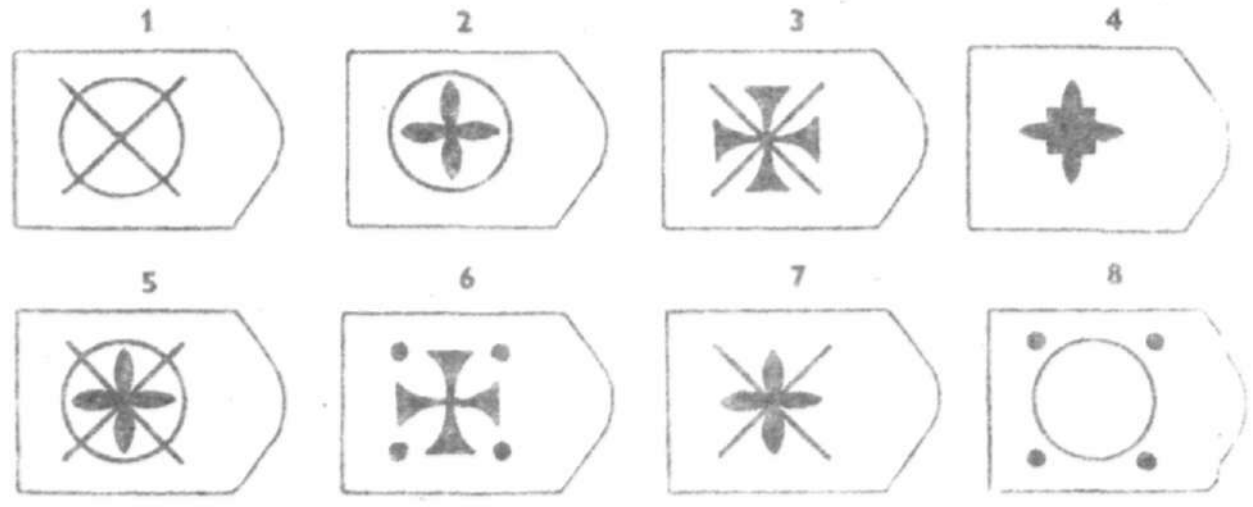


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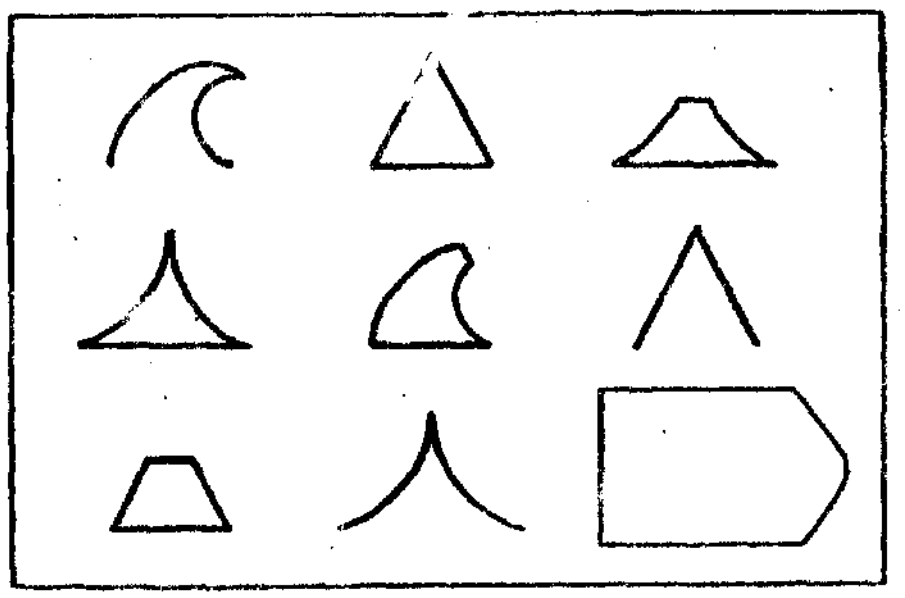


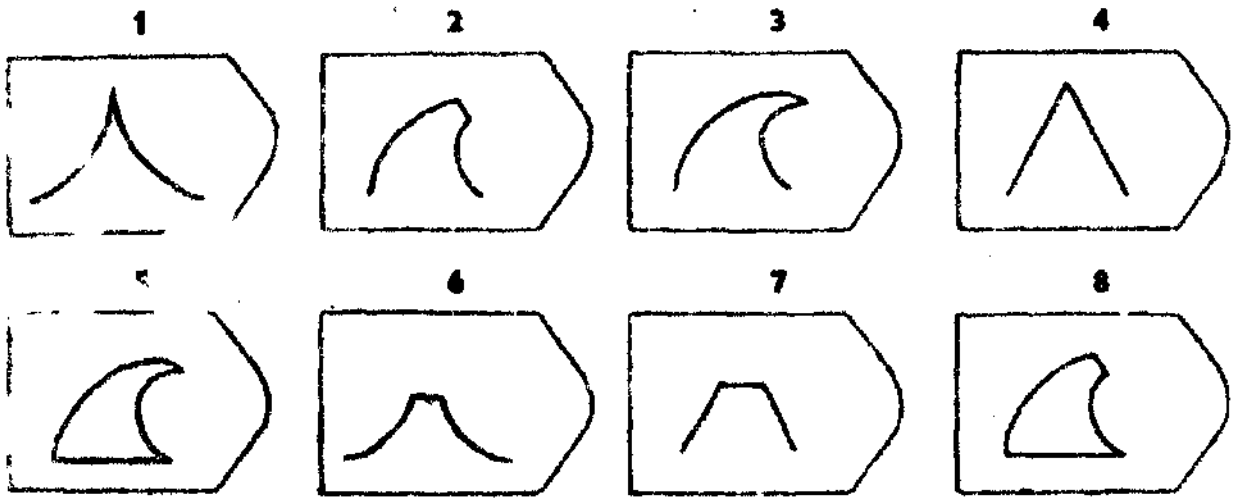




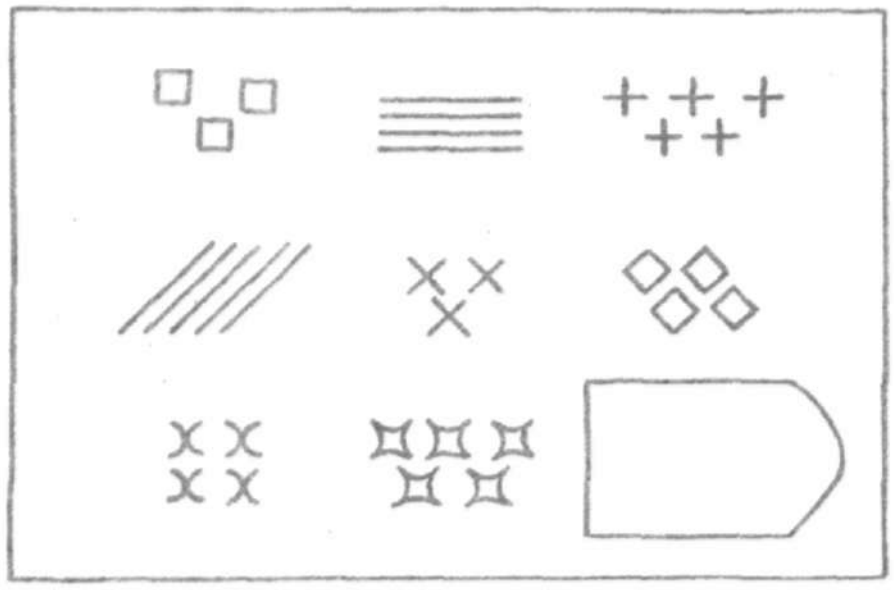

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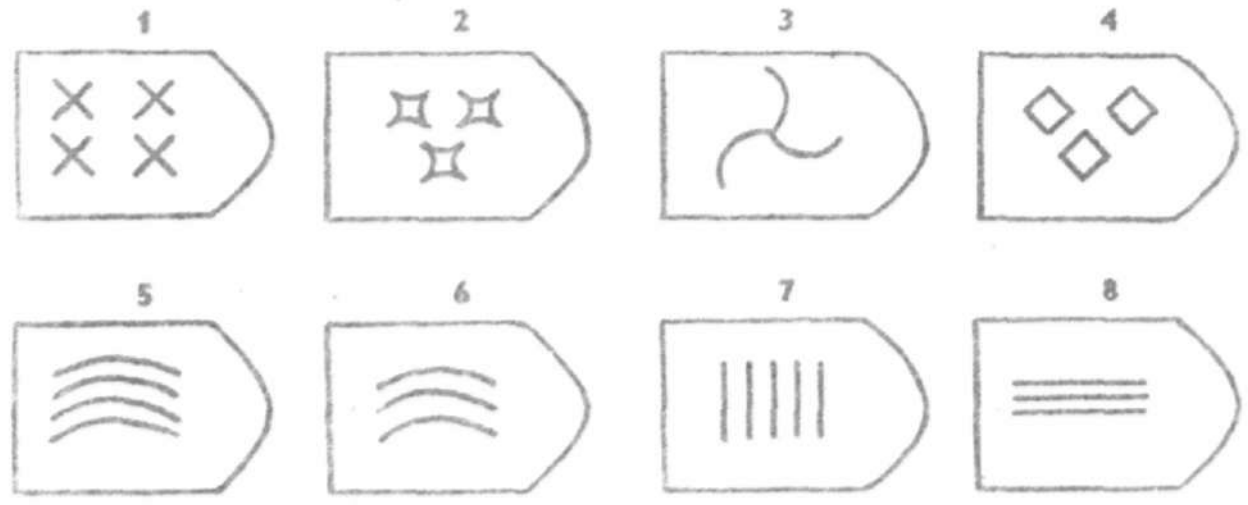
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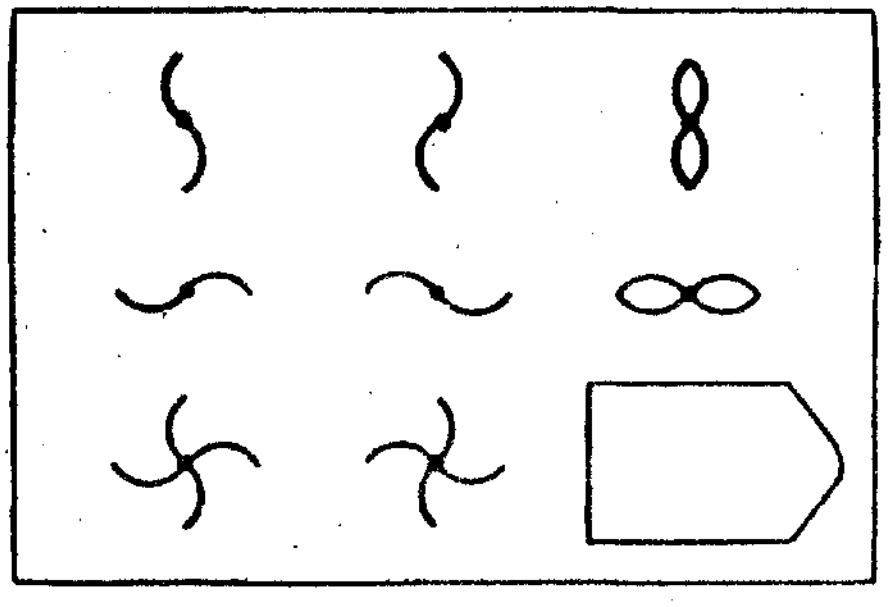


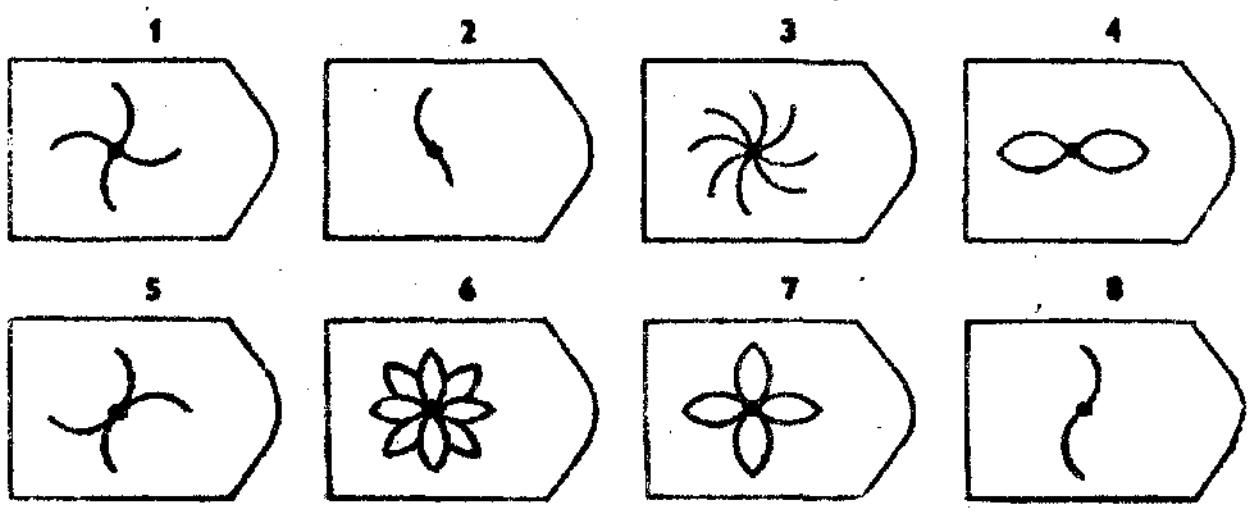


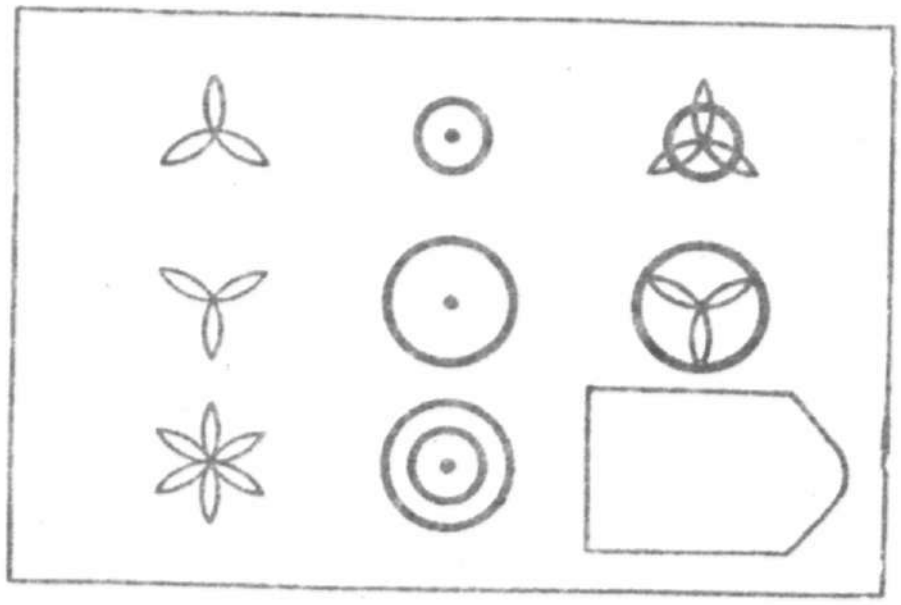
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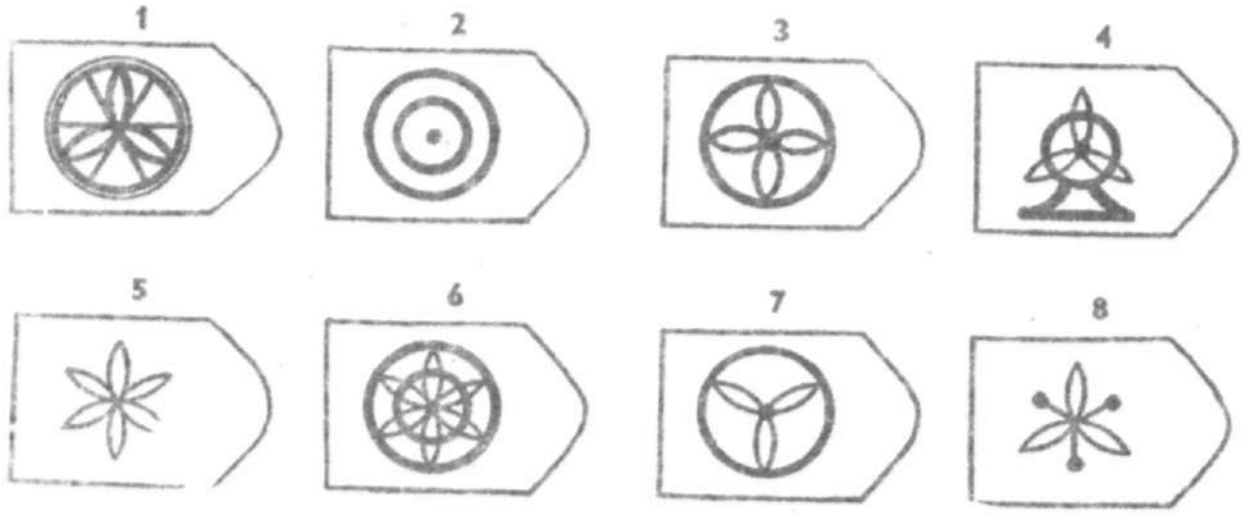
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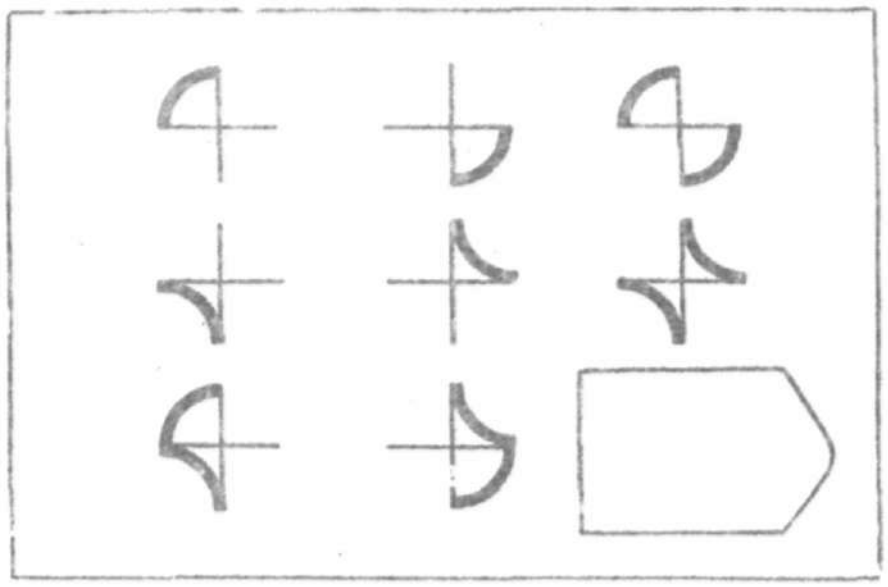


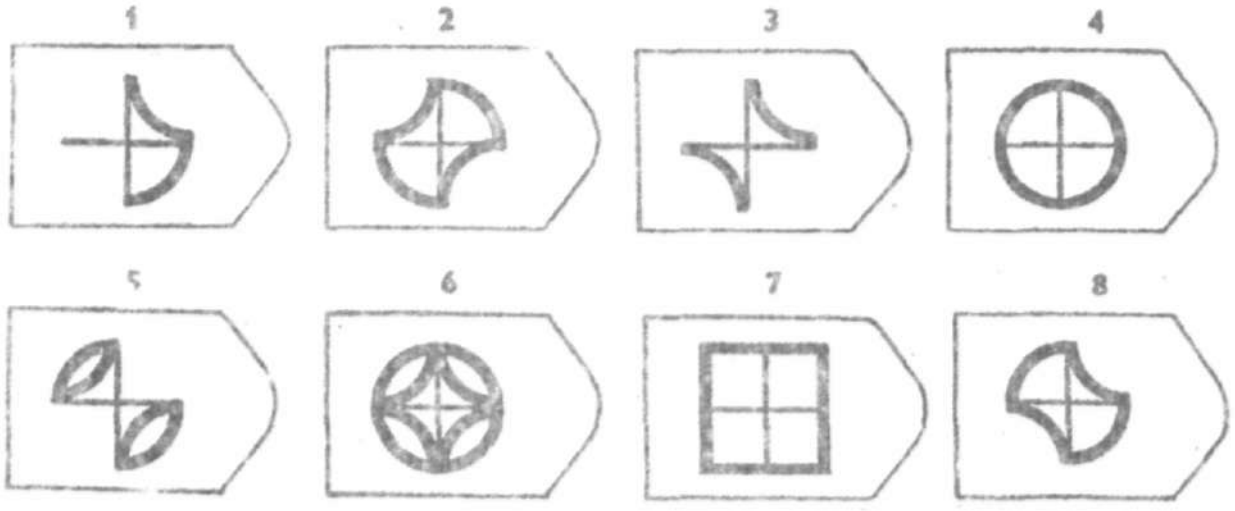




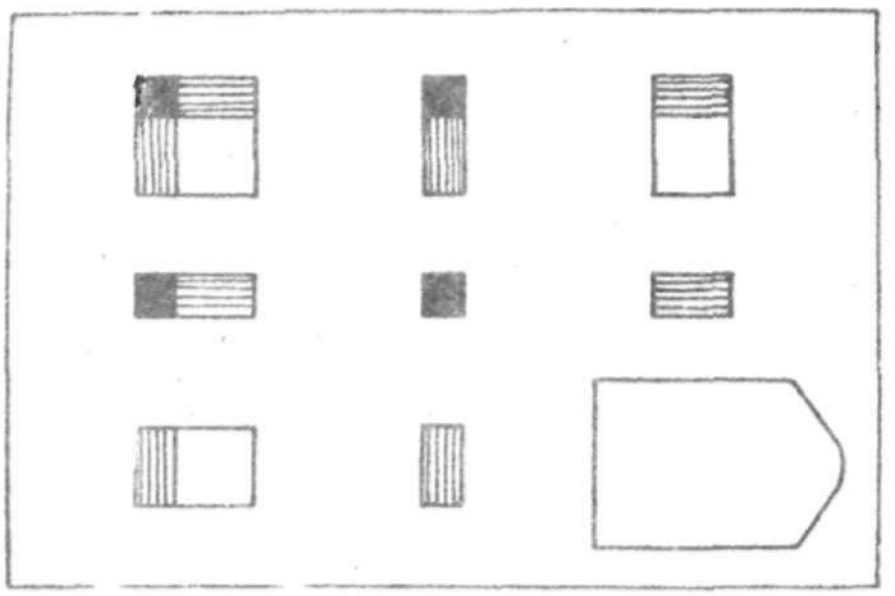

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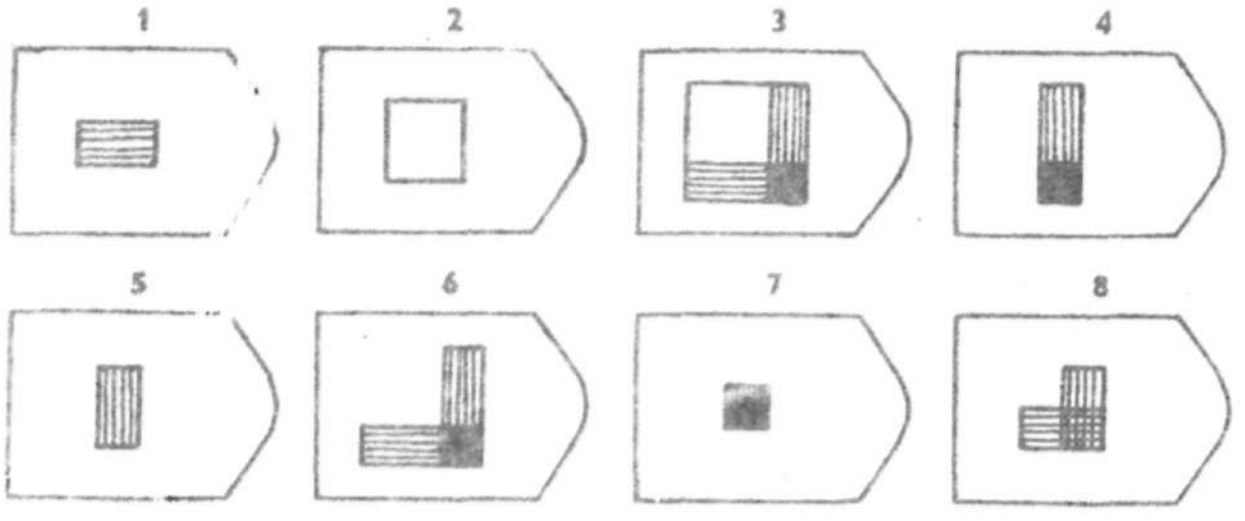
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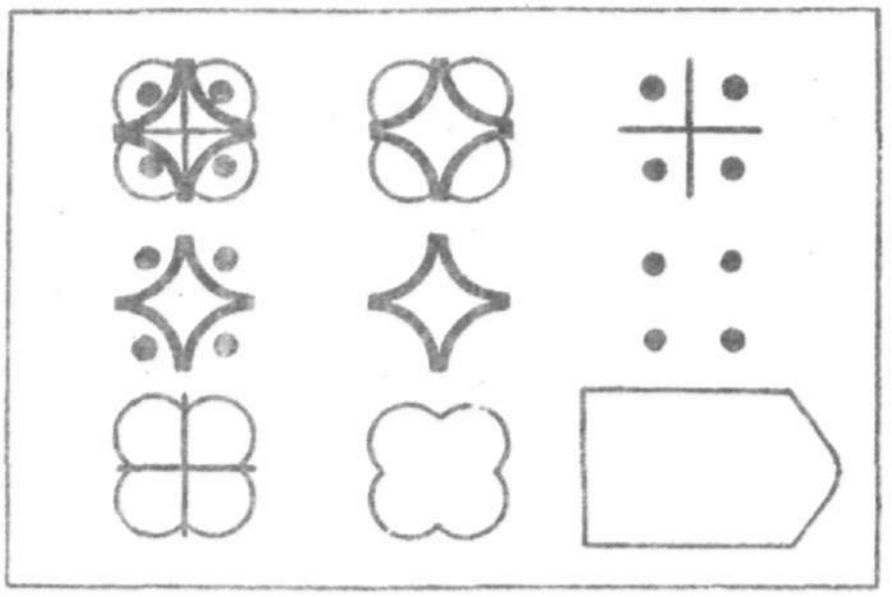


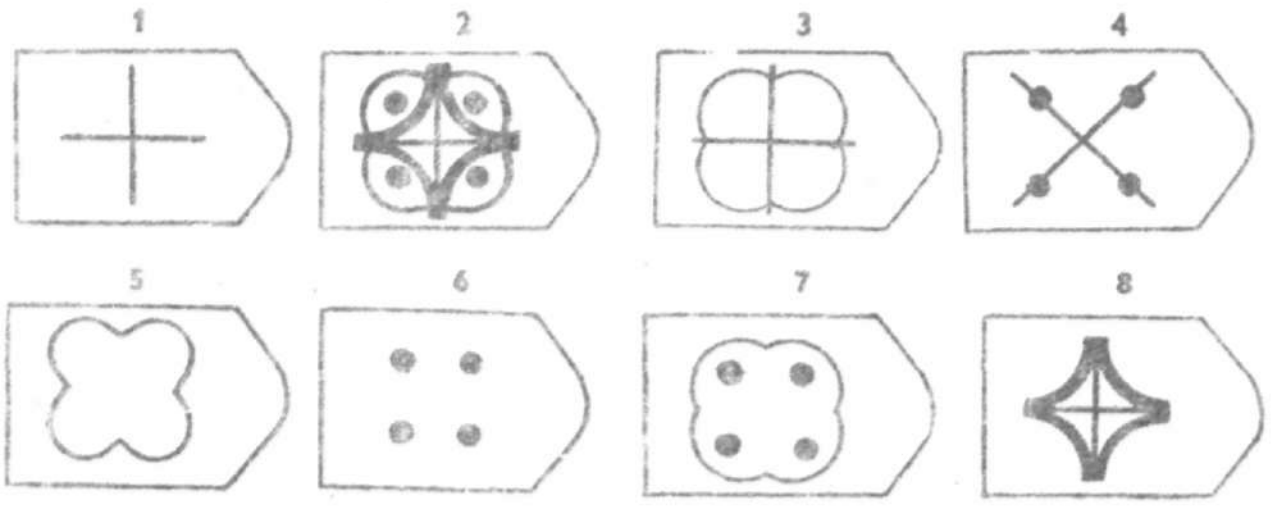
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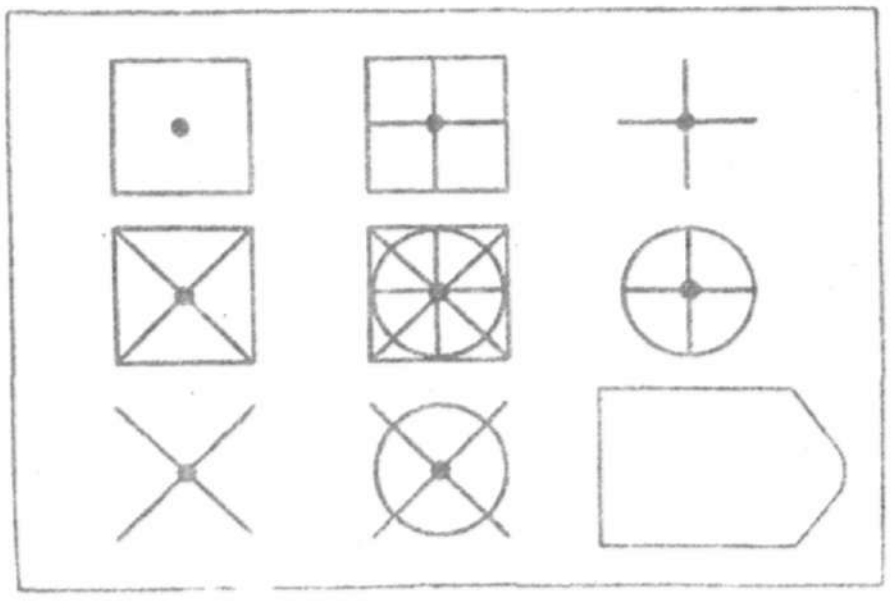


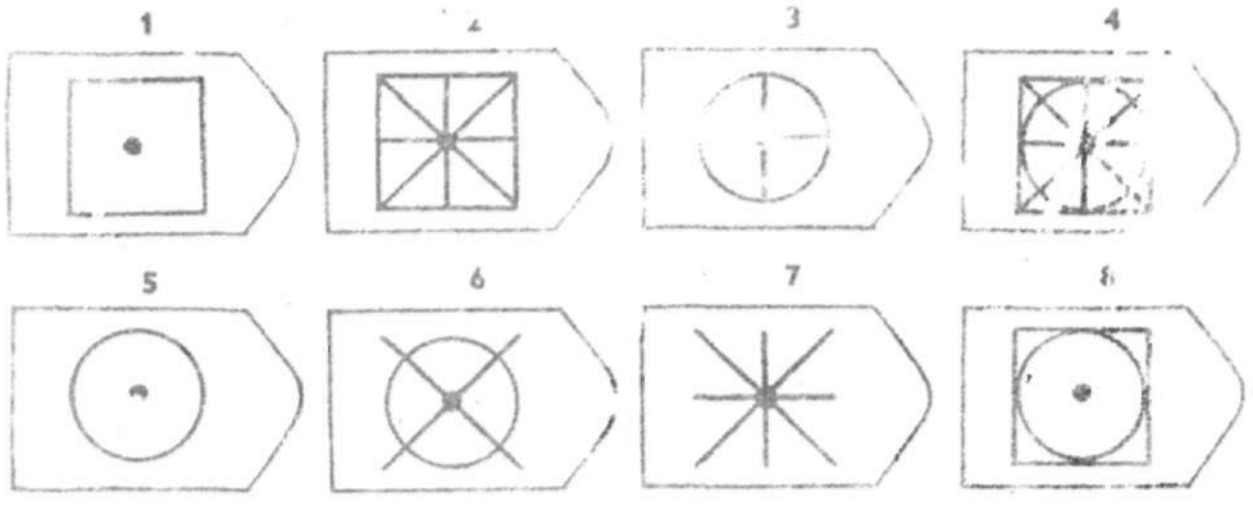
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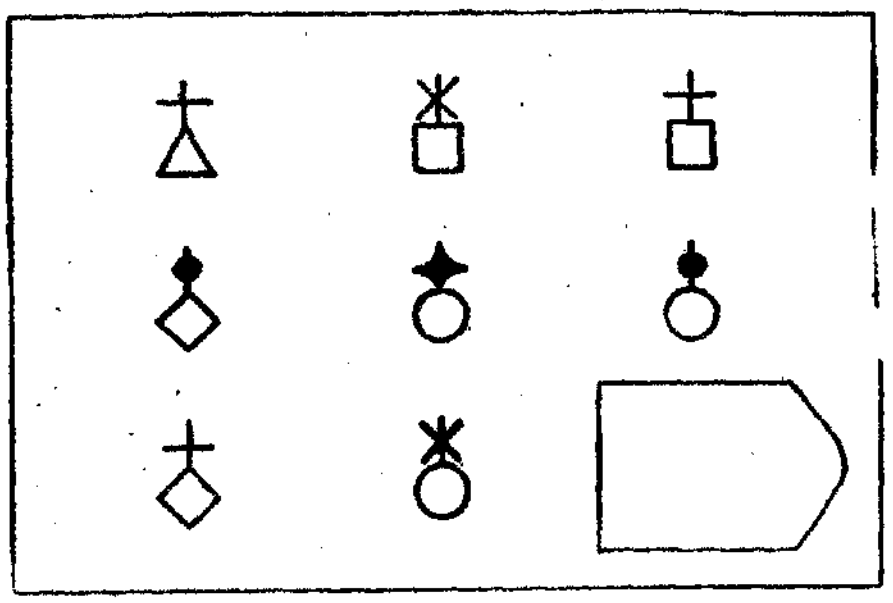


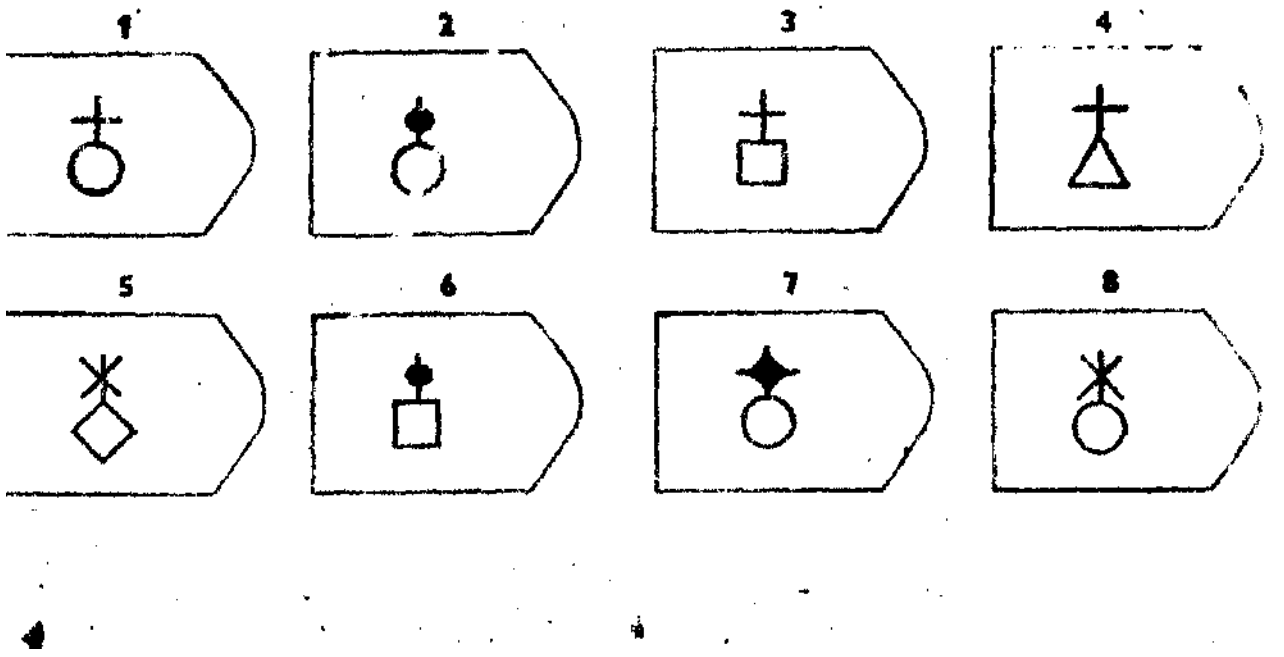


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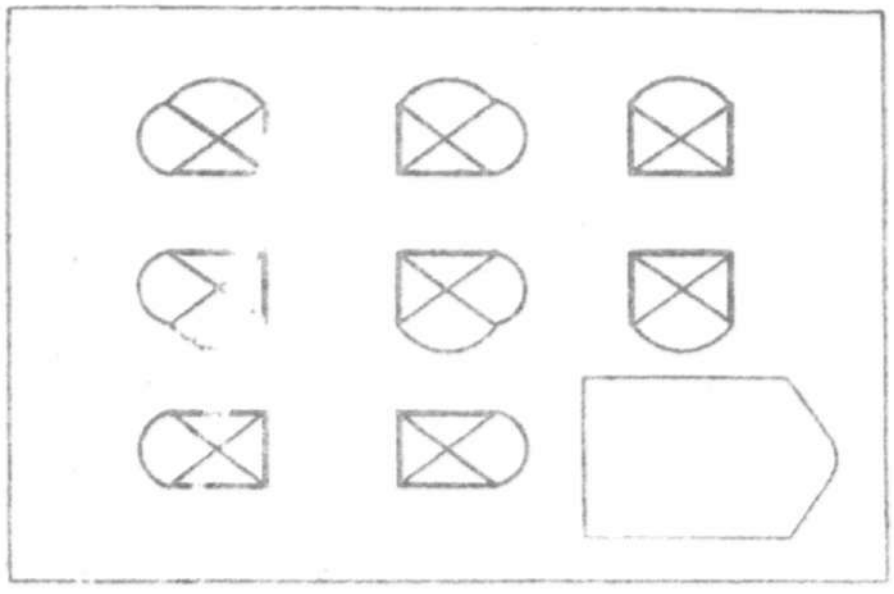


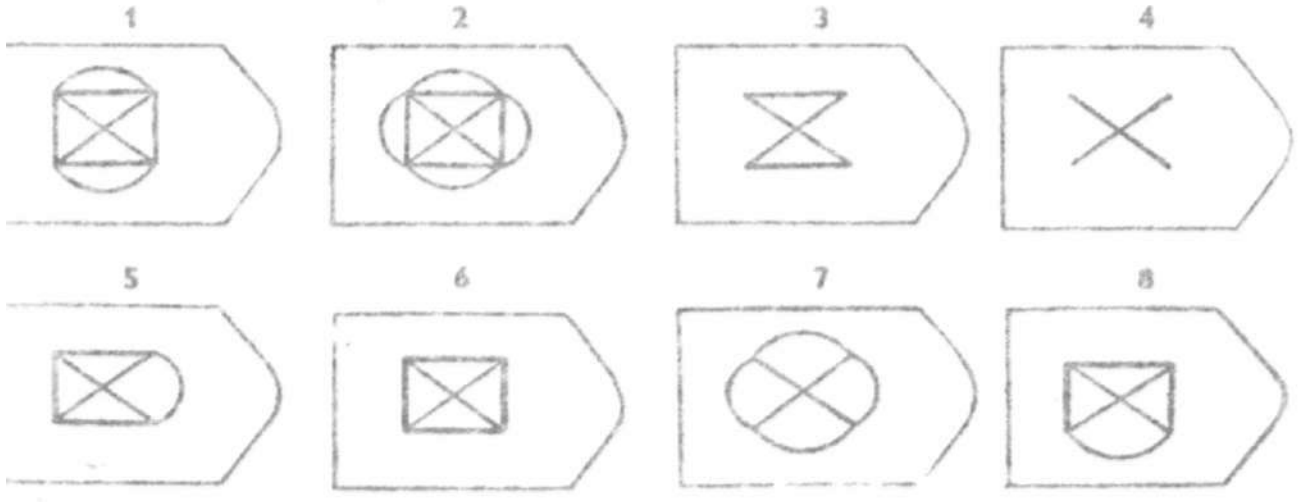




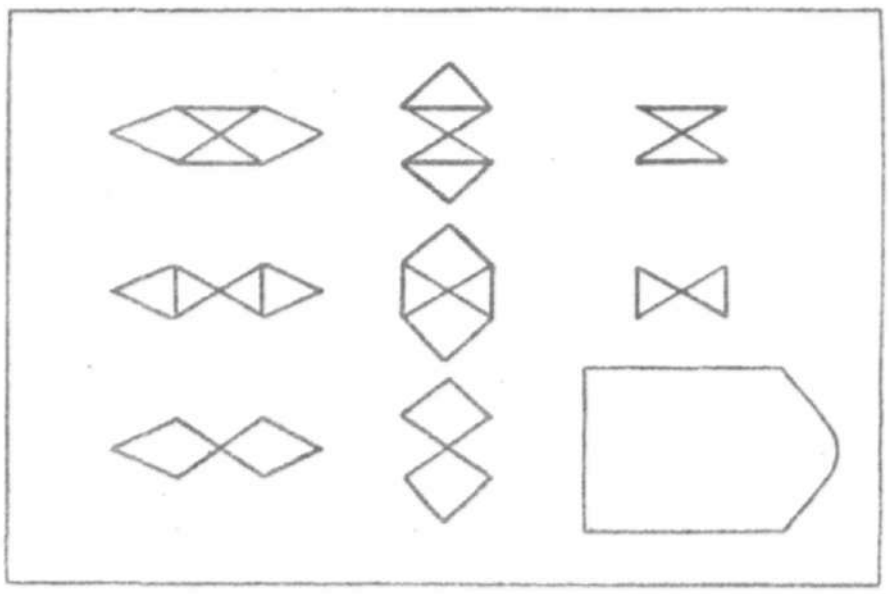

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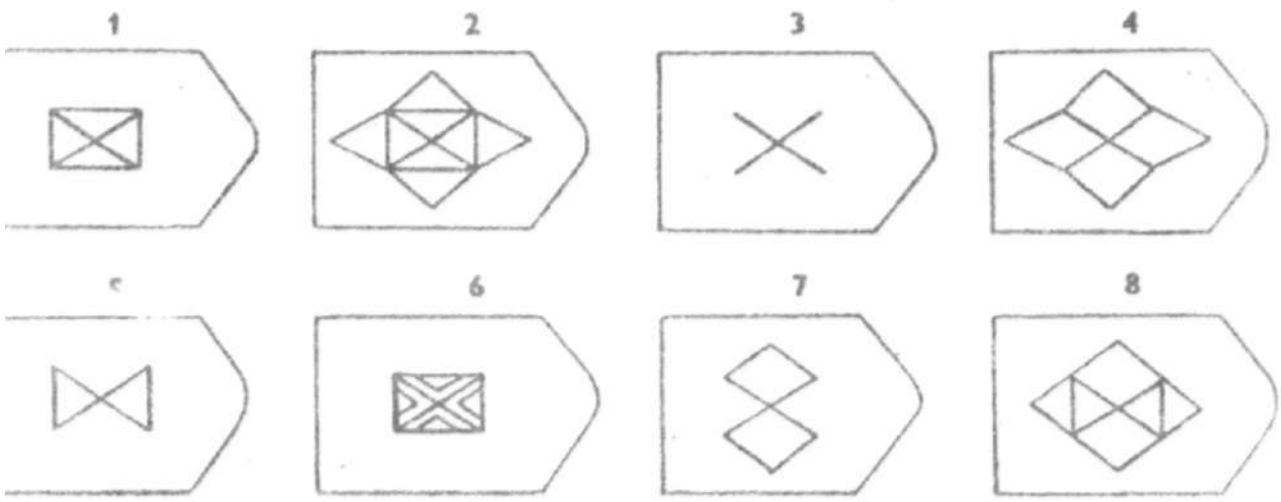
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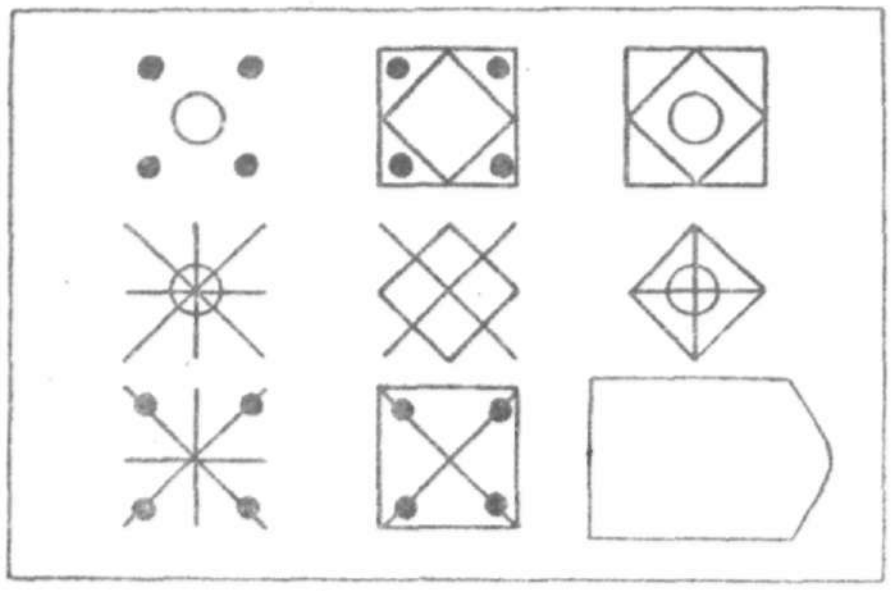


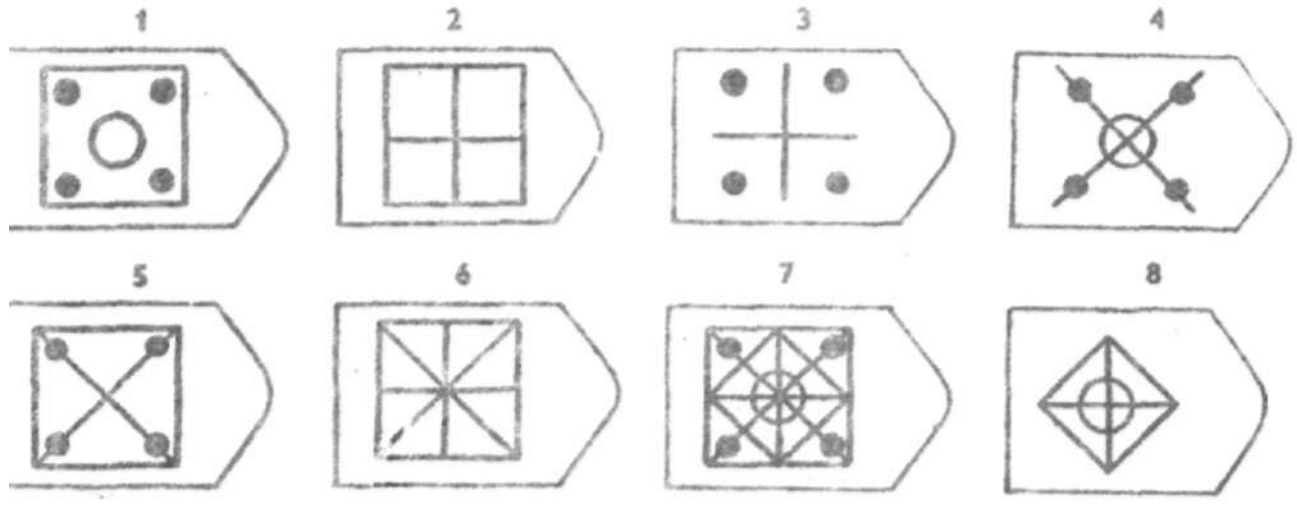
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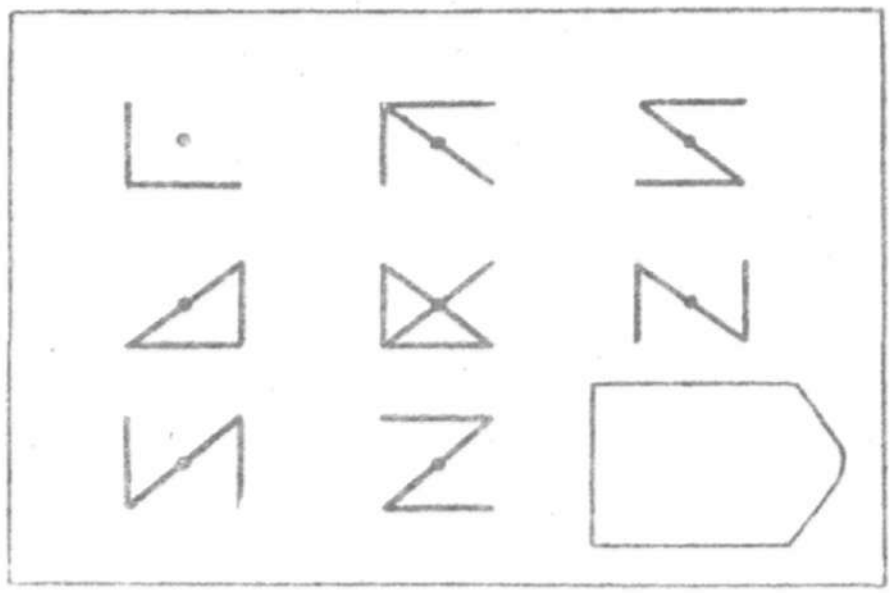


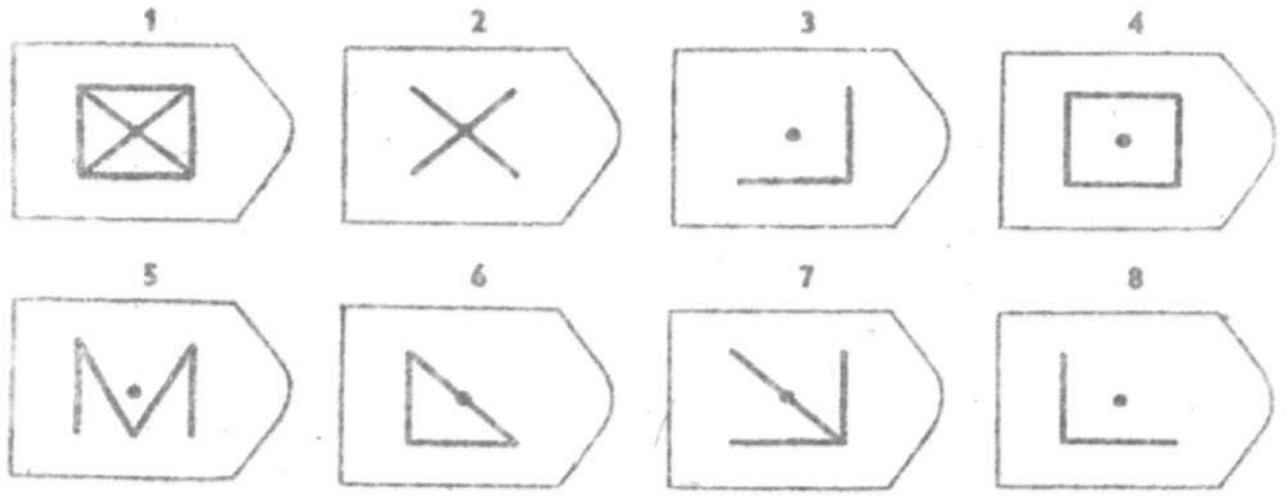
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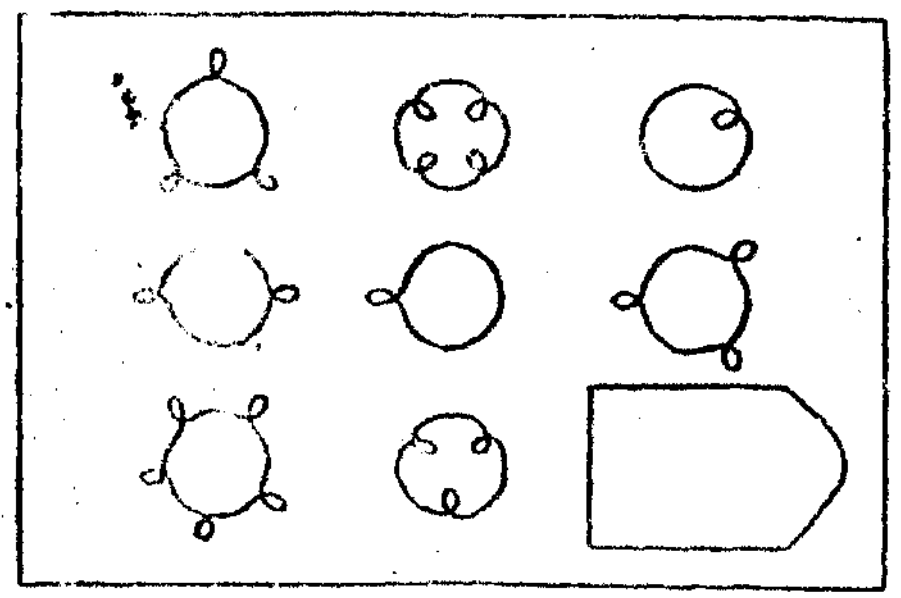


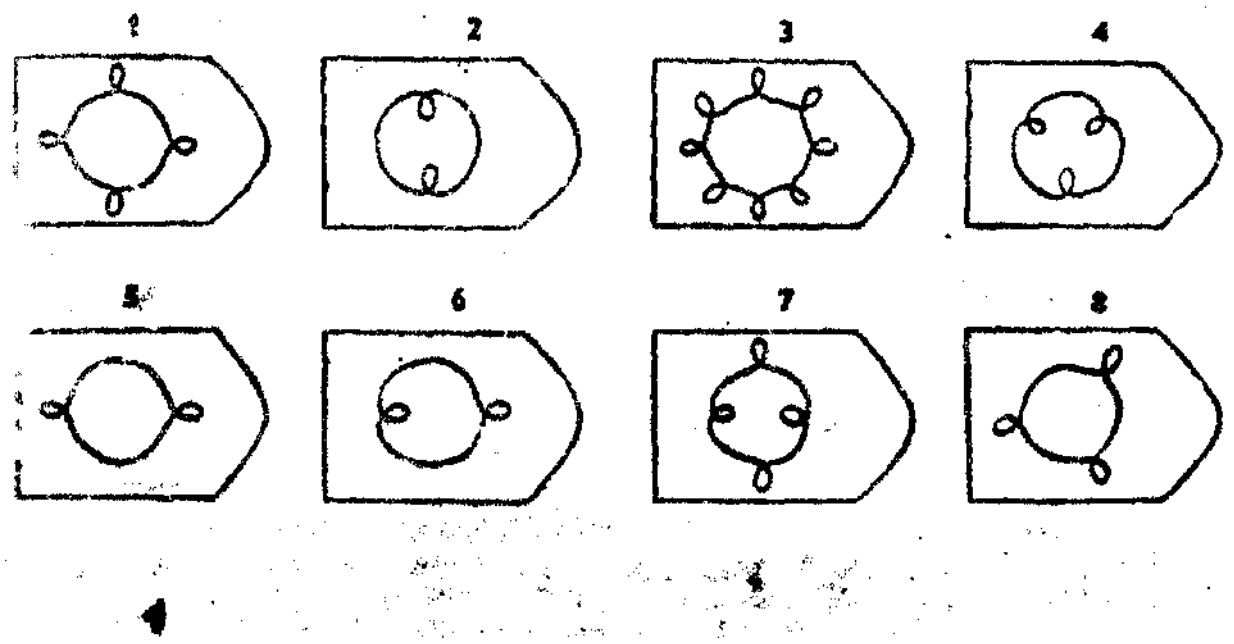
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E 12





STANDARD PROGRESSIVE MATRICES

140

ANSWER SHEET

Age Date of Birth

Class

Address

s Job

wn Job

A	B	C	D	E
	1	1	1	1
	2	2	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	5
	6	6	6	6
	7	7	7	7
	8	8	8	8
	9	9	9	9
	10	10	10	10
	11	11	11	11
	12	12	12	12

Time	Total	Grade

Tested by

APENDIX 3

DESCRIPTION OF THE IBADAN CREATIVITY ASSESSMENT SCALE

The Ibadan Creativity Assessment Study started in 1976 (Bakare and Akinboye), with a primary objective of a general assessment of the creative patterns of behaviours in students which could help one assess the creative personality profiles associated with each subject discipline. It was believed that knowledge from such assessments can help in knowing the patterns of creative behaviours of Nigerian students generally. This information could be useful in planning for social development, improving on instructional strategies, monitoring the vocational interests of youngsters toward their greatest energy channels, planning man-power development, and placement of personels in the various working contexts--government, Ministry, Industry, Schools, etc. The test is presetnly in use in other parts of Nigeria like Lagos, Jos and presently for this study - Kaduna State.

Description of Ibadan Creativity Assessment Scale:

The scale consists of 97 items divided into four sets (A, B, C, D). The following are the number of items in each set:

(i) Set A = 21
(ii) Set B = 25
(iii) Set C = 26
(iv) Set D = 25

Each item carries a ten point self-rating scale as in Fig.1.

(Totally unlike me) I 0 1 2 3 4 5 6 7 8 9 I (Very much like me).

Each student is expected to rate items most descriptive of him or her (in the increasing order of magnitude (6,7,8,9). Items least descriptive of students are expected to be rated low (in decreasing order of magnitude (4,3,2,1,0). Zero being a student's rating for an item that is total unlike the student. Those items for which students are not sure were to be rated 5.

Each of the four Selection (A, B, C, D), measures specific traits such as:

(i) Section A = Ideative Flexibility
(ii) Section B = Ideative Originality
(iii) Section C = Ideative Fluency
(iv) Section D = Ideative Motivation.

Administering the Ibadan Creativity Assessment Scale:

The Ibadan Creativity Assessment Scale (Like the Progressive Matrices), can be administered (a) as an individual test, (b) as a group test and (c) as a self-administered test.

Materials: The essential materials required are (i) Pencils and (ii) The Test Booklet(s) - Ibadan Creativity Assessment Scale.

Scoring Ibadan Creativity Assessment Scale:

The test is scored by simply adding up the number circled on the scale (Fig.1). The sum total (after addition) of each section (A, B, C, D) is the student's raw score.

Interpreting the Scores on the Test:

The raw scores on Ibadan Creativity Assessment Scale can be used for computation and for comparisons within the same class or group.

The scales for this test were valided by Bakare and Akinboye (1976a, 1976b). The method of validation was mainly internal. That is, an internal consistency reliability was established for each of the constructs - ideative flexibility, ideative originality, ideative fluency and ideative motivation. Each scale was then factor analysed to establish construct validity for them. Co-efficient Alpha was the index of internal consistency for each sub-scale as follows:-

(i) Scale A = .640

(ii) Scale B = .710

(iii) Scale C = .760

(iv) Scale D = .770

The factors isolated indicated one significant factor for each scale.

The maximum possible score for each scale is as follows:-

(i) Scale A (Flexibility) = 189

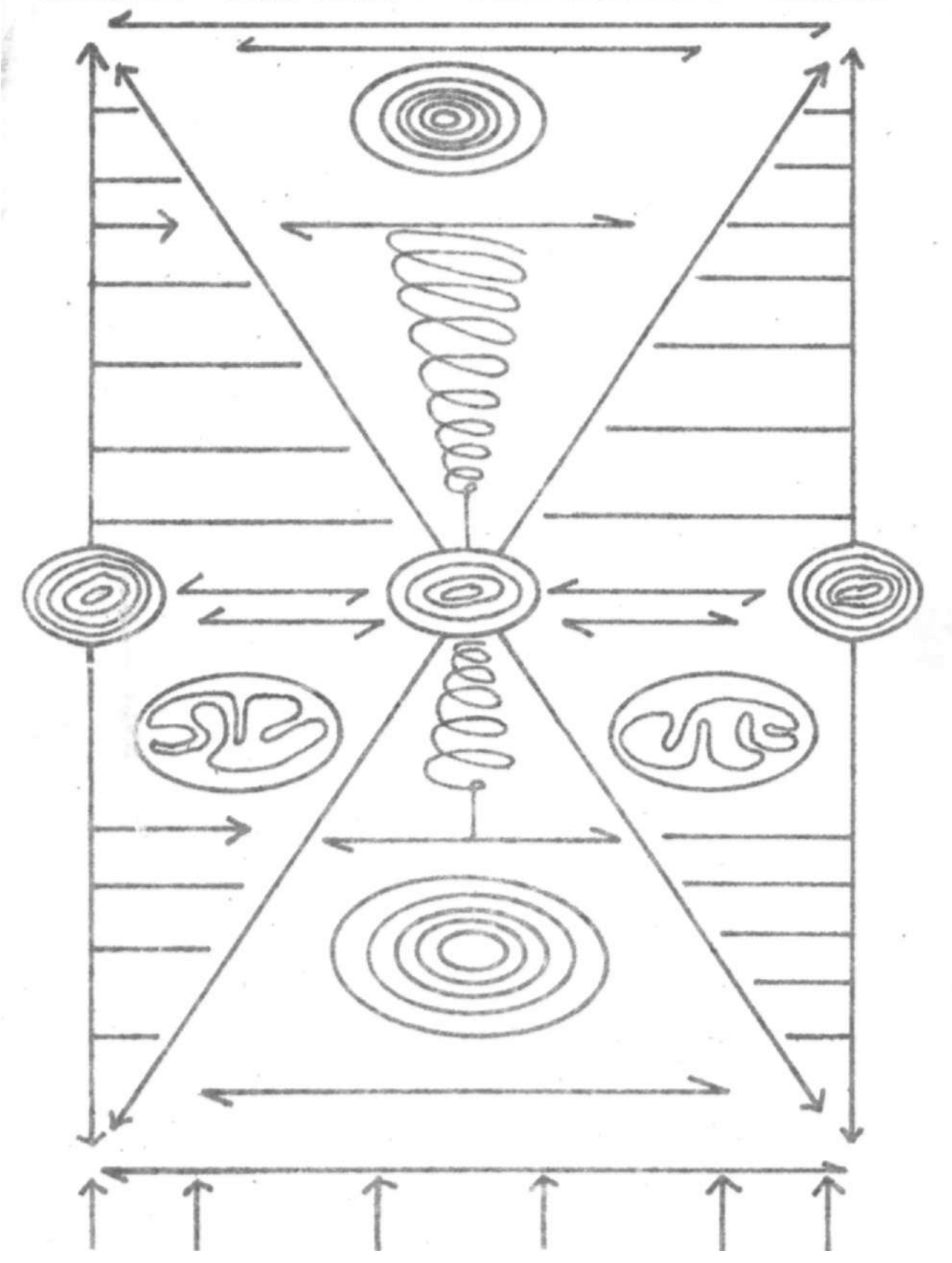
(ii) Scale B (Originality) = 225

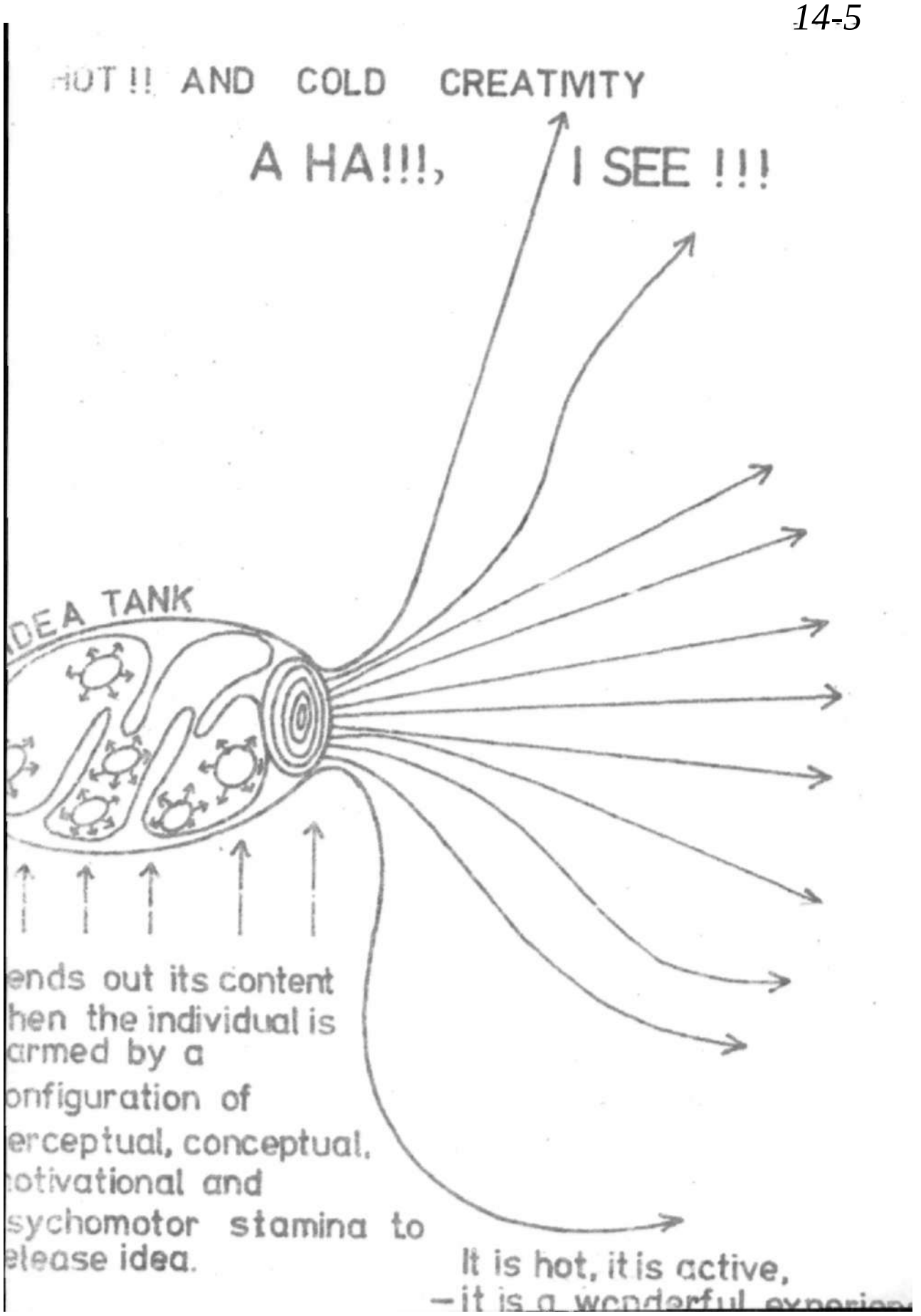
(iii) Scale C (Fluency) = 234

(iv) Scale D (Motivation) = 225

In each, and for the entire scales (A, B, C, D), pupils obtaining an average or above average score are regarded as creative. Similarly, pupils scoring below average in each scale as well as in all (A, B, C, D) are regarded as not creative.

IBADAN CREATIVITY ASSESSMENT SCALE




HOT !! AND COLD CREATIVITY
A HA!!!, I SEE !!!
DEA TANK
ends out its content
hen the individual is
armed by a
onfiguration of
erceptual, conceptual,
otivational and
sychomotor stamina to
elease idea.
It is hot, it is active,
—it is a wonderful experien

IBADAN CREATIVITY ASSESSMENT SCALE

ICAS (1977)

NAME .....

DATE .....

AGE .....

SEX .....

OCCUPATION or
PROFESSION
(present & future) .....

DIRECTIONS:

Please use the ten point scale below to rate yourself on each of the following items. Rate items most descriptive of you high (in the increasing order of magnitude (6,7,8,9). Rate items least descriptive of you low (in decreasing order of magnitute (4,3,2,1,0). Zero being your rating for an item that is totally unlike you. Those items you are not sure about, you rate 5.

(Totally unlike me) I 0 1 2 3 4 5 6 7 8 9 I (Very much like me)

You just circle the number that describes the magnitude of your personal description.

EXAMPLE:

I am dull at generating new ideas.

(Totally unlike me) I 0 1 2 3 4 5 6 7 8 9 I (Very ... like me

My rating is 2 because it is very much unlike me.

YOU CAN NOW START RATING YOURSELF ON THE ITEMS. YOU WILL TAKE JUST ABOUT 30 MINUTES TO COMPLETE THE WHOLE SCALE.

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SECTION A

How accurate are the following descriptions FOR YOUR person.

Accept ambiguous situations.	0	1	2	3	4	5	6	7	8	9
Attracted by mysterious unclear events	0	1	2	3	4	5	6	7	8	9
Tend to break health conventions.	0	1	2	3	4	5	6	7	8	9
Not hostile or agressive on the whole.	0	1	2	3	4	5	6	7	8	9
Lookifor new ways of doing things.	0	1	2	3	4	5	6	7	8	9
Tend to overlook significant implications of an idea.	0	1	2	3	4	5	6	7	8	9
Meticulously curious.	0	1	2	3	4	5	6	7	8	9
Often a fault-finder.	0	1	2	3	4	5	6	7	8	9
Does not like a constantly well-organized situations.	0	1	2	3	4	5	6	7	8	9
Manifest odd patterns of behaviour at times.	0	1	2	3	4	5	6	7	8	9
Sensitive to beautiful things.	0	1	2	3	4	5	6	7	8	9
Willing to take risks.	0	1	2	3	4	5	6	7	8	9
Like to propose new approaches to a problem.	0	1	2	3	4	5	6	7	8	9
Neglects significant facts arising from a problem situation.	0	1	2	3	4	5	6	7	8	9
Never bored.	0	1	2	3	4	5	6	7	8	9
Can perceive details.	0	1	2	3	4	5	6	7	8	9
I can easily adapt a thing for other uses.	0	1	2	3	4	5	6	7	8	9
I can adjust quite easily to novel situations.	0	1	2	3	4	5	6	7	8	

I can detect small shades of different colour from a painting that looks one colour.	0	1	2	3	4	5	6	7	8	9
It is easy for me to change my attention from one absorbing duty to another.	0	1	2	3	4	5	6	7	8	9
If I meet a person once, I'll know him when next I meet him.	0	1	2	3	4	5	6	7	8	9

SECTION B

Criticize my mates.	0	1	2	3	4	5	6	7	8	9
Attracted to difficult jobs.	0	1	2	3	4	5	6	7	8	9
Can pick out valuable things to me out of many seemingly equally attractive ones.	0	1	2	3	4	5	6	7	8	9
Like solitary life.	0	1	2	3	4	5	6	7	8	9
Not popular with people.	0	1	2	3	4	5	6	7	8	9
Non-conforming even to intimate friends.	0	1	2	3	4	5	6	7	8	9
Like to tackle problems that others may avoid.	0	1	2	3	4	5	6	7	8	9
Follows instructions very closely.	0	1	2	3	4	5	6	7	8	9
Seek knowledge for its sake.	0	1	2	3	4	5	6	7	8	9
Like to disagree at times.	0	1	2	3	4	5	6	7	8	9
Like to question orders of superiors when it is not clear	0	1	2	3	4	5	6	7	8	9
Do not like business	0	1	2	3	4	5	6	7	8	9
Can be proud and selfsatisfied at times.	0	1	2	3	4	5	6	7	8	9
Differ with friends on opinions at times.	0	1	2	3	4	5	6	7	8	9
Does not fear to make mistakes.	0	1	2	3	4	5	6	7	8	9
Reserved, not open like others	0	1	2	3	4	5	6	7	8	9
Do no want to be controlled by any person.	0	1	2	3	4	5	6	7	8	9
May be terribly native in style of life.	0	1	2	3	4	5	6	7	8	9

19.	Visionary and insightful	0	1	2	3	4	5	6	7	8	9
20.	Seek recognition for contributions I make.	0	1	2	3	4	5	6	7	8	9
21.	Averagely intelligent at least.	0	1	2	3	4	5	6	7	8	9
22.	Like to do things the way I think right.	0	1	2	3	4	5	6	7	8	9
23.	I am resolute, I'll change the order of things in the present world.	0	1	2	3	4	5	6	7	8	9
24.	It is monotonous to see even the most beautiful things without change for many years.	0	1	2	3	4	5	6	7	8	9
25.	Innovation and introduction of the unusual makes one happy and healthy	0	1	2	3	4	5	6	7	8	9

SECTION C

1.	Have easy-flowing ideas on certain problems that bother me.	0	1	2	3	4	5	6	7	8	9
2.	Self-sufficient in idea-generation.	0	1	2	3	4	5	6	7	8	9
3.	Versatile.	0	1	2	3	4	5	6	7	8	9
4.	Rich in terms of the variety of ideas running through my mind.	0	1	2	3	4	5	6	7	8	9
5.											
5.	I can ask a hundred questions on the uses of palm tree within 10 minutes.	0	1	2	3	4	5	6	7	8	9
6.	I can explain the possible consequences of an act fairly accurately.	0	1	2	3	4	5	6	7	8	9
7.	I can describe a scene as accurately as possible with a limited given time.	0	1	2	3	4	5	6	7	8	9
8.	If a pictorial scene is supplied, I can vividly supply many ideas describing the cause(s).	0	1	2	3	4	5	6	7	8	9
9.	If a painting is supplied in a sequential order, I can generate many ideas about the sequence that will follow.	0	1	2	3	4	5	6	7	8	9
10.	I can give many informations to explain a just-suppose question.	0	1	2	3	4	5	6	7	8	9
11.	If a diagram is incompletely drawn, I can quickly think of many ways of improvement	0	1	2	3	4	5	6	7	8	9
12.	I may be dry-up of ideas very often.	0	1	2	3	4	5	6	7	8	9
13.	I can easily draw an elephant from a big oval or circular drawing.	0	1	2	3	4	5	6	7	8	9
14.	I hate to write poems	0	1	2	3	4	5	6	7	8	9

15.	I like objective type examinations	0	1	2	3	4	5	6	7	8	9
16.	I prefer to write essay exminations.	0	1	2	3	4	5	6	7	8	9
17.	Plenty of ideas come to me early in the morning when I am about to take breakfast.	0	1	2	3	4	5	6	7	8	9
18.	I keep a notebook always in which I write the many ideas that come to me.	0	1	2	3	4	5	6	7	8	9
19.	I do not quickly see all the sides to an argument because of idea-shortage.	0	1	2	3	4	5	6	7	8	9
20.	At times when I am peacefully alone, myriads of ideas come te me on a long-standing problem.	0	1	2	3	4	5	6	7	8	9
21.	At times when playing a game, I tend to remember many useful ideas to solve a problem bothering me.	0	1	2	3	4	5	6	7	8	9
22.	I find it difficult to start a discussion	0	1	2	3	4	5	6	7	8	9
23.	When a discussion is started, my ideas start flowing like river.	0	1	2	3	4	5	6	7	8	9
24.	I tend to describe things with few words.	0	1	2	3	4	5	6	7	8	9
25.	When I start thinking about a problem, I wonder about the way my mind conjure myriads of ideas.	0	1	2	3	4	5	6	7	8	9
26.	It is interesting to put ones ideas on record.	0	1	2	3	4	5	6	7	8	9

SECTION D

1.	Have very deep interest in disorderly settings.	0	1	2	3	4	5	6	7	8	9
2.	Courageous.	0	1	2	3	4	5	6	7	8	9
3.	Have great determination.	0	1	2	3	4	5	6	7	8	9
4.	Desire high competence in my endeavours.	0	1	2	3	4	5	6	7	8	9
5.	Enthusiastic about all problems that come my way.	0	1	2	3	4	5	6	7	8	9
6.	Fail to let others know my new ideas.	0	1	2	3	4	5	6	7	8	9
7.	Keep unusually long hours on a ideas.	0	1	2	3	4	5	6	7	8	9
8.	Industrious	0	1	2	3	4	5	6	7	8	9
9.	Controlled by an inner force which does not care about what people say.	0	1	2	3	4	5	6	7	8	9
10.	Have abundant energy for work that interest me	0	1	2	3	4	5	6	7	8	9
11.	Emotionally sensitive to new ideas.	0	1	2	3	4	5	6	7	8	9
12.	Highly persistent on difficult problems.	0	1	2	3	4	5	6	7	8	9
13.	Discouraged at times due to certain situations.	0	1	2	3	4	5	6	7	8	9
14.	Self-confident.	0	1	2	3	4	5	6	7	8	9
15.	Resolute.	0	1	2	3	4	5	6	7	8	9
16.	Humorous.	0	1	2	3	4	5	6	7	8	9
17.	Can quickly receive and register external stimuli.	0	1	2	3	4	5	6	7	8	9
18.	Stubborn to the core over problems until ideas are found.	0	1	2	3	4	5	6	7	8	9
19.	Timid.	0	1	2	3	4	5	6	7	8	9

Tenacious.	0	1	2	3	4	5	6	7	8	9
Strives for future goals.	0	1	2	3	4	5	6	7	8	9
Have ability to defer pleasure till future time when it is mature.	0	1	2	3	4	5	6	7	8	9
Temperamental when looking for ideas to solve a problem.	0	1	2	3	4	5	6	7	8	9
I feel happy when I use my imagination to generate new ideas.	0	1	2	3	4	5	6	7	8	9
I employ the whole of my energy and all sorts of tricks in solving a problem.	0	1	2	3	4	5	6	7	8	9

APPENDIX "L"

SUGGESTED METHODS OF FOSTERING CREATIVITY AND INTELLIGENCE IN NIGERIAN PUPILS

Various research activities which were conducted recently, seem to point to the fact that the creative and intellectual capacities of Nigerian pupils could be improved through instruction. According to Whimbey and Wimbey(1980)[76], these research activities have reported significant results. For example, Klaus and Gray(1968)[77], conducted a survey named the "Early Training Project". This project attempted to increase the I.Qs of children through training. This training involved the teaching of concepts considered to be familiar to pupils which could be easily learned. Then, by guidance in classification, generalization and re-classification, hierarchies of concepts were established.

Along with the training, the teacher continuously encouraged the development of attitudes and motives necessary for school learning such as: persistence; achievement motivation; delay of gratification; and interest in books, crayons, pencils, and school materials. At the end of the 3-year program, the youngsters scored I.Q. points higher than that of a matched control group.

Again, the Milwaukes Project(1964)[78], started as an inter-disciplinary concern at the University of Wisconsin. It involved researchers in the areas of psychology, psychiatry, speech therapy, and sociology. It was a comprehensive project aimed at improving the intelligence of pupils. The method used involved a survey of a section of Milwaukee believed to be having

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[76]Wimbey, L., and Whimbey, A. Intelligence Can be Taught. New York: E.P. Dutton, A Division of Elsevier-Dutton Company, Inc., 1980.

[77]Klaus, R.A., and Gray, S.W. "The Early Training Project for Disadvantaged Children: A Report after Five Years". Monographs of the Society for Research in Child Development - 33, No. 4, 1968.

[78]Milwaukee Project, in Whimbey, L. and Whimbey, A.P. 42.

low I.Qs. This was followed by repeated home visits where various methods of increasing the I.Qs of pupils were employed. While the project still continues, it is believed that this experiment has so far yielded significant results.

In another study, Bereiter and Engelmann(1966)[79], set themselves two objectives: first, to develop facilities in basic patterns of reasoning and second, to teach primary topics of academic knowledge such as alphabets and counting. The teaching format consisted of intensive, repetitive attention - demanding, and structured drills. Discipline was strict and pertinent to the task being practiced; errors were pointed out explicitly rather than glossed over in vague terms; and most important, emphatic and overt response was required of each child. Analytical reasoning and sequential deductions were taught.

During the lesson, the teacher continually required responses from the children. This ensured that their attention was properly focused on the subject and that they were actively proceeding through the sequential steps of analyses and deduction. Considerable student response is a central feature of all the intellect training experiments.

Bloom and Broder(1945, 1950)[80], developed a remedial training program aimed at improving certain skills considered essential in problem-solving. They attempted to improve analytical thinking in pupils. Students were instructed in the procedure of verbalizing or thinking aloud while solving simple reasoning problems

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[79]Bereiter, C., and Engelmann, S. Teaching Disadvantaged Children in the Preschool. Englewood Cliffs: Prentice-Hall. 1966.

[80]Bloom, B.S., and Broders, L. Problem-Solving Processes of College Students. Chicago: University of Chicago Press. 1950.

The various intellect-training studies enumerated above present a common pattern. Intelligence is taken to be, in large part at least, a habitual approach to problem-solving--a learned mental skill. Training this skill is accomplished through demonstration and guided practice. It is against the backgroud of these various studies that the student will suggest various possible techniques of fostering intelligence.

Teaching intelligence at home:

(a) Talk and explain: Parents should talk to their children, even in infancy, describing and explaining the things they do for and with the children.

(b) Read: Parents should select those books which other children of the same age as theirs enjoy. Children will often as mothers to read their favorite story over and over, until they have memorized it and "pretend-read" it as they turn the pages. We can also develop reading readiness by just flipping through a magazine, naming the items pictured. There is no reason to wait until a child can speak before we start this.

(c) Parents should not be a pendant: Parents should never prolong talking or reading to a child who does not welcome it. We should not turn this into lessons. There will be endless natural opportunities later.

(d) Parent should not stiffle curiousity or perceptual motor Growth: Children love to climb and explore the world, with their hands and mouths. Parents should accident-proof the home so that the child can do this without swallowing inedibbles or injuring himself.

(e) A great deal of verbal interaction (at home and school), should be encouraged. This way the parent/teacher will have the opportunity of paying attention to each child's development in perceptual discrimination ability, concept formation, number, ability and language.

Teaching intelligence in school: teachers' role:

(a) Assorted play materials should be provided in schools. Materials such as wheeled toys, blocks, puzzles, footballs, paints, (colours), papers, etc., can be used to encourage the development of cognitive skills.

(b) The teacher should continuously encourage the development of attitudes and motives necessary for school learning in and around the classroom. Attitudes such as: persistence; achievement motivation; delay of gratification; and interest in books, crayons, pencils and other school materials.

(c) During each lesson, the teacher should continually require responses from the children. This will ensure that their attention is properly focused on the subject and that they are actively proceeding through the sequential steps of analysis and deduction.

(d) The teacher should encourage considerable student response at every stage of learning because it is a central feature of all the intellect-training exercises.

(e) The teacher should know that the tendency for children is to guessanswers rather than think. For instance, they may answer Yes to "Do you know where Audu ... before the remainder of the question is completed. In this type of situation, the teacher should be sensitive and try to counteract it. We can borrow the Bereiter and Engelmann's(1966) technique of counteraction that:

> "If the task requires the child to make a visual discrimination and the child has not inspected the material the teacher can assume that the child is about to make a guessed response. The teacher can prevent it by saying "Now look at it. What is this? What do you know about it?"[81]

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[81] Bereiter, G., and Engelmann, S. Teaching Disadvantaged Children in the Preschool. Englewood Cliffs: Prentice-Hall,'66.

(f) The teacher should encourage the method of reading and thinking aloud whenever occassion demand for such. Furthermore, it is found that discussing ideas on a one-toone tutorial basis can be very helpful in increasing intelligence.

(g) Adult intelligence can also be trained easily, through reading comprehension exercises. The deficient thinking habits characteristics of low I.Q. can be readily observed by the teacher during the early phase of the training when the pupil must continually be reminded to reread and reconsider sections of informations skipped and then further made to combine the information in constructing the precise meaning of the material, rather than guessing at the meaning.

(h) Where a text is considered difficult by the teacher, then he should resort to trained attention to all the words and continuos analytical construction extending over a long period.

(i) In figural reasoning, the teacher should involve his pupils in the activity of making comparisons. Proper figural reasoning will occure if comparisons are made, if tentative subrelations are formed, if further comparisons are made and the information is gathered together.

(j) In verbal analogy problems, the teachers' role is to make comparisons interspersed with constructions. Comparative thinking operates in answering the questions of a standard reading comprehension, examination.

In view of the above mentioned suggestions, it seems apparent that there is a parallel between cause-and-effect problem solving (detailed observations, recall of prior knowledge, comparisons, and rule generation), and the activities involved in solving intelligence test

items which explains the broad validity of I.Q. tests as demonstrated in this study. For example, tests such as figural reasoning, verbal analogy reasoning, and reading comprehension are certainly miniature problem samples requiring the same thinking pattern that underlies scientific analysis, technical reasoning, and academic pursuits. It is in this very sense that the student is emphasizing that "intelligence" is an undeniably useful tool in life which must be learnt by all pupils in Nigeria.

Teaching intelligence through cognitive-skills oriented classrooms:

From the student's close observation of the physical structure of the standard classrooms (in the 21 schools selected for this study), it appears that they are quickly becoming non-standard. Educators today have come to recognize the fact that "doing" is an important part of learning. For instance, if a teacher lectures mathematics, Fine Art or Geography for the major portion of the course, then the educational system has not provided guided pratice for students to master and apply the ideas taught.

Since the unversal trend in intelligence-training programmes (as mentioned earlier in this study), is based on increased student activity and discussion, the researcher would like to offer the following suggestions to the teacher:

(a) Students should be made to work in pairs or small groups for a major portion of the class, while the teacher continually (or at least periodically) observe them at work.

(b) The teacher should make sure that each pair or small groups of students are able to explain and discuss the reasoning they use and the conclusions they draw in comprehending and applying the course material.

(c) Finally, the teacher should ensure that the explanation, discussion, reasoning and conclusions are done in some format which will ensure that all students participate.

The conclusion pointed to by the various techniques and suggestions of the student, is that one or two courses of intelligence-training can and will produce significant growth. We are therefore saying that to do justice to students, such courses should permeate the entire educational system of Nigeria.

Training for creativity:

The student has contended that the creative abilities of our pupils can be improved through formal learning of techniques and practice. The attention given to creative training on our curricula is hardly enough to realize this objective. Parnes and Harding (1962), made a similar observation when they claimed that:

> "We are not now giving creativity the attention it deserves in our curricula. The plain fact is that there is a crying need for creativity to be taught in every classroom. Where it is now taught, it is by accident and chance, rather than by design and understanding."[82]

This would seem to mean that it is more important to condition our pupils towards flexibility, to make available to them modes of conduct which will enable them to constantly adjust to new situations, to examine and grapple with problems and to have ideas and methods for changing their environment. We should place creative training next to the different cognitive programmes because

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[82] Parnes, S.J. and Harding, H.F. (eds.). A Source Book for Creative Thinking. New York: Scribber, 1962.

we hold that, once our pupils are allowed and encouraged to develop the alternative process, they will become thinking learners in every aspect of their lives. Whereas, it is this thinking process which the student believes should be developed by the learner. Developing the ability to allow for alternatives at decision points calls into play knowledge acquired and the need for new knowledge. It would seem therefore (as the student has postulated earlier), that what Nigeria needs is a thinking nation of thinking individuals, who will survive and, indeed, help perpetrate a truly democratice society, wherein thoughtful considerations of divergent possibilities becomes the basis of sound convergent decisions. For the implementation and change resulting from the students argument, we are constantly reminded by Plato's (1947)[83] admonition that, "What is honored in a country will be cultivated there?". Torrance(1963)[84], also justifies the students' stand on the need to develop thinking abilities in pupils when he contends that '... the central purpose of education is the development of the ability to think ... if it is to accomplish either its traditional tasks, or those newly accentuated by recent changes'.

(i) Fostering Creativity in Nigerian children:

Since the early 1950s, many methods of fostering creativity have been actively researched into. Three basic assumptions underlie the methods of fostering creativity Mcleish, Matheson and Part (1973)[85]. These are the fact that:-

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[83]Plato, In Lodge, R.C. Plato's Theory of Education. London: Routledge and Kegan Paul, 1947.

[84]Torrance, E.P. "Are There Tops in Our Cages?" American Vocational Journal. 38: 20-22. 1963.

[85]McLeish, J. Matheson, W. & Part J. The Psychology of the Learning Group. Hutchinson University Library, London. 1973.

1. The creative process can be studied and described concretely to yield a method which can be used to foster it.
2. The psychological processes underlying invention (discovery) in the arts and sciences are basically the same and
3. The process of individual creation is closely analogous to that of group creation.

The above observations further reinforces the idea that creativity is a normally distributed trait which can be scrutinized and empirically studied. Many methods of creativity also capitalize on small group procedures and social adaptations. This makes it possible for individuals to develop and reinforce their creative potentials so that they can contribute more productively to societal progress. Some of these methods include:-

1. Synectics - a group method for developing creativity.
2. Brainstorming, another group method for fostering creativity.
3. Lateral thinking.
4. Direct creativity training.
5. Problem-solving.
6. Attribute listing, etc.

An institute for creative problem solving had been established since 34 years at the Creative Education Foundation of the State University College at Buffalo(U.S.A.) This foundation conducts an annual workshop to deliberately foster creativity in individuals, groups, industrialists, planners and governmental agents. The 1977 newsletter of this foundation contains over two hundred methods of fostering creativity in people. Another journal (Creativity In Action) has been established specifically to increase peoples' awareness about the various methods by which they could produce more ideas, utilize ideas, improve industry, roads, education, health, research, organizations and so consequently develop society.

Of these variegated methods, only three methods have been empirically studied in Nigeria, Akinboye(1976)[86]. These are the brainstorming method, direct creativity method and the problem-solving method. Brainstorming was found to be most acceptable and more effective with Nigerian adolescents, direct creativity training was next while problem-solving was found to be least effective. Problem-solving method was of course more effective than no method (that is the control).

It is important that a brief outline of what these methods are is given so that we can have an insight into the way they can foster creativity and social adaptation of our pupils.

(ii) Brainstorming:

Brainstorming is a group technique for facilitating the production of many new ideas for creative problem-solving. This technique was introduced by Osborn(1939, 1957)[87] as a powerful too in the generation of novel ideas. Since its initial introduction, brainstorming has become a popular idea-spurring technique in creative thinking.

Brainstorming simply means the use of the BRAIN to STORM a problem. The basic assumption of this technique is that the free expression of ideas by a group's member is naturally stimulating. This it does by reinforcing the expression of approximations of the desirable novel ideas in a group member by deferring conscious critical evaluation. In presenting the principal guidelines for the application of the Brainstorming techniques, Osborn(1957) emphasized the following rules:-

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[86] ibid.

[87] Osborn, A.F. Applied Imagination, New York: Scribber, 1957.

(1) Criticism should be avoided (evaluation comes later).

(2) "Freewheeling" is desirable (wild ideas are especially welcome because they can be more easily cultivated than new ideas produced).

(3) As many new ideas as are possible should be produced (because quantity ideas bread quality).

(4) It is important to combine and improve the ideas which have already been expressed(they should serve as "stepping stones" for new ideas).

Brainstorming technique has been used by business organizations, academic institutions, governmental agencies and the armed forces all over the world. Its use has grown to an extent that the mechanism of its sessional operations and its effectiveness in small groups have been reappraised in recent times. (de Bone 1973)[88], de Bone observed that a brainstorm session should only begin if its duration, warm up period, number of participants, the type of participants, a note taker (secretary) and a Chairman who is trained had been established.

(iii) Direct creativity training method:

The purpose of the direct creativity training techniques is first to foster an individual's creativity and second to enable him to make creative decisions quite easily. This method includes a number of steps:

1. Fact-finding - this essentially involves problem-definition, picking out and isolating the problem.

2. Idea-finding - this includes idea-production through thinking of all possible sides to the problem.

3. Solution-finding - verification of tentative solutions for their validity. This method is very useful for both group and individual ideations.

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[88] de-Bone, E. The Use of Lateral Thinking. Jonathan Cape Ltd., London. 1973.

(iv) Problem-solving:

Problem-solving is a process required in reaching a desired goal starting from a set of initial conditions. By observation, the problem-solver may seek to know the structure of a phenomenon. Davis (1966)[89], summarized problem-solving in three principal steps.

A problem can be solved by using the traditional learning approach. Skinner (1953)[90], for example, defined problem-solving as behaviour which through the manipulation of environmental contingencies makes the appearance of a solution more probable. Problem-solving is often described therefore, as a process of finding a solution. Studies, Wilson and Alexis (1962)[91], Simon (1955)[92] generally indicate that through problem-solving, man is capable of making useful decisions either for himself, group or society. Parnes (1967)[93], suggested that if a person or group adopts the following strategies of idea generation, he may be able to get his problem more easily solved. This strategy include, a process of putting ideas to other uses, adapting, modifying, magnifying, minifying, substituting, rearranging, reversing, combining ideas before a final decision-making.

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[89]Davis, C.A. Current Status of research and theory in Human Problem-Solving. Psychological Bulletin, 1966, 66, 34-64.

[90]Skinner In Creative Problem-Solving. Institute Newsletter. 1953.

[91]Wilson and Alexis, in Torrance, E.P. and Myers, R.E. 1962.

[92]Simon, In Rothenberg and Hausman (ed.), The Creativity Question, Duke Univesity Press, 1976.

[93]ibid.

One will not doubt the fact that in a social system where individuals or groups operate as above in their work-a-day life, there is wound to be higher productivity in the various sectors of the economy.

(v) Obstacles to creativity and the role of the teacher:

Torrance and Myers (1970)[94], pointed out certain school conditions which are capable of affecting the development of creativity. Prominent among their observations are conditions such as very large classes because as they contend, an overcrowded classroom is bound to result in regimentation. Others are:

(a) Strong emphasis on memorizing.

(b) Discouraging anything which does not fall within the prescribed pattern, whether it be original painting or original storytelling.

(c) A highly organized and rigid schedule of class activities.

(d) Always expecting solutions (to problems) which have been decided in advance and which alone are correct (valid).

(e) Strick authoritarian teaching methods by teachers which are capable of destroying individual initiative.

(f) Constant use of threats and mockery by a teacher.

(g) Over-emphasis of rewards and success which leads to defensive attitudes.

(h) The belief of teachers that creative children are difficult to change and their work (production), equally difficult to asses, and

(i) The acceptance (by teachers), of academic achievement of pupils as the only measure of success.

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[94]Torrance, E.P. and Myers, R.E. Creative Learning and Teaching. Harper and Row, New York: 1970.

The teachers' role may be seen mainly by way of his eliminating 'negative' social attitudes with a 'positive' one. One main reason why a more postive attitude must be adopted has been identified by Cowan (1972)[95], when he says:-

> "Creative children are more like adults than other children: they tend to want more autonomy and more independence. All people are pretty reasonable about limits and restraints. What no one wants, including creative children, are arbitrary limits ... Without freedom, no one can be creative. And creativity is nurtured by warmth and affection".

(vi) Some suggestions on training creativity in Nigerian pupils for the teacher:

In the light of Cowan's observation as above, the student would postulate certain aids to creative learning which could be adopted by our teachers.

(a) Encouragement of self-initiated learning: Individual activity would encourage pupils to expound themselves.

(b) Encouragement of non-authoritarian learning situation: This is based on the premise that liberal conditions smoothen they way for creative activity. If this is a connotation of 'freedom', the student would want to state that the sense in which it is used does not mean lack of discipline. Freedom here should be seen in the sense of freedom to experiment within the bounds of pupil's interest and capabilities.

(c) Over-learning must be encouraged. By over-learning we mean, the process of absorbing and coming to terms with as much information and as many impressions as possible.

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[95]Cowan, J.C. Development of the Creative Individual. San Diego, Cliff: Knapp, 1972.

(d) Creative processess of thought should be encouraged. Theachers should allow pupils to take intellectual risks, to speculate on the basis of inconclusive information and to examine structural and spatial relationships.

(e) The teacher should postpone judgement. The creative teacher should minimize the importance of errors.

(f) Intellectual flexibility should be encouraged Pupils can be stimulated to regard things and situations objectively and to view them differently and in an unconventional way.

(g) Teachers should encourage self assessment. For instance, pupils can be supported in frustrations and when they make mistakes.

(h) We should provide an immediate environment that favours creativity and encourages children who show desire to be creative becuase as Pressey (1962) says:-

> "Development of any ability is fostered by a favourable immediate environment, expert instruction, frequent and progressive opportunities for the exercise of ability, social facilitation, and frequent success experiences."[96]

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[96]Pressey, M. In Lytton, H. Creativity and Education. Routledge and Kegan Paul; Student Library edition. London: 1971

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