



GeoGenius

VISUALISATION KIT

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www.GeoGenius.co.za

GeoGenius

Visualisation

Kit

INSTRUCTION GUIDE

Visualisation processes are very important in the development of geometrical understanding. Given the limitations of print we most often experience three dimensional objects (3D) through two dimensional (2D) representations both in school mathematics and in general. This kit has been created to assist children in developing their visualisation skills by gaining experience in looking at objects from different perspectives (views) so that over time they will be more confident in interpreting 2D representations of 3D objects.

In the visualisation activities of this kit four players work together to construct a 3D arrangement of blocks where each player only has information about one view of the arrangement. This is in essence a co-operative activity, but a competitive edge can easily be added by setting up the activity as a timed task, or having two or more groups of children compete to see who can complete the activity first. As the level of complexity increases, so does the co-operation needed within groups.

THE VISUALISATION KIT

Depending on which version of the kit you have purchased, your kit will contain either enough materials for one group of four players to work together at a time (single game set) or enough materials for up to four groups of four or more to work together (the classroom set).

TO PLAY THE GAME PLAYERS NEED

- A set of viewing cards [Figure A]
There are 36 sets of cards supplied with the kit. More card sets can be downloaded from the GeoGenius website in the form of pages to be printed (www.GeoGenius.co.za). Card sets can also be purchased – see the Visualisation Kit order form on the GeoGenius website. The cards are graded in terms of difficulty (with set 1 of each level being the easiest set and then progressing from there). Each set of cards consists of four cards labelled A, B, C and D
- 7 different coloured blocks [Figure B]
- A visualisation grid [Figure C]
- A pad of blank cards [Figure D]

FIGURE A

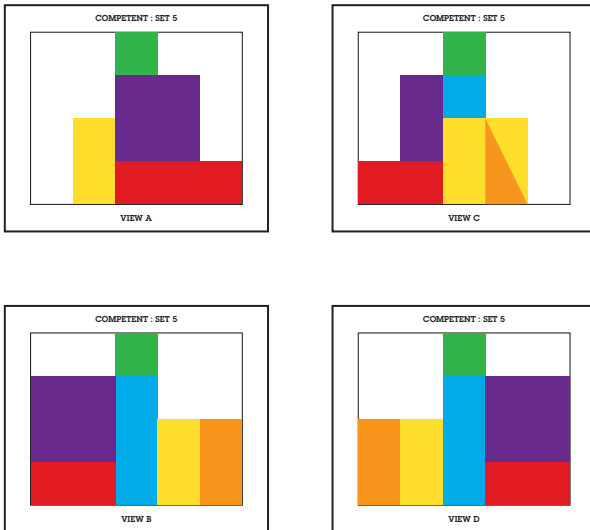


FIGURE B

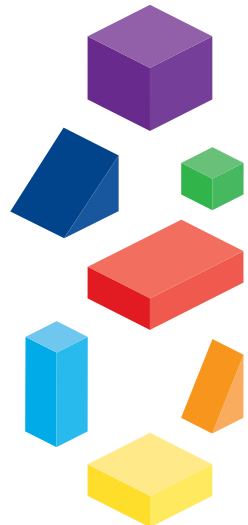


FIGURE C

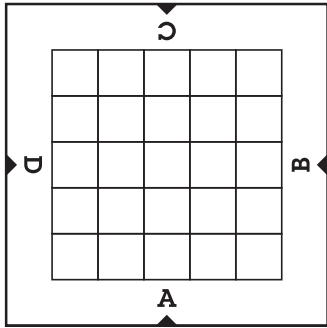
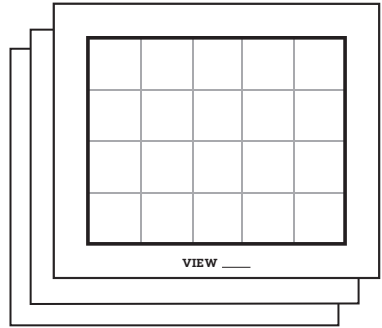
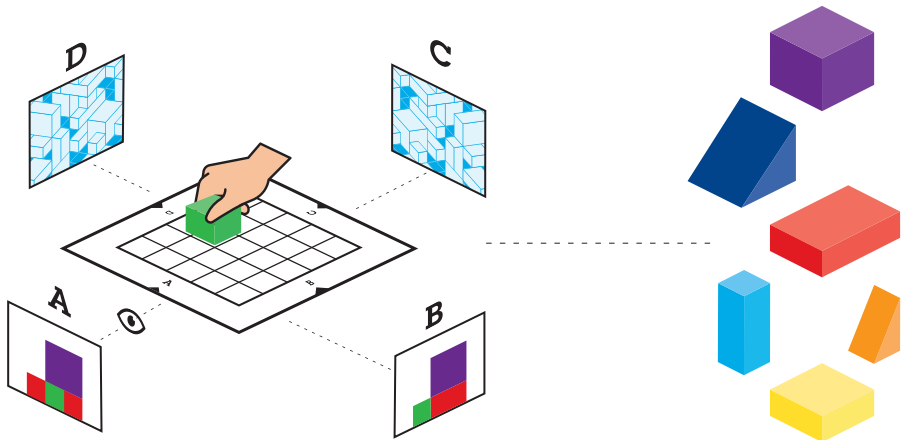


FIGURE D



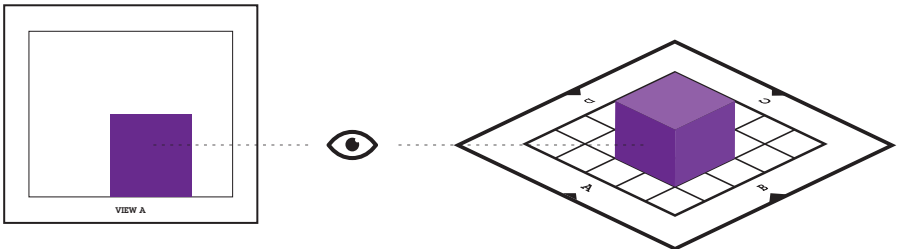
PLAYING THE GAME

- The visualisation grid is placed in the middle of the table.
- Four players (A, B, C and D) sit around the table, each facing the grid from their point of view (perspective).
- One set of cards is selected and shared out. Each player receives the card that corresponds to their view (A, B, C or D). Players should only look at their own cards.
- By selecting the blocks they need, the players work together to place the blocks on the grid to make the arrangement on the cards. The players have completed the task when each player is satisfied that the arrangement looks correct from their point of view (perspective).



NOTES ON PLAYING THE GAME

- Each card shows a 2D side view of the arrangement of the blocks. As players play the game, it is hard for them not to see the arrangement from the top. At first players (especially younger players) get distracted by this. It can help these players to put the grid on a box on top of the table enabling the players to look at the grid from the side and at eye level.



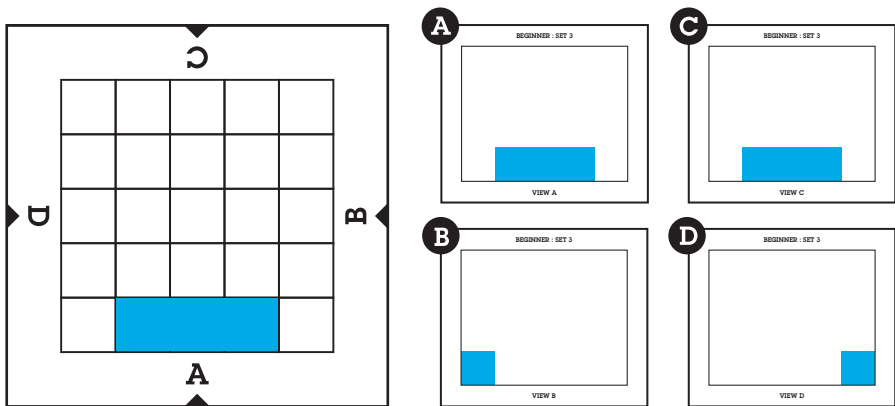
- Not only does playing this game develop visualisation skills, but it also helps players to develop social skills. The game is easier to play if players take turns. One player places blocks on the grid in such a way that their view of the grid is the same as on their card. The rest of the players then take turns to adjust, replace or add more blocks so that each player's view also corresponds with what they see on their card.
- It is important for players to realise that the viewing cards have been drawn to scale.
- It is also important for players to realise that because they can only see the final arrangement of blocks from the side, they cannot interpret how far forward or how far away the blocks are from them.
- Remember that the game can be played over and over again with players taking up different views. Also, given the importance of the skills that players are developing, repeating the game with the same set of cards helps players increase their confidence.

DEVELOPING CONFIDENCE WITH THE VISUALISATION KIT

The 36 sets of cards are graded in terms of difficulty (with set 1 of each level being the easiest and progressing from there). When used as a classroom activity the teacher should choose a set of cards that is appropriate for the age, confidence and experience (with the kit) of the players. When played at home, players should choose sets of cards that they find challenging, but not frustrating and progress from there as they gain confidence.

BEGINNER (CARD SETS 1 - 6)

At the beginner stage the cards typically involve only one block. Players gain confidence in choosing the correct block and placing it in the correct position with appropriate spacing from the sides.

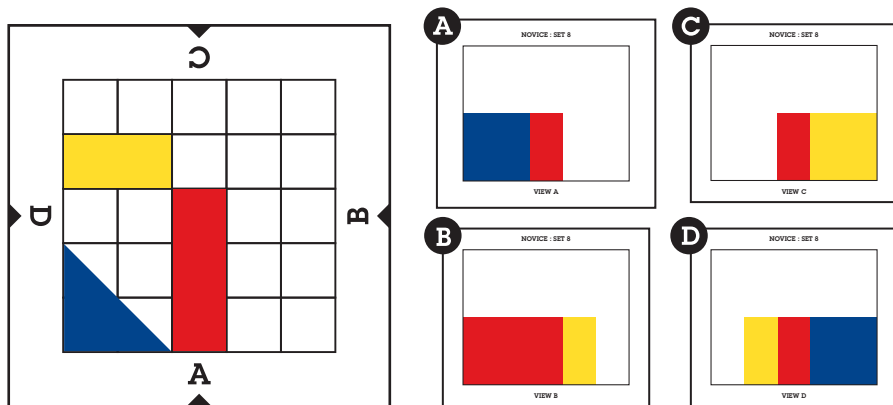


DISCUSSION

The viewing cards represent how the block is placed on the grid according to a particular view. In set 3 (illustrated here) only the blue block is used. Two of the players see a long side and the other two see the shorter side. While one player sees the block on the left hand side of the grid (Player B), the opposite player (D) sees the block on the right of their grid. For Players A and C, the block is moved away from the edges and is exactly in the middle. The solution to set 3 is illustrated with the view from above.

NOVICE (CARD SETS 1 - 10)

At the novice stage the cards typically involve a few blocks (two to three blocks). Players gain confidence in choosing the correct blocks and placing them in the correct position with appropriate spacing from the sides as well as in the correct sequence (in front and behind) with regard to each other.

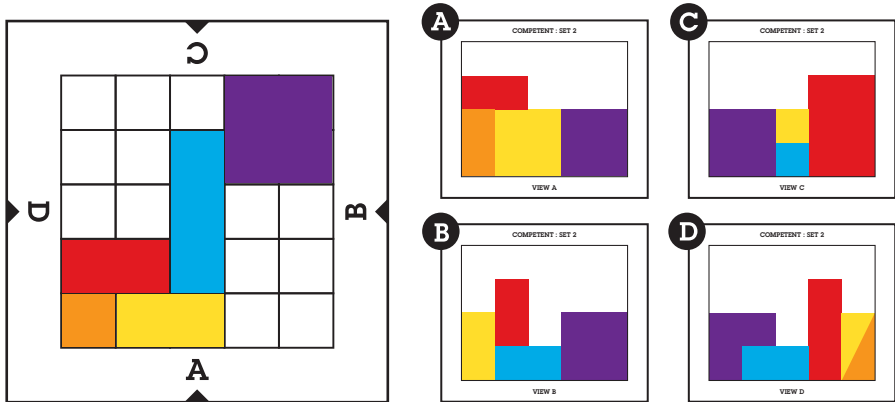


DISCUSSION

With the novice cards players have to gain comfort with the fact that not all of each block is visible to them. The possibility exists that a block which is visible to some players is completely invisible to one or more of the other players. Also note how in the illustration, the triangular block (prism) actually looks like a rectangle to all the players that can see it.

COMPETENT (CARD SETS 1 - 8)

At the competent stage the cards typically involve an increased number of blocks (four to seven blocks). Players will need to apply the experience and confidence gained in the previous levels. Now, with an increased number of blocks, players choose the correct blocks and place them in the correct position with appropriate spacing from the sides as well as in the correct sequence (in front and behind) with regard to each other.

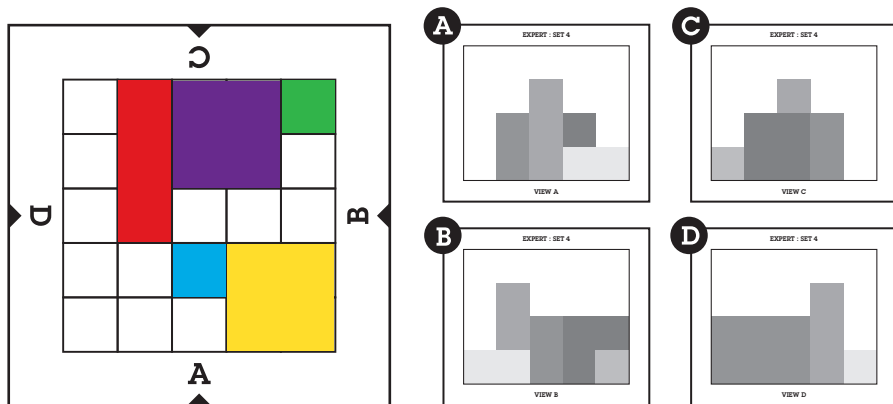


DISCUSSION

As with the easier cards players have to gain comfort with the fact that not all of each block is visible to them. The possibility exists that a block which is visible to some players is completely invisible to one or more of the other players. The orange triangular block (prism) in the illustration highlights one of the lessons players need to learn. While it looks like a triangle to player D, it looks like a rectangle to player A. Players need to gain comfort that from some points of view a triangular block (prism) may look like a rectangle.

EXPERT: GREYSCALE (CARD SETS 1 - 6)

At the expert stage the cards involve a range of blocks (two to seven blocks). The view cards are, however coloured grey. Although the different views are in shades of grey, the edges of the blocks are still visible. The sets start with viewing cards that involve only two or three blocks, as fewer blocks will be easier than more blocks. As players gain experience and confidence working with the two block greyscale view cards, they can progress to the three block view cards and so on, until they are confidently arranging the seven block greyscale view cards. As with the colour card sets, the blocks will still need to be arranged as before: choose the blocks and place them in the correct position with appropriate spacing from the sides as well as in the correct sequence (in front and behind) with regard to each other. Because the colours of the blocks are not shown on the view cards, there will now be situations where more than one solution is possible. In other words the arrangement can be completed using different combinations of blocks

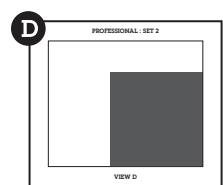
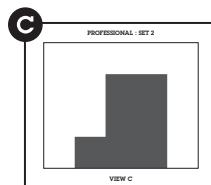
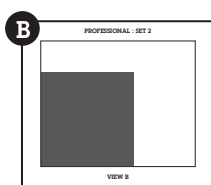
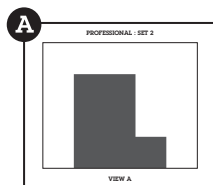
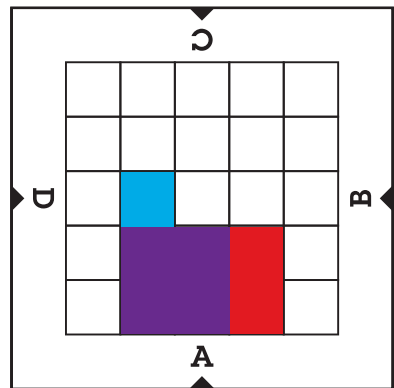
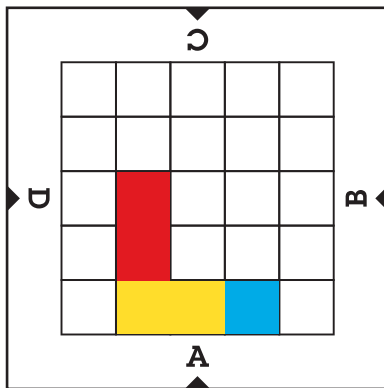


DISCUSSION

Now that the players are comfortable with the fact that not all of each block is visible to them and the possibility that a block which is visible to some players is completely invisible to one or more of the other players, they need to gain experience and confidence working without the support of colour. The return to two block viewing cards, before moving onto the more complex cards is intended to give the players the opportunity to work with the greyscale view card at an already mastered level. Once again the introduction of the two triangular blocks (prisms) at this level again, present an interesting challenge and some of the card sets have more than one solution.

PROFESSIONAL: BLACK SILHOUETTE, EDGES NOT VISIBLE (SETS 1 - 6)

At the professional stage the cards involve same range of blocks (two to seven), however the challenge has now increased significantly because the arrangement is seen as a silhouette on the view cards. The edges of the blocks are also not visible. The same arrangement rules apply as before, but there will be situations where more than one solution is possible. The example below clearly illustrates two different solutions for the same silhouette.

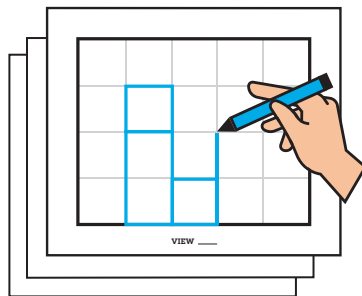
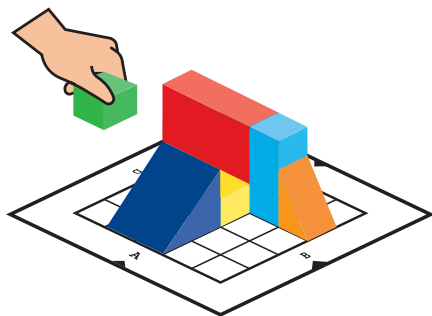


DISCUSSION

This activity requires the children to draw on previous experience in arranging the blocks with the greyscale view cards as their reference. They will now need to gain experience and confidence working without the support of colour, and without the edges of the blocks to guide them. The return to viewing cards with two or three blocks, before moving onto the more complex cards is intended to give the players the opportunity to work with the silhouette view card at an already mastered level. There is an increased level of ambiguity regarding the solutions as they have limited information with which to work. Situations may arise where there is more than one solution, as in the example above. There may also be situations when a different number of blocks can achieve the same silhouette for example, there may be cases where a certain 2 block arrangement can also be created using 3 blocks.

MAKING YOUR OWN CARDS: BLANK VIEW CARD TEMPLATES

In this activity players place a set of blocks on the grid to make an arrangement and then draw the corresponding view cards. Next they challenge other players to build the arrangement of blocks for their cards. Players should gain confidence in placing the blocks and drawing the corresponding views, with a smaller number of blocks before progressing to more complex views using more blocks, with hidden and stacked views.



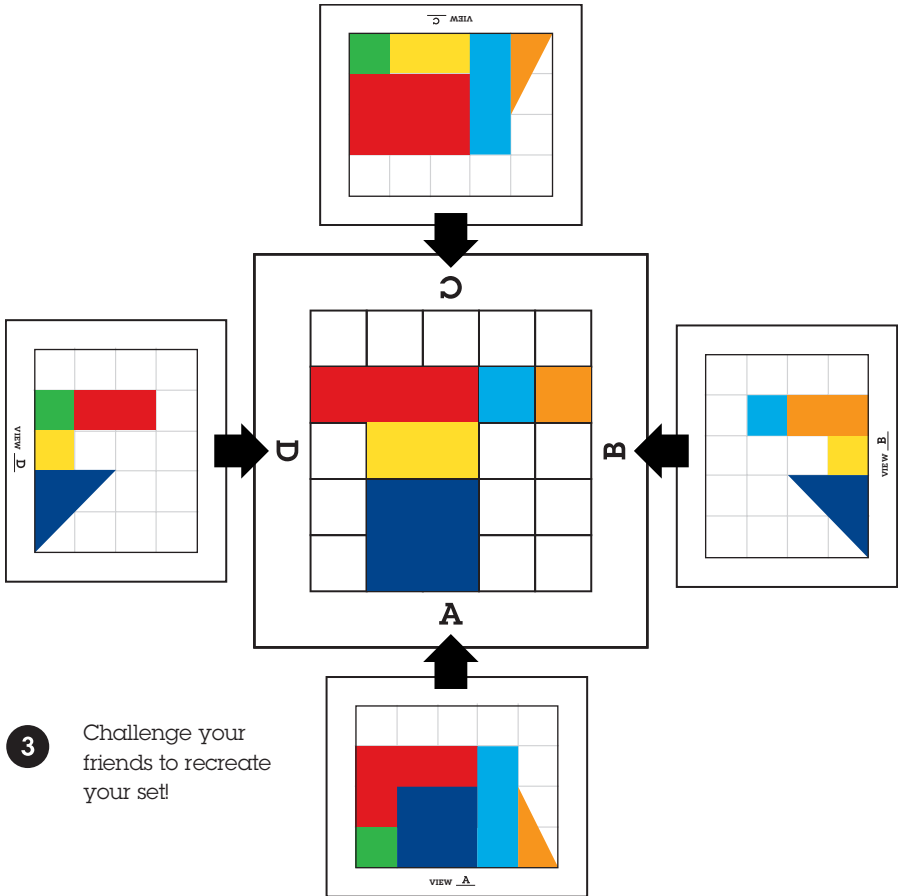
1 Visualise and build your own unique set.

2 Draw the view cards of every perspective from A - D.

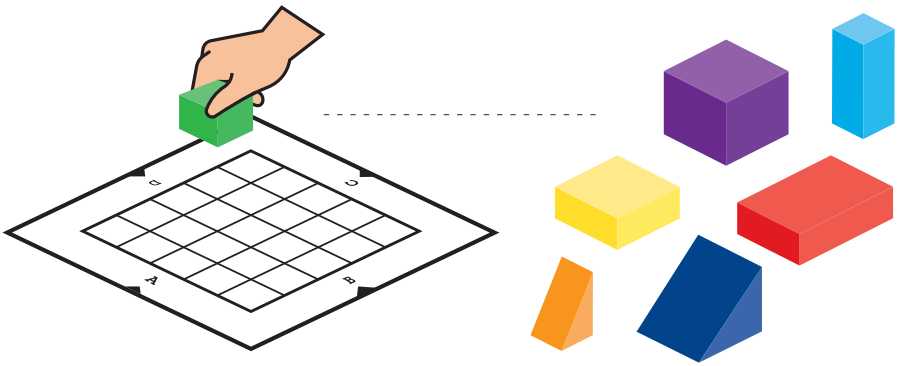
DISCUSSION

This activity requires the children to draw on previous experience in arranging the blocks using the view cards as a reference. They will now need to develop the skill of drawing and creating their own view cards. Children can be drawing their own view cards at each stage and do not need to wait until they have completed each of the levels. As with the supplied cards, children should start developing card sets with one block, before moving onto more complex multiple block arrangements. Once a set of view cards has been drawn, another group can be asked to place the blocks on the grid using those view cards.

Submit your cards to info@geogenius.co.za and have them published at www.GeoGenius.co.za



3 Challenge your friends to recreate your set!



BLANK VIEW CARD TEMPLATE

VIEW _____



VIEW _____



To order additional kits and/or sets of particular pieces please send an email to info@geogenius.co.za or visit www.GeoGenius.co.za

