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## TRAINING TASK -ENGLISH

- 1. Area:** Chess skills – moves. Related to chess.
- 2. Difficulty Level:** Low.
- 3. Title of the task:** Defining and describing concepts: squares, files, ranks, diagonals.
- 4. Purpose, aim and objectives of the task:**

At the end of the lesson the students will be able to:  
– Define chess concepts in English.

### 5. Materials and Instruments:

Computer screen, projector or sheet of paper with printed diagram.

**6. Expected timing:** 2 x 45 minutes.

### 7. Method:

Presentation of the chess diagram and pieces:

- on a computer screen,
- through a projector,
- or on a paper sheet.

At this stage on the basis of a decision tree teacher should introduce several quantitative indicators of individual ways of solving problems on a chessboard: M, N, A, nn, Pmax, Pser, Dmax, T, W.

These indicators were introduced by Adriaan de Groot (Think and Choice in Chess, The Hague 1965) to analyze thinking aloud protocols. These indicators give many opportunities for the study of thinking (as was shown in Przewoźnik & Soszynski: How to think in Chess, Milford 2001).

#### Indicator M

M – denotes the number of all considered moves contained in the entire decision tree. This can be used to measure moves in chess and also to analyze expressions in other decision-making situations. This indicator allows us to distinguish between those individuals who seek more information for decision making and those who make decisions on the basis of a smaller amount of information.

#### Indicator N

N – denotes the total number of subsequent proposals to solve. This number may be a reflection of the subject's mentality type. A large value of N would be consistent with an empirical mentality type, the chess player who prefers a problem-solving approach based on the processing of large amounts of data, and the calculation and verification of a large number of multiple variants. In contrast, a relatively smaller value of N may be characteristic of the theoretical chess player type, whose thinking is less empirical and more deductive without giving specific variants. On the other hand, the value of N may be a function of the position on the chessboard, where the more complex a position is, the greater the value of N, because more variations need to be calculated. And a simple position may correspond to a smaller number of N.

#### Indicator A

A – denotes the set of alternative actions (candidate moves) considered by the subject, here understood as equal to the set of options in a decision-making process. It can be assumed that persons characterized by great fluency and versatility would consider many different solving propositions in the process of choosing moves. It may be that fluency of thought will be more closely correlated with the value of N, whereas versatility more closely with the value of A. As in the case of N, the value of A may depend on the situation on the board and not only on the individual traits of the chess player.

#### Indicator nn

nn – denotes the overall total number of successive changes in the solving propositions.

#### Indicator Pmax

Pmax – denotes the number of re-examined solving propositions. This value marks out all the proposals considered more than once.

#### Indicator Pser

Pser – denotes the number of times a solving proposition is re-considered, but only in the longest single series.

#### Indicator Dmax

Dmax – denotes the maximum length of calculated variations, the measured number of white and black moves. This value reveals how far ahead the subject is able to calculate variations, to what extent he is able to or wishes to foresee events as they unfold on the chessboard.

Indicator T

T – denotes the time to solve the exercise.

Indicator V

V – denotes the value of the solution, i.e. 1 or 0.

The indicators described above (M, N, A, nn, Pmax, Pser, Dmax, T, V) are summarised and visualized in Figure 1.

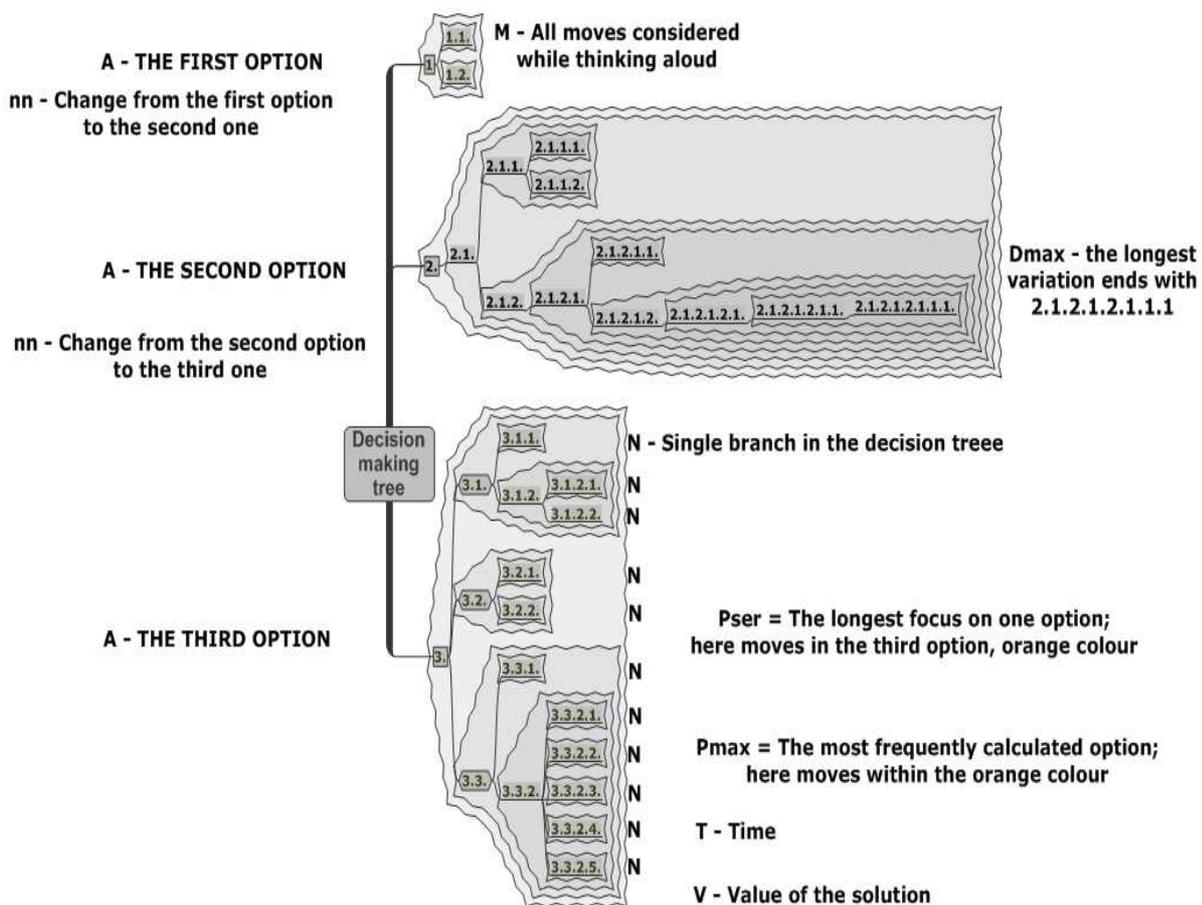
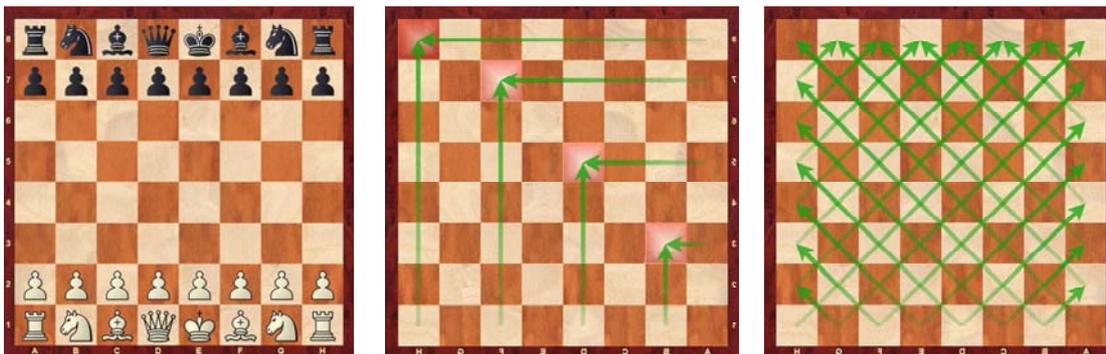


Figure 1. The nine-indicators method – summary.

## 8. Instruction for the task:

Before the beginning of the exercise no knowledge and no skills are required from the students.

Teacher shows chess diagrams with pawns and pieces.



1. Pupils identify pawns and pieces and learn the words (diagram 1):

White  
Black  
King  
Queen  
Bishop  
Knight  
Rook  
Pawn  
Pawns

2. Pupils identify letters a-h and cyphers 1-8 and learn the names of the squares (coordinates on diagram 2): g3, e5, c7, a8.

3. Pupils identify letters a-h and cyphers 1-8 and learn the names of the diagonals (coordinates on diagram 3).

Teacher and pupils introduce other suitable English words.

## 9. Risks and recommendations:

Highly recommended, if the teachers are not in a hurry while pupils are solving tasks.

The teachers should use brain-friendly strategies, mainly: “Let every pupil to be successful”.

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**10. References related to the task:**

Jan Przewoźnik – Introduction to chess. [MATE file]

**11. Pictures or online material related to the task:**

Printed diagrams, computer screen or chess program.

**12. Online materials related to resources and preparation of the task:**

None.

**13. Elaborated by:**

Jan Przewoźnik –  
University of Economics and Innovation in Lublin  
West Pomeranian School of Business in Szczecin.

**14. Trainer's notes**

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## TRAINING TASK – ENGLISH

**1. Area:** Chess skills – moves and special moves. More complex phrases. Related to chess.

**2. Difficulty Level:** High.

**3. Title of the task:** Defining and describing moves on a chessboard.

**4. Purpose, aim and objectives of the task:**

At the end of the lesson the students will be able to:

– Know how do the pawns and pieces move on a chessboard – in English in more complex sentences.

**5. Materials and Instruments:**

Computer screen, projector or sheet of paper with printed diagram.

**6. Expected timing:** 4 x 45 minutes.

**7. Method:**

Presentation of the chess diagram and pieces:

- on a computer screen,
- through a projector,
- or on a paper sheet.

At this stage on the basis of a decision tree teacher should introduce several quantitative indicators of individual ways of solving problems on a chessboard: M, N, A, nn, Pmax, Pser, Dmax, T, W.

These indicators were introduced by Adriaan de Groot (Think and Choice in Chess, The Hague 1965) to analyze thinking aloud protocols. These indicators give many opportunities for the study of thinking (as was shown in Przewoźnik & Soszynski: How to think in Chess, Milford 2001).

#### Indicator M

M – denotes the number of all considered moves contained in the entire decision tree. This can be used to measure moves in chess and also to analyze expressions in other decision-making situations. This indicator allows us to distinguish between those individuals who seek more information for decision making and those who make decisions on the basis of a smaller amount of information.

#### Indicator N

N – denotes the total number of subsequent proposals to solve. This number may be a reflection of the subject's mentality type. A large value of N would be consistent with an empirical mentality type, the chess player who prefers a problem-solving approach based on the processing of large amounts of data, and the calculation and verification of a large number of multiple variants. In contrast, a relatively smaller value of N may be characteristic of the theoretical chess player type, whose thinking is less empirical and more deductive without giving specific variants. On the other hand, the value of N may be a function of the position on the chessboard, where the more complex a position is, the greater the value of N, because more variations need to be calculated. And a simple position may correspond to a smaller number of N.

#### Indicator A

A – denotes the set of alternative actions (candidate moves) considered by the subject, here understood as equal to the set of options in a decision-making process. It can be assumed that persons characterized by great fluency and versatility would consider many different solving propositions in the process of choosing moves. It may be that fluency of thought will be more closely correlated with the value of N, whereas versatility more closely with the value of A. As in the case of N, the value of A may depend on the situation on the board and not only on the individual traits of the chess player.

#### Indicator nn

nn – denotes the overall total number of successive changes in the solving propositions.

#### Indicator Pmax

Pmax – denotes the number of re-examined solving propositions. This value marks out all the proposals considered more than once.

#### Indicator Pser

Pser – denotes the number of times a solving proposition is re-considered, but only in the longest single series.

#### Indicator Dmax

Dmax – denotes the maximum length of calculated variations, the measured number of white and black moves. This value reveals how far ahead the subject is able to calculate variations, to what extent he is able to or wishes to foresee events as they unfold on the chessboard.

Indicator T

T – denotes the time to solve the exercise.

Indicator V

V – denotes the value of the solution, i.e. 1 or 0.

The indicators described above (M, N, A, nn, Pmax, Pser, Dmax, T, V) are summarised and visualized in Figure 1.

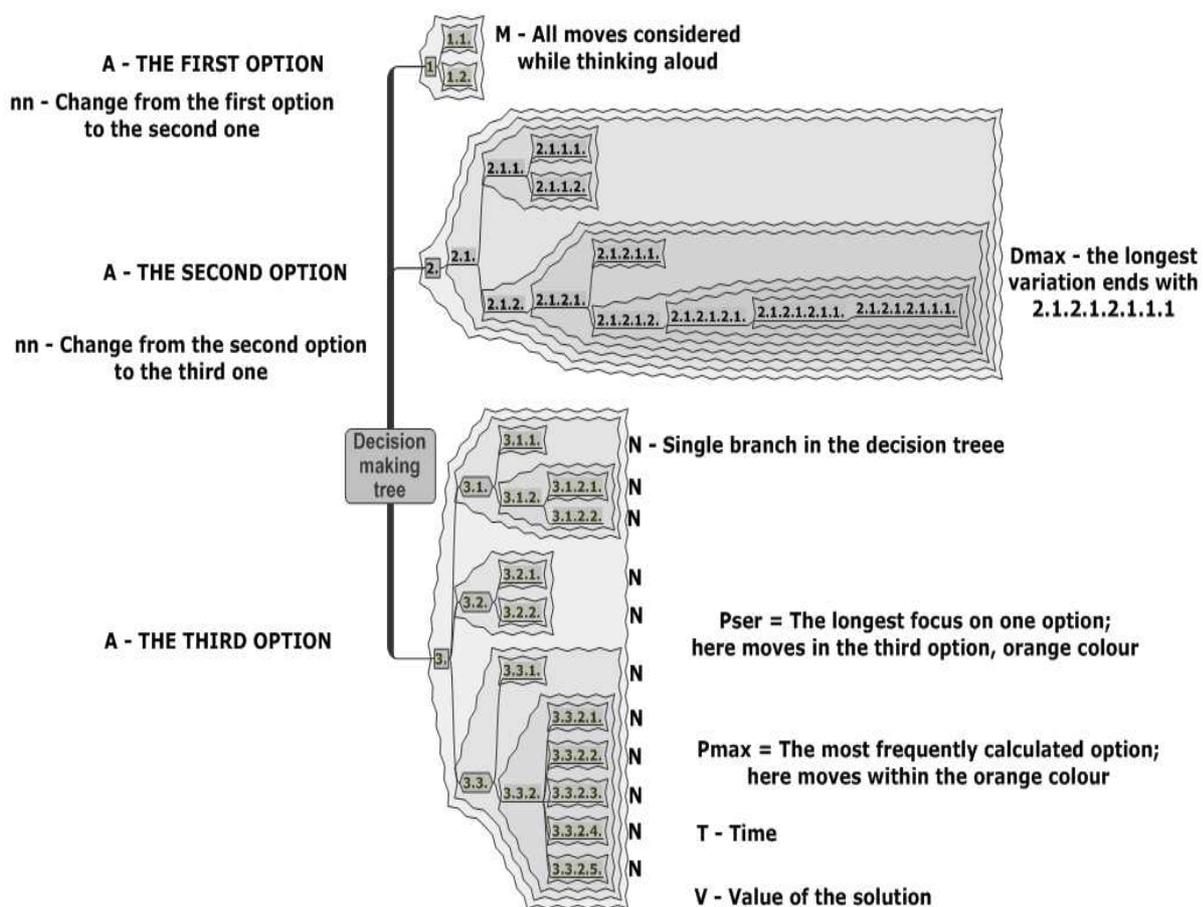
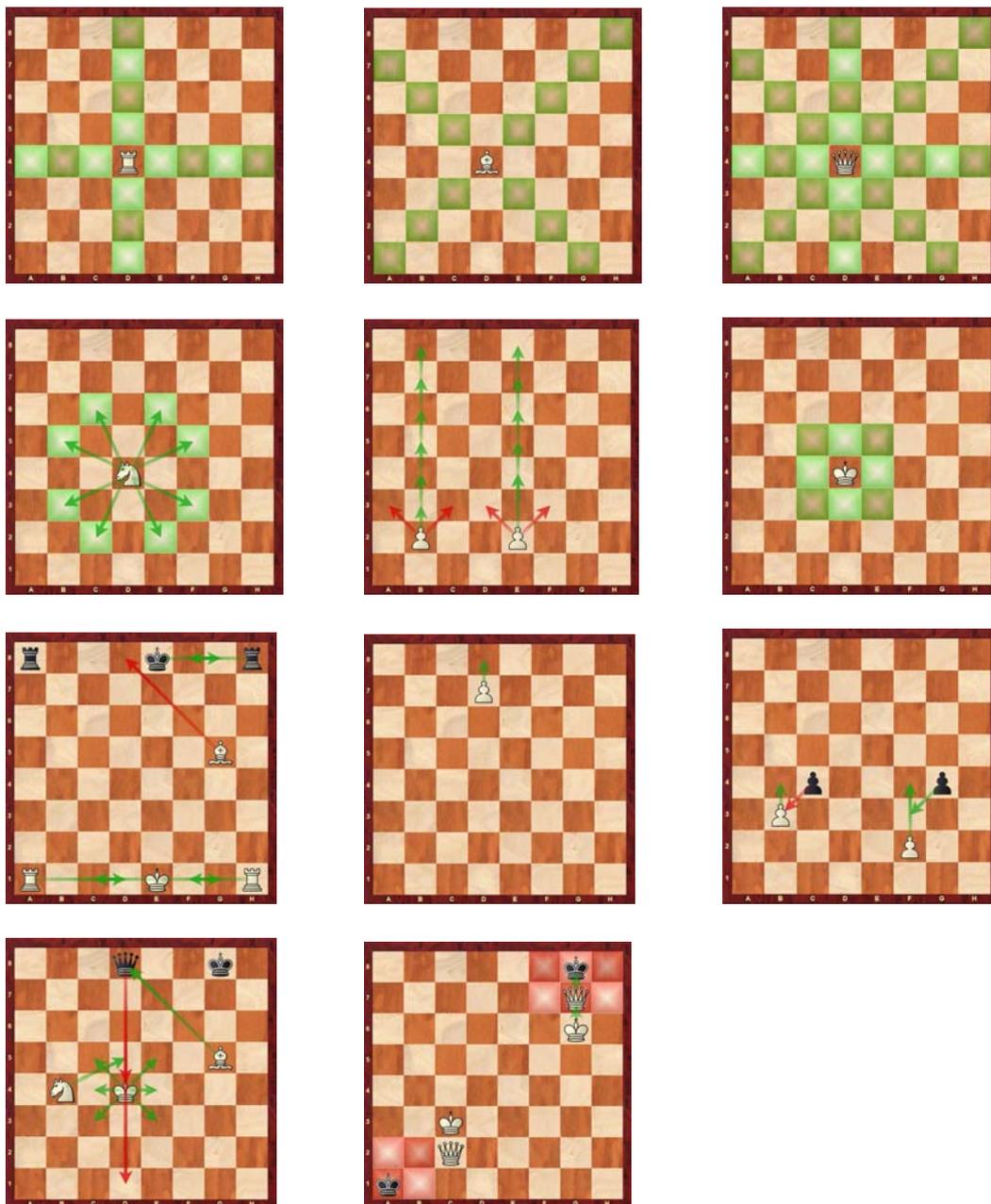


Figure 1. The nine-indicators method – summary.

### 8. Instruction for the task:

Before the beginning of the exercise pupils should know pawns, pieces, squares, files, ranks, diagonals and moves.



1. Pupil A moves on a chessboard – pupil B uses *Present Continuous*: He/she is playing from... to...
2. Pupil A moves on a chessboard – pupil B after a while uses *Simple Past*: He/she played from... to...
3. Pupil A moves on a chessboard – pupil B after a while uses *Present Perfect*: He/she played from... to...
4. Pupil A moves on a chessboard – pupil B uses the phrase: “XY should have been played”, and shows another move.

Variations: pupils use such words as castle, promotion, allowed, forbidden, etc.

Variations: Simple, Continuous, Perfect, Perfect Continuous.

Variations: passive forms.

### 9. Risks and recommendations:

Highly recommended, if the teachers are not in a hurry while pupils are solving tasks.  
The teachers should use brain-friendly strategies, mainly: “Let every pupil to be successful”.

### 10. References related to the task:

Jan Przewoźnik – Introduction to chess. [MATE file]

### 11. Pictures or online material related to the task:

Printed diagrams, computer screen or chess program.

### 12. Online materials related to resources and preparation of the task:

None.

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### 13. Elaborated by:

Jan Przewoźnik –  
University of Economics and Innovation in Lublin  
West Pomeranian School of Business in Szczecin.

### 14. Trainer's notes

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## TRAINING TASK – ENGLISH

- 1. Area:** Chess skills – moves and special moves. Related to chess.
- 2. Difficulty Level:** Medium.
- 3. Title of the task:** Defining and describing moves on a chessboard.
- 4. Purpose, aim and objectives of the task:**

At the end of the lesson the students will be able to:

– Know how do the pawns and pieces move on a chessboard – in English.

- 5. Materials and Instruments:**

Computer screen, projector or sheet of paper with printed diagram.

- 6. Expected timing:** 4 x 45 minutes.

- 7. Method:**

Presentation of the chess diagram and pieces:

- on a computer screen,
- through a projector,
- or on a paper sheet.

At this stage on the basis of a decision tree teacher should introduce several quantitative indicators of individual ways of solving problems on a chessboard: M, N, A, nn, Pmax, Pser, Dmax, T, W.

These indicators were introduced by Adriaan de Groot (Think and Choice in Chess, The Hague 1965) to analyze thinking aloud protocols. These indicators give many opportunities for the study of thinking (as was shown in Przewoźnik & Soszynski: How to think in Chess, Milford 2001).

#### Indicator M

M – denotes the number of all considered moves contained in the entire decision tree. This can be used to measure moves in chess and also to analyze expressions in other decision-making situations. This indicator allows us to distinguish between those individuals who seek more information for decision making and those who make decisions on the basis of a smaller amount of information.

#### Indicator N

N – denotes the total number of subsequent proposals to solve. This number may be a reflection of the subject's mentality type. A large value of N would be consistent with an empirical mentality type, the chess player who prefers a problem-solving approach based on the processing of large amounts of data, and the calculation and verification of a large number of multiple variants. In contrast, a relatively smaller value of N may be characteristic of the theoretical chess player type, whose thinking is less empirical and more deductive without giving specific variants. On the other hand, the value of N may be a function of the position on the chessboard, where the more complex a position is, the greater the value of N, because more variations need to be calculated. And a simple position may correspond to a smaller number of N.

#### Indicator A

A – denotes the set of alternative actions (candidate moves) considered by the subject, here understood as equal to the set of options in a decision-making process. It can be assumed that persons characterized by great fluency and versatility would consider many different solving propositions in the process of choosing moves. It may be that fluency of thought will be more closely correlated with the value of N, whereas versatility more closely with the value of A. As in the case of N, the value of A may depend on the situation on the board and not only on the individual traits of the chess player.

#### Indicator nn

nn – denotes the overall total number of successive changes in the solving propositions.

#### Indicator Pmax

Pmax – denotes the number of re-examined solving propositions. This value marks out all the proposals considered more than once.

#### Indicator Pser

Pser – denotes the number of times a solving proposition is re-considered, but only in the longest single series.

#### Indicator Dmax

Dmax – denotes the maximum length of calculated variations, the measured number of white and black moves. This value reveals how far ahead the subject is able to calculate variations, to what extent he is able to or wishes to foresee events as they unfold on the chessboard.

Indicator T

T – denotes the time to solve the exercise.

Indicator V

V – denotes the value of the solution, i.e. 1 or 0.

The indicators described above (M, N, A, nn, Pmax, Pser, Dmax, T, V) are summarised and visualized in Figure 1.

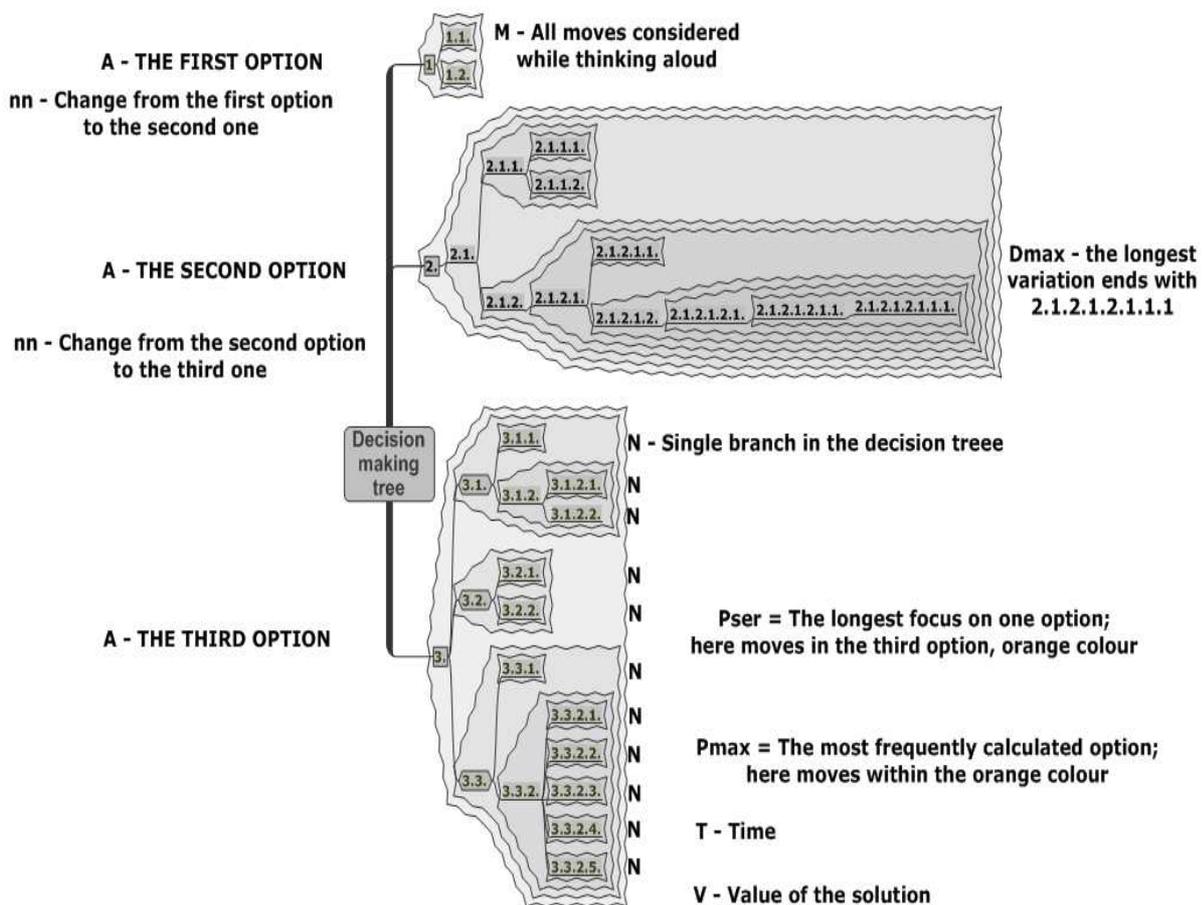
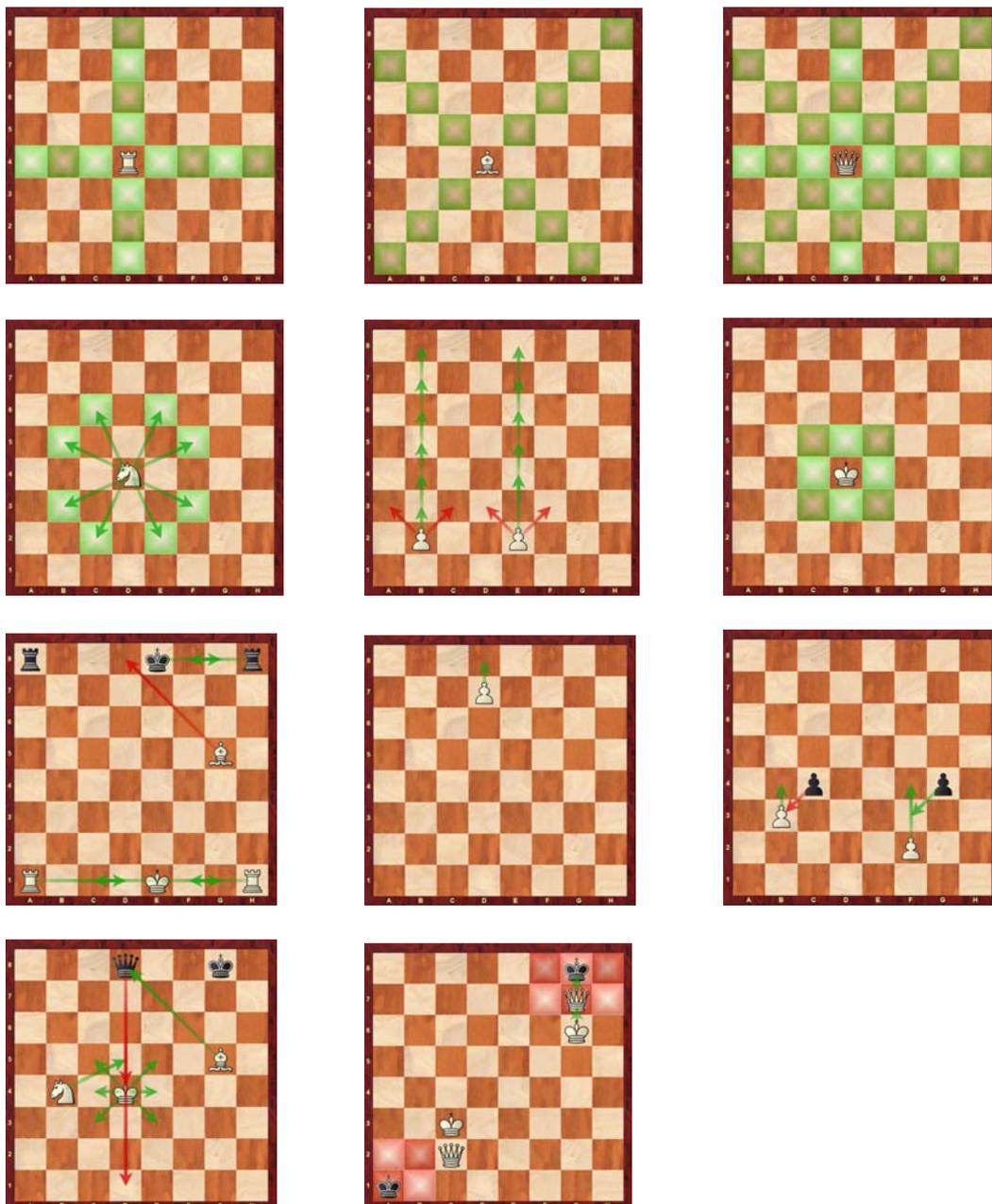


Figure 1. The nine-indicators method – summary.

### 8. Instruction for the task:

Before the beginning of the exercise pupils should know pawns, pieces, squares, files, ranks, diagonals. Teacher shows chess diagrams with pawns and pieces and shows how they are moving.



1. Pupils identify pawns and pieces and learn the phrases:  
I, you, we, you, they play on (and here pupils call the name of the target square)  
He/she plays on (and here pupil calls the name of the square)  
I, you, we, you, they play from (and here pupils call the name of the starting square) to (and here pupils call the name of the target square)  
He/she plays on (and here pupil calls the name of the square)  
He/she plays from (and here pupils call the name of the starting square) to (and here pupils call the name of the target square).
2. Pupils define special moves: castle, promotion, en passant, check, checkmate – in English.
3. Pupils define special word: check – in English.
4. Pupils define the goal of the game – checkmate – in English.

Teacher and pupils introduce other suitable English words or phrases, for example: I promote, check, checkmate, I play, I escape from d4 on..., etc.

### **9. Risks and recommendations:**

Highly recommended, if the teachers are not in a hurry while pupils are solving tasks.  
The teachers should use brain-friendly strategies, mainly: “Let every pupil to be successful”.

### **10. References related to the task:**

Jan Przewoźnik – Introduction to chess. [MATE file]

### **11. Pictures or online material related to the task:**

Printed diagrams, computer screen or chess program.

### **12. Online materials related to resources and preparation of the task:**

None.

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### 13. Elaborated by:

Jan Przewoźnik –  
University of Economics and Innovation in Lublin  
West Pomeranian School of Business in Szczecin.

### 14. Trainer's notes

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## TRAINING TASK – MATHEMATICS

- 1. Area:** Chess skills – moves. Related to chess.
- 2. Difficulty Level:** Easy.
- 3. Title of the task:** Defining and describing concepts: moves – geometry.
- 4. Purpose, aim and objectives of the task:**

At the end of the lesson the students will be able to:

- Move on a chessboard according to rules and train geometrical paths
- Train indicator Dmax from the Nine Indicators Method.

### 5. Materials and Instruments:

Computer screen, projector or sheet of paper with printed diagram.  
“Stars” prepared with paper or plastic.

### 6. Expected timing: 1 x 45 minutes.

### 7. Method:

Presentation of the chess diagram and pieces:

- on a computer screen,
- through a projector,
- or on a paper sheet.

At this stage on the basis of a decision tree teacher should introduce several quantitative indicators of individual ways of solving problems on a chessboard: M, N, A, nn, Pmax, Pser, Dmax, T, W.

These indicators were introduced by Adriaan de Groot (Think and Choice in Chess, The Hague 1965) to analyze thinking aloud protocols. These indicators give many opportunities for the study of thinking (as was shown in Przewoźnik & Soszynski: How to think in Chess, Milford 2001).

#### Indicator M

M – denotes the number of all considered moves contained in the entire decision tree. This can be used to measure moves in chess and also to analyze expressions in other decision-making situations. This indicator allows us to distinguish between those individuals who seek more information for decision making and those who make decisions on the basis of a smaller amount of information.

#### Indicator N

N – denotes the total number of subsequent proposals to solve. This number may be a reflection of the subject's mentality type. A large value of N would be consistent with an empirical mentality type, the chess player who prefers a problem-solving approach based on the processing of large amounts of data, and the calculation and verification of a large number of multiple variants. In contrast, a relatively smaller value of N may be characteristic of the theoretical chess player type, whose thinking is less empirical and more deductive without giving specific variants. On the other hand, the value of N may be a function of the position on the chessboard, where the more complex a position is, the greater the value of N, because more variations need to be calculated. And a simple position may correspond to a smaller number of N.

#### Indicator A

A – denotes the set of alternative actions (candidate moves) considered by the subject, here understood as equal to the set of options in a decision-making process. It can be assumed that persons characterized by great fluency and versatility would consider many different solving propositions in the process of choosing moves. It may be that fluency of thought will be more closely correlated with the value of N, whereas versatility more closely with the value of A. As in the case of N, the value of A may depend on the situation on the board and not only on the individual traits of the chess player.

#### Indicator nn

nn – denotes the overall total number of successive changes in the solving propositions.

#### Indicator Pmax

Pmax – denotes the number of re-examined solving propositions. This value marks out all the proposals considered more than once.

#### Indicator Pser

Pser – denotes the number of times a solving proposition is re-considered, but only in the longest single series.

#### Indicator Dmax

Dmax – denotes the maximum length of calculated variations, the measured number of white and black moves. This value reveals how far ahead the subject is able to calculate variations, to what extent he is able to or wishes to foresee events as they unfold on the chessboard.

Indicator T

T – denotes the time to solve the exercise.

Indicator V

V – denotes the value of the solution, i.e. 1 or 0.

The indicators described above (M, N, A, nn, Pmax, Pser, Dmax, T, V) are summarised and visualized in Figure 1.

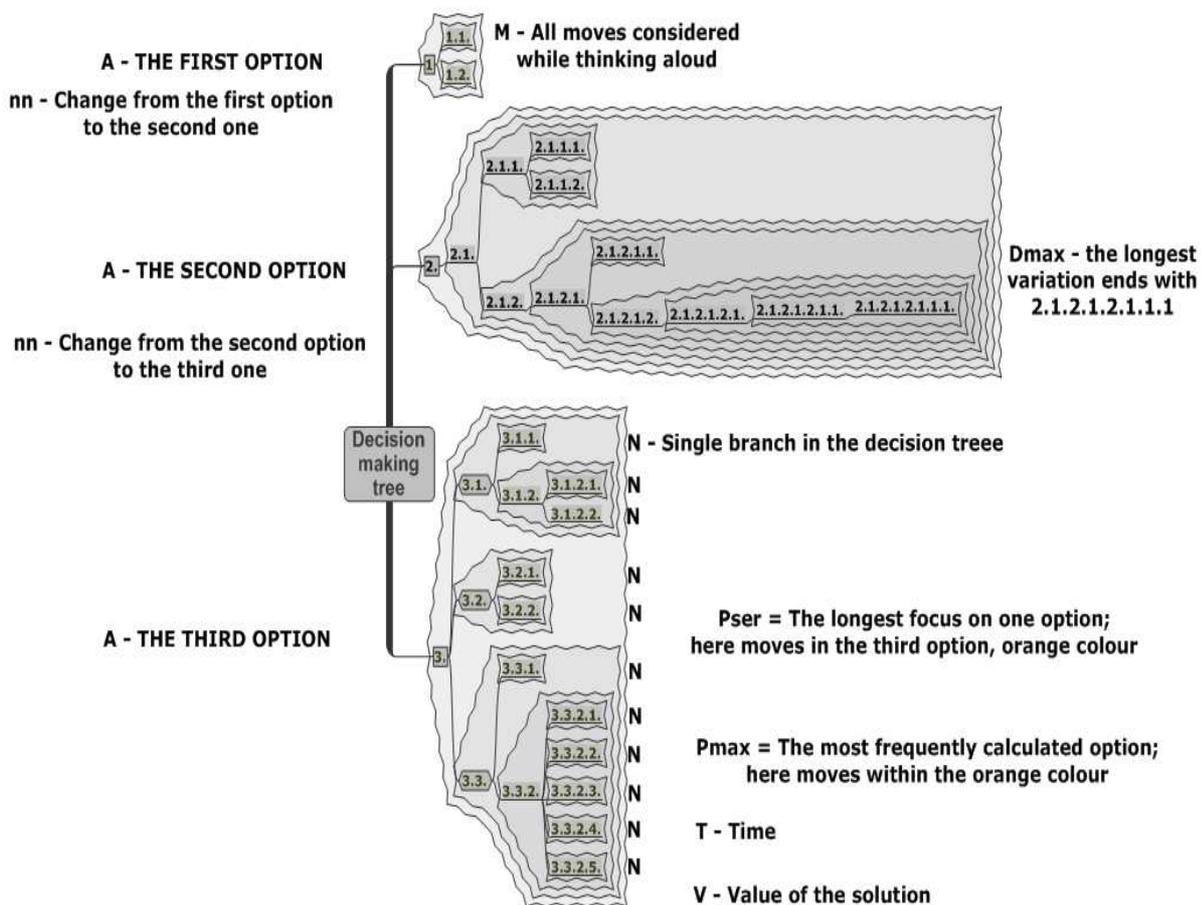
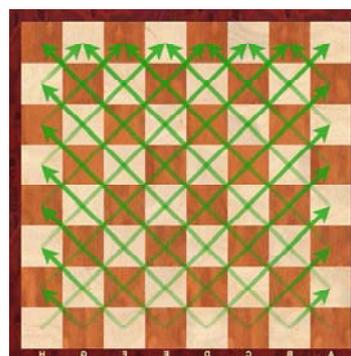
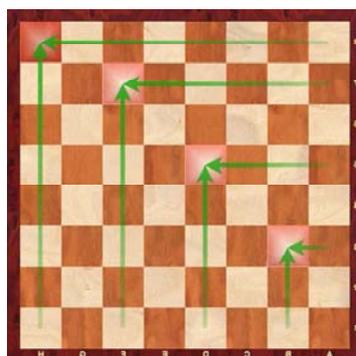


Figure 1. The nine-indicators method – summary.

## 8. Instruction for the task:

Before the beginning of the exercise knowledge about a chessboard (squares, files, ranks, pieces) and chess moves is required from the students.

Teacher shows chess diagrams with pawns and pieces.



1. Pupils identify pawns and pieces and learn the words (diagram 1):

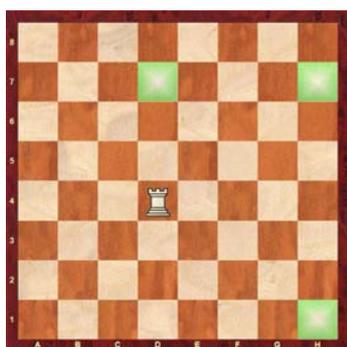
White  
Black  
King  
Queen  
Bishop  
Knight  
Rook  
Pawn  
Pawns

2. Pupils identify letters a-h and cyphers 1-8 and learn the names of the squares (coordinates on diagram 2): g3, e5, c7, a8.

3. Pupils identify letters a-h and cyphers 1-8 and learn the names of the diagonals (coordinates on diagram 3).

**4. The main geometrical task:** teacher puts a piece on a chessboard and a few “Stars” (paper or plastic; or graphic in computer mode). Students (pupils) should “collect” the “Stars” in the shortest way. Examples:

Rook:



Solution: Rd4 – d7 – h7 – h1.

The moves may be counted and pupil’s results compared.

The exercises is repeated with other pieces: Bishop, Queen, King, Pawn (pawns take along diagonals!). Example with solution:



Nd4 – e6 – g5 – h3.

**Teacher prepares his or her own routes! On this level 3-5 stars are recommended. Pay attention: The teachers may also add barriers on the routes, for example own pieces (cannot be taken), or squares attacked by opponent’s pieces (the squares must be omitted).**

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## 9. Risks and recommendations:

Highly recommended, if the teachers are not in a hurry while pupils are solving tasks.  
The teachers should use brain-friendly strategies, mainly: “Let every pupil to be successful”.

## 10. References related to the task:

Jan Przewoźnik – Introduction to chess. [MATE file]

## 11. Pictures or online material related to the task:

Printed diagrams, computer screen or chess program.  
Paper or plastic “Stars”.

## 12. Online materials related to resources and preparation of the task:

None.

## 13. Elaborated by:

Jan Przewoźnik –  
University of Economics and Innovation in Lublin  
West Pomeranian School of Business in Szczecin.

## 14. Trainer's notes

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## TRAINING TASK – MATHEMATICS

- 1. Area:** Chess skills – moves. Related to chess.
- 2. Difficulty Level:** High.
- 3. Title of the task:** Defining and describing concepts: moves – geometry.
- 4. Purpose, aim and objectives of the task:**

At the end of the lesson the students will be able to:

- Move on a chessboard according to rules and train geometrical paths
- Train indicator Dmax from the Nine Indicators Method.

### 5. Materials and Instruments:

Computer screen, projector or sheet of paper with printed diagram.  
“Stars” prepared with paper or plastic.

### 6. Expected timing: 2 x 45 minutes.

### 7. Method:

Presentation of the chess diagram and pieces:

- on a computer screen,
- through a projector,
- or on a paper sheet.

At this stage on the basis of a decision tree teacher should introduce several quantitative indicators of individual ways of solving problems on a chessboard: M, N, A, nn, Pmax, Pser, Dmax, T, W.

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Indicator T

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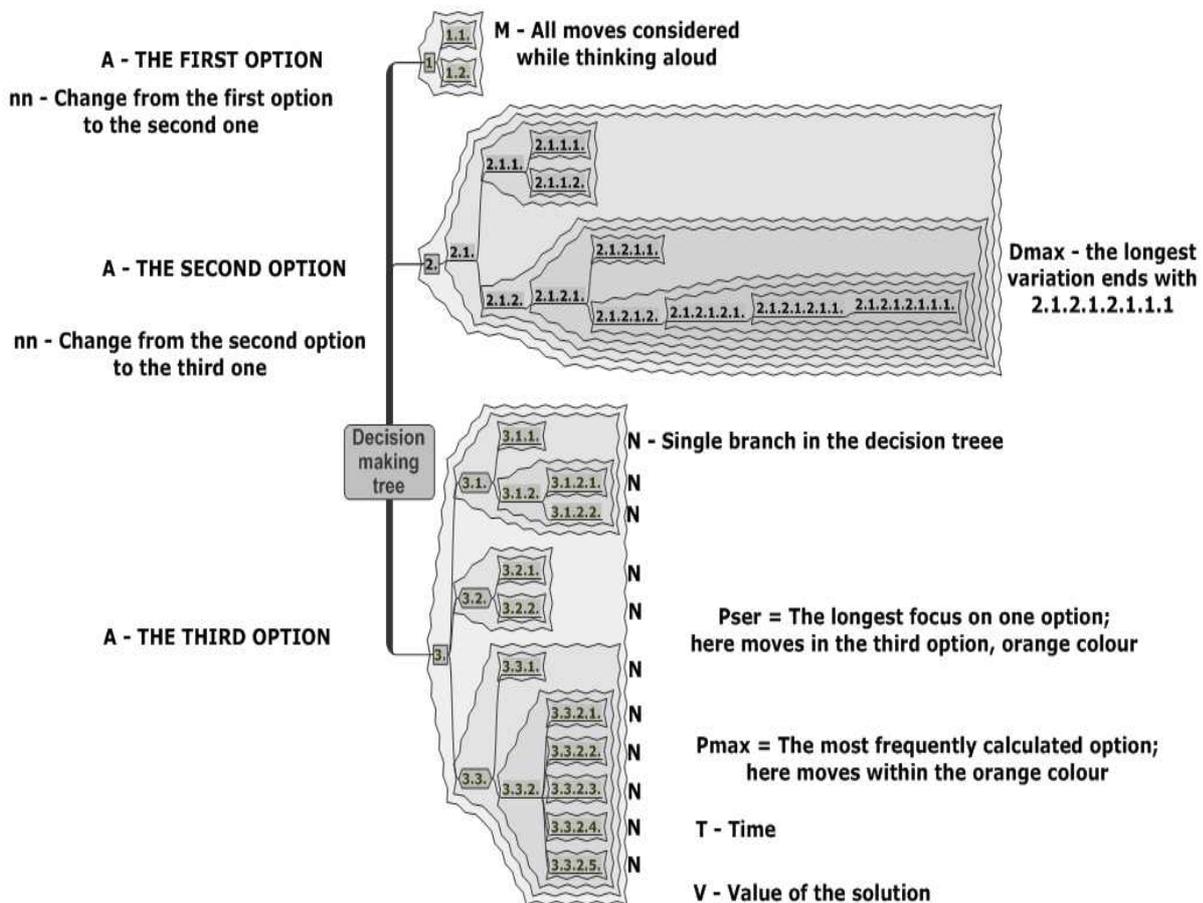
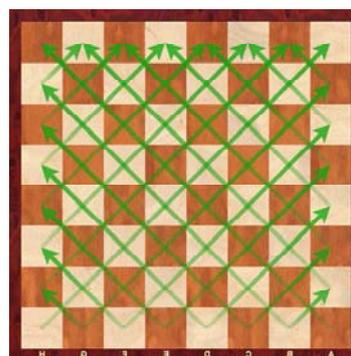
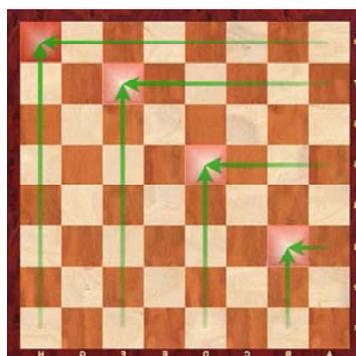


Figure 1. The nine-indicators method – summary.

## 8. Instruction for the task:

Before the beginning of the exercise knowledge about a chessboard (squares, files, ranks, pieces) and chess moves is required from the students.

Teacher shows chess diagrams with pawns and pieces.



1. Pupils identify pawns and pieces and learn the words (diagram 1):

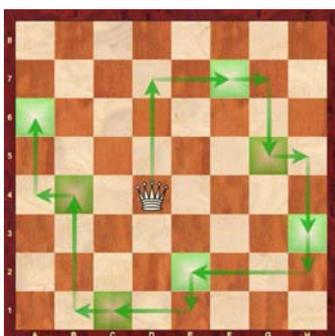
White  
Black  
King  
Queen  
Bishop  
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Rook  
Pawn  
Pawns

2. Pupils identify letters a-h and cyphers 1-8 and learn the names of the squares (coordinates on diagram 2): g3, e5, c7, a8.

3. Pupils identify letters a-h and cyphers 1-8 and learn the names of the diagonals (coordinates on diagram 3).

**4. The main geometrical task:** teacher puts a piece on a chessboard and more than 5 “Stars” (paper or plastic; or graphic in computer mode). Students (pupils) should “collect” the “Stars” in the shortest way. In relation to the former tasks (Easy and Medium), this time the stars are not direct on the rout. Examples:

Queen:



One of the solutions: Qd4 – d7 – f7 – g7 – g5 – h5 – h3 – h2 – e2 – e1 – c1 – b1 – b4 – a4 – a6.

The moves may be counted and pupil’s results compared.

The exercises may be repeated with other pieces: Rook, Bishop, Knight, King.

**Pay attention: The teachers may also add barriers on the routes, for example own pieces (cannot be taken), or squares attacked by opponent’s pieces (the squares must be omitted).**

**Teacher prepares his or her own routes! On this level 6-63 stars are recommended. Therefore this time the routes may be very creative!**

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## 9. Risks and recommendations:

Highly recommended, if the teachers are not in a hurry while pupils are solving tasks.  
The teachers should use brain-friendly strategies, mainly: “Let every pupil to be successful”.

## 10. References related to the task:

Jan Przewoźnik – Introduction to chess. [MATE file]

## 11. Pictures or online material related to the task:

Printed diagrams, computer screen or chess program.  
Paper or plastic “Stars”.

## 12. Online materials related to resources and preparation of the task:

None.

## 13. Elaborated by:

Jan Przewoźnik –  
University of Economics and Innovation in Lublin  
West Pomeranian School of Business in Szczecin.

## 14. Trainer's notes

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## TRAINING TASK – MATHEMATICS

- 1. Area:** Chess skills – moves. Related to chess.
- 2. Difficulty Level:** Medium.
- 3. Title of the task:** Defining and describing concepts: moves – geometry.
- 4. Purpose, aim and objectives of the task:**

At the end of the lesson the students will be able to:

- Move on a chessboard according to rules and train geometrical paths
- Train indicator Dmax from the Nine Indicators Method.

### 5. Materials and Instruments:

Computer screen, projector or sheet of paper with printed diagram.  
“Stars” prepared with paper or plastic.

### 6. Expected timing: 2 x 45 minutes.

### 7. Method:

Presentation of the chess diagram and pieces:

- on a computer screen,
- through a projector,
- or on a paper sheet.

At this stage on the basis of a decision tree teacher should introduce several quantitative indicators of individual ways of solving problems on a chessboard: M, N, A, nn, Pmax, Pser, Dmax, T, W.

These indicators were introduced by Adriaan de Groot (Think and Choice in Chess, The Hague 1965) to analyze thinking aloud protocols. These indicators give many opportunities for the study of thinking (as was shown in Przewoźnik & Soszynski: How to think in Chess, Milford 2001).

#### Indicator M

M – denotes the number of all considered moves contained in the entire decision tree. This can be used to measure moves in chess and also to analyze expressions in other decision-making situations. This indicator allows us to distinguish between those individuals who seek more information for decision making and those who make decisions on the basis of a smaller amount of information.

#### Indicator N

N – denotes the total number of subsequent proposals to solve. This number may be a reflection of the subject's mentality type. A large value of N would be consistent with an empirical mentality type, the chess player who prefers a problem-solving approach based on the processing of large amounts of data, and the calculation and verification of a large number of multiple variants. In contrast, a relatively smaller value of N may be characteristic of the theoretical chess player type, whose thinking is less empirical and more deductive without giving specific variants. On the other hand, the value of N may be a function of the position on the chessboard, where the more complex a position is, the greater the value of N, because more variations need to be calculated. And a simple position may correspond to a smaller number of N.

#### Indicator A

A – denotes the set of alternative actions (candidate moves) considered by the subject, here understood as equal to the set of options in a decision-making process. It can be assumed that persons characterized by great fluency and versatility would consider many different solving propositions in the process of choosing moves. It may be that fluency of thought will be more closely correlated with the value of N, whereas versatility more closely with the value of A. As in the case of N, the value of A may depend on the situation on the board and not only on the individual traits of the chess player.

#### Indicator nn

nn – denotes the overall total number of successive changes in the solving propositions.

#### Indicator Pmax

Pmax – denotes the number of re-examined solving propositions. This value marks out all the proposals considered more than once.

#### Indicator Pser

Pser – denotes the number of times a solving proposition is re-considered, but only in the longest single series.

#### Indicator Dmax

Dmax – denotes the maximum length of calculated variations, the measured number of white and black moves. This value reveals how far ahead the subject is able to calculate variations, to what extent he is able to or wishes to foresee events as they unfold on the chessboard.

Indicator T

T – denotes the time to solve the exercise.

Indicator V

V – denotes the value of the solution, i.e. 1 or 0.

The indicators described above (M, N, A, nn, Pmax, Pser, Dmax, T, V) are summarised and visualized in Figure 1.

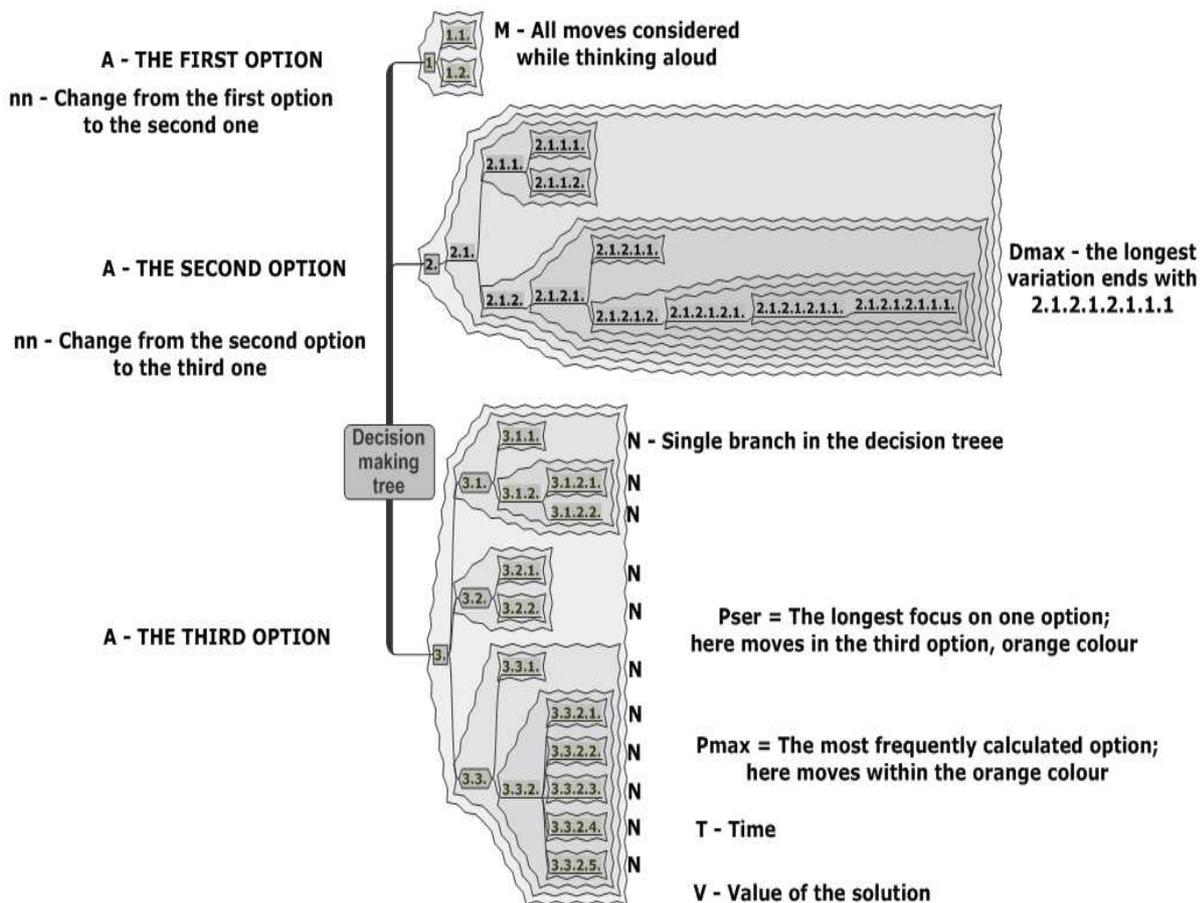
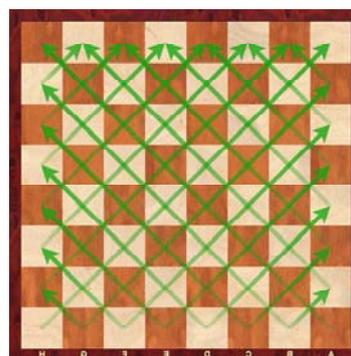
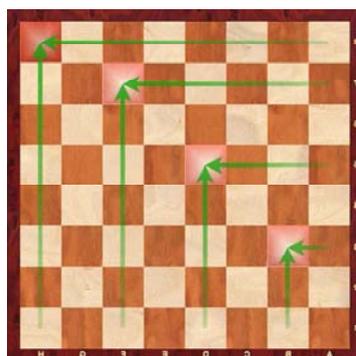


Figure 1. The nine-indicators method – summary.

## 8. Instruction for the task:

Before the beginning of the exercise knowledge about a chessboard (squares, files, ranks, pieces) and chess moves is required from the students.

Teacher shows chess diagrams with pawns and pieces.



1. Pupils identify pawns and pieces and learn the words (diagram 1):

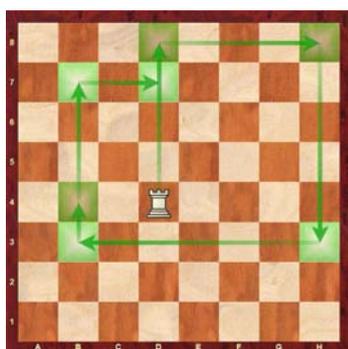
White  
Black  
King  
Queen  
Bishop  
Knight  
Rook  
Pawn  
Pawns

2. Pupils identify letters a-h and cyphers 1-8 and learn the names of the squares (coordinates on diagram 2): g3, e5, c7, a8.

3. Pupils identify letters a-h and cyphers 1-8 and learn the names of the diagonals (coordinates on diagram 3).

**4. The main geometrical task:** teacher puts a piece on a chessboard and a few “Stars” (paper or plastic; or graphic in computer mode). Students (pupils) should “collect” the “Stars” in the shortest way. Examples:

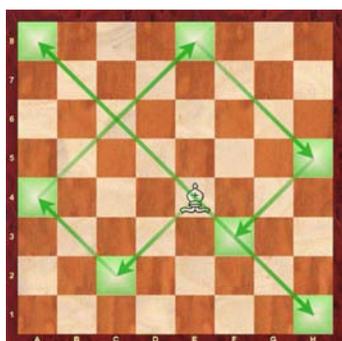
Rook:



Solution: Rd4 – d8 – h8 – h3 – b3 – b7 – d7.

The moves may be counted and pupil’s results compared.

The exercises is repeated with other pieces: Bishop, Queen, King, Pawn (pawns take along diagonals!). Example with solution:



Be4 – c2 – a4 – e8 – h5 – f3 – a1 – h8.

**Teacher prepares his or her own routes! On this level 6-63 stars are recommended. Therefore this time the routes may be very creative!**

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