K'NEX User Group

Guide to using K'NEX in children's clubs and childcare schemes

…featuring the Baby Buggy challenge

www.knexusergroup.org.uk

Contents

1. Introduction

"Out-of-school education" is an essential part of the UK educational system. Children gather together at different times of the week and year, in many different venues, to learn new skills and to enjoy themselves. Examples include:

Children's Clubs that meet regularly for an hour or two, such as after-school clubs, lunch-time clubs, cubs, brownies, rainbows, beavers, scouts, guides, clubs for children with special educational needs, maths clubs, science clubs, engineering clubs, computer clubs, etc

Childcare schemes that children can attend for days at a time, such as playschemes, summer camps and summer schools

The infrastructure for out-of-school education in the UK has been developed considerably over the last five years, and organisations such as ContinYou (formerly Education Extra and CEDC) and the New Opportunities Fund have done a great deal to accelerate the development of out-of-school education.

The purpose of this short guide is to explain how challenges based on the K'NEX construction kit can be used to assist children aged 5 to 16 in out-of-school education settings to develop:

- Technology skills
- Innovation skills
- Problem-solving skills
- Teamworking skills
- Communications skills
- Self-esteem

Note that throughout the guide, for ease of reference, we use the term "playscheme" to refer to all types of Childcare scheme (including summer camps), and "children" as a collective term for 5 to 16 year olds.

1.1 Who is this guide for?

This Guide has been written for everyone who has an interest in out-of-school education, including those who are:

- Leaders and Helpers at children's clubs and playschemes
- Managers of out-of-school education programmes
- Interested in the potential of out-of-school education to help them meet their educational objectives (eg headteachers)

1.2 What is K'NEX

K'NEX is one of the most successful construction kits in the world, second in popularity only to Lego. It is based around a series of "rods", which can be joined together by "connectors" such as the one shown in our logo. Once they have mastered using these simple components, children and adults alike can use their imagination to make potentially millions of different working models.

It is ease of use and versatility that make K'NEX such a good investment for educational purposes, whether in schools, clubs, family learning or post-16 education.

You will find that there is no age limit for enjoying K'NEX - it is suitable for all ages from 5 to 95. There is also a version of K'NEX with bigger components for 3 to 7 year olds, called Kid K'NEX, as shown in the photo.

We would recommend that the best way to use K'NEX with 5 to 16 year girls and boys is to get them to complete *K'NEX challenges*, working in pairs. This approach will help the children to develop problem-solving skills and teamworking skills, as well as gaining a better understanding of technology. Ten K'NEX challenges may be found in the Appendix to this Guide.

K'NEX can also be used effectively to develop the skills and self-esteem of children with learning difficulties, once they have mastered the basic techniques for joining rods and connectors together.

It is also worth remembering that even though educational organisations use K'NEX because of its high educational value, children enjoy using K'NEX simply because it is fun. This makes K'NEX a good vehicle for engaging children who are hard-to-reach in out-of-school education, such as disaffected pupils and children from disadvantaged communities.

2. A simple K'NEX challenge – *the Baby Buggy*

This section describes how a children's club or playscheme could hold a simple *K'NEX Baby Buggy challenge*.

2.1 Planning and promoting the challenge

1. Decide how long you want to allow for the challenge (maybe an hour for younger children, and 45 minutes for older children).

2. Choose the date on which you want to run the challenge (eg your regular Club meeting next Tuesday), and fill in the date in the Baby Buggy poster in the Appendix.

3. Put up copies of the poster on your noticeboard, and anywhere else that the children will see. Many clubs and playschemes find that advertising their K'NEX challenge in advance increases the numbers attending.

4. Decide how you can best lay out your premises for the K'NEX challenge. One approach is to use a large open plan room that can be laid out with tables and chairs. Another is to get the children working on the floor (inside or outside).

5. Decide on the maximum number of children you will allow to take part in the challenge at the same time. This may depend upon factors such as the number of staff available, and the size of the room.

6. If you don't already have your own K'NEX, divide the maximum number of children by 20 to calculate the number of K'NEX Simple Machine Deluxe sets you will need to purchase. For example, buy 2 sets if your maximum number of children is going to be 32.

7. Use the Order Form in the Appendix to order the sets you need.

8. Allocate one or more members of staff to act as "Helpers" to deliver the challenge.

9. Assist the Helpers to develop the necessary skills to deliver the challenge, via training and/or self-help (see section 3.10).

10. Photocopy the Baby Buggy challenge card in the Appendix, so that you have one card for each child attending, to take home at the end.

11. Sort the K'NEX you have bought into the compartmented trays provided.

2.2 Delivering the challenge

12. Arrange the trays of K'NEX so that four children are able to use each tray of K'NEX, working in pairs.

13. Explain to the children that they are going to do a K'NEX challenge, and ask them to put up their hand if they have used K'NEX before. This will help you to identify which children will need help getting started with their challenge.

14. Use the challenge card to explain verbally to the children what they have to do, and if your children are good readers, give each child their copy of the Challenge Card before they start.

15. Ask your Helpers to assist any children who haven't used K'NEX before to understand how to join the rods and connectors together.

16. Then ensure that your Helpers are wandering around, assisting children to understand the challenge, and to overcome any problems they may encounter in completing the challenge.

17. The children can then work at their own pace to complete the challenge to the 1st level of difficulty.

18. When a pair of children has completed this task, ask them to demonstrate how their baby buggy works.

19. If there is still time, ask the pair to attempt the 2nd and then the 3rd level of difficulty.

20. 10 minutes before the end of the session, let the children know that in five minutes they will have to start tidying up.

21. 5 minutes before the end of the session, ask the children to dismantle their model, and put the K'NEX pieces back tidily in the tray.

22. When they have done so, praise them for their hard work, and give each child a signed Challenge Card to take away as a certificate of their achievement.

2.3 Monitoring and evaluating the event

23. If possible, record comments made by the children as they are completing the challenge.

24. Hold a review with your staff to evaluate the event, including staff feedback, and the comments received from the children.

We would hope that your evaluation will identify benefits from the event such as:

- By completing the challenge, the children attending will have developed skills such as technology skills, problem-solving skills and self-esteem.

- By working together to complete the challenge, the children will have developed their teamwork skills and communication skills.

- If attendance at the challenge was optional (eg in a playscheme), the event will have attracted good numbers, of both boys and girls.

2.4 Conclusions

We hope you will agree that a simple K'NEX challenge such as the Baby Buggy can be fairly easy to organise, but can deliver significant educational benefits to children. Once you have run your first K'NEX challenge, you will then have the equipment and trained staff necessary to deliver many more K'NEX challenges in future.

One of many ways to build a K'NEX mousetrap

3. Design your own programme of K'NEX events

Section 2 explained how to run a simple, one-challenge K'NEX event for children aged 5 to 16. The purpose of this section of the Guide is to examine the options in designing and delivering a programme of K'NEX events to your own specification.

3.1 Objectives

The first stage in the planning process is to agree the objectives for your programme of K'NEX challenges, including:

a) Which children are you trying to attract into the Programme? Existing Club or Playscheme members? New Club or Playscheme members? Children with special needs (eg learning difficulties)?

b) What age range are you seeking to cover?

c) Do you have specific learning objectives? Eg helping children to develop technology skills, or teamworking skills, or self-esteem.

d) Are there other objectives or outcomes that you need to meet? Eg annual targets or grant outcomes.

3.2 Style of K'NEX event

The example given in section 2 was a simple one-challenge open access K'NEX event. However, the versatility of K'NEX lends itself to a number of styles of out-of-school events, including:

- Events offering a range of K'NEX challenges.
- Events for different age ranges (eg 5 to 7, 8 to 11, 12 to16)
- K'NEX events that run for half a day, a day, or even longer, rather than just for an hour.
- K'NEX events that travel around multiple venues (eg all the cub and brownie packs, or all the playschemes, in a county).
- K'NEX events that complement other activities available to the children attending (eg K'NEX challenges within the theme of a playscheme).
- K'NEX events which are open access (ie children can drop in when they like and stay as long as they like), or closed access (ie a specific group of children participate, and all start at the same time).

3.3 Cost of K'NEX events

In deciding which style of K'NEX event to provide, it is worth noting that there are two cost elements to any K'NEX event:

a) Set-up costs, such as equipment purchase, staff training, printing, and any marketing.

b) Delivery costs, such as staff wages.

For a simple hour-long event such as the Baby Buggy challenge, run by paid staff, the set-up cost for 32 children might be:

a) £360 for two K'NEX Classroom super sets, plus

b) £100 for staff training (2 staff).

The delivery costs using the same 2 staff might then be £32 per session. This would be true whether the event is run once, or many times at different venues.

In general, this fact leads organisations that have made the decision to provide K'NEX out-of-school-education to:

a) Make an initial investment in K'NEX, by buying sufficient K'NEX for their purposes, training a pool of staff, and then

b) Deliver K'NEX events on a reasonably regular basis, so as to gain the maximum return on that investment.

3.4 Funding your event

Out-of-school education is often not generously funded, and even a small K'NEX event may require imaginative use of budgets and funding streams. Funding sources that might be considered would include:

- An existing out-of-school education budget.
- A grant for out-of-school education (eg from ContinYou).
- Funding from charitable trusts (if eligible).
- Sponsorship (eg from local businesses)
- Charging children participating a fee to attend (eg 50p per adult or child)

Often a combination of funding sources will be needed, for instance education funding topped up by sponsorship. This can work well, as sponsors are usually much happier funding costs like equipment purchase than they are funding overhead costs such as salaries.

The Appendix contains a draft of a letter that you might like to send out to local employers, asking for sponsorship of your K'NEX events.

A Roundabout challenge

3.5 Selecting a venue for your K'NEX event

Almost all out-of-school education venues are suitable for K'NEX challenges, including:

- Scout and Guide Huts
- Community centres
- Schools
- Libraries
- Museums
- Leisure centres

The ideal location for K'NEX out-of-school education within one of the above venues would be either:

1. a large open-plan room or area, with groups of tables and chairs each seating 4 to 10 children, or

2. an open-plan room with a bare floor, that the children can sit on.

An alternative approach is to run your K'NEX event outside, although having a wet weather fallback is probably also useful!

3.6 Becoming familiar with K'NEX

If you do not have any K'NEX at present, it is a good idea at an early stage of your project to purchase a single K'NEX set. You and your staff can then familiarise yourself with K'NEX, before going on to decide which K'NEX challenges to offer (see next section).

The *K'NEX Discovery Building set* is a low cost set that is good for staff familiarisation. A review of this set, and an order form, are included in the Appendix to this Guide. K'NEX education sets can also be purchased via the User Group website www.knexusergroup.org.uk

Once you purchased your set, we recommend that you build some of the models in the accompanying instruction book, and also look at the pages on the User Group website entitled "Challenges" and "Handy hints". You might also like to consider attending one of the User Group's training courses, as shown on the "Training" page of the website.

3.7 Choosing K'NEX challenges

Once you have determined your learning objectives, decided on the style of event, chosen your venue(s), and achieved some familiarity with K'NEX, the next stage is to decide which K'NEX challenges you will offer to the children who will attend your programme of K'NEX events.

Some of the factors in this decision are:

1. What ages of children will be attending?

2. Does your venue give you lots of space to complete big challenges that need floor space or test areas? Or is it quite small, which will make it sensible to choose only smaller challenges.

3. Will the K'NEX challenges be completed in part or in whole out of doors? If so, it is best to choose some challenges that will work well outdoors.

4. Do you want your programme of K'NEX events to have a "theme", within which you can provide challenges? This might help you to market the event, or integrate it with other concurrent activities for the children. An example of a theme would be "Amusement Park K'NEX challenges" in a playscheme that has an Amusement Park theme.

5. Will you need challenges that are easy to explain verbally or pictorially? Eg because you anticipate low levels of literacy in participants, or lots of children for whom English is not their first language. Alternatively, for the latter group, you may decide to translate the Challenge Cards into other languages.

6. Do you already have access to enough K'NEX to run your event? If so, you may want to consider K'NEX challenges that use your stock of K'NEX to best effect

Once you have answered the above questions, we suggest you then draw up a "long list" of possible K'NEX challenges, from sources such as:

- The challenges at the back of this Guide.

- The challenges on our website www.knexusergroup.org.uk

- Looking at structures and mechanical devices in your locality, and basing a challenge on them.

- Asking colleagues and any children you know to brainstorm ideas.

Thinking up challenges is not difficult, once you get into the swing of it, and providing challenges based on your own locality may help you to attract children to the event. When brainstorming, we suggest you write down every idea, however silly it sounds at first. Some of the best K'NEX challenges sounded impossible at first!

If after going through the above process, you still do not have enough suitable challenges, then feel free to email the K'NEX UK User Group for ideas, on info@knexusergroup.org.uk.

The final stages in deciding on your challenges are then:

1. Examining each challenge in turn, to determine how well it meets the objectives and constraints of your event.

2. Developing the long list into a short list of challenges.

Ferris wheel challenge

3. Looking at each challenge in turn, and seeing if it can be modified to better meet your objectives and constraints . An example would be changing the description of the challenge, to make it more relevant to local children.

4. Finalising the list of challenges that you intend to offer, and the Challenge Card for each one.

3.8 Procuring the K'NEX sets for your event

Once you have finalised the challenge card(s) for your programme of K'NEX events, you will be in a position to procure the K'NEX you need.

The first step is to specify the equipment you will provide for the children attending the event. This will usually comprise:

a) Sturdy plastic trays with compartments and a tight-fitting lid, containing a good selection of all the basic K'NEX rods and connectors, with one tray to share between two pairs of children.

b) Some extra "Free issue" K'NEX in tubs, which children can help themselves to if they are building larger K'NEX models such as towers.

c) Any special K'NEX components that will be needed for the challenges you have chosen (eg K'NEX motors).

d) Any other equipment or materials that will be needed for the challenges you have chosen (eg plastic bags for the lifeboat challenge in the Appendix).

You will also need to set a maximum number of children that you will allow to attend the event at the same time.

Finally, you can multiply the "equipment for each group of 4 children" by the "number of groups of 4 children" to calculate your total equipment requirement.

You may already have access to all this equipment, but if not, we suggest the next steps should be:

1. Visit the "K'NEX shop" web page on our website www.knexusergroup.org.uk. This explains how to order K'NEX, and allows you to browse through the K'NEX education sets available in our on-line shop.

2. You can then place an order on-line, or by fax/post.

3. Alternatively, if you decide that you only require K'NEX Discovery building sets and/or K'NEX Simple Machine Deluxe sets, you can use the short Order Form in the Appendix to this Guide.

We would be very grateful if you could buy the K'NEX you require from the K'NEX UK User Group. We are a not-for-profit organisation, and the income from sales of K'NEX allows us to maintain our website, develop guides, and provide free email support.

3.9 Event procedures and documentation

Another important stage in planning your programme of K'NEX events is to draw up event procedures. These can be quite short and simple, but will help

greatly when you start to train the staff who are going to run the programme.

Some of the issues that you may like to address in the procedures are:

1. How many staff will you need to run the event? Staff:Visitor ratios between1:8 and 1:15 are usual, depending on the level of support children will need.

2. If your event is open access (ie drop-in), how will you ensure you do not exceed the maximum number of concurrent children you have allowed for the event? Eg put up a "Full" sign.

3. What documentation will you need to prepare for the event? (see checklist below).

4. How will you ensure that you have considered all health and safety issues relating to the event? Eg carrying out a risk analysis.

5. What guidelines will be required for staff who are acting as Helpers at the event? Eg explaining challenges to children, helping children get started, assisting children if they get stuck, assessing completed challenges.

6. What are your procedures for marketing the event? Eg sending out flyers, putting up posters, giving talks at local schools, encouraging word of mouth recommendations.

We suggest that you might consider some or all of the following documentation for your programme of K'NEX events:

Marketing the event:

- Posters
- Banners

Delivering the event:

- Challenge cards
- Handy hints
- Certificates
- Passports

Challenge Cards we would regard as essential. As you can see from the Appendix, each Challenge Card refers to one or more "Handy hints". These Hints are designed to assist both families and staff to overcome particular problems in completing their challenge, such as "Building strong 3-D models". Colour versions of all Handy hints may be found on our website, and

A Guitar challenge

can be printed and laminated to use as posters at your event, if you wish.

The other form of documentation that we would recommend is a piece of paper that each child completing a challenge can take away after the event, as a "reward" for their achievement.

In the Baby Buggy challenge in section 2, the children simply took away a signed copy of the Challenge Card. A better approach may be to use laminated challenge cards, which the children give back at the end, together with some form of <u>Certificate</u> to given to each child who helped complete a challenge.

Certificates work well if you are only providing a single K'NEX challenge to children. However, one of the major strengths of K'NEX is that you can use the same box of K'NEX to provide as many different challenges as you like. This has the benefit of encouraging children to attend your club or playscheme on multiple occasions to complete different challenges, thereby greatly increasing the educational added value.

The best document to provide to children attending a multi-challenge K'NEX event is a <u>Passport</u>. An example is included in the Appendix. The Passport is usually issued to each child when they arrive for the first time. As each challenge is completed, a Helper initials that challenge and the level of difficulty reached. Passports are then taken home with one or more challenges signed, and the document should prove very effective in encouraging children to return time and again to get more challenges "signed off".

The Passport can also be bar-coded. This can speed up the registration of children, and can also help if the completed Passport is required as evidence for reporting purposes.

3.10 Staff training

Choosing and training the right staff is probably the most important decision in running your programme of K'NEX events. Some of the questions you will need to answer are:

1. Who will be responsible for planning and managing your programme of K'NEX events?

2. How many members of staff will you need to run the programme?

3. What background should those staff/volunteers have? We would recommend that the primary requirement for staff and volunteers is that they are good at working with children. Giving them the necessary technical knowledge to run K'NEX challenges is then a fairly straightforward training issue – see below.

4. Will you use paid staff, volunteers, or a combination of both?

5. Do you already have the staff/volunteers you need, or will you need to recruit any extra staff or volunteers? One source you might consider if you are looking for extra personnel during holidays is student primary school teachers, who are good at working with children.

6. How will you train your staff/volunteers to run your programme of K'NEX events? This might include:

a) Providing general training based on the procedures discussed in section 3.9.

b) Asking personnel to build some of the standard models in your K'NEX sets, from instructions.

c) Asking personnel to become familiar with the resources on www.knexusergroup.org.uk (Eg Handy hints).

d) Asking personnel to complete the challenge(s) you have chosen for your K'NEX event, working in pairs.

Note that the User Group can provide training workshops, and that these can be accredited if required. This may be worth considering if you are planning to run large K'NEX events, or train a team of staff to deliver events at multiple venues.

7. Can you pilot the event with a limited number of children, to give the personnel experience, and to test out your procedures?

3.11 Delivering your K'NEX event

Once you have planned your programme of events, trained staff, and run a pilot, the actual delivery of the events will (we hope!) prove to be fairly straightforward.

The major tasks during each session are to ensure that all children are enjoying themselves, and achieving the satisfaction that comes from the completion of the K'NEX challenge(s) on offer.

Some particular issues that you may wish to ask Helpers to watch out for are:

- Making sure that the children understand what they have to do

- Helping them get started if they haven't used K'NEX before

- Assisting them if they get stuck part way through a challenge – but doing it in such a way that staff help them to resolve the problem for themselves, rather than simply telling them how to do it

- Ensuring that challenges are assessed on completion, and that children are praised for their work

- Trying to ensure that children do not have wait to too long when waiting for help.

- Making sure the children dismantle their models and tidy up their K'NEX before they leave

A Flower challenge

3.12 Monitoring and evaluation

All programmes of K'NEX events will require some form of monitoring and evaluation. This may be simple and informal, via a post-event meeting with staff and volunteers, to discuss their views on how well the event went, and the verbal feedback they received from the children attending.

More formal evaluation may require:

1. Having a registration form for each child attending the event, on which you record details that might include details such as name, age, gender, ethnicity and postcode.

2. Using the registration details to analyse statistics such as male/female ratio, visitors by age range, ethnic background, and where children live.

3. Using the postcode to analysis further demographic data about your children (eg percentage from disadvantaged communities.

4. Asking visitors to complete a questionnaire and/or a visitor book and/or a suggestion form before they leave.

5. Asking staff to keep a daily log of their own comments and any relevant comments received from children.

6. Holding regular meetings of staff and volunteers to review all data collected, and to discuss any actions that need to be taken (eg improvements to procedures).
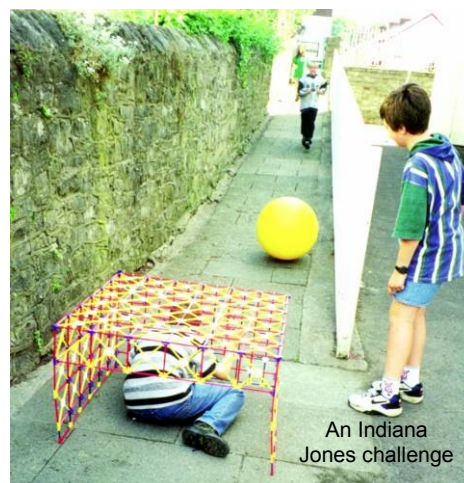
3.13 And finally…

Good luck! And please email us:

- if you have any queries or suggestions on running K'NEX events in out-of-school education.

- If you have any ideas for improvements to this Guide.

4. Outcomes and benefits

In section 2.3, we listed a few of the benefits that would arise out of running a simple K'NEX Baby Buggy challenge. Designing your own programme of K'NEX events gives you the ability to deliver a wider range of outcomes and benefits, which might include:

✓ The children have enjoyed working with K'NEX.

✓ Both boys and girls have participated.

✓ The children have developed:
  - Technology skills
  - Innovation skills
  - Problem-solving skills
  - Team-working skills
  - Communication skills
  - Self-esteem

✓ These skills have helped the children to become better equipped for working in the modern economy.

✓ Disaffected pupils and other hard-to-reach children may have enjoyed themselves at your K'NEX event, and as a result may become more willing to participate in other forms of education in future.

✓ Children with learning difficulties who have completed K'NEX challenges at the event may have increased their self-esteem.

✓ The children who attended your programme of K'NEX events may already be looking forward to your next activity.

✓ You may find that your programme of K'NEX events has helped increase the number of children that regularly attend your club or playscheme.

An Indiana Jones challenge

Index

Appendix - Resources for photocopying

To help you to run the Baby Buggy challenge

- Poster
- Challenge Card with space for signature, for the children to take home

To help you to design your own K'NEX events

- A4 Passport for children attending an event with multiple K'NEX challenges on offer (requires folding twice after being printed)
- Challenge cards to copy and laminate
    - Circus
    - Drum
    - Fire engine
    - Lifeboat
    - Lift
    - Spinning tops
    - Sundial
    - Suspension bridge
    - Table tennis
    - Zoo

Other resources to help you

- Letter to raise sponsorship
- Reviews of K'NEX sets
- K'NEX Order Form

Note that a further 30 full-colour challenges are available on **www.knexusergroup.org.uk**, including the Golf challenge and the Bridge that Gap challenge shown in the photo below.

Bridge that Gap and Golf challenges
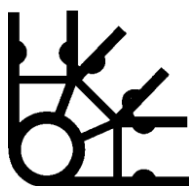
We are pleased to
invite you to a

K'NEX
Baby Buggy
challenge

at: _____

on: _____

from: _____   to: _____

All welcome

K'NEX Baby Buggy challenge

Please help - our baby doll isn't old enough to walk yet, and we need to take her shopping. Could you build a baby buggy for us, to keep her comfy and safe?

Equipment: K'NEX set including small wheels, plus a doll or cuddly toy about 20cm high

Level 1 ✓5 Make a simple baby buggy for a doll.

Level 2   As level 1, with a seat belt.

Level 3   As level 2, plus brakes to hold the buggy stationary on a slope.

✓5 = Suitable for 5 year olds

For level 1, think about how you could make your baby buggy. How will you make a box big enough for the doll to sit in or lie in? How many wheels will you need? How will you fasten them on? Will you need a handle to push the buggy with?

For level 2, think about how seat belts in real baby buggies or cars work. Can you build something made of K'NEX onto your baby buggy that will work just as well?

For level 3, think about how you could make a brake. Will it prevent the wheels turning, or will it stop the buggy in some other way?

Handy Hints

There are only three ways to connect K'NEX rods to K'NEX connectors: End-on, Side-on, and Through the hole in the middle. All three are shown in the picture.
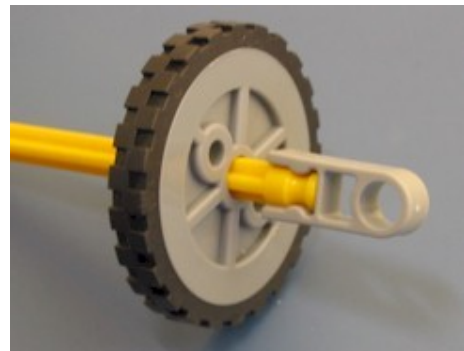
To use a K'NEX wheel, simply put a rod through the hole in the middle, and it will spin freely. One way to stop the wheel falling off the rod is to put a grey connector on the end of the rod.

_____

This is to certify that

_____

has completed the K'NEX Baby Buggy Challenge.

Signed: _____

K'NEX Passport

Name:

_____

Age: ___

Visit dates:

_____ _____ _____

You can find lots more K'NEX challenges to enjoy with your family and friends on
www.knexusergroup.org.uk

Don't forget to bring this Passport with you if you visit us again!

Challenges available

Challenge	Level 1 2 3	Signed	Challenge	Level 1 2 3	Signed
Circus ✓5	☺ ☺ ☺	____	**Spinning tops ✓5**	☺ ☺ ☺	____
Drum ✓5	☺ ☺ ☺	____	**Sundial**	☺ ☺ ☺	____
Fire Engine	☺ ☺ ☺	____	**Suspension bridge**	☺ ☺ ☺	____
Lifeboat ✓5	☺ ☺ ☺	____	**Table tennis**	☺ ☺ ☺	____
Lift	☺ ☺ ☺	____	**Zoo ✓5**	☺ ☺ ☺	____

✓5 = suitable for 5 year olds

Circus

The circus is coming! Can you make some circus performers, animals and circus acts for us? What about a big top, or a flying trapeze?

Levels of difficulty	
Level 1 ✓5	Make some circus animals and performers
Level 2 ✓5	As level 1, plus a big top to put them in
Level 3	As level 2, and a flying trapeze on which the performers can swing
	✓5 = suitable for 5 year olds

Can you think of any animals or performers that you might find in a circus? Could you make models of them?

For level 2, could you make a 'big top' (a big circus tent) out of K'NEX for your animals and performers?

For level 3, can you make a 'flying trapeze' at the top of the big top that a person can swing on? How might you attach the trapeze so that it swings easily?

Equipment needed: K'NEX set

☺ Handy hints
L1 3 ways to connect rods and connectors
L3 Making corners with blue and purple connectors
L4 Strong 3-D structures

Drum

Drums are one of the oldest forms of musical instrument, and are found all around the world. Can you use your K'NEX set to make a drum?

Levels of difficulty	
Level 1 ✓5	Make a drum using a drum skin stretched across a K'NEX frame
Level 2 ✓5	Make some drumsticks
Level 3	As level 2, plus a way of changing the tension of the drum skin
	✓5 = suitable for 5 year olds

Can you stretch a plastic sheet over a K'NEX model to make a drum? How will you fasten the plastic sheet to your model?

For level 2, how could you make some drum sticks? What sound does the drum make when you beat it?

For level 3, can you improve your model so that the plastic sheet can be tightened, perhaps when you pull a lever or turn a handle? What effect do you think this will have on the sound of the drum?

Equipment needed: K'NEX set

Plastic sheet cut to size (eg supermarket carrier bag)

☺ Handy hints
L1 3 ways to connect rods and connectors
N4 Plastic sheet

Fire Engine

Quick! A fire has started in an office block nearby. Can you make a fire engine that can help the office workers escape, and then put out the fire?

Levels of difficulty	
Level 1	Make a fire engine vehicle
Level 2	As level 1, with a ladder on a turntable which you can turn with a handle
Level 3	As level 2, and the ladder extends when you turn a second handle

Can you think of all the different parts of a Fire Engine? How can you build them into your model?

For level 2, how can you make a long ladder with K'NEX? Can it lie flat when the vehicle is moving, and be put upright when you arrive at the fire? Could you build it on a turntable, which turns with a handle?

For level 3, how could you make a ladder in two sections which extends when you turn a handle?

Equipment needed: K'NEX set

For level 3:   50cm length of string

☺ Handy hints
L1 3 ways to connect rods and connectors
L3 Making corners with blue and purple connectors
L5 Wheels and tyres
L6 Making rods turn with wheels or connectors
L8 Handles
N1 String

Lifeboat

Lifeboats are designed to be launched in all weathers, to save the lives of people in trouble at sea. Can you make a model of a lifeboat, that won't sink even when carrying a lot of weight?
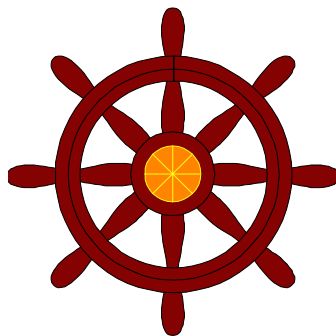
Levels of difficulty	
Level 1 ✔5	Make a simple model of a boat, that will float on water without capsizing or sinking
Level 2 ✔5	As level 1, and test to see how many weights it can carry
Level 3	As level 2, with a mast 30cm high

What shape is a boat? Will your boat be long and thin, or short and fat? How will you fasten the plastic sheet to your boat, to make it float?

For level 2, see how many weights your boats can carry. Does it make a difference where in the boat you put the weights? Can you improve your boat so that it will carry more weights without capsizing?

For level 3, how can you attach a mast to your boat. What happens when you put the boat back in the water? If it capsizes, what can you do to stop this happening?

Equipment needed: K'NEX set

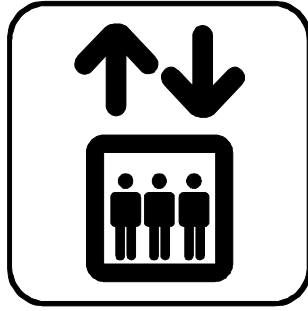Plastic sheet cut to size (eg supermarket carrier bag)

For level 2:   Some small weights

☺ Handy hints
L1 3 ways to connect rods and connectors
N4 Plastic sheet

Lift

Tall buildings use lifts to take people quickly up and down to each floor. Can you make a lift, that can carry people from the ground to the second floor?

Levels of difficulty	
Level 1	Make a block of flats with three floors
Level 2	As level 1, with a simple lift that goes from the ground to the 2nd floor, operated by a handle
Level 3	As level 2, plus a folding door that can be opened and closed

What shape is your block of flats going to be? How can you make it as strong as possible?

For level 2, where will the lift run up and down? How can you use a handle to make it move up and down?

For level 3, how can you add a door which folds up to open?

Equipment needed: K'NEX set

For level 2:   2m length of string

☺ Handy hints
L1 3 ways to connect rods and connectors
L3 Making corners with blue and purple connectors
L4 Strong 3-D structures
L6 Making rods turn with wheels or connectors
L7 Pulleys
L8 Handles
N1 String

Spinning tops

Round and round and round they go… Faster and faster… Colours that blend as they spin…See for yourself with the Spinning Tops Challenge!
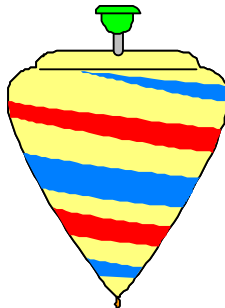
Levels of difficulty	
Level 1 ✓5	Make a simple spinning top
Level 2 ✓5	As level 1, with three different colours that blend as the top spins
Level 3 ✓5	Make three tops, and have them all spinning at the same time
	✓5 = suitable for 5 year olds

What will your spinning top look like? What colour connectors and rods will you use? How can you attach the stem to the part that spins round? How long will your top spin for?

For level 2, how could you use three different colours in the spinning part of your top?

For level 3, what design of top spins for longest? Can you make three tops of the best design all stay spinning at the same time?
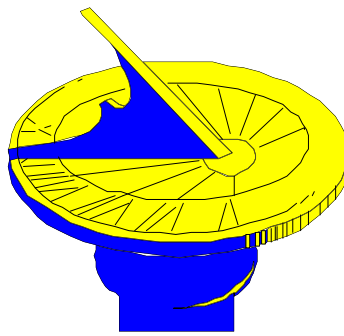
Equipment needed: K'NEX set

☺ Handy hints
L1 3 ways to connect rods and connectors
L6 Making rods turn with wheels or connectors

Sundial

How did people know what time it was before clocks were invented? They sometimes used sundials, in which the sun cast a shadow on a dial marked out with the daylight hours. Could you make one?

Levels of difficulty	
Level 1	Make an octagonal flat surface, with a K'NEX rod sticking out from the middle at a 45 degree angle
Level 2	As level 1, plus a stand to raise it about 1m from the ground
Level 3	As level 2, with a sheet of card on the flat surface marked out to show where the shadow is at each daylight hour

First find a sunny day! Then think how you could make an octagon (an eight-sided 2-D shape) out of K'NEX. How can you make a rod stick up at or near the middle at an angle of 45 degrees?

For level 2, how can you make a stand that will hold the sundial about 1m up in air? Will it have feet to give it stability?

For level 3, cut your card to match the octagon shape, and attach it with Bluetac. See how the shadow falls. How can you mark out where the shadow will be for each daylight hour?

Equipment needed: K'NEX set

For level 3:   Sheet of thin white card
                      Bluetac
                      Pencil

☺ Handy hints
L1 3 ways to connect rods and connectors
L3 Making corners with blue and purple connectors
L4 Strong 3-D structures

Suspension bridge

Suspension bridges are often used to cross rivers and sea channels which are too wide for any other sort of bridge. Could you make one out of K'NEX?

Levels of difficulty	
Level 1	Make a 1m roadway out of a flat layer of K'NEX rods and connectors
Level 2	As level 1, plus two towers to support the bridge, and place them on either side of a 50cm gap
Level 3	As level 2, and support the roadway from the towers using string

Safety: Children should be supervised when using scissors

How can you make a 2-dimensional flat roadway for your bridge? What rods and connectors will you use? Will you need to reinforce the roadway with sideways diagonals to make it stronger?

For level 2, how will you make two strong towers? How tall do you think they should be? Can you make them stable, so they don't fall over easily?

For level 3, how many lengths of string will you need? Where will you fasten them onto the roadway and onto the tower? Will you need to 'anchor' the ends of the roadway?

Equipment needed: K'NEX set

For level 3:   5m of string
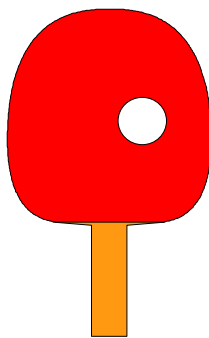   Blunt-nosed scissors

☺ Handy hints
L1 3 ways to connect rods and connectors
L3 Making corners with blue and purple connectors
L4 Strong 3-D structures
N1 String

Table tennis

To play table tennis you need to have a good eye for a ball, fast reflexes and a high degree of concentration. But first you need a table tennis bat and a net…

Levels of difficulty	
Level 1	Make a table tennis bat
Level 2	As level 1, plus a table tennis net
Level 3	As level 2, and play a rally of five shots with your bat over the net with a friend

How will you make your bat? For instance, can you sandwich the cardboard sheet somehow between two red squares? How will you hold the bat? Will the bat be strong enough if you hit the ball hard?

For level 2, how long will your net have to be to reach across the table? How can you make it stand upright?

For level 3, find a friend and have a go! If your bat breaks or won't hit the ball straight, how could you improve it?

Equipment needed: K'NEX set
17cm square piece of cardboard or corrugated plastic

Level 3 test area: Table
Table tennis ball

☺ Handy hints
L1 3 ways to connect rods and connectors
N2 Cardboard sheet

Zoo

What animals might you find in a zoo? Big ones? Small ones? Reptiles? Mammals? Insects? Put them all in your K'NEX Zoo!

Levels of difficulty		
Level 1	✓5	Make some animals for your zoo
Level 2	✓5	As level 1, and a zoo building and enclosure for your animals
Level 3	✓5	As level 2, and plenty of activities for the animals, to keep them happy.

What are your favourite zoo animals? Could you make models of them out of K'NEX?

For level 2, how could you make your animals a really comfortable place to live in at your zoo. Are they used to having trees or plants around? Do they live in hills or on the plains? Where will they find water to drink? Where will they sleep at night?

For level 3, what activities do you think the animals would like? How can you build them out of K'NEX?

Equipment needed: K'NEX set

☺ Handy hints
L1 3 ways to connect rods and connectors

Dear

K'NEX challenge

We are planning to run a K'NEX challenge in the next few months. At this event, local children will work together to complete engineering challenges using the K'NEX construction kit. A sample of a K'NEX challenge is enclosed.

The purpose of the event is to help both the children attending to develop the following skills:

- Technology skills
- Innovation skills
- Problem-solving skills
- Team-working skills
- Communication skills

We are writing to local employers to ask them to support us, by sending us a donation to help meet the cost of the event.

We appreciate that you receive many requests for financial support, but hope you will agree that the planned event will have particular relevance to local employers such as yourselves, as we will be helping local children to develop **essential work place skills**.

We would be grateful for any financial support that you can afford to give, but as a guideline we are asking local employers to calculate their donation on the basis of £1 for each of their employees (minimum £10).

Please do not hesitate to call me if you have any queries, otherwise we look forward to hearing from you once you have considered our request.

With many thanks in anticipation,
Yours sincerely

K'NEX Set reviews

The K'NEX User Group sells a full range of K'NEX education sets, guides and parts in its online shop at **www.knexusergroup.org.uk.** Three of the most popular K'NEX sets are described below, together with an Order Form overleaf.
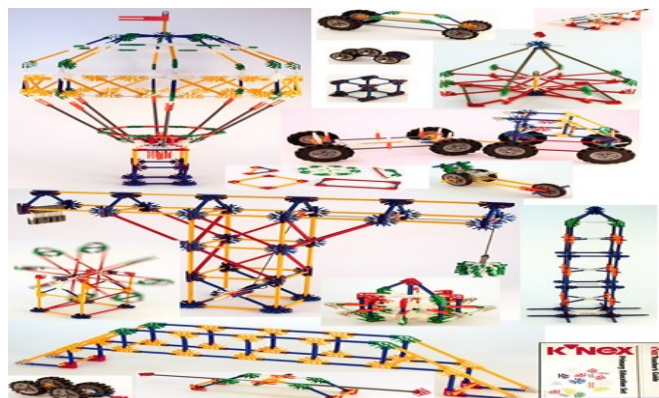
K'NEX Discovery Building set

A general purpose K'NEX set that is equally effective in the home, schools, clubs, childcare schemes and family learning.

20 different models can be built from instructions, and the set is also a good base for setting simpler K'NEX challenges.

Suggested age range: **5 to 95**

Number that one set can support:

2-4 children, working in pairs

K'NEX Primary Education set

Large general-purpose K'NEX set, with a good mix of classic K'NEX parts. Ideal for use in the home, schools, clubs, childcare schemes and family learning, and excellent value for money.

All the models shown in the photo could be built **at the same time** with this set.

32-page Teacher's guide based on UK Primary curriculum, plus 12 double-sided activity cards, covering the topics: Flat shapes, Patterns, Symmetry, Cubes and cuboids, Designing and building, Working with pulleys and Balancing.

Suggested age range: **5 to 95**

Number that one set can support:

12 children, working in pairs

Kid K'NEX Creatures set

A large Kid K'NEX set that enables children to build a range of "creatures". Good for home, nursery, school and family learning.

Build any 8 of 13 different models simultaneously, from full colour building cards. Includes 14 eyes, 11 dorsal fins and 4 bird feet.

Suggested age range: **3 to 7**

Number that one set can support:

12 children working in pairs

K'NEX Order Form

To use this order form, please print it out, and fill in every field marked with an asterisk. Then fax to **(0208) 196 2248**, or mail to *K'NEX User Group, 87A Newton Road, Mumbles, Swansea SA3 4BN.* If you have any queries on completing this form, please email us via info@knexusergroup.org.uk

*Date ordered		***Your purch. order ref.**	
*Organisation			
*Address			
		*Postcode	
*Telephone		***Email**	
*Name		***Position**	
*Signature		(Order not valid unless signed)	

Part no.	Description	Price	*Quantity	*Value
78650	**K'NEX Discovery set**			
79520	**K'NEX Primary Education set**			
78690	**Kid K'NEX Creaturesset**			

* Nett value of goods = £

All orders are subject to our Terms and conditions, which may be found at:

http://www.knexusergroup.org.uk/acatalog/tandc.html