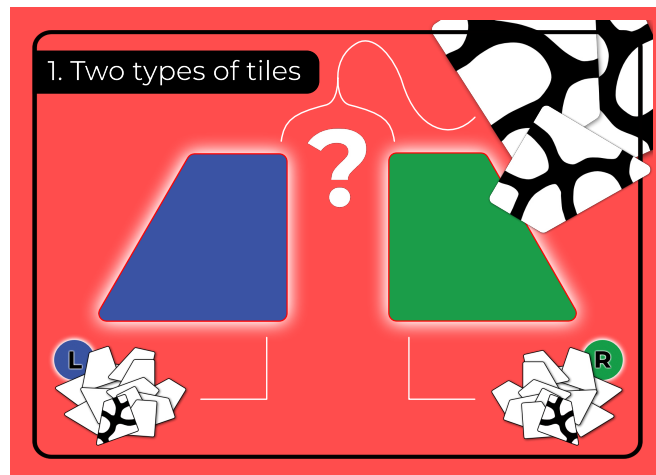


Kids Card#1



Aim

- To familiarise the user with the tiles
- For the user to understand that there are two types of tiles and to be able to visually recognise them
- If unable to *visually* tell whether a tile is 'left' or 'right' handed, for the user to develop strategies for manipulating the tiles in order to understand their handedness.
- For the user to be able to sort the tiles into two distinct mirrored sets.

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. Why is there a question mark?
4. What does it mean by "Two types of tiles"?
5. How does the title link to the two piles of tiles shown at the bottom of the card.
6. What makes one tile go into one pile whilst another goes in the other.

Spelling it out...

Place the card on the table.

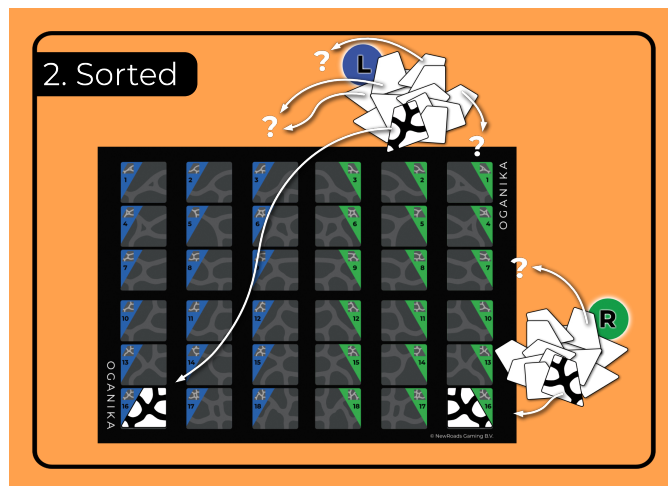
Select a tile and try and fit it so that the design side is face up in either the blue or the green template on the card.

Continue to do this for each tile, sorting them into two piles.

Tiles that fit design side up in the blue template are called LEFT-HANDED tiles.

Tiles that hit design side up in the green template are called RIGHT-HANDED tiles.

Kids Card#2



Aim

- To familiarise the user with the tiles.
- For the user to understand that there are two types of tiles and to be able to visually recognise them.
- For the user to be able to sort the tiles into two distinct mirrored sets.
- For the user to understand different ways to sort, group and order the tiles.
- To provide to the user a means of distinguishing and making sense of the different designs.

Usage

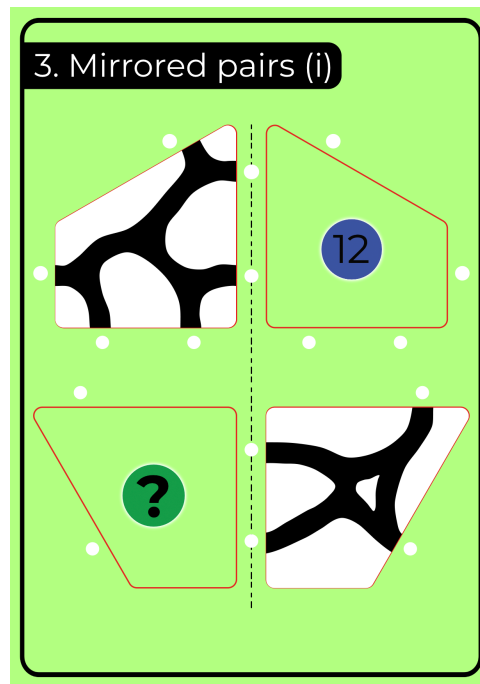
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does this card link with the previous one?
4. How does the title of the card relate to what the card is asking you to do.
5. Can you see how the tiles have been sorted on the poster?
6. How many different groupings are illustrated on the poster?
7. Why has the poster been designed in this way?

Spelling it out...

- Using the two piles of Left and Right handed tiles that you sorted from the last card, unfold the sorting poster and find the correct place for each tile on the poster.
- Notice how the numbers on the poster correspond to particular tiles.
- Careful examination of the poster should reveal particular ways of sorting the tiles.
- Firstly they have been sorted via 'handedness' - the central line of mirror symmetry down the middle of the poster.
- Next they have been sorted as to whether they have a connector at the 'top' of the tile - this splits the tile set across the middle horizontal.
- Next they have been sorted based on the 'base' connectors (columns).
- Finally they have been sorted based on the diagonal side connectors (rows).

Kids Card#3



Aim

- To familiarise the user with the fact that left handed and right handed tiles are mirrors of one another.
- To familiarise the user with how the numbers on the poster relate to numbers on the cards.
- For the user to be able to recognise mirrored tile designs.
- For the user to treat tiles in different orientations and understand how the surface designs meet and match.

Usage

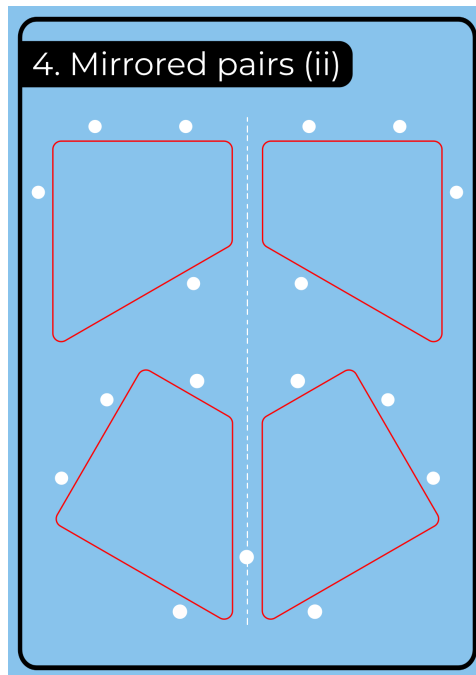
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does this card link with the previous one?
4. How does the title of the card relate to what the card is asking you to do.
5. How do the colours and numbers relate to the poster?
6. What does the dotted line represent?
7. What do the white dots represent?

Spelling it out...

- Since the tiles are mirrored, G12 will be the tile on the top left hand side. So G12 & B12 will form the mirrored pair.
- Careful examination will have to be performed to find the two remaining tiles but once B? Is located, G? Is just it's mirrored opposite.
- This is one one level a very simple card and activity but it is deliberately done to make sure users can locate tiles from the poster and moreover are aware of different ways of representing tiles - note the connector points, an awareness that is necessary for the next card.

Kids Card#4



Aim

- To familiarise the user with the fact that left handed and right handed tiles are reflections of one another.
- For the user to be able to recognise mirrored tile designs.
- For the user to treat tiles in different orientations and understand how the surface designs meet and match.
- For the user to use different representations of the same object.
- For the user to develop their skills of visualisation.

Usage

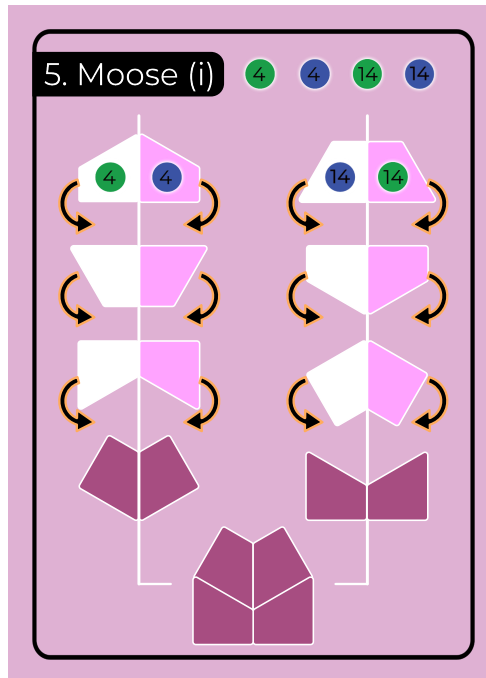
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does this card link with the previous one?
4. How does the title of the card relate to what the card is asking you to do.
5. What does the dotted line represent?
6. What do the white dots represent?
7. Could the dots have the opposite meaning?
8. Comparing this card with the previous one, how many different ways can 2 mirrored tiles be placed into matching positions?

Spelling it out...

- Careful note of the dots will reveal which tiles are required.
- If the user's visualisation skills are good they will be able to select the tiles immediately from the poster.
- If the user's visualisation skill are not so good, then a trial and error method may have to be used.

Kids Card#5



Aim

- To familiarise the user with tile manipulation.
- To continue to build skills of visual understanding.
- To creatively 'see' a surface design as an animal.

Usage

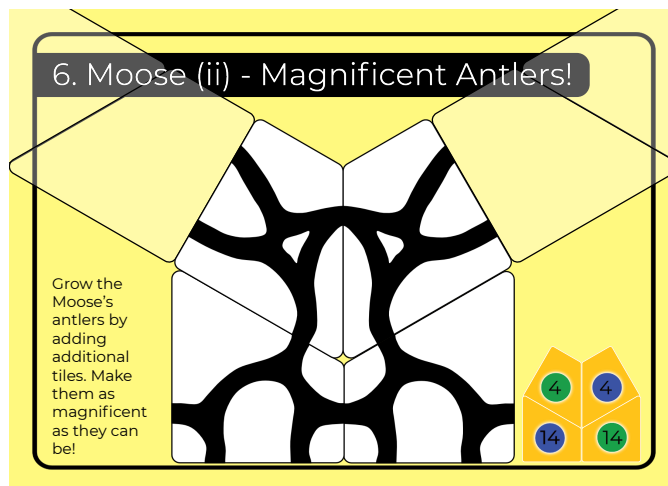
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. Which tiles do you think you are supposed to use?
4. What are the arrows for?
5. For each column sequence, how does each layer link to the next?
6. Why is the card called Moose?

Spelling it out...

- Take the required tiles, place them in the formation shown and carefully rotate each tile to form the next form in the column. Rotate again and one final time. The two forms that you will make can then be fitted together to make the final form shown (centre bottom). The design on the tile should look like a moose.

Kids Card#6



Aim

- To creatively play with the tiles by extending the Moose's antlers

Usage

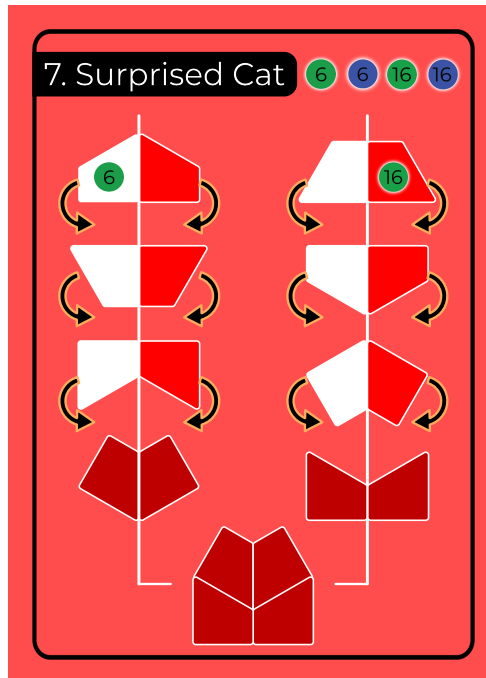
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does this card link with the previous one?
4. How does the title of the card relate to what the card is asking you to do?
5. Do you think that there should be any rules as to how the antlers grow?
(e.g. Straight lines only?, Symmetry? Surface designs match?)

Spelling it out...

- Take the moose design from the previous card, or make it again from the design shown.
- Extend its antlers using additional tiles.
- Try and make the best design possible.
- You might want to think about how the tiles and the designs on the tiles fit together.

Kids Card#7



Aim

- To familiarise the user with tile manipulation.
- To reinforce skills of visual understanding.
- To creatively 'see' a surface design as an animal.

Usage

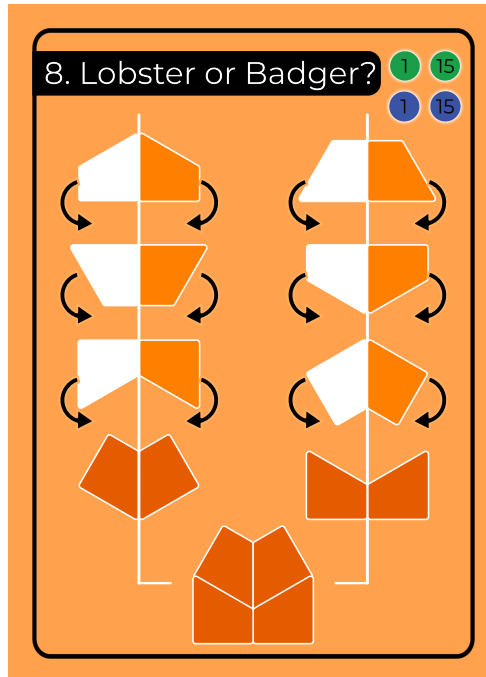
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. Which previous card is this similar to?
2. What do you notice?
3. What do you think the card is asking you to do?
4. Which tiles do you think you are supposed to use?
5. What are the arrows for?
6. For each column sequence, how does each layer link to the next?
7. Why is the card called Surprised Cat?
8. Could you give it another title?

Spelling it out...

- Take the required tiles, place them in the formation shown and carefully rotate each tile to form the next form in the column. Rotate again and one final time. The two forms that you will make can then be fitted together to make the final form shown (centre bottom). The design on the tile should look like a surprised cat.

Kids Card#8



Aim

- To familiarise the user with tile manipulation.
- To reinforce skills of visual understanding.
- To creatively 'see' a surface design as an animal.

Usage

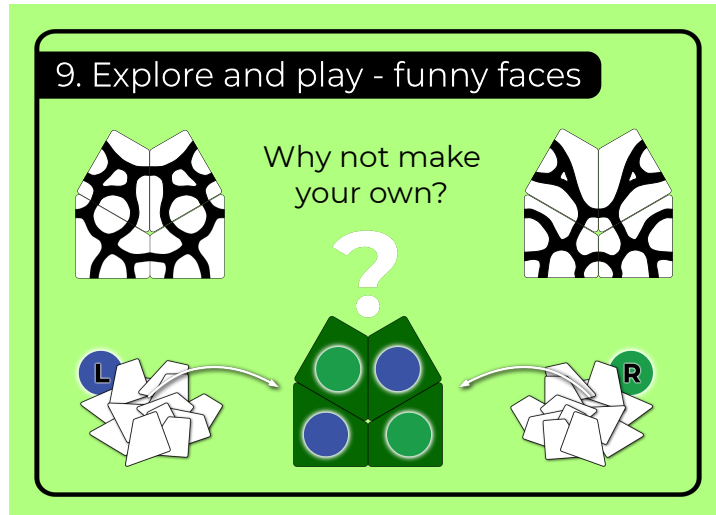
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. Which previous cards is this similar to?
2. What do you notice?
3. What do you think the card is asking you to do?
4. Which tiles do you think you are supposed to use?
5. What are the arrows for?
6. For each column sequence, how does each layer link to the next?
7. How many different animals can you see?

Spelling it out...

- Take the required tiles, place them in the formation shown and carefully rotate each tile to form the next form in the column. Rotate again and one final time. The two forms that you will make can then be fitted together to make the final form shown (centre bottom). The design on the tile can be seen in two ways: as a lobster or as a badger.

Kids Card#9



Aim

- To build on previous experience and extend into creative play.
- To reinforce skills of visual understanding.
- To creatively look for and 'see' a surface designs as visual interpretations of animals/

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

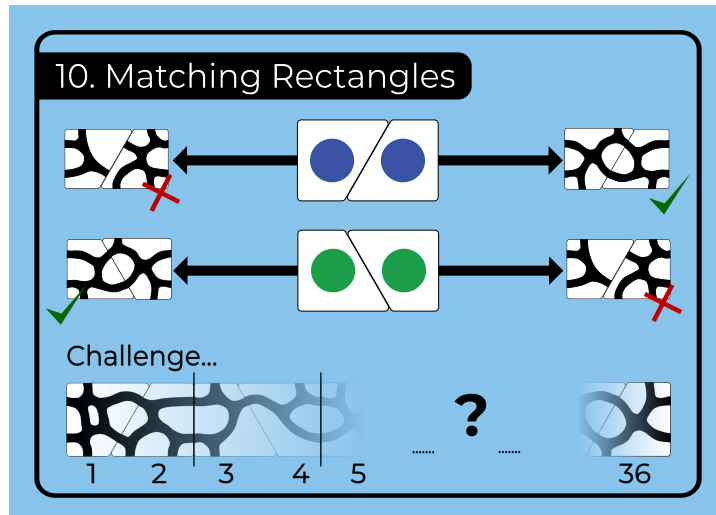
1. Which previous cards is this similar to?
2. What do you notice?
3. What do you think the card is asking you to do?
4. Do you think there are any rules to the construction of the animals?
(4 tiles?, 2 of each handedness?, surface designs have to match?, Tiles have to be arranged in the same form/structure as that shown on the card?)

Additional.

Creative play does not involve judgement *of* the player (note it can involve judgement *by* the player). There is no 'correct' answer. If 'rules' are imposed it is still okay to break them but discussion can be held around whether or not a creation adheres to the initial rules or not. Do not criticise. Praise. Encourage to explore more. Encourage to break rules once they can abide by them:

1. How might the design look if 6 tiles were used instead of 4.
2. Are there any other ways to arrange the 4 tiles?

Kids Card#10



Aim

- To extend facility of visual understanding to more complex situations.
- To extend geometric understanding of tiles into basic shape construction.
- To understand requirement in situations for 'matching' the surface design
- To concept check understanding of 'matching' and extend into low level 'challenge' activity.
- To provide opportunity for reflection regarding modular construction (i.e. the challenge is simply a construction of rectangles as end points will always match.)

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. What is a rectangle?
4. Why are there crosses and ticks next to the examples shown?
5. How many different types of rectangle are shown?
6. Is it possible to make a rectangle out of a left and a right handed tile?
7. What do you have to do for the challenge?
8. Why are there numbers and a question mark - what do these mean?

Additional.

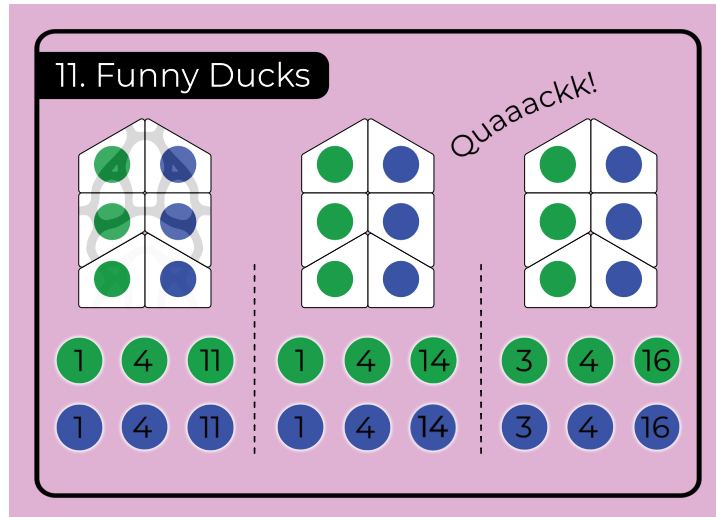
Construction of the challenge can be done tile by tile. A different strategy would be to create 18 sets of rectangles and then just place end to end as all end points will match with all others. Construction of rectangles cannot be done with symmetric pieces as each rectangle requires either 2 left or 2 right handed pieces for its construction. However:

1. Can the overall design be symmetric?
2. Is it possible to match the rectangles along their longer length? (i.e. to create a different rectangle - in effect a 2 x 18 rectangle as opposed to a 1 x 36*).

*Note it is understood by the author that these lengths are not commensurate thus the phrase 'in effect' is being used. It is just that this is a very easy short-hand by which to describe the difference in dimensions.

Spelling it out...

Simply understand that to construct a basic rectangle requires 2 tiles of the same handedness and that we are now moving into activities where correctly matching connections are required. If the user makes simple rectangles then any rectangle will join end to end with any other because of the connection points. In this way this is the easiest way to construct a solution (of which there are thousands).



Aim

- To extend facility of creatively interpreting ('see'ing) designs.
- To use this facility as a gauge for successful completion of mini puzzles
- To utilise previous geometric constructions in building up a form.

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

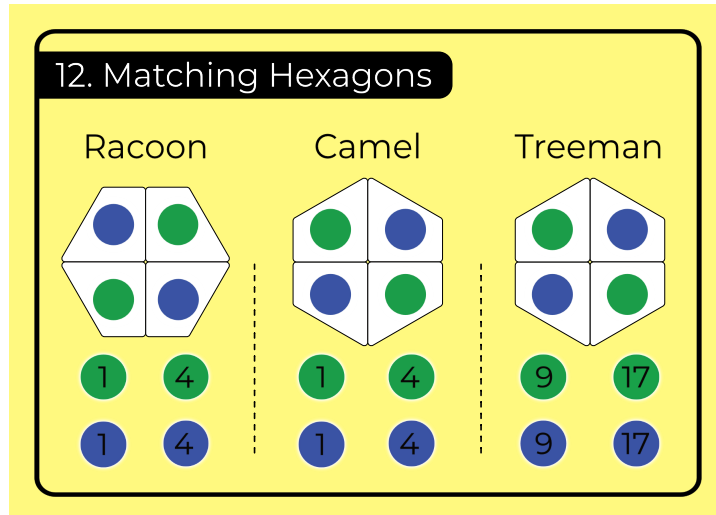
1. What do you notice?
2. What do you think the card is asking you to do?
3. How does the previous card link to this one?
4. Why is the card called Funny Ducks?
5. How does the title link to what you can partially see on the first construction?
6. Do you think there are right and wrong solutions?
7. Should the designs have symmetry?

Additional - creative

Using different sets of tiles but using the same construction, can you find other ducks, or other animals?

Spelling it out...

The faint lines on the initial diagram indicate where 4 of the tiles should go. Due to symmetry it should be obvious where the remaining two should be positioned. The design if looked at 'correctly' should look like a duck's face. In a similar manner the user is to place the tiles symmetrically on the other two diagrams. There may be more ways than one to place them into the template but the user is specifically trying to make something that looks like a duck in both instances.



Aim

- To continue to use facility of creatively interpreting ('see'ing) designs.
- To use this facility as a gauge for successful completion of mini puzzles
- To introduce a new geometric construction - a regular hexagon.

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does the previous card link to this one, how does it differ?
4. What are you expecting to see when you try out the puzzle?
5. Is there only one way of organising the tiles into the hexagon construction?
6. Do you think there are right and wrong solutions?
7. Should the designs have symmetry?

Additional - creative

Using different sets of tiles, but using the same construction, can you find other other animals?

Spelling it out...

Pay close attention to the template designs, you should see that the first is in a different orientation to the others. In a similar manner as to the previous card the selected tiles are to be placed into the template shown. Each correct placement should give a design the looks like the animal/creature stated above. Be aware that orientation matters - i.e. you may have the correct solution but it's upside down so you can't see the animal/creature that you're looking for.

Kids Card#13



Aim

- To consolidate and challenge.
- To transition into more abstract thinking.

Note this is a challenging activity and it is not expected that children of any age will be able to achieve a solution at a first attempt. It is a card that they can come back to several times over to test themselves and their reasoning

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does the previous card link to this one?
4. Do you think the tiles have to match? (Yes)
5. Do you think the surface design beyond matching is important? (I.e. are we looking to make pictures of animals etc? No)

Spelling it out.

Step 1. Use all 36 tiles to construct 9 hexagons whereby the surface design's end points match between tiles at all points.

If you cannot, why not? What aspects of the tiles are preventing you from achieving this? Is there a work-a-around?

A very simple method is to match the base of a left & right handed tile together simply by using symmetry pairs. This will give a 'side' of a hexagon whereby all the connection points will automatically match with another 'side'. In this manner it is very simple to construct 9 small hexagons.

Step 2. Can you put all nine hexagons together in the shape shown so that all end points on the surface design match between tiles at all points?

If you cannot, why not? What aspects of the hexagons are preventing you from achieving this? Is there a work-a-around?

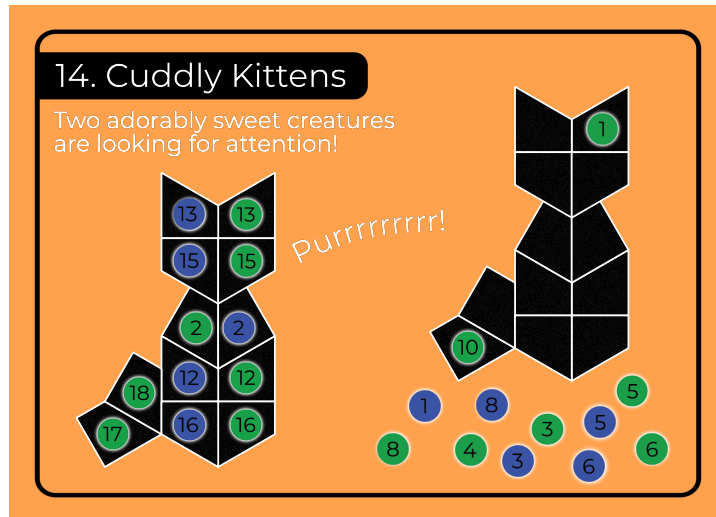
Using the above construction method it is very easy to rearrange the tiles into different hexagons, so if you cannot do the second part of the task it may be because you don't have a correct set of

hexagons that will match. Therefore try breaking apart the hexagons and creating different ones by splitting the template down the vertical line of symmetry. In this way you should be able to achieve a solution in the most efficient manner possible.

Additional - managing expectations

As noted above this is not an easy challenge. It is, however, an accessible challenge (i.e. anyone can have a go) but not an easy one. Therefore make sure that whoever is working on this understands that by NOT completing it they are NOT failing. Any attempt to achieve is an achievement. Persistence, and a resolve to come back and try it at a later date, is the main criteria for success.

Kids Card#14



Aim

- To transition into more abstract structures and more challenging puzzles

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does the previous card link to this one?
4. Do you think the tiles have to match? (Yes)
5. Do you think the surface design beyond matching is important? (I.e. are we looking to make pictures of animals etc? Not necessarily - the structure itself is the picture.)

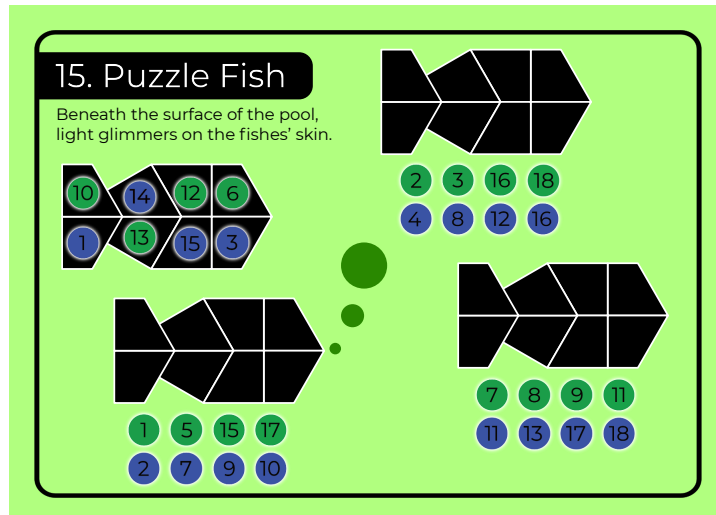
Extension

1. Is it possible to make a third kitten? If not why not?
2. If not is there a workaround?

Spelling it out...

- For the first kitten, take the tiles noted and place in the correct position.
- For the second make sure that the tiles match the template design and make sure that they match.
- It is not possible to create a third identical kitten due to each design using more right handed tiles than left, however if you modify the design of the tails a little then it is certainly possible... you may need to switch some tiles between designs as well...

Kids Card#15



Aim

- To transition into and consolidate working with more abstract structures and more challenging puzzles

Usage

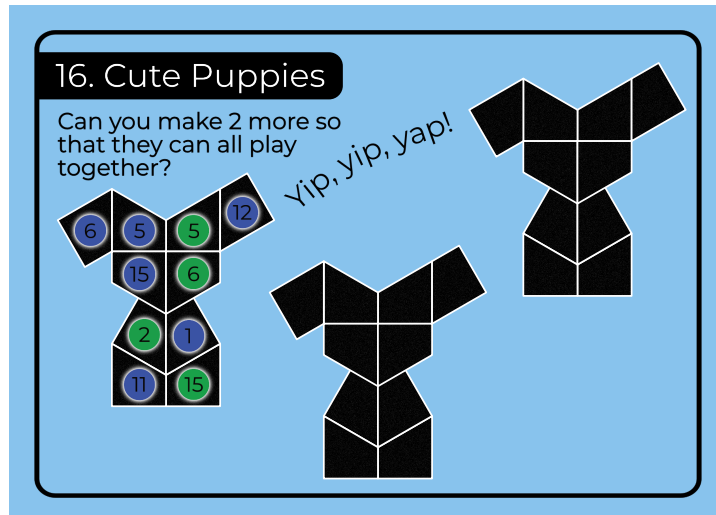
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does the previous card link to this one?
4. Do you think the tiles have to match? (Yes)
5. Do you think the surface design beyond matching is important? (I.e. are we looking to make pictures of animals etc? Not necessarily - the structure itself is the picture.)

Spelling it out...

Use the tiles given to make the fish.

Kids Card#16



Aim

- To transition into and consolidate working with more abstract structures and more challenging puzzles

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does the previous card link to this one?
4. Do you think the tiles have to match? (Yes)
5. Do you think the surface design beyond matching is important? (I.e. are we looking to make pictures of animals etc? Not necessarily - the structure itself is the picture.)

Extension

Once you've made 3 puppies and they're all sitting together, you should have 6 tiles left over. These 6 tiles will all be right handed. How could you free up 2 left handed tiles and still have 3 puppies? If you can work it out then with 2 left handed and 2 right handed tiles, you should be able to make a ball for the puppies to play with*.

*Note you may have to rework some of your tiles.

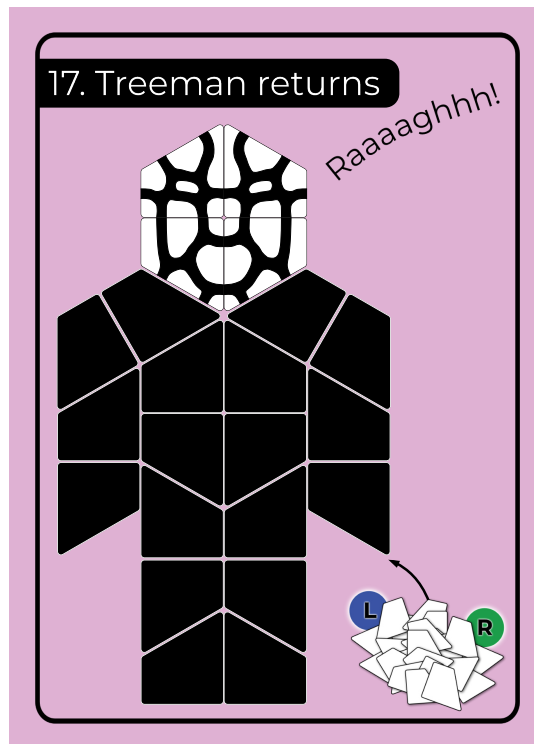
Spelling it out...

Use the tiles shown to make the first puppy

Use any of the remaining tiles to make the next two puppies

Again - similar to the kitten card you will find that if you wish to make a ball then some design modification needs to be made due to more left handed tiles being used than right. In this instance simply reflecting one of the designs so that a different handed tile is used for the ears will free up what is required.

Kids Card#17



Aim

- To give an opportunity for more reasoned and complex creative play

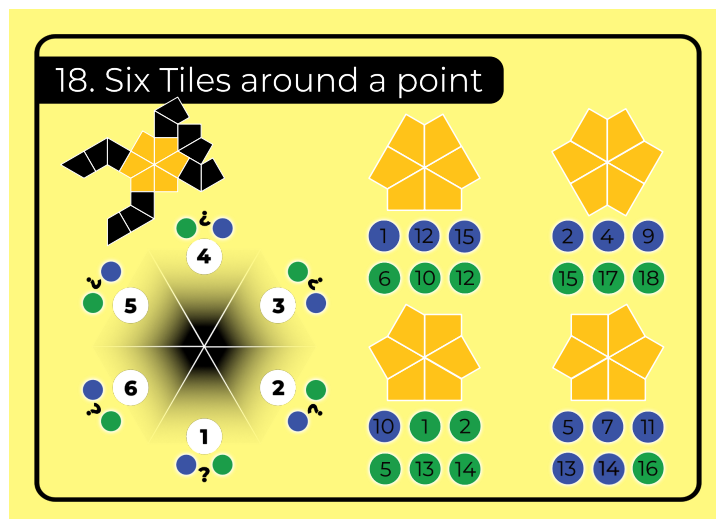
Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. Does this link to any previous cards? (Yes #12)
4. Do you think the tiles have to match? (Yes)
5. Do you think the surface design beyond matching is important? (I.e. are we looking to make pictures of animals etc? In this instance yes - consideration should be given if possible to what the final design looks like.)

Spelling it out...

Beyond the 4 tiles shown, use tiles of your choice from the remaining set to complete the template making sure all tiles match correctly. Try to use tiles so that the final design does look like a figure with arms and legs.



Aim

- To transition into and consolidate working with more abstract structures and more challenging puzzles

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. The numbers 1 - 6 why are they backgrounded by white and not green or blue?
4. What are the question marks there for?
5. What is similar and what is different about the 4 designs shown?
6. How does the title link with all of the answers to the questions above?

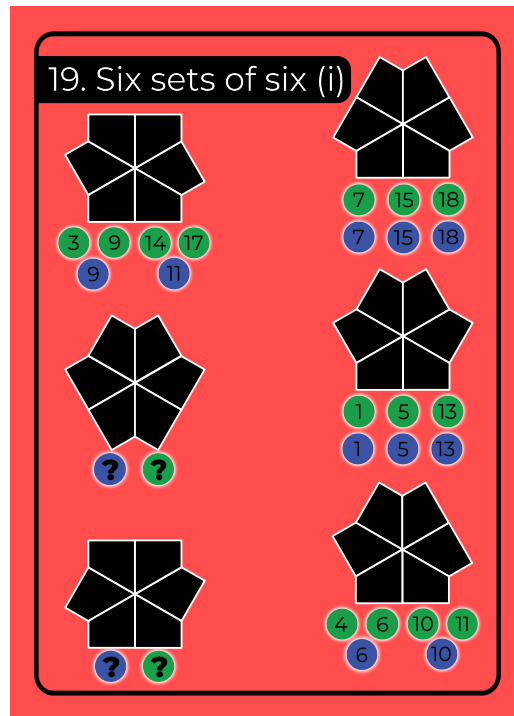
Extension

Is it possible to make more templates/designs with six tiles around a point with the remaining tiles. If not why not? How many different templates of six tiles around a point is it possible to make?

Spelling it out...

- On a very simple level, simply use the tiles shown to construct the templates given.
- This card is directing the user to consider how many different ways it is possible to arrange six tiles (of any handedness and combinations of handednesses) around a point. To address this question properly might need pen and paper to sketch out answers or to at least record results. There is a systematic way of working it out. Many puzzles can be set using combinations of these templates.

Kids Card#19



Aim

- To provide a challenge which may cause the user to reflect on the nature of the tiles and their properties, in more abstract ways.

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

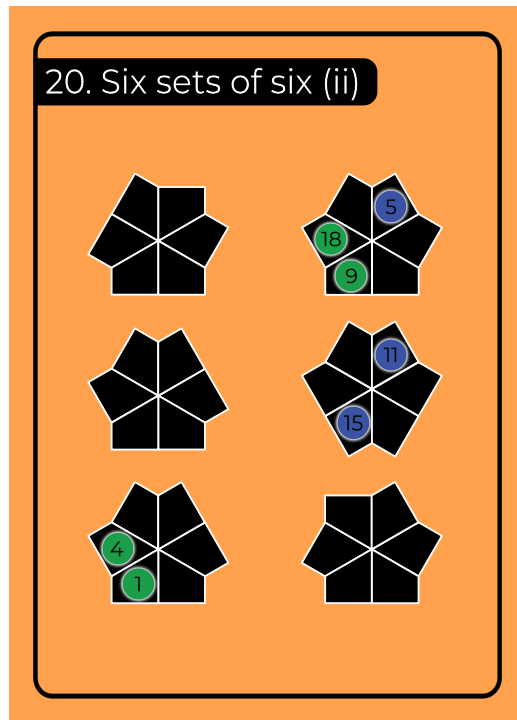
1. What do you notice?
2. What are the question marks there for?
3. What is similar and what is different about the 6 designs shown?

Extension

Six sets of six must use all of the tiles set. Are there combinations of templates for 6 tiles about a point which can't be set as a puzzle? Do the designs of the templates help you understand how many different 6 tiles about a point templates there are? What's special about this set of six templates?

Spelling it out...

- On a very simple level, simply use the tiles shown to construct the templates given.
- Where there are question marks it's up to you to decide which tiles to use.
- Careful examination of the templates should reveal that they are all different.
- Just because there are six tiles about a point doesn't mean that you can make six of these with a tile set. Since different templates use different amounts of left and right handed tiles there are only certain combinations of 6 templates of this style that can *potentially* go together and even then it is still necessary to see if it's possible to fit the tiles into the design so that they match.

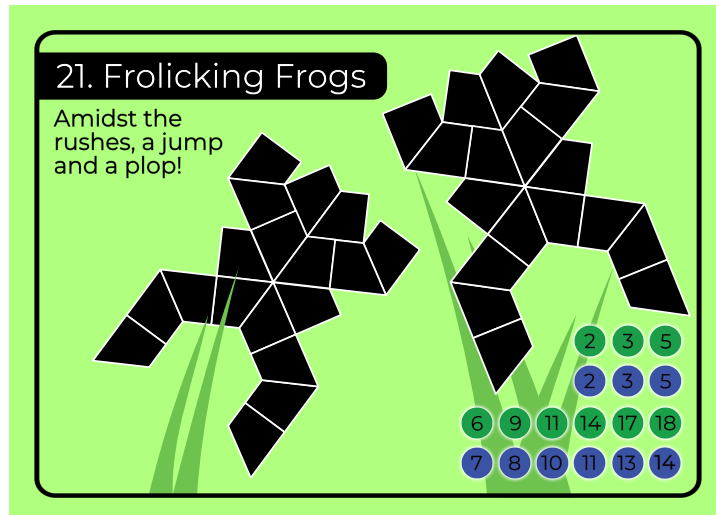


Aim

- To provide a challenge which may cause the user to reflect on the nature of the tiles and their properties, in more abstract ways.
- To encourage persistent problem solving.

Very similar to card 18. With slightly higher challenge. Be prepared to get frustrated.

Kids Card#21



Aim

- To develop more challenging puzzles

Usage

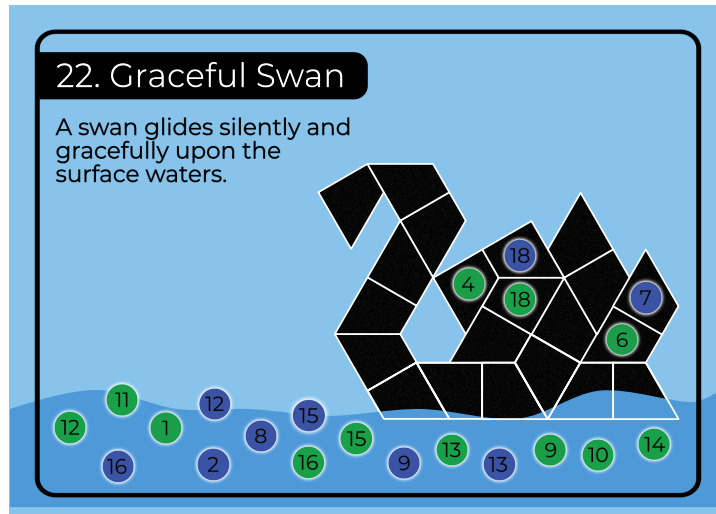
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. Do you think the surface design needs to show a frog? (No)
4. How many tiles does each template show?

Spelling it out...

- Use the 18 tiles given to construct a frog.
- Use the remaining 18 to construct the other.

Kids Card#22



Aim

- To develop more challenging puzzles, with more complex template structure

Usage

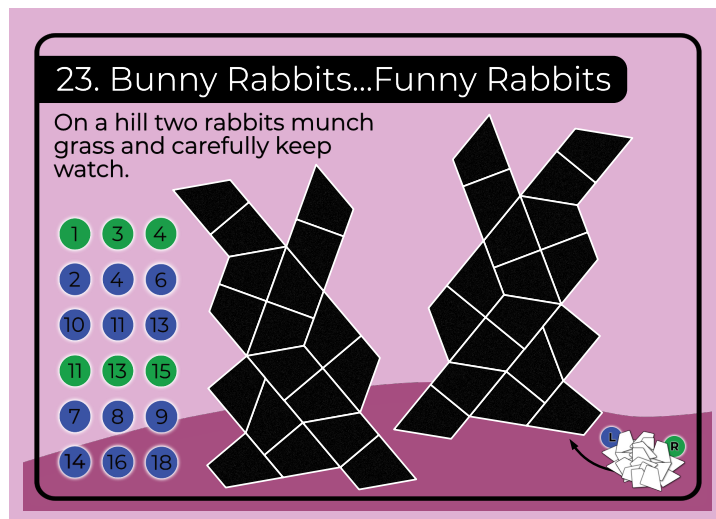
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. Do you think the surface design needs to show a swan? (No)

Spelling it out...

- Use the 21 tiles given to construct the swan
- Make sure that attention is given to the correct orientation of the tiles within the template design.

Kids Card#23



Aim

- To develop more challenging puzzles with more complex tile orientation

Usage

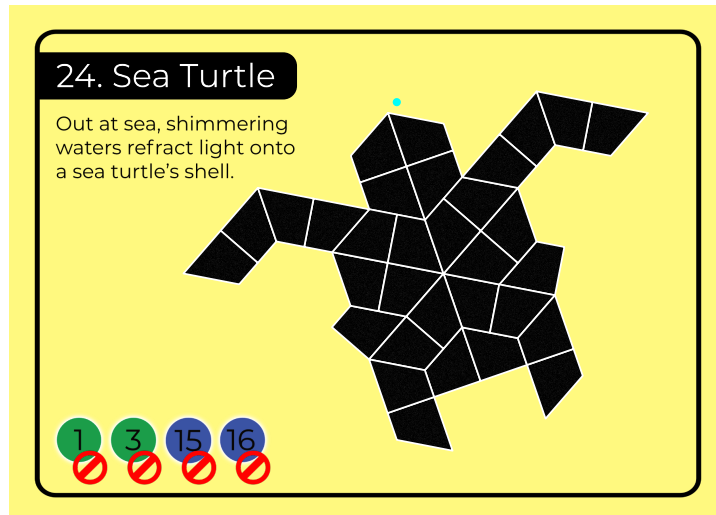
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. Do you think the surface design needs to show a rabbit? (No)
4. How many tiles does each template show?

Spelling it out...

- Use the 18 tiles given to construct the rabbit design on the left hand side.
- Use the remaining 18 to construct the other.

Kids Card#24



Aim

- To develop more challenging puzzles with more complex tile orientation

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does the tile information match with the template design
4. Do you think the surface design needs to show a turtle? (No)

Spelling it out...

- All tiles are to be used except tiles G1,G3,B15 & B16

Kids Card#25



Aim

- To develop more challenging puzzles with more complex tile orientation

Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does the tile information match with the template design
4. Do you think the surface design needs to show a butterfly? (No)
5. Should the surface design be symmetric? (Perhaps...)

Spelling it out...

- Use all tiles to construct 2 butterflies.

Kids Card#26



Aim

- To develop more challenging puzzles with more complex tile orientation

Usage

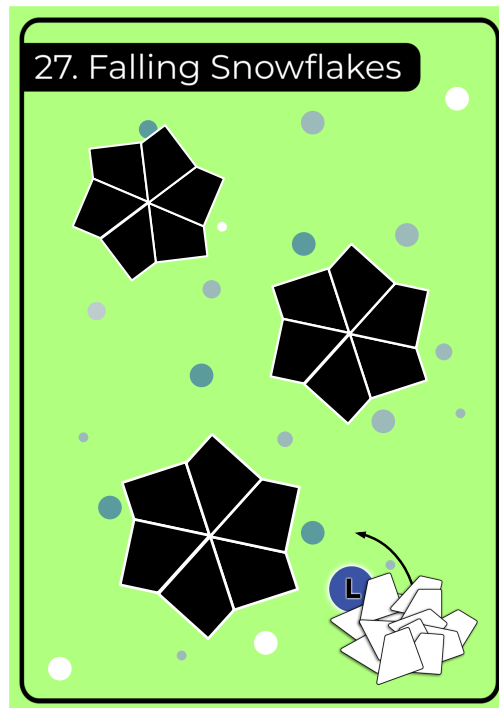
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. How does the tile information match with the template design
4. Do you think the surface design needs to show a dog (No, but it might be nice to consider at least the face)
5. Are there enough tiles in the set to complete both dogs (No. Note that the old dog requires all 36 tiles...but that doesn't stop you doing the younger dog with a different tile set.)

Spelling it out...

- Use all 36 tiles of a tile set to complete the older dog. If you fancy an easier challenge just do the younger one.

Kids Card#27



Aim

- To consider only single handed tile arrangements

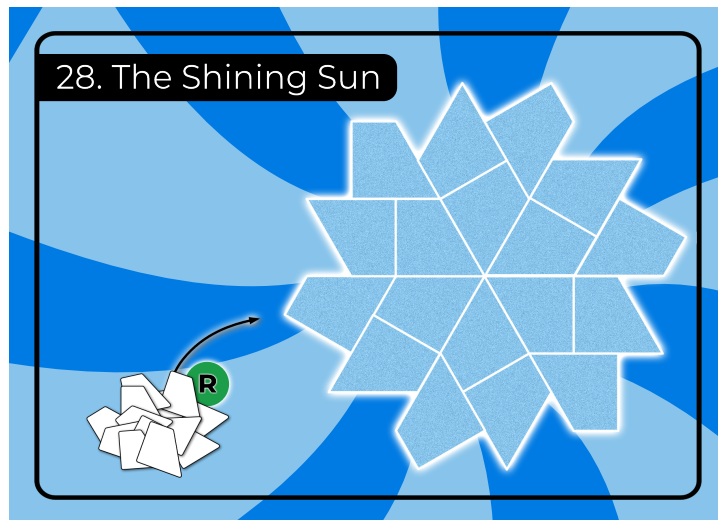
Extension

In this card and the next only a single handed tile is used. What other designs can you come up with using 18 single handed tiles?

Spelling it out...

- Use the 18 left-handed tiles to construct the templates shown.

Kids Card#28



Aim

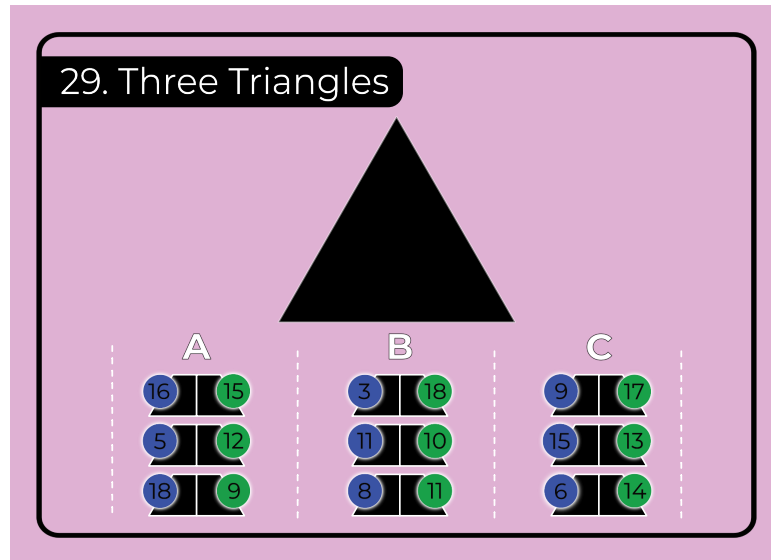
- To consider only single handed tile arrangements

Extension

In this card and the previous only a single handed tile is used. What other designs can you come up with using 18 single handed tiles?

Spelling it out...

- Use the 18 right-handed tiles to construct the template shown making sure all the surface design matches.



Aim

- To consider and familiarise the user with the construction of a triangle template using the geometry of the tiles.

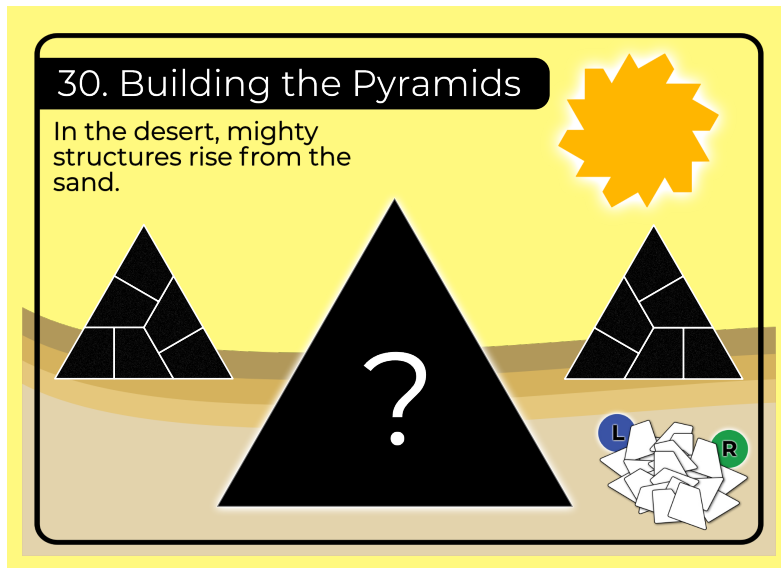
Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. Why are the tiles paired
4. How do the columns link to the shape above?

Spelling it out...

- Each of the 3 pairings in each column can be placed together to form an equilateral triangle.
- In other words a single equilateral triangle can be formed by using 6 tiles (3 left-handed & 3 right-handed).
- With careful consideration it should be evident that there are two different triangle constructions available using 6 tiles as the final template can be reflected to its mirror image. (See next card).



Aim

- To consider and familiarise the user with the construction of a triangle template using the geometry of the tiles.
- To develop more complex and challenging puzzles.
- To develop persistence in problem solving.

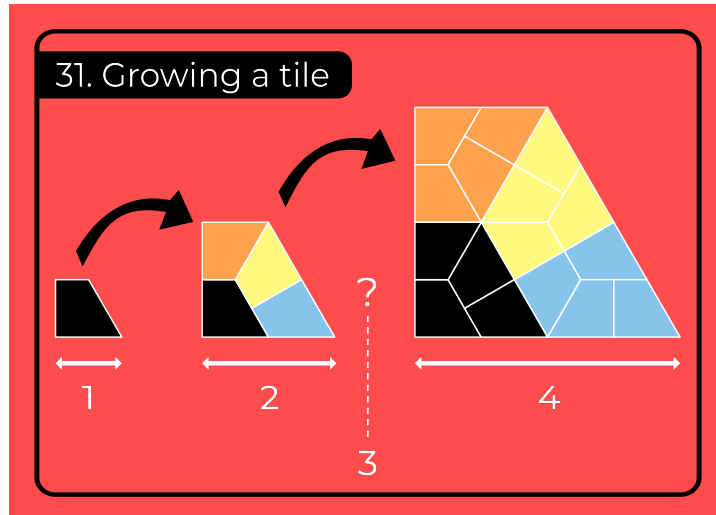
Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is asking you to do?
3. Are the two smaller pyramids the same?
4. How might the larger pyramid relate in design to the smaller ones?
5. Why is there a question mark there?

Spelling it out...

- The larger pyramid is 4 times (in area) that of a smaller pyramid, therefore we may expect it to require 24 tiles as opposed to 6.
- There may be a very straight forward way of constructing a pyramid using 24 tiles (in terms of its template - hint you might be able to fit 4 triangles together.)
- Use all 36 tiles to construct 2 small pyramids (6 tiles each), using the templates shown and then the larger pyramid (24 tiles) using whatever template construction that you can to achieve the overall shape.



Aim

- To begin to understand the self similar nature of the tiles geometry.

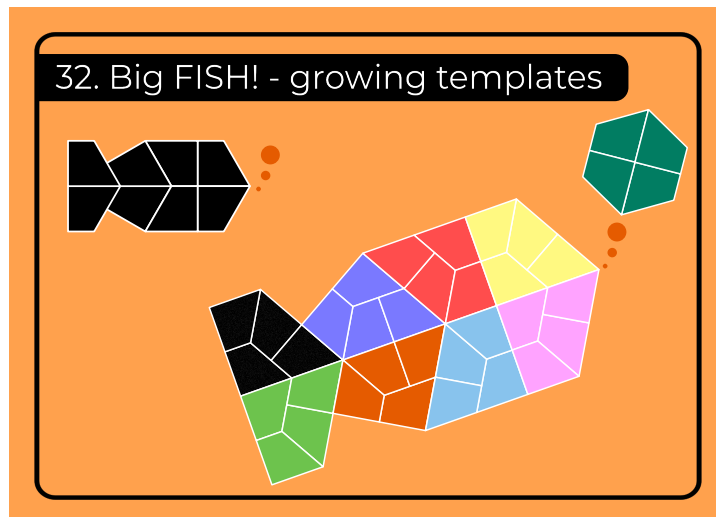
Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. What do you think the card is showing you about the tile's shape?
3. How do the numbers relate to the diagrams.
4. What is the question mark there for?
5. What do you think the card is asking you to do?

Spelling it out...

- The geometry of the tile is such that it is self similar - this means that you can construct shapes which are in effect scaled up versions of the same tile shape. The card shows two such examples - a template using 4 tiles and a template using 16 tiles.
- Looking at the numbers you can see that the number corresponds to the base length of the overall shape.
- So 1 has a base length of 1, 2 has a base length of 2 and 4 has a base length of 4
- The connection between the base lengths and the number of tiles required to make the shape is simply the square of the base length. I.e. to make this similar shape with a base length of 4 requires $4 \times 4 = 16$ tiles.
- Therefore to make a similar shape with a base length of three - if it is possible - will require 9 tiles.
- 9 is clearly an odd number so some thought will have to go into how to construct the template of the shape, before attempting to get a matching surface design.



Aim

- To build on the understanding of the tile's geometry by applying this knowledge to simpler designs.

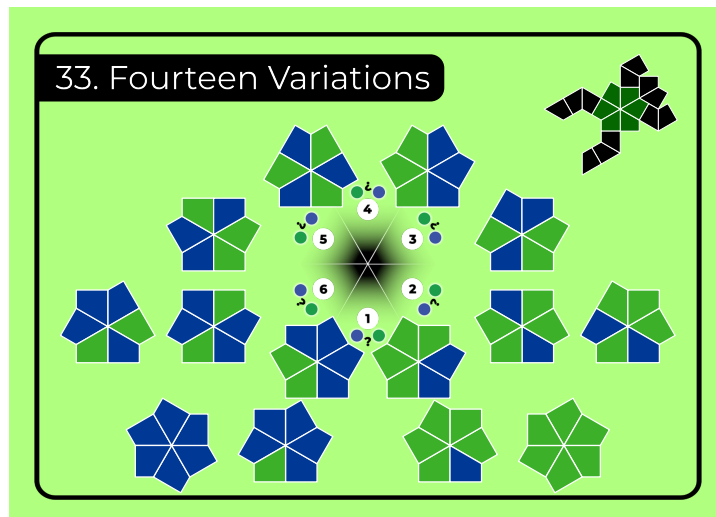
Usage

Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. How does this card link with previous cards?
3. How does the title link to what is being shown?
4. What do you think the card is asking you to do?

Spelling it out...

- Since similar shapes to a single tile can be constructed then any smaller simpler design can be expanded by substituting into the initial template 4 tiles for every original tile present.
- Here we have taken the fish from card 15 and expanded the design by doing the above.
- Use all 36 tiles to complete the large fish and its bubble.



Aim

- To provide a nearly complete solution set to a previously posed question.
- To provide a basis (in conjunction with card 34) for a variety of challenging puzzles

Usage

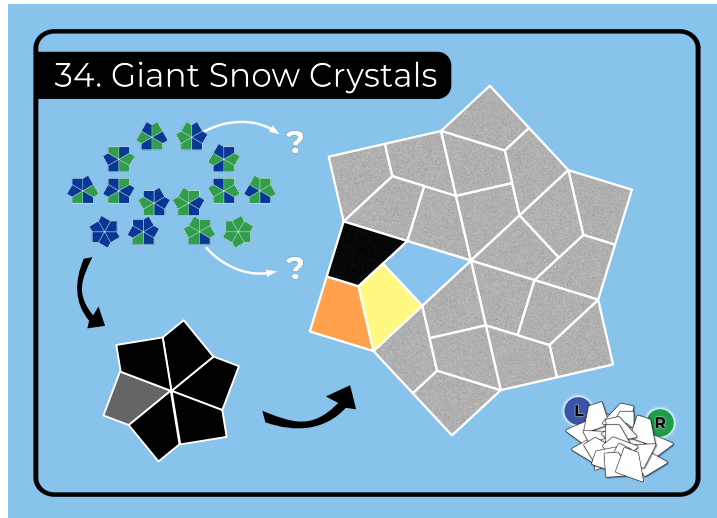
Encourage your child to make sense of what the card is showing. Instead of explaining to them, ask them specific questions like:

1. What do you notice?
2. Which previous cards does this link to?
3. 14 variations are shown...is this all of them?
4. By combining this with your understanding from the previous 2 cards - what is being suggested?

Spelling it out...

- This provides an answer to the question raised earlier about how many different ways 6 tiles can be placed around a single point. 14 variations are shown - this is the complete set...(though it reduces to 9 if you ignore reflections).
- Since each of these designs only uses 6 tiles and a design can be scaled up by replacing a single tile with 4 tiles, then this means that each of these design can be scaled up using a total of 24 tiles.
- SEE NEXT CARD

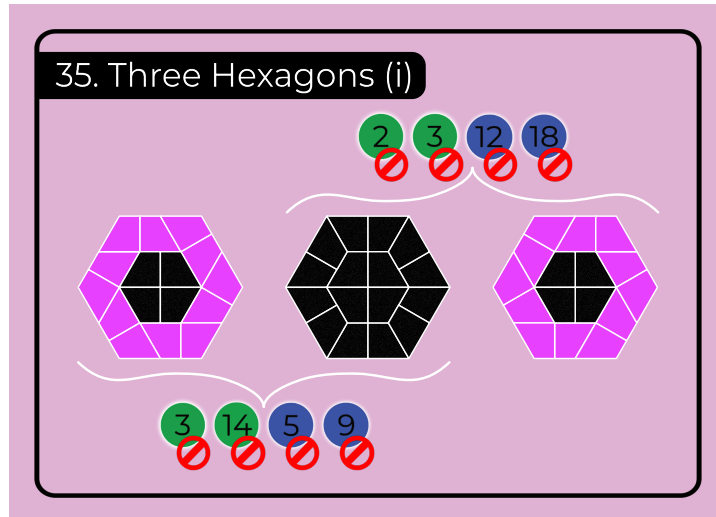
Kids Card#34



Aim

- In conjunction with the previous card, to provide a range of challenging and engaging puzzles.

See previous Card Notes.



Spelling it out...

- At this stage of development, we have shown and familiarised the user with some basic geometrical structures and also shown the self similar nature of the tiles.
- The Hex16 shown in black is simply an enlargement of the Hex4 design...but things start getting interesting.
- You can see that to the left and right of the black Hex16 are two other Hex16 constructions.
- To construct 2 Hex16 of any construction combination will require 32 tiles - leaving 4 remaining.
- Therefore the challenge on this card is to either choose the left hand pairing and remove G3,G14,B5 & B9 from the tile set, and utilising the remaining tiles to construct the pair OR choose the right hand pairing and remove G2,G3, B12 & B18 from the tile set and construct this pair.

Extension

It is very interesting and rewarding to explore different Hex16 construction combinations, and with 2 sets of tiles a simple game (simple in the sense of playing - not simple in the sense of completing) can be played with 2 players.

Step 1: Each player has a tile set.

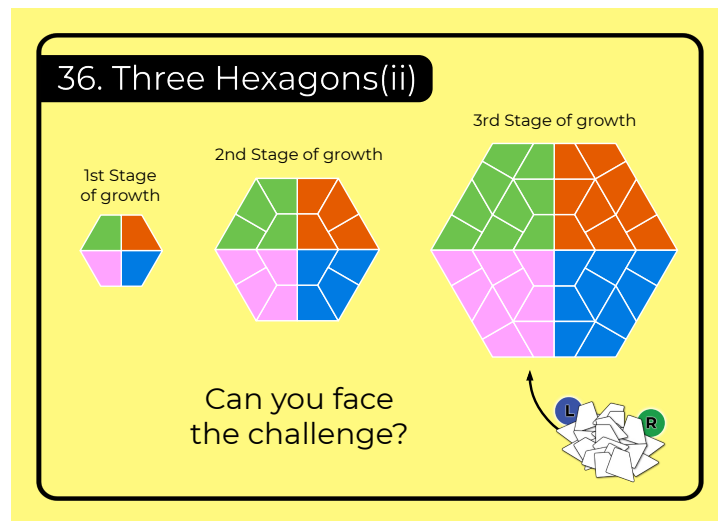
Step 2: One player removes 2 left handed tiles from their set and another removes 2 right handed tiles from their set.

Step 3: The tiles that the other player have removed from their set are now also removed from the players set.

Step 4: Each player should now have 4 tiles removed from their set and these will be the same tiles for each player.

Step 5: With the 32 tiles remaining in their set each player attempts to construct 2 Hex16's

Step 6: The winner is the first to achieve this. A time limit can be set at the outset such that if neither player achieves this in the given time the match is called as a draw.



Spelling it out...

- At this stage we have shown how to construct a Hex4, a Hex16 (3 variants) and if you haven't already realised, we now show 1 method to construct a Hex36.
- The first challenge is to attempt to place all of the tiles into the template of the Hex36 shown, such that the surface design matches.
- If and once this has been achieved it can be a very interesting and rewarding process to think about how many different construction templates there are to construct a Hex36 (Hint: are there are at least 10...100...1000?)
- Play and enjoy.