

# **Guide to using K'NEX in Family Learning**

...featuring the  
Mousetrap challenge



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## 1. Introduction

Learning within the family has long been recognised as a keystone of the UK education system. In recent years, government agencies and local authorities have recognised the potential for investing in increased family learning provision. There have been some notable successes, particularly in the fields of family literacy, language, numeracy and IT.

The infrastructure for family learning in the UK has also been developed, and organisations such as NIACE and the Campaign for Learning have done a great deal to accelerate the development of learning within families.

Some of the current topics that are being discussed in family learning circles are:

- How can we extend family learning into new subject areas such as science and technology?
- How can family learning assist the development of “soft skills” such as problem-solving and teamwork?
- How can we ensure both adults and children are equally involved in family learning activities?
- How can we attract more fathers into family learning?
- How can we attract hard-to-reach families, such as those from disadvantaged communities?
- How can we deliver more accredited family learning?

The purpose of this short guide is to explain how family learning activities based on the K'NEX construction kit can assist family learning practitioners to meet the above objectives. Note that the term “Families” in this Guide includes not only families, but also other forms of kinship network (eg aunts and uncles, close family friends).

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### 1.1 Who is this guide for?

This Guide has been written for everyone who has an interest in family learning, including those working in:

- Family literacy, language, numeracy
- Wider family learning
- Schools and colleges
- Libraries and museums
- Community Education and Adult Education
- Parent-Teacher Associations

### 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.



Building K'NEX models helps children and adults to understand subjects such as structures, forces and simple machines, in the way that Meccano educated an earlier generation. However, Meccano was aimed and advertised exclusively at boys, whereas both girls and boys find K'NEX easy and enjoyable to use. K'NEX can also be used effectively by children and adults with learning difficulties, once they have mastered the basic techniques for joining rods and connectors together.

A further strength of K'NEX is that, when used to set Challenges, it can help both children and adults to develop skills such as innovation skills, problem-solving skills and team-working skills. These are skills that are much sought after by employers.

It is also worth remembering that even though educational organisations use K'NEX because of its high educational value, children and adults enjoy using K'NEX simply because it is fun. This makes K'NEX a good vehicle for engaging hard-to-reach family members, such as fathers and families from disadvantaged communities.

## 2. A simple K'NEX Family Learning event – *the Mousetrap challenge*

This section describes how your own organisation could easily plan and deliver a simple K'NEX Family Learning event – *the Mousetrap challenge*.

### 2.1 Planning and promoting the event

1. Choose the date(s) on which you want to run the event (eg a weekend), and the opening hours (eg 11am to 5pm).
2. Book a suitable venue, which has a large open plan room that can be laid out with tables and chairs.
3. Fill in details of the venue, date(s) and opening hours in the Mousetrap poster in the Appendix.
4. Photocopy 100 or more copies of the poster, and send them out to local organisations such as schools, libraries, leisure centres and community centres to promote the event.
5. Decide on the maximum number of visitors (adults plus children) you will allow into the event at the same time. This will depend upon factors such as the size of the room, and the number of staff.
6. If you don't already have your own K'NEX, divide the maximum number of visitors by 20 to calculate the number of K'NEX Simple Machines deluxe sets you will need to purchase. For example, buy 3 sets if your maximum number of visitors at any one time is going to be 60.
7. Use the Order Form in the Appendix to order the sets you need, plus a single Kid K'NEX classroom collection set, which can be used when families arrive with children under 5.
8. Allocate two or more members of staff as "Helpers" to operate the event.
9. Assist the Helpers to develop the necessary skills to deliver the event, via training and/or self-help (see section 3.10).
10. Photocopy the Mousetrap challenge cards in the Appendix, ready to give out to families participating in the event.
11. Sort the K'NEX you have bought into the compartmented trays provided.



### 2.2 Delivering the event

12. Lay out the room with tables and chairs for families to sit at, plus a Reception Desk near the entrance.
13. Meet families on arrival at the Reception desk, and explain what they have to do to build their mousetrap.
14. Give each family a copy of the Challenge Card, and a tray of K'NEX, and ask them to sit down at a table to complete their challenge.
15. Ensure one or more Helpers are wandering around the tables, assisting families to understand the challenge, and to get started with K'NEX if they haven't used it before.

16. Families then work at their own pace to complete the challenge, to the 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> level of difficulty.
17. Ensure the wandering Helpers are also on hand to assist families further if they require it, and to encourage the family together to work as a team.
18. When the family has completed its challenge, ask them to demonstrate how their mousetrap works, and praise them for all their hard work.
19. Ask the family to dismantle their model, put the K'NEX pieces back tidily in the tray, and return the tray to Reception.
20. When they return the tray, sign their Challenge Card to take away as a certificate of their achievement.

### 2.3 Monitoring and evaluating the event

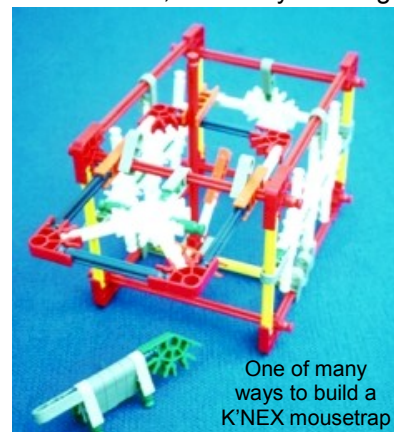
21. As each family arrives, record the number of male and female children and adults in the family, and ask them for their postcode.
22. After the event, calculate the number of males children, female children, female adults and male adults, and the number attending from different postcode districts (eg SA1 2).
23. Hold a review with staff to evaluate the event, including staff feedback, visitor statistics, and any verbal feedback received from families.

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

- By completing the challenge, the children and adults attending the event will have developed their technology skills and problem-solving skills.
- By working together to complete the challenge, the children and adults will have developed their teamwork skills and communication skills.
- The event will have attracted both boys and girls.
- The event will have attracted a significant proportion of male adults (fathers etc) as well as female adults (mothers etc).
- If the venue is appropriate, and the marketing effective, the event will have attracted families from disadvantaged areas.

### 2.4 Conclusions

We hope you will agree that a simple event such as the K'NEX Mousetrap challenge can be fairly easy to organise, but can deliver significant educational benefits to both adults and children, via family learning. Once you have run your first K'NEX event, you will then have the K'NEX and trained staff necessary to deliver many more K'NEX events in future.



One of many ways to build a K'NEX mousetrap



### 3. Design your own K'NEX Event

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

#### 3.1 Event objectives

The first stage in the planning process is to agree the objectives for your K'NEX family learning event(s), including:

- Which families are you trying to attract to the event? Local families? Families who are visiting the area?
- Do you have a specific group of participants that you are trying to reach? Eg families from particular communities, or fathers?
- Do you have specific learning objectives? Eg developing teamwork within the family, or attracting adults back into education.
- 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 family learning events, including:

- K'NEX events which are closed access (ie to an established group of families), rather than open access.
- K'NEX events run at a single venue for a day, a weekend, a school holiday, or all year round.
- K'NEX events that travel around multiple venues for a day or more at a time (eg all the libraries, schools or FE colleges in a county). This approach is particularly effective in rural areas.
- Events offering a range of K'NEX challenges, so as to attract repeat visits from families.
- Family Learning events that include K'NEX challenges alongside other types of family challenge (eg computer-based ones).
- K'NEX events that provide accredited family learning (see section 4).

#### 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:

- Set-up costs, such as equipment purchase, staff training, printing, and marketing.
- Delivery costs, such as staff wages and room hire costs.

For an event such as the Mousetrap challenge, the set-up cost might be £1,000, and the delivery costs £200 per day. This would be true whether the event is run for a single day or a whole week, or at a series of different venues instead of at a single venue.

In general, this fact leads organisations that have made the decision to provide K'NEX family learning events to:

- Make an initial investment in K'NEX, by buying sufficient K'NEX for their purposes, training a pool of staff, and then
- Deliver K'NEX events on a reasonably regular basis, so as to gain the maximum return on that investment.

#### 3.4 Funding your event

Family learning is not always 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:

- Funding for Family Literacy, Language and Numeracy.
- Funding for Wider Family Learning.
- Funding for community regeneration.
- A grant for children's education that can be used for family learning (eg New Opportunity Fund).
- A grant for adult education that can also be used for family learning (eg European Social Fund).
- Funding from charitable trusts (if you are eligible).
- Sponsorship (eg from local businesses)
- Charging families participating a fee to attend (eg £1 per adult or child, if this is permitted)

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

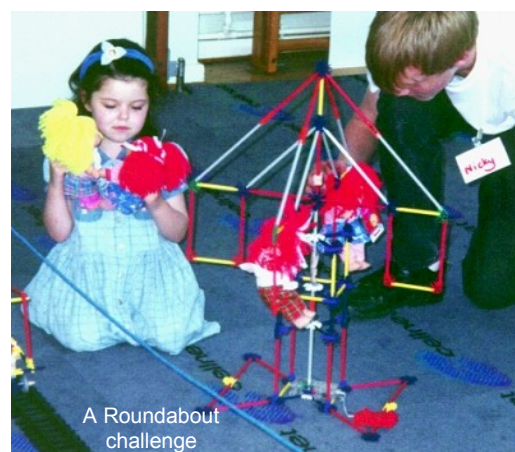
The Appendix contains a draft of a letter that you might like to send out to local employers, asking for sponsorship of your K'NEX event.

#### 3.5 Selecting a venue for your K'NEX event

Almost all family venues are suitable for K'NEX challenges, including:

Centres such as:

- Family Learning centres
- Community centres
- Community IT centres



- Community schools
- Libraries
- Museums
- Colleges and universities
- Local companies
- Tourist attractions
- Shopping centres
- Leisure centres

#### Family events such as

- Family shows (eg county shows)
- Fetes
- Festivals

The ideal location for K'NEX family learning within one of the above venues would be a large open-plan room or area, with groups of tables and chairs each seating 6 to 10. An alternative approach is to run your K'NEX event outside, although having a wet weather fallback is probably also useful!

For open access events, it is also a good idea to have a Reception desk to welcome families when they arrive.

Other general facilities that you should look for in a good venue for K'NEX family learning are:

- toilets for staff and visitors
- good wheelchair access
- easily accessible by public transport and on foot
- proximity to the target groups you want to attract (eg particular housing estates)

### **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. If your families include under 5s, a Kid K'NEX set will also be useful. You and your staff can then familiarise yourself with K'NEX and Kid K'NEX, before going on to decide which activities to offer (see next section).

The *K'NEX Discovery Building set* and *Kid K'NEX Classroom set* are relatively low cost sets that are good for staff familiarisation. A review of these sets, 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](http://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 activities for your event**

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 activities you will offer to the families who will attend your event.

Some of the factors in this decision are:

1. Do you know the ages of the children attending with their families? If not, we suggest you offer a range of K'NEX challenges for age 5 and older, plus some Kid K'NEX activities for under 5s.
2. Will the K'NEX activities be part of an accredited learning programme?
3. Does the venue you have chosen give you lots of space to complete big models that need floor space or test areas? Or is it quite small, which will make it sensible to choose only smaller table-top activities.
4. Will the K'NEX event be held in part or in whole out of doors? If so, it is best to choose some activities that will work well outdoors.
5. Do you want your event to have a "theme", within which you can provide one or more K'NEX activities? This might help you to market the event, or integrate it with other family activities. An example would be "medieval K'NEX challenges" alongside a medieval fayre (see case study on Family Learning page of website).
6. Will you need activities that are easy to explain verbally or pictorially? Eg because you anticipate low levels of literacy in participants, or lots of families for whom English is not their first language. Alternatively, for the latter group, you may decide to translate K'NEX activities into other languages.
7. Do you already have access to enough K'NEX and/or Kid K'NEX to run your event? If so, you may want to consider activities that use your stock of K'NEX and Kid 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 activities, from sources such as:

- The instructions that you received with your set, and the instructions on our website.
- The challenges at the back of this Guide, and the challenges on our website.
- 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 for challenges.

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 market 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@knexusgroup.org.uk](mailto:info@knexusgroup.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.
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 families.
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 K'NEX event, you will be in a position to procure the K'NEX you need to run the event.

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

- a) Sturdy plastic trays with compartments and tight-fitting lids, containing a good selection of all the basic K'NEX components.
- b) Some extra "Free issue" K'NEX in tubs, which families 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 yacht challenge in the Appendix).

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

Finally, you can multiply the "equipment required per family" by the "maximum number of families" 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.knexusgroup.org.uk](http://www.knexusgroup.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 event 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 event.

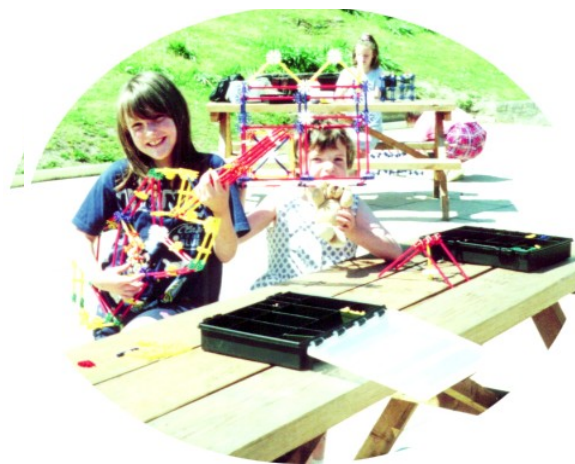
Some of the issues that you may like to address in the event procedures are:

1. How many staff will you need to run the event? Staff:Visitor ratios between 1:8 and 1:20 are usual, depending on the level of support families will need.
2. How will you ensure you do not exceed the maximum number of concurrent visitors you have set 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 families, helping families get started, assisting families if they get stuck, assessing completed challenges, keeping evidence for accredited learning.
6. What are your procedures for marketing the event? Eg sending out flyers, putting up posters, giving talks at local schools, writing press releases, encouraging word of mouth recommendations.

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

Marketing the event:

- Posters
- Banners





- Advertisements
- Press releases

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 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 with their family can take away after the event, as a "reward" for their achievement.

In the Mousetrap challenge in section 2, the children simply took away a signed copy of the Challenge Card. A better approach is to use laminated challenge cards, which the families give back at the end, together with some form of Certificate to given to each child who helped complete a challenge.

Certificates work well if you are only providing a single K'NEX challenge to families. 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 families to visit the event on multiple occasions to complete different challenges, thereby greatly increasing the educational added value of your event.

The best document to provide to families attending a multi-challenge K'NEX event is a Passport. An example is included in the Appendix. The Passport is usually issued to each child when they arrive for the first time with their family. 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 families to return time and again to get more challenges "signed off".

In larger K'NEX family learning venues, the Passport can also be bar-coded. This can speed up visitor registration, and can also help if the completed Passport is required as evidence for accredited family learning programmes.

### 3.10 Staff training

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

1. Who will be responsible for planning and managing your K'NEX event?

2. How many members of staff will you need to run the event? A staff:visitor ratio of about 1:15 is a good starting point for planning and budgetary purposes.
  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 families. 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 often good at working with families.
  6. How will you train your staff/volunteers to run your K'NEX event? 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](http://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 courses if required. This may be worth considering if you are planning to run large K'NEX events, or to train a team of staff to deliver K'NEX events at multiple venues.
7. Can you pilot the event with a limited number of families, to give the personnel experience, and to test out your procedures?

### 3.11 Delivering your K'NEX event

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

The major tasks during opening hours are to ensure that all family members 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 families 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 and adults are praised for their work
- Trying to ensure that families do not have to wait too long to be served (eg on initial entry, or when waiting for help)
- Making sure families dismantle their models and tidy up their K'NEX before they leave

### 3.12 Monitoring and evaluation

All 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 any volunteers, to discuss their views on how well the event went, and the verbal feedback they received from families.

More formal evaluation may require:

1. Having a registration form for each family attending the event, on which you record details that might include for every visitor details such as name, age range, 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 families live.
3. Using the postcode to analysis further demographic data about your visitors (eg percentage from disadvantaged communities).
4. Extending the registration form to include other useful information such as address (so you can invite families to future events) and "how did you find out about this event" (so you can assess the effectiveness of your marketing).
5. Asking visitors to complete a questionnaire and/or a visitor book and/or a suggestion form before they leave.
6. Asking staff to keep a daily log of their own comments and any relevant comments received from families.
7. Holding regular meetings of staff and any volunteers to review all data collected, and to discuss any actions that need to be taken (eg improvements to procedures).
8. Providing internal and external moderation for accredited family learning programmes.

Note that you may also have to record extra information or develop additional evaluation procedures to meet the needs of your funding organisation, or if your K'NEX events provide accredited learning.

### 3.13 And finally...

Good luck! And please email us:

- if you have any queries or suggestions on running K'NEX events.
- If you have any ideas for improvements to this Guide.

## 4. Accredited learning with K'NEX

The K'NEX UK User Group has developed the following four accredited learning units for both **family learning** and **adult education**:

For learners (all 10 hours):

- K'NEX for hands-on Technology (levels 1 or 2)
- K'NEX for hands-on Science (level 1)
- K'NEX for hands-on Numeracy (level 1)

For tutors (6 hours):

- K'NEX for hands-on Learning (for Tutors) (level 2)

All of the above are accredited as progression units by both the National Open College Network (NOCN), and the independent Open College North West (OCNW). Any organisation delivering family learning and/or adult education can register as a learning centre with their local OCN or with OCNW, and deliver the units to their learners, using coursework materials supplied by the User Group. The unit for tutors is usually delivered directly by the User Group.

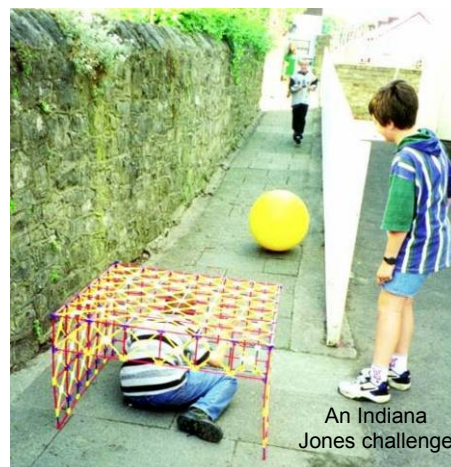
No previous experience of the K'NEX construction kit is required for any of the units.

### 4.1 K'NEX for hands-on Technology

Learners will build models from the K'NEX construction kit to help them to better understand the technology of everyday life, including structures and simple machines.

The learner will start by gaining familiarity with the K'NEX construction kit, by building two simple working models from instruction cards (eg seesaw, swing). The learner will then complete a series of nine "challenges", in which they must build a K'NEX model of an everyday structure or simple machine, without instructions (eg house, tower, bridge, crash helmet, car, roundabout, baby buggy, mousetrap, crane).

The education materials for this unit are in the User Group Guide to "Hands-on Science and Technology".





## 4.2 K'NEX for hands-on Science

Learners will build ten models from the K'NEX construction kit to help them to better understand the science of everyday life, including forces, motion and sources of energy.

The learner will complete ten working K'NEX models from instruction cards. Each model will demonstrate a different aspect of forces, energy and motion (eg weighing scales, wheelbarrow, steering wheel, battery powered car, rubber band-powered car, windmill, waterwheel, food mixer, exercise bicycle, block and tackle).

The education materials for this unit are in the User Group Guide to "Hands-on Science and Technology".

## 4.3 K'NEX for hands-on Numeracy

Learners will complete ten one-hour model-building sessions using the K'NEX construction kit, to help them to better understand numeracy, shape, space, measure and handling data in the adult numeracy core curriculum.

The learner will complete ten K'NEX model-building sessions last one hour, working from instruction cards. Each session will cover one or more aspects of the adult numeracy core curriculum (eg counting, patterns and relationships, fractions, squares, cubes, estimating, equations, costing, 2-D shapes, 3-D shapes, nets, angles, segments, congruence, similarity, rotation, reflection, symmetry, areas, volumes, rulers, weighing, compasses, clock faces, sundials, dice, spinners, tables and bar charts).

The education materials for this unit are in the User Group Guide to "Hands-on Maths".

## 4.4 K'NEX for hands-on Learning (for Tutors)

The unit will train teachers, tutors and other educators how to use the K'NEX construction kit to help adults and/or children to develop:

- a better understanding of technology, science and numeracy, and
- improved creativity skills and problem-solving skills.

The unit is for teachers, family learning practitioners, club leaders, leaders of childcare schemes, home educators, post-16 tutors and other educators. It lasts six hours, split equally between theory and practical sessions.

The learner will:

- a) Receive Powerpoint presentations on "Introduction to K'NEX", "Educational uses of K'NEX" and "Planning and delivering a K'NEX event".
- b) Build at least two K'NEX models from instruction cards.
- c) Complete at least two K'NEX challenges.

## 5. Outcomes and benefits

In section 2.3, we listed a few of the benefits that would arise out of running a simple K'NEX Mousetrap challenge. Designing your own K'NEX event gives you the ability to deliver a wider range of outcomes and benefits, such as:

- ✓ Children, parents, grandparents, and other members of kinship networks have enjoyed working with K'NEX.
- ✓ Both boys and girls have participated.
- ✓ Fathers and other male adults have been attracted into a family learning activity, as well as the more usual female adults.
- ✓ Both the children and the adults have developed:
  - Technology skills
  - Innovation skills
  - Problem-solving skills
  - Team-working skills
  - Communication skills
  - Self-esteem
- ✓ These skills have helped both children and adults to become better equipped for working in the modern economy.
- ✓ Participants may have completed accredited learning units.
- ✓ Hard-to-reach families may have enjoyed themselves at your K'NEX event, and as a result may become more willing to involve themselves in other forms of lifelong learning in future.
- ✓ If you are running your K'NEX events to complement other forms of family learning, such as family literacy, family numeracy and family IT sessions, you may find that the K'NEX events help to reduce drop-out rates.
- ✓ Children and adults with learning difficulties who have completed K'NEX challenges at the event will have increased their self-esteem.
- ✓ The families who attended the K'NEX event will already be looking forward to your next family learning activity.



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## Appendix - Resources for photocopying

### To help you to run the Mousetrap challenge

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

### To help you to design your own K'NEX event

- A4 Passport for families attending an event with multiple K'NEX challenges on offer (requires folding twice after being printed)
- Challenge cards to copy and laminate
  - Crash helmet
  - Dinosaur
  - Farm
  - Ferris Wheel
  - Fimble house
  - Jewellery
  - Lifeboat
  - Magnetic fishing
  - Rocket
  - Shopping trolley

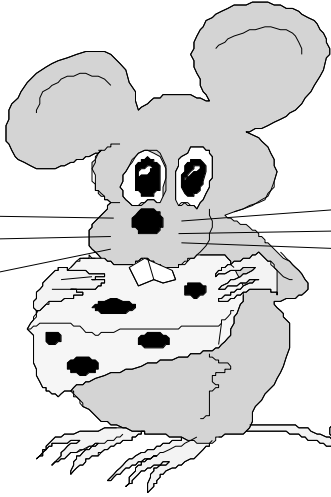
### Other resources to help you

- 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](http://www.knexusergroup.org.uk), including the Golf challenge and the Bridge that Gap challenge shown in the photo below.



We are pleased to  
invite you to a



# K'NEX

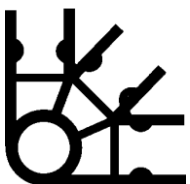
# Mousetrap challenge

at: \_\_\_\_\_

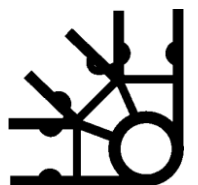
on: \_\_\_\_\_

from: \_\_\_\_\_ to: \_\_\_\_\_

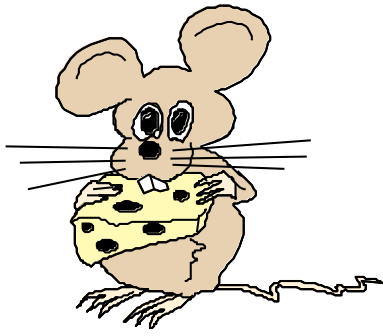
## All families welcome



We regret that we cannot admit  
unaccompanied children or adults.







# K'NEX Mousetrap challenge

*Your town has been overrun by hungry mice, who are eating everything they can lay their paws on. We have found a nice new home for them in the country, but first we need your help to catch them. Please build a mousetrap for us that can catch a mouse without hurting it.*

- Level 1     Make a model of a mouse, as shown opposite
- Level 2     Build a mousetrap which can catch the mouse without hurting it
- Level 3     Add a release lever which can let the mouse out again when we have taken it to the country (optional)



For level 1, you will need a blue rod, four little green rods, a green connector, two light grey connectors, and five dark grey connectors.

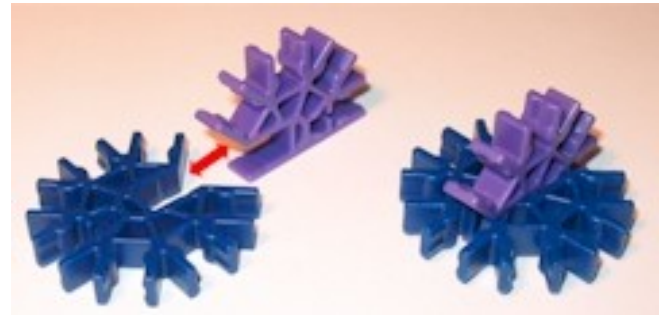
For level 2, think about how you could catch the mouse without hurting it. Where will the mouse be held when it is caught? What happens to the trap after the mouse goes in, to prevent it escaping? Why does the mouse want to go into the trap? - you can use a yellow connector as a piece of cheese if you want!

For level 3, can you built some sort of lever which you pull or press to open the trap up again, to let the mouse out?



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.



Blue and purple connectors have slots in. This means you can connect two purple connectors to each other; two blue connectors to each other; or a blue connector to a purple connector. To do this, put one slot inside the other slot, and push until you hear a click.

---

*This is to certify that*

---

*has completed the K'NEX Mousetrap Challenge.*

*Signed:* \_\_\_\_\_



# K'NEX Passport

Name: \_\_\_\_\_

You can find lots more K'NEX challenges  
to enjoy at home with your family on:

[www.knexusergroup.org.uk](http://www.knexusergroup.org.uk)

Age: \_\_\_\_

Visit dates:  
\_\_\_\_

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



## Challenges available

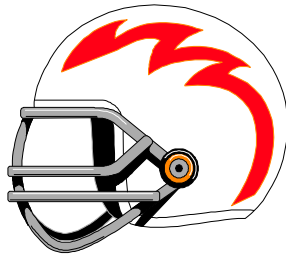
Challenge	Level			Signed
	1	2	3	
<b>Crash Helmet ✓5</b>	😊	😊	😊	_____
<b>Dinosaur</b>	😊	😊	😊	_____
<b>Farm</b>	😊	😊	😊	_____
<b>Ferris Wheel</b>	😊	😊	😊	_____
<b>Fimble Car ✓5</b>	😊	😊	😊	_____

Challenge	Level			Signed
	1	2	3	
<b>Jewellery ✓5</b>	😊	😊	😊	_____
<b>Magnetic fishing ✓5</b>	😊	😊	😊	_____
<b>Rocket</b>	😊	😊	😊	_____
<b>Shopping trolley</b>	😊	😊	😊	_____
<b>Yacht</b>	😊	😊	😊	_____

✓5 = suitable for 5 year olds

## Crash helmet

*Whether you're playing American Football, riding a bike or working on a building site, your head is in danger! Can you make a crash helmet that will protect it?*



### Levels of difficulty

- Level 1 ✓5 Make a simple hat or helmet
- Level 2 As level 1, but the helmet does not break if you pat the top of your own head quite hard
- Level 3 As level 2, and the helmet does not break if you stand on it (on the floor!)

✓5 = suitable for 5 year olds

How could you make a hat or helmet that is the right shape for your head? What K'NEX rods and connectors could you use to make it fit snugly? How can you make it as strong as possible?

For level 2, test your helmet by putting it on your head and patting it. Did it bend or break? How could you improve the design, so it won't break? Don't be afraid to start again if you want to try a new design.

For level 3, put your hat on the floor, and put your foot on it gently. Does it bend or break? Keep improving your design, so eventually you can stand on it.

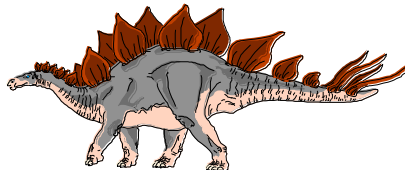
Equipment needed: K'NEX set

### 😊 Handy hints

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

## Dinosaur

*Exploring with a friend, you discover that a recent earth slip has uncovered a cave, which you follow down for a long way until it opens up into a huge space deep underground. Many animals live in this 'Lost World' which have died out on the surface, including Dinosaurs, which have evolved into clever and friendly animals well adapted to living in the 21<sup>st</sup> Century. When you return home, though, no-one believes what you have found! You decide to build a working model of the dinosaur, to convince everyone that they exist.*



### Levels of difficulty

- Level 1 ✓5 Make a simple model of a dinosaur
- Level 2 As level 1, plus a mouth which opens and closes
- Level 3 As level 2, plus moveable legs, that allow the dinosaur to walk

✓5 = suitable for 5 year olds

Think about the different sorts of dinosaurs you have seen pictures of. Could you try and make a model of one of these out of K'NEX? How big will it be? Does it walk on two legs or four? Will a 21<sup>st</sup> Century dinosaur be different to one that lived millions of years ago?

For level 2, think how you could make a mouth out of K'NEX, that can open and close.

For level 3, how could you fasten the dinosaurs to its body in such a way that the dinosaur can "walk"? Will your dinosaur be able to bend its knees?

Equipment needed: K'NEX set

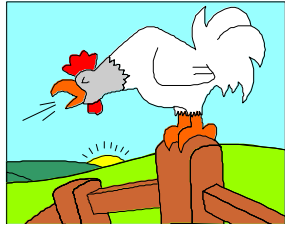
### 😊 Handy hints

- L1 3 ways to connect rods and connectors
- L4 Strong 3-D structures



## Farm

*Farms first appeared thousands of years ago, but sadly the last fifty years have seen farms in many parts of the country replaced by houses and roads. Could you build a farm for us, complete with animals, buildings and farm machinery?*



### Levels of difficulty

- Level 1 ✓5 Make models of some farm animals
- Level 2 ✓5 As level 1, plus a farm building with a door for them to live in
- Level 3 As level 2, plus an item of farm machinery that really works
- ✓5 = suitable for 5 year olds

What animals might you find on a farm? How many have two legs and how many four? Could you make models of some of them?

For level 2, think how you might make a barn or other farm building for the animals to live in. Can you make it really strong? Will it have a door?

For level 3, think about the types of machinery that you find on a farm. Could you make a model of one type? You can use a battery motor if you want to.

Equipment needed: K'NEX set

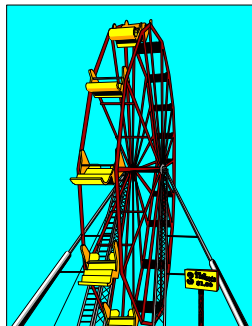
For level 3: Battery motor  
K'NEX wheels

### ☺ Handy hints

- L1 3 ways to connect rods and connectors
- L3 Making corners with blue and purple connectors
- L4 Strong 3-D structures
- L5 Wheels and tyres
- L6 Making rods turn with wheels or connectors
- M2 Battery motors

## Ferris wheel

*It is the school holidays, and a fair is being held near your school. Then a phone call comes - all the fairground rides have been damaged in a big storm and can't be used. The fair opens tomorrow, and we need your help - to build an exciting Ferris wheel for the children to ride on.*



### Levels of difficulty

- Level 1 Make a simple Ferris Wheel
- Level 2 As level 1, with a motor that makes it turn
- Level 3 As level 2, with seats that always hang downwards when the wheel turns

What does a Ferris wheel look like? How can you build a frame which is strong enough to hold the wheel up? What design will you use for the wheel? Where will the people sit?

For level 2, think about how you can attach your motor. Will you attach it to the frame or to the wheel?

For level 3, we do not want to have the people turning upside down as they go around the wheel! How can you ensure that the seats are always hanging downwards?

Equipment needed: K'NEX set

For level 2: Battery motor

### ☺ 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
- M2 Battery motors

## Fimble car

*Our Fimble can't walk very fast, and she needs to get to the shops every week. Can you build her a Fimble car?*



### Levels of difficulty

- Level 1 ✓5 Make a simple car for a Fimble.  
Level 2 ✓5 As level 1, with a seat belt to keep the Fimble safe  
Level 3 ✓5 As level 2, with a roof to keep the Fimble dry when it rains.

✓5 = suitable for 5 year olds

Fimble ® is the registered trademark of Mattel, Inc.

Can you think of all the different parts of a car? How can you build them into your model? How many wheels will your Fimble car have?

For level 2, why do you think the Fimble should wear a seat belt? How can you make one out of K'NEX?

For level 3, what shape will the car roof be? How will you fasten it on to the body of the car?

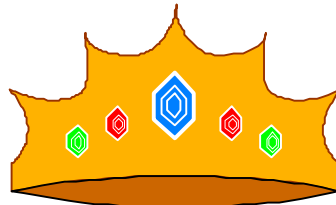
Equipment needed: K'NEX set  
K'NEX wheels  
Fimble models about 6" high (you can buy these in toy shops)

### ☺ Handy hints

- L1 3 ways to connect rods and connectors  
L3 Making corners with blue and purple connectors  
L5 Wheels and tyres

## Jewellery

*Have you ever wanted to wear expensive jewellery, or to put a crown on your head? Now's your chance!*



### Levels of difficulty

- Level 1 ✓5 Make some simple jewellery to wear on your arms  
Level 2 ✓5 As level 1, plus some jewellery to wear around your neck  
Level 3 ✓5 As level 2, plus a crown to wear on your head

✓5 = suitable for 5 year olds

Think about the sort of jewellery you are going to make. How will it fit on your arm? What shape will it be? What colours will you need?

For level 2, what would look really good around your neck? How can you make it out of K'NEX?

For level 3, how can you use K'NEX rods and connectors to make a crown that will fit comfortably on your head. What patterns will there be on the crown?

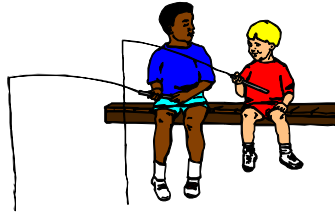
Equipment needed: K'NEX set

### ☺ Handy hints

- L1 3 ways to connect rods and connectors

## Magnetic fishing

A robot steel fish has been seen swimming in a lake near your school. Where has it come from? How does it work? Scientists need to know, but they can't catch it, as it ignores the usual worms and things on fishing lines. Can you help, by making a fishing rod and line with a magnet on the end?



### Levels of difficulty

- Level 1 ✓5 Make a simple fishing rod and a model of a fish
- Level 2 ✓5 As level 1, plus magnets on the fish and on a line, so that the fish can be 'caught'
- Level 3 As level 2, plus a reel to wind the fish in once it is caught
- ✓5 = suitable for 5 year olds

How long will your fishing rod be? How can you make it strong enough? What will your K'NEX fish look like?

For level 2, how can you fasten on the magnets to the fish and the fishing line? Will your fish be too heavy to pick up?

For level 3, how can you make a handle to wind in the fishing line once you have caught your fish?

Equipment needed: K'NEX set

For level 2: Two ring or horseshoe magnets  
1m length of string

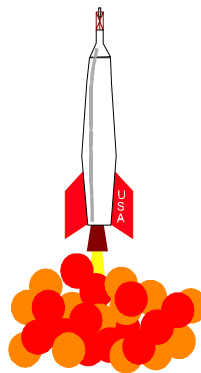
Test area: An empty tub or box to use as a 'fishing pool'

### ☺ Handy hints

L1 3 ways to connect rods and connectors  
L8 Handles  
L11 Making shafts for sports equipment  
N6 Magnets

## Rocket

Rockets have to fly very, very fast to break away from the pull of the earth's gravity. They can only do this if they have a streamlined shape, and are very strong. Can you design a new rocket for the next mission to Mars?



### Levels of difficulty

- Level 1 ✓5 Make a simple model of a rocket
- Level 2 As level 1, that can stand at least 1m tall
- Level 3 As level 2, with space inside for a 'Mars rover' that can land softly on the planet surface
- ✓5 = suitable for 5 year olds

What shape is your rocket going to be? How tall? Can you use a design that will make it really strong? How can you achieve a streamlined shape? Why is this needed?

For level 2, what type of structure can you use to achieve the necessary strength and stability?

For level 3, what will your 'mars rover' look like? How will it be launched from the rocket? How can it land on the planet without being damaged?

Equipment needed: K'NEX set

For level 3: K'NEX wheels

### ☺ Handy hints

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



## Shopping trolley

*Whoever designs a shopping trolley that will always steer the way you want it to go will make a fortune. Could you become an inventor, and design the perfect shopping trolley?*



### Levels of difficulty

- Level 1 ✓5 Make a simple trolley with four wheels
- Level 2 ✓5 As level 1, with a handle to push it by
- Level 3 As level 2, with swivel wheels so that the trolley goes in whatever direction you wish
- ✓5 = suitable for 5 year olds

Have you ever pushed a shopping trolley, or sat in one? What shape was it? Where did the wheels fasten on? Could you make one out of K'NEX - the bigger the better?

For level 2, think how you could make a strong horizontal handle to push it by, just like on real shopping trolley.

For level 3, how could you make your front or rear wheels swivel? Will they swivel independently (as on a real shopping trolley), or will they swivel together? Can you push your trolley by the handle, and steer it in any direction?

Equipment needed: K'NEX set  
K'NEX wheels

### 😊 Handy hints

- L1 3 ways to connect rods and connectors
- L3 Making corners with blue and purple connectors
- L5 Wheels and tyres

## Yacht

*What could be more fun than sailing across the sea in a yacht on a sunny day? Have you ever been on a yacht, or watched one sailing? Could you make a model of a yacht that really sails?*



### Levels of difficulty

- Level 1 Make a simple model of a yacht without sails
- Level 2 As level 1, and put plastic sheet around the hull so that it floats
- Level 3 As level 2, and add a sail so that it moves along when the wind blows

What shape will your yacht be? Where will you put the mast? What rods and connectors will you need?

For level 2, how can attach your plastic sheet to the hull? Does it let in any water when you test it?

For level 3, what shape will your sail be? How can you attach it to the mast? If it doesn't catch the wind and make the yacht move, how can you improve it? If your boat capsizes when the wind blows, how can you prevent this?

Equipment needed: K'NEX set

For level 2: 2 plastic sheets cut to size (eg supermarket carrier bags)

*Test area (level 2): Trough of shallow water*

### 😊 Handy hints

- L1 3 ways to connect rods and connectors
- N4 Plastic sheet

Dear

### **K'NEX Family learning event**

We are planning to run a family learning event in the next few months. At this event, local families 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 adults and 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 the event, by:

1. Putting the enclosed poster up on your staff noticeboard.
2. Helping us to meet the cost of the event, by sending us a donation.

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 adults and 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](http://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](mailto: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 Creatureset			
* 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>