## Puzzle Contrast



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Designed by Serhiy and Peter Gabarchuk, made by D. Namdarian, 2012.
(3 layers of laser cut plastic, $2.5 " \times 3+1 / 8^{\prime \prime} \times 5 / 16^{\prime \prime}$, with directions that show two problems)
Here are 26 rectilinear ( 28 straight-line) moves and 20 rectilinear ( 22 straight-line) moves solutions for the two problems, as well as a 24 rectilinear ( 24 straight-line) move solution to go between the two solved positions ( 24 rectilinear moves, using 26 straight-line moves, suffices if X and Y are exchanged):

| $\begin{array}{lllll}\text { A } & \text { A } & \text { B } & \mathrm{B} \\ \mathrm{X} & & & Y \\ \text { C } & \text { C } & \mathrm{D} & \mathrm{D}\end{array}$ | $\begin{array}{cccc} \text { A } & \text { A } & B & B \\ & & X & Y \\ \text { C } & \text { C } & D & D \end{array}$ | $\begin{array}{lllll} & & & & B \\ & B \\ \text { A } & \text { A } & \mathrm{X} & \mathrm{Y} \\ \text { C } & \mathrm{C} & \mathrm{D} & \mathrm{D}\end{array}$ | $\begin{array}{llll}\text { B } & \text { B } & & \\ \text { A } & \text { A } & X & Y \\ \text { C } & \text { C } & \text { D } & \text { D }\end{array}$ | $\begin{array}{llll}\text { B } & \text { B } & & \text { X } \\ \text { A } & \text { A } & & Y \\ \text { C } & \text { C } & \text { D } & \text { D }\end{array}$ | $\begin{array}{llll}\text { B } & \text { B } & Y & X \\ A & A & & \\ \text { C } & C & D & D\end{array}$ | $\begin{array}{llll}\text { B } & \text { B } & Y & X \\ \text { A } & \text { A } & \text { D } & \text { D } \\ \text { C } & \text { C } & & \end{array}$ | $\begin{array}{llll}\text { B } & \text { B } & Y & X \\ \text { A } & \text { A } & \text { D } & \text { D } \\ & & C & C\end{array}$ | $\begin{array}{cccc}\text { B } & B & Y & X \\ & & D & D \\ A & A & C & C\end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{array}{llll} \text { B } & \text { B } & Y & X \\ \text { D } & \text { D } & & \\ \text { A } & \text { A } & \text { C } & \text { C } \end{array}$ | $\begin{array}{llll} \hline \text { B } & \text { B } & Y & \\ \text { D } & \text { D } & & X \\ \text { A } & \text { A } & \text { C } & \text { C } \end{array}$ | $\begin{array}{llll} \mathrm{B} & \mathrm{~B} & & \\ \text { D } & \text { D } & \mathrm{Y} & \mathrm{X} \\ \text { A } & \text { A } & \text { C } & \text { C } \end{array}$ | $\begin{array}{llll}  & & & B \\ & B \\ D & D & Y & X \\ \text { A } & \text { A } & \text { C } & \text { C } \end{array}$ | $\begin{array}{llll} \hline \text { D } & \text { D } & B & B \\ & & Y & X \\ \text { A } & \text { A } & \text { C } & \text { C } \end{array}$ | $\begin{array}{cccc}\text { D } & D & B & B \\ A & A & Y & X \\ & & & C \\ C\end{array}$ | $\begin{array}{llll} \mathrm{D} & \mathrm{D} & \mathrm{~B} & \mathrm{~B} \\ \mathrm{~A} & \mathrm{~A} & \mathrm{Y} & \mathrm{X} \\ \mathrm{C} & \mathrm{C} & & \end{array}$ | $\begin{array}{llll} \hline D & D & B & B \\ A & A & Y & \\ C & C & & X \end{array}$ | $\begin{array}{llll} \hline D & D & B & B \\ A & A & & \\ C & C & Y & X \end{array}$ |
| $\begin{array}{llll} \hline D & D & B & B \\ & & A & A \\ C & C & Y & X \\ \hline \end{array}$ | $\begin{array}{lllll} & & & B & B \\ D & D & A & A \\ C & C & Y & X\end{array}$ | $\begin{array}{lllll}\text { B } & B & & & \\ D & D & A & A \\ C & C & Y & X\end{array}$ | $\begin{array}{lllll}\text { B } & B & A & A \\ D & D & & \\ \text { C } & C & Y & & X\end{array}$ | $\begin{array}{lllll}\text { B } & \text { B } & \text { A } & A \\ \text { D } & \text { D } & & & X \\ \text { C } & \text { C } & Y & \end{array}$ | $\begin{array}{llll}\text { B } & \text { B } & A & A \\ \text { D } & \text { D } & Y & X \\ \text { C } & C & & \end{array}$ | $\begin{array}{llll}\text { B } & \text { B } & \text { A } & \text { A } \\ \text { D } & \text { D } & \mathrm{Y} & \mathrm{X} \\ & & & C \\ & & & \end{array}$ | $\begin{array}{cccc}\text { B } & \text { B } & A & A \\ & & Y & X \\ \text { D } & \text { D } & C & C\end{array}$ | $\begin{array}{lllll}\text { B } & \text { B } & \text { A } & \text { A } \\ \mathrm{Y} & & & \\ \text { D } & \text { D } & \text { C } & \mathrm{C}\end{array}$ |


| A | A | B | B | A | A | B | B |  |  | B | B | B | B |  |  | B | B | X | B | B | Y | X | B | B | Y | X |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| X |  |  | Y |  |  | X | Y | A | A | X | Y | A | A | X | Y | A | A |  | Y | A | A |  |  | A | A | D | D |
| C | C | D | D | C | C | D | D | C | C | D | D | C | C | D | D | C | C | D | D | C | C | D | D | C | C |  |  |
| B | B | Y | X | B | B | Y | X |  |  | Y | X | Y |  |  | X | Y | X |  |  | Y | X | D | D | Y | X | D | D |
| A | A | D | D |  |  | D | D | B | B | D | D | B | B | D | D | B | B | D | D | B | B |  |  | B | B | C | C |
|  | C | C | A | A | C | C | A | A | C | C | A | A | C | C | A | A | C | C | A | A | C | C | A | A |  |  |  |
| Y | X | D | D | Y | X | D | D | Y |  | D | D |  |  | D | D | D | D |  |  | D | D | C | C | D | D | C | C |
| B | B | C | C |  |  | C | C |  | X | C | C | Y | X | C | C | Y | X | C | C | Y | X |  |  | Y |  |  | X |
|  |  | A | A | B | B | A | A | B | B | A | A | B | B | A | A | B | B | A | A | B | B | A | A | B | B | A | A |


| B B A A <br> $Y$    <br> D D C C | $\begin{array}{llll}B & B & A & A \\ Y & X & & \\ D & D & C & C\end{array}$ | $\begin{array}{llll}B & B & & \\ Y & X & A & A \\ D & D & C & C\end{array}$ | $\begin{array}{lllll} & & & B & B \\ Y & X & A & A \\ D & D & C & C\end{array}$ | $\begin{array}{lllll} & \\ & X & B & B \\ Y & & A & A \\ \text { D } & D & C & C\end{array}$ | $\begin{array}{lllll}Y & X & B & B \\ & & A & A \\ D & D & C & C\end{array}$ | $\begin{array}{llll}Y & X & B & B \\ A & A & & \\ \text { D } & D & C & C\end{array}$ | $\begin{array}{llll}Y & X & B & B \\ A & A & C & C \\ D & D & & \end{array}$ | $\begin{array}{cccc}Y & X & B & B \\ A & A & C & C \\ & & D & D\end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{array}{llll} \hline Y & X & B & B \\ & & C & C \\ A & A & D & D \\ \hline \end{array}$ | $\begin{array}{llll}Y & X & B & B \\ C & C & & \\ A & A & D & D\end{array}$ | $\begin{array}{lllll}Y & X & & \\ C & C & B & B \\ A & A & D & D\end{array}$ | $\begin{array}{lllll}\text { Y } & & & & X \\ C & C & B & B \\ \text { A } & \text { A } & \text { D } & \text { D }\end{array}$ | $\begin{array}{ccccc} & & & Y & X \\ \text { C } & \text { C } & \text { B } & \text { B } \\ \text { A } & \text { A } & \text { D } & \text { D }\end{array}$ | $\begin{array}{ccccc}\text { C } & \text { C } & Y & X \\ & & B & B \\ \text { A } & \text { A } & \text { D } & D\end{array}$ | $\begin{array}{lllll}\text { C } & \text { C } & Y & X \\ B & B & & \\ \text { A } & \text { A } & \text { D } & D\end{array}$ | $\begin{array}{llll}\text { C } & \text { C } & Y & X \\ \text { B } & \text { B } & \mathrm{D} & \mathrm{D} \\ \text { A } & \text { A } & & \end{array}$ | $\begin{array}{llll}\text { C } & \text { C } & Y & X \\ \text { B } & \text { B } & \text { D } & \text { D } \\ & & \text { A } & \text { A }\end{array}$ |
| $\begin{array}{lllll}\text { C } & \text { C } & Y & X \\ & & & D & D \\ \text { B } & \text { B } & \text { A } & \text { A }\end{array}$ | $\begin{array}{lllll}\text { C } & \text { C } & Y & X \\ \text { D } & \text { D } & & \\ \text { B } & \text { B } & \text { A } & \text { A }\end{array}$ | $\begin{array}{lllll}\text { C } & \text { C } & Y & \\ \text { D } & \text { D } & & & X \\ \text { B } & \text { B } & \text { A } & \text { A }\end{array}$ | $\begin{array}{lllll}\text { C } & \text { C } & & \\ \text { D } & \text { D } & \mathrm{Y} & \mathrm{X} \\ \text { B } & \text { B } & \text { A } & \text { A }\end{array}$ | $\begin{array}{lllll} & & & C & C \\ D & D & Y & X \\ \text { B } & \text { B } & \text { A } & \text { A }\end{array}$ | $\begin{array}{llll} \text { D } & \text { D } & \text { C } & \text { C } \\ & & Y & X \\ \text { B } & \text { B } & \text { A } & \text { A } \end{array}$ | $\begin{array}{lllll}\text { D } & \text { D } & \text { C } & \text { C } \\ \mathrm{Y} & & & \\ \text { B } & \text { B } & \text { A } & \text { A }\end{array}$ |  |  |

