

evolve



**a creative drama manual
for science teachers**
a teaching manual promoting creative
learning in science and the arts

True science investigates and brings to human perception such truths and such knowledge as the people of a given time and society consider most important. Art transmits these truths from the region of perception.

Leo Nikolaevich Tolstoy

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Introduction

This manual is the result of Actors bringing drama skills and theatre techniques into the science curriculum. It is the result of work done in Secondary and Primary schools, with pupils from Year 1 to Year 10, intermittently over a period of three years. Staff training, PGCE Students training and consultancy work in schools were all included.

The actual exercises and games included in this handbook have been borrowed, adapted, distorted, tailored and created from scratch. We acknowledge the creative drama practitioners we have worked with and the various handbooks that have been dipped into.

A variety of drama games and exercises have been devised and adapted to tailor activities to the themes of the curriculum. Drama techniques such as tableaux and role-play and moving images bring diagrams and tables to life, and access and explore the subject through a variety of techniques which appeal to different ways of learning and understanding.

It was invaluable to have been able to try out and experiment with the ideas in real schools with real students and teachers. The participant groups varied greatly, and offered differing challenges to these drama techniques.

The drama activities worked well in classes where challenging behaviour and attitudes existed. Similarly, they improved the engagement in science of the more reticent, quiet pupils who would avoid being drawn into the lesson by hiding behind their good behaviour and politeness. In drama there are no observers, and in many of the exercises everyone has to participate in an active and not a passive way. The drama demands that everyone joins in – there is no other option – so these more reticent pupils were not able to get away with ‘behaving’ and daydreaming their way through the lesson. This is just as important an application of the drama techniques as engaging with unruly, boisterous classes.

At the end of the project we asked the children to make comments about their experience of working in this way. The following are a few of their comments:

“I liked to play the games because you learn when you play as well as when you copy from the book.”

“You learn more because you listen.”

“It’s easier to remember and drama’s fun.”

“We don’t have to sit down all the time.”

“It helped me understand science.”

“It’s made me want to come to science.”

“Learning in a fun way.”

“When we learned in drama it was easier to remember.”

“It was useful to link the science back to a drama they’d done. They remembered.”

Helen (Teacher)

“I’d like to be more involved in science.”

“You can’t be wrong.”

“It made me happy.”

“I liked it. And I remembered more.”

“It’s better than sitting looking at a book.”

“It’s better, ‘cos you’re moving around and doing things.”

“I liked it because it was different.”

“You can do so much more with the drama.”

Asima (Teacher)

Aims

- **To make the science personal (pupils to engage in science and to 'buy into' the subject)**
- **To demystify scientific terminology and vocabulary (to make science language everyday and trip off the tongue)**
- **To give students confidence in using scientific language and ideas**
- **To encourage and increase listening skills**
- **To use different ways of learning, understanding and remembering**
- **To approach science in a variety of ways**

Methods

- **Games**
- **Exercises**
- **Bringing diagrams to life**
- **Role play**
- **Tableaux**
- **Presentation skills**
- **Structured listening and discussion techniques**
- **Relating science to our own lives and experiences**
- **Humour**

Applications and Practicalities

(How to use the handbook)

The manual is divided into these sections:

- A** Focussing Activity
- B** Introductory Activity
- C** Development Through Core Techniques
- D** Closing Activity
- E** Sample Sessions

In each section each activity is described and some variations and additions to the basic exercise are given. Where appropriate, an example of a scientific application of the activity is given.

There is a section of sample sessions that took place in schools as part of the Evolve project.

Activities for individuals, pairs, small groups, large groups and whole groups are suggested.

In this way we hope the manual shows how individual exercises can be used as part of a more conventional lesson and also how a whole lesson can be taught along the lines of creative drama in science.

The handbook is designed to be flexible. A complete drama-based science lesson can be planned from exercises from each section or specific exercises can be picked out to complement and be included in more traditional lessons. Also, the sample sessions can be used.

All of these activities took place in science laboratories with the furniture re-arranged to suit the activities. If the space is being used in a different way from usual science lessons, it is important to set up the room before the class arrives, and to ensure that they are familiar with this new lesson format. As actors, we are comfortable working in an open space, but we have included spatial controls within the structure of each exercise. A circle is frequently used as a basis for exercises and this is a good structure to return to after small group activities. Many of the focussing, introductory and closing activities can be adapted to take place with students seated at tables or behind laboratory benches.

Drama lessons may be noisier than a normal lesson, so it is important to have some consideration or prior warning to adjacent classes and to use a Closing Activity to calm things down before pupils move on to another lesson.

A note about any materials that are needed for specific activities is included with each of the activity descriptions. Over time you will find that you will have acquired a collection of balls, balloons, ribbons, chalk, rope, soft wrapped sweets etc. to use in your sessions.

When playing the games and exercises it is important to be very strict about the rules and structure of the game. This means that the game or exercise will work. Don't be afraid to stop or to interrupt an exercise if the rules or structure are slipping, as the end result will be so much clearer and more satisfactory if the rules are followed.

When describing how to play the games or exercises, a leader has been included. This would usually be the teacher but once games become familiar then a student can lead the game, but you will know your own classes best. Most of the time it is good if the leader can join in, but when first leading the games or when an outside eye is needed this should initially be the teacher.

It's a good idea not to use exercises where players can be declared 'out'. When the game is being used to focus and engage the group it seems to defeat the object if some players will not be fully involved. Some of the exercises have been adapted so that the game can continue with all players.

In the process of using Drama in Science, communication, presentation skills and confidence building are addressed. Also listening, team work, negotiation and cooperation are built into the work.

Drama can be used across the curriculum - particularly for a whole school project such as Arts Week, Science Week or Environmental studies. The Evolve project has been used in Cross Curricular INSET.

As in any Science experiment, possible hazards have to be identified when using Drama. Clearly explaining exercises to cover any safety issues, making sure everyone understands and follows the rules is important. The size and type of the space to be used, the group dynamic and your own knowledge of capabilities and attitudes are all things to be considered when planning Drama and Science sessions Science session.

The following are top tips to bear in mind:

- If you have a drama department, organise a skills swap so you can learn more drama exercises from them to tailor to your science activities.
- Try out the exercises amongst yourselves.
- Enjoy the exercises and games.
- Give the instructions really slowly and clearly and don't be afraid to repeat.
- Don't let anyone cheat! The rules are there to make the exercise work.
- Be creative in changing and adapting the exercises.



Activities

This section is divided up into four sub-sections, mirroring the different segments of a session.

A Focus Activities

B Introductions

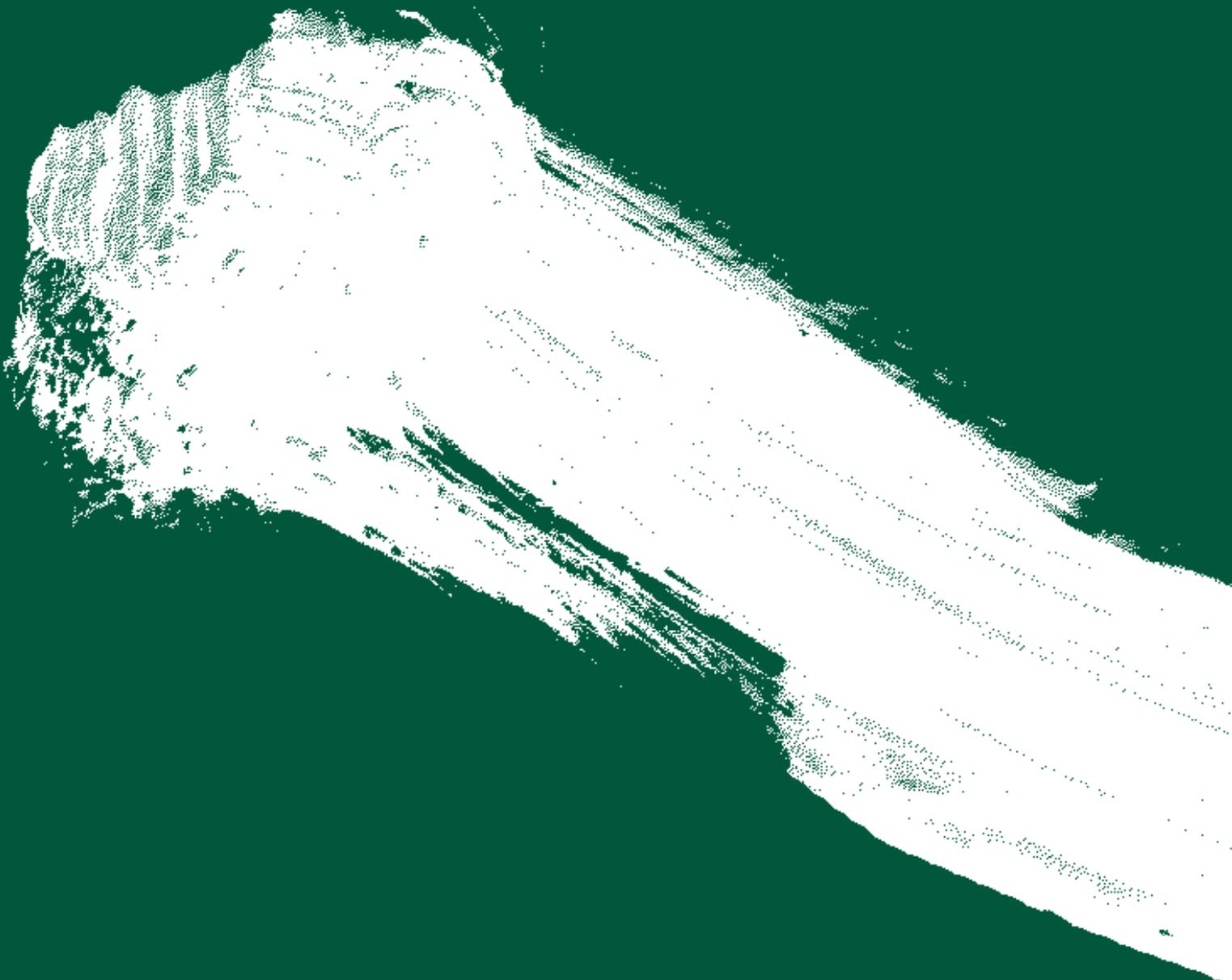
C Development Through Core Techniques

D Closings

The directions have been written as clearly as possible. Each exercise can be used in a variety of different science settings. These particular exercises were chosen as they were the most frequently used in schools when developing this work.

There are a good deal many more exercises out there and should you find yourself in possession of a 'drama games handbook' we are sure that once you have become accustomed to the way of thinking you will be able to adapt other exercises to a science context. (References included in Appendix).

We have tried to choose the most useful exercises and not overwhelm you with too many.



A - Focus Activities

The exercises in this section are designed to focus the group, bring them together and to get them to engage in the session. They also get the group to concentrate, work together and get their energy going.

- 1 **Keepy Uppy***
- 2 **On the Bank / In the River**
- 3 **Hand Circle - aka 'Slapper'***
- 4 **Bonny**
- 5 **Name and Food***
- 6 **Fruit Salad / Recipe Game**
- 7 **Diddle Dee**
- 8 **Touch Three Things**
- 9 **Zip, Zap, Boing, Whizz**
- 10 **Rhythm Circle***

*Can be used as Closing too.

activity 1 **Keepy Uppy***

➔ General applications

Working as a group.
Co-operation.
Concentration.
Focus.
Co-ordination.

➔ Materials

Small softball.
Clear space.

➔ Instructions

The players stand in a loose circle and try to keep the ball in the air by patting it upwards. No one player can pat the ball more than once in a row and players cannot follow a prearranged order. The number of pats is counted until the ball hits a wall or drops to the floor. When this happens the group starts again, trying to beat the previous score.

+ Additions and variations

- 1 Each time a player pats the ball they have to name a television programme. If a player cannot think of another programme they call out the previous programme name until a player comes up with a new name.
- 2 The players have to move the ball from one end of the space to the other.
- 3 The counting can be done in a different language or alphabetically or in various multiples.
- 4 The counting can be done individually or as a group.

U Science application

As the players play the game, they call out the names of the planets or the colours of the visible spectrum or the names of mammals or the electromagnetic spectrum etc.

🎯 Tips

- 1 Play the game using only the left hand or only the right hand.
- 2 Play the game again at the end of the session and compare the scores.
- 3 Play the game in two teams.



activity 2 **On The Bank / In The River**

General applications

Concentration.
Physical warm-up.
Fun.
Listening.
Vocabulary.
Focus.

Materials

None.

Instructions

All the players stand in a circle. The leader calls out “In the River” and the players take a jump into the circle. The leader calls out “On the Bank” and the players jump back to the edge of the circle. The players have to listen carefully as the leader calls out and tries to trick the players. Players must only jump when the sentence is correct or if they are not already standing in the river / on the bank. For example; if the leader calls out “On the Bank” when the players are already on the bank, the players must stand still. The leader may make an incorrect call and jump themselves but the players must stay still. If a player jumps when they shouldn't they are out.

Additions and variations

- 1 The game can be played with chairs so “On the Bank” is seated and “In the River” is standing. Other actions could be used to suit the group and the situation.
- 2 The game can be played in a different language to learn and familiarise new vocabulary.

Science application

The orders can be changed to suit the subject. For example, when the sun is being studied, the game could be ‘Under the Sun / In the Shade’.

Tips

- 1 Rather than being ‘out’ the players count how many lives they lose in the course of the game. In this way, all the players are kept involved.

activity 3 **Hand Circle - aka ‘Slapper’***

General applications

Group co-operation.
Concentration.
Focus.
Co-ordination.

Materials

None.

Instructions

Players place their hands, palms down, side-by-side in a circle either on the floor or on a table. The hands must be alternated so no two hands next to each other belong to the same player. The leader begins by slapping one of their palms on the surface (floor or table). The hand to the right then slaps the surface and so on around the circle. The aim is to pass the slap around the circle without missing out a hand and as quickly and smoothly as possible. It can be a strange

sensation staring at the next hand, willing it to move, then realising that it is your hand!

Additions and variations

- 1 If a palm slaps down twice then the slap is sent back around the circle in the opposite direction.
- 2 Three slaps in a row means that the next hand is missed out.
- 3 The game can be played standing up and using feet instead of hands.

Tips

- 1 The leader has the power to control the game by ‘collecting’ the slaps as they come to them.
- 2 The game can be used as a starter and the players are already in a circle for the following activity.

activity 4 **Bonny**

...the challenge of the game is not to sing beautifully but for the whole group to synchronise the actions with the song and with each other.

➔ General applications

Listening.
Group work.
Physical and vocal warm-up.
Co-ordination.
Focus.

➔ Materials

The song 'Bonny':

My Bonny lies over the ocean
My Bonny lies over the sea
My Bonny lies over the ocean
So bring back my Bonny to me.

Bring back, bring back
Oh, bring back my Bonny to me, to me
Bring back, bring back
Oh bring back my Bonny to me.

➔ Instructions

The group stands in one large circle.

The leader goes through the song line by line in a call and response with the players to teach or remind them of the song. Once the song is learned, sing the song with the following movements:

Each time a 'B' is sung, then the players bend their knees or straighten them.

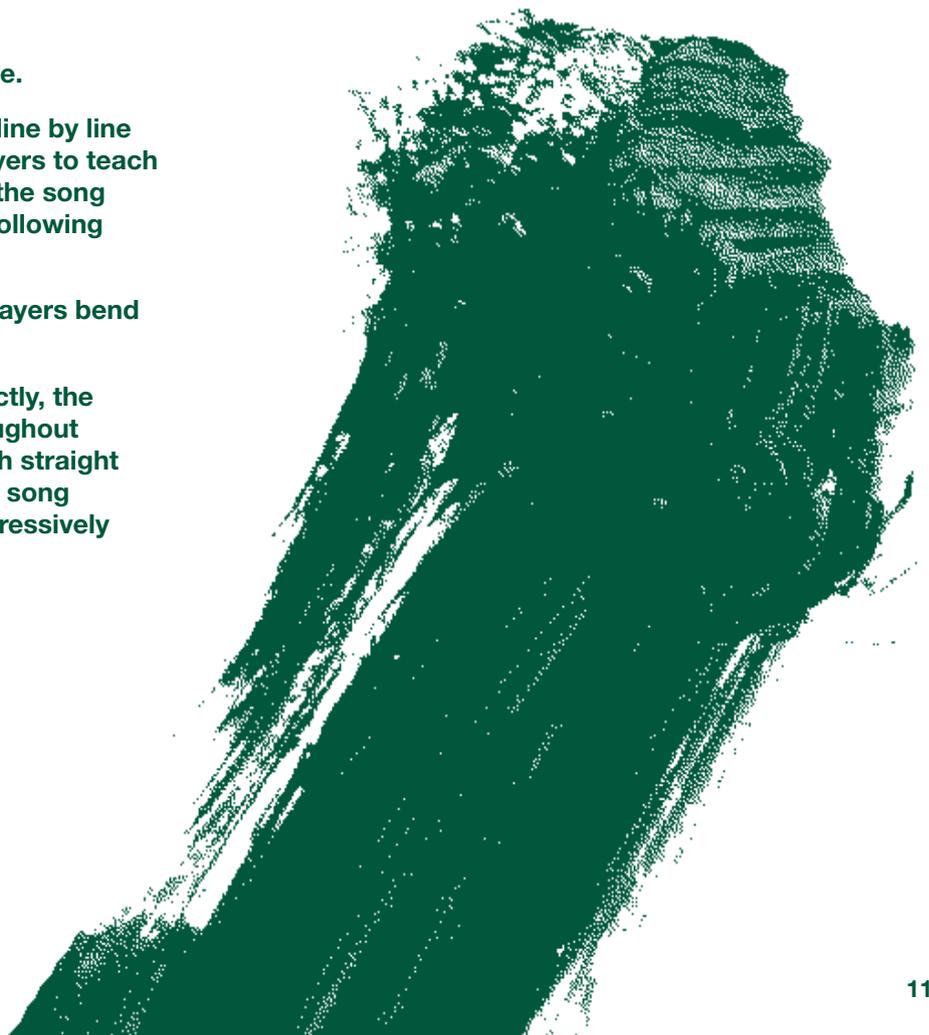
If the actions are carried out correctly, the players will bob up and down throughout the song beginning and ending with straight knees. The players should sing the song through several times getting progressively faster.

➕ Additions and variations

- 1 Once the players know the song further actions can be added, such as stretching arms out when the knees are bent.

🎯 Tips

- 1 The challenge of the game is not to sing beautifully but for the whole group to synchronise the actions with the song and with each other. For some players, once the emphasis is on the movements, then the singing improves.
- 2 The game can be played in a circle or sitting behind desks when players would stand and sit instead of bending and straightening the knees.



activity 5 Name and Food*

➔ General applications

Concentration.
Vocabulary.
Vocal warm-up.
Icebreaker.
Memory.

➔ Materials

None.

➔ Instructions

Players sit in a circle and are given a moment by the leader to think of the name of a food which begins with the same letter or sound as their own name. In turn, around the circle, each player introduces their own name and food e.g. 'Sean Sugar' or 'Rachel Rhubarb'.

⊕ Additions and variations

- 1 The exercise can be accumulative. The first player introduces themselves and their food. The next player around the circle introduces the previous player and then themselves e.g. 'This is Sean Sugar and I'm Rachel Rhubarb'. The next player introduces the first and second players, then themselves. This continues around the circle so that the last player has to name all the players and their foods before adding their own.

👉 Science application

The word chosen can be made more appropriate to the group or the subject being studied, for example it could be an element or a metal or an animal beginning with the same letter as the player's name.

🎯 Tips

- 1 The game does not have to be played in a circle so long as the order of the players is maintained.

“I'm Benny
Banana”



activity 6 Fruit Salad / Recipe Game

➔ General applications

Listening.
Physical warm-up.
Icebreaker.
Mixes up the group

➔ Materials

Circle of Chairs.

➔ Instructions

Players sit in a circle on chairs. One player without a chair stands in the middle of the circle. The leader names the players 'Apple', 'Orange' and 'Banana' in order around the circle ending with the player standing in the middle. Players have to remember their fruit. The player in the middle calls out one of the fruits and all those players who are that fruit have to leave their seats and find an empty chair. The player in the middle also takes this opportunity to sit in one of the emptied chairs. Whichever player is left in the middle without a seat calls out the name of one of the fruits and the game continues. The player left in the middle may also call out 'Fruit Salad!' and then all the players must change their seats.

⊕ Additions and variations

- 1 Players can be given flash cards with the name of their fruit on or pictures of their fruit and the cards could be held up instead of the names called out.
- 2 Instead of calling out the fruit the players can perform a previously agreed action or mime.

👉 Science application

The 'recipe' of the game can be changed to suit the subject of the session, e.g.

'**Rainbow**' – red, orange, yellow, green, blue, indigo, violet.

'**Solar System**' – Mercury, Venus, Earth, Mars, Saturn, Jupiter, Uranus, Neptune, Pluto.

'**Photosynthesis**' – carbon dioxide, water, light, glucose, oxygen.

'**Electromagnetic Spectrum**' - gamma rays, x-rays, ultra-violet, visible spectrum, radio waves.

'**Respiration**' – oxygen, sugar, carbon dioxide, energy.

🎯 Tips

- 1 The players cannot move to the chairs directly either side of them or return to the seat they have just left.



activity 7 **Diddle Dee**

General applications

Concentration.
Listening.
Vocal warm-up.
Focus.

Materials

The following words:

Diddle
Dee
Diddle
Dee
Diddle
Diddle
Diddle
Dee

Instructions

The players stand or sit in a circle and say the above ditty, one word each, around the circle. If a player says a word in the wrong order, e.g. they 'diddle' when they should 'dee', or they pause and

interrupt the rhythm or mispronounce the word then they are out and must sit down or leave the circle. The next player in the circle, who begins at the start of the ditty, resumes the game. The game continues until the circle is finally left with only two players who have a 'play-off'.

Additions and variations

- 1 If the game is played seated instead of players being 'out' when they get the ditty wrong they stand up on their chairs. Once a second player is out and standing on their chair too a second game can be held by the people standing on the chairs. Once a player is out from the second game they sit down and re-join the seated game. This means there are two games being played simultaneously, with players moving from one to the other.

Tips

- 1 The game can be played sitting behind desks so long as the players keep to the established order.

activity 8 **Touch Three Things**

General applications

Physical warm-up.
Listening.
Observation.
Concentration.
Comprehension.

Materials

None.

Instructions

Players stand in a circle and take note of where in the circle they are and which players are standing each side of them. The leader calls out three items in the room and then calls 'Go!' at which all the players leave the circle to touch these three items and then return to their position in the circle. The last player back chooses the next three items to call out and so the game continues.

Additions and variations

- 1 Objects called out can belong to a previously agreed criteria.
- 2 Instead of calling the names of objects, the leader could call out a description of the object, e.g. 'Something blue, something green and something yellow', or 'A solid, a liquid and a gas.'
- 3 The description can be more like a clue, e.g. 'Something that uses oxygen, something that acts as a catalyst', or 'Something that transfers energy, something that produces heat.'

Tips

- 1 Three is a good number to remember but you could play the game with an increased number of multiples.
- 2 Encourage players to look out for each other, to play the game with urgency but no accidents! So long as there is more than one object in the room which fits the description there should be no collisions or bottlenecks.
- 3 This activity is a good way to get to know the space in which you are working.

activity 9 Zip, Zap, Boing, Whizz

General applications

Concentration.
Vocal warm-up.
Listening.
Alertness.

Materials

None.

Instructions

Players stand in a circle. The leader claps to the right and calls 'Zip'. The players follow on in the same way, sending the 'Zip' to the right around the circle. This should be done fast and energetically. The leader then claps to the left and calls 'Zap', and the players in turn pass the 'Zap' to the left around the circle. Players can stop a 'Zip' or 'Zap' by holding both hands up at chest height and calling 'Boing!', which changes the direction of the game so a 'Zip' is stopped and sent back around the circle as a 'Zap' and vice versa. A player can also send the 'Zip' or 'Zap'

across the circle with a 'Whizz!' by stretching out both arms across the circle, index fingers pointing at the player who is being 'Whizzed'. This player then chooses to 'Zip', 'Zap' 'Boing' or 'Whizz' and so the game continues. If players 'Zip' or 'Zap' etc. in the wrong order then they are out.

Additions and variations

- 1 Once the players are out they can sit down in the circle. When more than three are out of the first game, then a second game can be played by the seated players with players moving from one game to the other when they are out.

Tips

- 1 Try establishing 'Zip' and 'Zap' really well before adding 'Boing' then play the game with these three before adding 'Whizz'. It's more important to be able to play the simpler versions slickly than to be able to play the full game in a stilted, non-energetic manner.

activity 10 Rhythm Circle*

General applications

Listening.
Group work.
Attention.

Materials

None.

Instructions

The players stand in a circle. The first player claps a rhythm, then all the other players clap this same rhythm in unison. The next player around the circle claps a different rhythm which all the players repeat in unison and so on until the game has gone around the whole circle.

Additions and variations

- 1 The rhythm can be stamped or be a mixture of clapping and stamping etc.

Science application

The players clap the rhythms of the syllables of scientific terms.

Instead of clapping a rhythm, players can speak a sentence about the particular science subject the group is studying.

Tips

- 1 The basic game can be a very quick focussing exercise which forms the group into a circle ready to move onto the next activity.
- 2 It's a good opening activity when studying sound.

B - Introductory Activities

The activities in this section are used to introduce the subject and to begin initial exploration. They also warm up the players mentally and physically, and give the opportunity for players to make a personal connection with the science subject.

- 1 Soundscapes / Sound Effects
- 2 Two Truths and One Lie
- 3 1, 2, 3 Alternate Counting
- 4 Psst! (Chinese Whispers)
- 5 Four Words Build
- 6 Paired Listening – 3, 2, 1
- 7 Lines
- 8 People To People
- 9 My Favourite...
- 10 Mill and Grab Shapes

activity 1 Soundscapes / Sound Effects

General applications

Listening
Concentration personal
Response

Materials

None.

Instructions

The players sit in a circle and listen in silence for a minute to all they can hear. In turn around the circle they mention one thing they heard. The leader then introduces the name of the soundscape, e.g. 'The City', 'Morning,' 'School', 'The Street', 'The Farm' etc. In turn, around the circle, the players make a sound that is heard in this place or time so the whole group makes a soundscape for that situation.

Additions and variations

- 1 The players add their sound effects in order and once they have added their sound they can repeat it whenever they wish in response to other sounds and so the soundscape is accumulative.
- 2 The players tell a story set in a chosen place or time using only sound effects to set the scene and communicate the action.

Science application

As an introductory exercise to studying Day and Night the players could make a soundscape for each of these. Similarly soundscapes could be made for each of the seasons when they are being studied.

Tips

- 1 By spending a few moments listening to the sounds that can be heard around them and feeding them back to the group the players really focus and it also emphasises how important sound is to tell us where we are and what is happening.

activity 2 Two Truths and One Lie

General applications

Listening.
Vocabulary.
Memory.
Communication.
Discussion.

Materials

None.

Instructions

The players are put into pairs and the topic of the session is introduced. The players are given a few moments on their own to think of two things they know to be true about the topic and one thing they know to be a lie about the topic. The players then take it in turns to tell each other the two truths and one lie. They then have to decide which statements their partner told them were

true and which was a lie. The players can be very obvious or be subtle and clever, and try to catch out their partner. The players then feed back to the whole group some of the truths and some of the lies about the topic.

Additions and variations

- 1 The same exercise can be played with a time limit in which players have to move around the room and tell as many people as possible the two truths and one lie. Players then feed back to the whole group any lies they heard and truths and also any statements of which they were unsure.

Tips

- 1 The same exercise can be used at the beginning of a topic and again at the end to compare knowledge and understanding of the topic.

activity 3 1, 2, 3 Alternate Counting

General applications

Listening.
Using knowledge.
Language.
Communication.
Icebreaker.

Materials

None.

Instructions

Players stand in pairs facing each other. One player is Player A and one is Player B. The couple have to count to three, speaking alternate numbers, and then repeat the sequence over and over again. The aim is to achieve speed and fluidity. For example;

Player A: One
Player B: Two
Player A: Three
Player B: One
Player A: Two
Player B: Three
Player A: One ...etc.

The next stage is to replace the spoken word 'One' with a Clap, repeating the sequence over and over.

The next stage is to replace the 'One' with a Clap and 'Two' with a Jump and repeat.

The final stage is to replace the 'One' with a Clap and 'Two' with a Jump and 'Three' with a gentle touch to your partner's forehead and repeat.

Science application

The game may be used with actions or vocabulary to do with the science topic. For example, when studying different types of rocks, 'One' could become Sedimentary, 'Two' could become Metamorphic and 'Three' could become Igneous. As a development, the players could develop gestures or actions to represent each of the different rock types and present them in sequence.

activity 4 Psst! (Chinese Whispers)

General applications

Listening.
Communication.

Materials

None.

Instructions

Players sit in a circle and the leader whispers a sentence in the ear of the player on their right. This player then whispers what they heard into the ear of the player on their right. This continues around the circle until the whispered sentence has reached the player on the leader's left who says out loud what they have just heard. The leader then says out loud the sentence they started the game with and the two are compared.

Science application

The sentence can be a statement about the subject being studied and thus provoke discussion.

Tips

- 1 Players are only allowed to whisper the sentence they hear once, and they have to pass on what they heard. The statement may be misheard or get distorted, but players must pass on what they hear and not what they think they should have heard.
- 2 The exercise can also be used as a concluding exercise.

activity 5 **Four Words Build**

General applications

Communication.
Listening.
Reasoning.
Working in a group.

Materials

Pens.
Paper.

Instructions

The leader chooses the word that is to be defined, e.g. 'Respiration' or 'Science' or 'Research'.

Each player has three minutes to write down four words that they think describe the subject word.

The players join up in pairs and each pair has three minutes to compare their combined eight words and choose four from these eight that they agree describe the subject word.

Each pair joins with one other pair. The groups of four then compare the eight words they have between them and again they have three minutes to choose four from these eight.

Each group of four then joins another group of four. This group of eight has three minutes to choose four words from the eight they have between them.

This continues until the whole class joins together in one final group and makes the final choice of four words that describe the subject word.

At the end of the exercise, the whole group has come up with four words that they have all agreed describe the subject word.

Science application

The word can be any subject that the class is studying and used as an introduction and again later to revise the subject.

Tips

- 1 It's a good idea to talk about the process of the game; what it feels like to have to discard words you have put forward, are any of the final words any of the ones you began with, was it easy / hard to come to agreements?
- 2 The three minute time limit can be changed to suit time available and numbers. The leader can also be flexible with the time limit so they can be sensitive to how the groups are working.

activity 6 **Paired Listing – 3, 2, 1**

General applications

Communication.
Listening.
Pair work.

Materials

None.

Instructions

The leader places the players in pairs around the space sitting facing each other. The players name themselves A and B. The leader gives the subject matter to be spoken about.

Player A then has three minutes to speak on the subject while B listens without comment or interruption.

Player B then has two minutes to feed back to player A what they have heard. Player A listens without comment or interruption.

Player A then has one minute to correct anything or add anything that B missed out.

The players then change over roles with player B beginning the game.

Science application

This exercise can be used to bring a personal element to a new science subject. For example, if the subject of the session is how the seasons happen, then the subject for the initial exercise could be your favourite season, or something that happened to you in winter. This way the players are already talking about the nature of the subject and making a personal connection to the subject.

activity 7 **Lines**

General applications

Concentration.
Physical.
Categorising.

Materials

A clear space.

Instructions

One end of the room is indicated as 1st January and the other end as 31st December. The players have to place themselves along this line in order of their birthdays.

The players can also make the line according to their height or hand size or eye colour or alphabetically by name.

Additions and variations

- 1 The players can be set the task of getting into the lines without using words, or in silence.

Science application

The game can be played with the players in role as planets, different animals or gasses, and the line can be a size line or temperature line or density line etc.

activity 8 **People To People**

General applications

Physical warm - up.
Pair work.

Materials

A clear space.

Instructions

The leader asks the players to walk around the space, using all the space. When the leader calls out “People to People!” the players find themselves a partner as quickly as possible.

The leader gives out instructions such as “Palms to palms” and the players stand like this. The leader calls out a couple more instructions – for example, “Back to back”, “Elbows to elbows” which the players carry out before calling, “Move around the room” and the players continue walking around the space.

Again the leader calls out “People to People” and the players quickly find a different partner and the leader calls out more instructions.

Additions and variations

- 1 If there is an odd number in the room whoever is left without a partner gets to be the leader and call out the instructions.
- 2 Instructions can be combined, e.g. elbows to elbows and knees to knees.
- 3 Instructions can be made more specific, e.g. back to back sitting down.

Science application

When learning muscle groups or the skeleton these names can be used in the instructions.

activity 9 My Favourite...

General applications

Listening.
Sharing.
Making the science personal.
Communication.

Materials

None.

Instructions

The players sit in a circle and are given the following sentence to complete, “My favourite food is because” They are given a few moments to think about it first.

In turn around the circle the players give their completed sentence.

Additions and variations

- 1 The exercise can also use the sentence “If I was a I’d be a because”

Science application

The sentence can be made to fit any subject. So, if the class is looking at the visible spectrum for instance, then the sentence could be “My favourite colour is because” If the subject is mammals this could be the subject of the sentence and so on.

activity 10 Mill and Grab Shapes

General applications

Physical.
Group work.
Spatial awareness.
Co-operation.

Materials

None.

Instructions

The leader asks the players to walk around the space until they call out a number. Players then have to form groups of this number. In these groups the leader asks the players to make a particular shape e.g. a triangle, a circle. The leader counts down from five to nought by which time the group should have made the shape. Once the groups have made the shapes and the leader has checked them the players walk around the room until the leader calls out another number and then another shape and so the game continues.

Additions and variations

- 1 The players can be given direction in how to walk around the room, e.g. as if it is very cold, as if you are late for a meeting, as if you are trying to sneak away without being heard.

- 2 The players could be asked to walk around the room at different speeds, based on 1 being slothful, 5 being an everyday pace and 10 being as fast as possible without breaking into a run.
- 3 Once the players are in groups they can be asked to stand with a given number of points of contact with the floor. For instance; a group of three with eight points of contact with the floor, a group of seven with five points of contact with the floor.

Science application

When the players are in groups they could be given pictures of different star constellations and asked to make their shape with their groups.

Tips

- 1 Give the players a time limit in which to make the shape. This encourages them to work quickly and not get caught up in discussion but respond visually and physically.
- 2 The leader should emphasise that players must avoid coming into contact with other players at all costs as they move around the space.

C - Development Through Core Techniques

The activities in this section are used to explore science in more detail. The three main techniques used are:

- 1 Tableaux
- 2 Animated Diagrams
- 3 Role Play

Each of these techniques uses different ways of learning and understanding and takes the diagrams, words and images off the page or work sheet into the space, and uses the players rather than pen, paper or white board. We looked at each of these techniques individually, but they will often cross over into each other or the work may well develop through from one technique to the next. For example; an Animated Diagram may grow out of Tableaux work and Tableaux may be used as the basis for a role-play as they are brought to life. Diagrams and images in text books and worksheets can be used as a stimulus for these exercises. Examples have been included to show the application of these techniques to a specific science topic and show in greater detail how to structure the techniques.

1 Tableaux

This is a technique using a still image to show or explore the science being studied, like a photograph or a freeze frame on a video. It's a good way to get pupils to think of examples of when and how they experience the science in their own lives. Once a basic tableau has been made it can be further developed and added to in order to explore the science further.

How to Play

It's good to play the exercise 'People to People' (see activity 8 in Introductions, p 20) to warm up the group and encourage them to work with everybody. To introduce the idea of Tableau I usually play 'Mill and Grab and Tab' (a version of activity 10 in Introductions, p 21).

The group walks around the space. The leader calls out a number and the players have to get into groups of that number.

In these groups the players are given an image they have to make - without any discussion between them - in the time it takes to count down from 5 to 1. Initially choose a very simple image, for example 'a dentist and a patient'. Without conferring, the players make this image and are still / frozen by the time you reach 1. To share the tableaux at this point you can ask half the room to relax while the other half hold their positions for all to see. Then swap over.

After each tableau is completed the players move around the room until you call out another number and another image. Call out a different number each time so the players have to work in groups of different sizes and with different people.

You can also call out an object which must be made in a frozen image or tableau e.g. a mug of tea, a toaster, a hair dryer, a fridge etc.

The tableaux can be developed further by asking the players to add sound effects.

Players can be directed to walk in different ways as if on different surfaces such as ice (when looking at friction), as if it is very hot or very cold (when looking at temperature).

Once the players have got to grips with the technique you can ask them in their final groupings to make a tableau of the science being studied. At this point, the players may confer in order to make a more complex tableau. When studying forces the players can be asked to make an image of how they experience force in their own lives. In this instance they may make images of pushing open a door, someone pushing someone over, pushing a broken down car, pulling a friend away from a fight etc. It's helpful to define the time scale for the examples so I will often ask the players to think of ways they have experienced force, from the time they got up to the time when they reached school that day. When each group has created a good, clear tableau, it is shown to the rest of the class and is used as a focus of discussion.

Developments

The tableaux can be developed further in a variety of ways to explore the subject and to involve more people in one tableau.

Labels

The rest of the group can add to the tableaux by verbally labelling the tableau or by making written labels and using metre rules to annotate the tableau. These labelled tableaux can be photographed and the photographs stuck into exercise books to act as a diagram and to jog the pupils' memories.

Adding to the tableau

More players can be added to the tableau to show the direction of the force (by pointing) and the magnitude of the force (by decreasing or increasing the length of the pointing arm and showing the magnitude in their facial expressions!)

The groups can be asked to add sound effects to their tableaux or one sentence each or one movement each or, in the case of forces, the groups can be asked to make a balanced force unbalanced, or show the force in a different direction to that shown in the tableau.

The tableaux can be extended by asking players to add a 'before' tableau and an 'after' tableau. For example; when studying acid rain, groups make 'before', 'during' and 'after' tableaux to show how acid rain affects the atmosphere or the environment.

Examples

The Electro Magnetic Spectrum

Each group has to come up with a tableau to show an everyday example of one of the waves on the electro magnetic spectrum. These tableaux are then placed in a line across the room in the correct order of the electro magnetic spectrum so you end up with a human display. These tableaux can be photographed and used in a classroom display to show the spectrum.

Other examples of tableau work can be seen in the section on Sample Sessions and includes:

- Forces.
- Levers.
- Balanced Meals.



2 Animated Diagrams

This technique is used to bring the diagram off the page and animate it. It helps students to understand the different parts of a diagram. It can also be used to present tables and information in a different way and to engage in a more physical and visual way of learning and to promote physical memory. Human diagrams can be further developed and animated to become role-play.

How

Choose a diagram or table that you want to study and explore further. The aim is to lay out the diagram in the room using people and be able to move the parts of the diagram to explain and explore it further. Elements of the diagram can begin as tableaux and movements and sounds etc. can be added. The following are a couple of examples to show how Animated Diagrams work.

1 Eclipses

This is a very simple way to illustrate how eclipses happen by literally taking the diagram off the page and onto the floor and moving it, thus engaging both visual and physical memory.

Materials

Signs, one each for Earth, Moon and Sun. These can be decorated or on circles of card, possibly of different sizes, and prepared in an earlier lesson by the players.

Method

Give the three cards to three different players and talk through how each one exists in relationship to each other. For example, the earth orbits the sun and turns on its own axis once every twenty-four hours. Get the players to act this out. Do something similar with the earth and moon. Then get the players to act out the relationship between all three and present a lunar eclipse and a solar eclipse.

Additions and variations

- 1 The cards can be given out as a revision technique for the players to go through the eclipses in smaller groups.

2 Travel the Light

To explore how light reflects and travels in everyday situations. The players make frozen images or tableaux of everyday situations and then one player walks the path the light takes from an object to the eye.

Method

Begin by making a frozen image of people in a car; a driver, a passenger, and a person in the back seat. Add things outside of the car such as a lorry behind (shown by a lorry driver sitting in the driver's seat) plus some people walking on the pavement and someone on a bicycle beside the car. All these images are made as if a video has been put on pause (a very good video or DVD with no judders or fuzziness!). Another player walks the path of a beam of light as it is reflected; as light reflects off the lorry onto the rear view window of the car and back off the window into the lorry driver's eyes. Another player could trace the beam of light that travels from the people on the pavement to the eyes of a passenger etc. This is a whole group activity as the players are guided through it by the leader and onlookers can make suggestions to improve the image. The journey of the beam of light can also be marked out with a length of wool or string.

Additions and variations

- 1 Smaller groups can then be asked to show examples of the passage of light in different situations e.g. when looking through a periscope or using a camera.

Examples

Other examples of when Animated Diagrams can be used are:
Electrical circuits.
The pH scale.
Reflection and Refraction.

3 Role Play

This method further develops the Animated Diagrams and Tableaux and not only aids in presenting and remembering information but also uses science knowledge and understanding.

Role play is really useful where there is a journey of any kind - as in food moving through the digestive system, blood transporting things around the body, heat being transferred etc. By walking these paths themselves and creating the processes along the way, pupils engage their physical memory and also have to clarify in their understanding of the processes they are role-playing.

How

The role-play can be teacher-led and executed by the whole class together, with roles being handed out by the teacher and everyone contributing to show what is happening. Smaller groups can also be given the task, working independently to create part of the role-play and then the teacher can put the whole piece together at the end of the session. For example, smaller groups could be given the task of representing what happens in different parts of the digestive system, e.g. mouth, gullet, stomach and so forth. When all the groups have completed these representations satisfactorily they can be put in the correct order and a volunteer 'piece of food' can be sent down the line to experience what happens to food in the digestive system.

Each part of the role-play has to be broken down into its constituent parts. Each part of the journey - and the processes that occur along the way - has to be identified and represented in a clear form. At the beginning of the digestive system, the mouth has to be broken down into the teeth and the chewing action and the introduction of the enzyme in the saliva.

Additions

The addition of sound effects, words, characterisation and attitude really brings role-play to life. The blood in the blood stream waiting for nutrition could be enticing and beckoning the food in a greedy manner, making hungry noises or calling out, "come on, come on". Good insulators can be surly and turn their backs on heat energy and shun it, while good conductors can be really friendly and call out eagerly to heat energy. This characterisation and attitude adds humour and personalises the role-play for the pupils and makes it even more memorable.

Examples

The best way to get to grips with the idea of role-play is to look at an example; the following is a role-play looking at blood as the transport system around the body. There are further role-plays included in the section of Sample Sessions.

Blood Transport Role Play

In groups, the players will represent the different organs or cells

Materials

Soft sweets with wrappers.
Balloons.

Method

In groups, the players will represent the different organs or cells and their actions, as described below:

Heart

Makes a pumping action; it is the pump that makes the blood move around the body, maybe physically pushes the 'blood' past them. Needs a movement and a sound. Receives oxygen balloon from the blood.

Intestines

After the stomach has churned the food, it ends up here where nutrients pass into the blood. The 'nutrients' in the form of the wrapped soft sweets are passed up and down the intestine before being passed to the blood. Needs a special passing action and sound.

Lungs

This group needs to make a contracting and expanding action and corresponding sound, as if air is being drawn in and out. They have a good supply of oxygen balloons which they pass into the bloodstream. They also receive deflated or popped balloons from the blood, representing carbon dioxide produced by the cells as a by-product of respiration.

Cells

This group needs to make hungry noises as they wait for nutrition, maybe leaning back to back and stretching arms out for food, showing little energy. They receive inflated balloons representing oxygen from the blood as well as the nutrients brought from the intestines in the form of the wrapped sweets. Once they receive balloon and sweet, they unwrap the sweet, eat it, pop the balloon and hand back the bits of balloon (carbon dioxide) and the sweet wrapper (waste product) to the blood then, they do five star jumps to show they now have energy. This is usually the most popular role-play!

Kidney

These are the cleaners and need to make cleaning, mopping and sweeping actions and sounds. They receive the empty sweet wrappers/ waste products from the blood.

Blood

This group travels around the body making deliveries and collections of sweets / nutrients, inflated balloons / oxygen, burst balloons/ carbon dioxide, and empty sweet wrappers/ waste products. The 'blood' is 'pumped' around the body by the heart.

Each group can be set the task to find their own appropriate actions and noises. They are then put in order around the room and the blood travels around the sequence.

Once the blood has done one circuit, it's a good idea to swap over the roles of the groups so that everyone gets to experience being the blood and each of the organs or cells along the way (especially the cell).

D - Closings

The exercises in this section are to bring the group together at the end of the session. They also give an opportunity to reflect on the subject of the session, to refocus the group and to calm the group down. Several of the exercises included in the Focus section can also be revisited at the end of a session.

- 1 Hands into the Middle**
- 2 Pass the Pulse**
- 3 Count to Twenty**
- 4 Bat and Moth**
- 5 Group Sculpture**
- 6 Get Knotted!**
- 7 Applause Game**
- 8 Science Blog**
- 9 Twenty**
- 10 Secret Agent**

There are also several of the activities in the section on Focus exercises that can be used as Closings. These include:

Keepy Uppy

Hand Circle, aka Slapper

Rhythm Circle

activity 1 Hands into the Middle

➔ General applications

Working as a Group.
Calming.
Focus.
Challenge.

➔ Materials

None.

➔ Instructions

Players stand around a large desk with their hands palm down in a circle on the desk. The aim of the exercise is for all the hands to end up in the middle, but no two hands are allowed to move at one time. If two hands move at the same time then all hands have to return to the start position. Players are not allowed to make a prearranged order but must focus in on the whole group and 'sense' when it is safe to move.

⊕ Additions and variations

- 1 If the group is large then the game can be played with everyone kneeling on the floor and placing their hands palms down on the floor.

🎯 Tips

- 1 The game doesn't have to be played each time until the point when all the hands are in the middle (you may be there until home time with some groups!) but the challenge can be taken up at the beginning of the next session.
- 2 The exercise can be played at the beginning of the session and then at the end of the session and results compared and reflected upon.



activity 2 **Pass the Pulse**

General applications

Co-operation.
Co-ordination.
Concentration.

Materials

None.

Instructions

Players stand in a circle lightly holding hands. The leader explains that they will pass a pulse around the circle by gently squeezing the hand held in their own right hand. When this player feels that gentle squeeze they then squeeze the hand held in their right hand and so the squeeze, or 'pulse', is passed around the circle. Players can watch the pulse pass around the circle as well as feel it and the aim is for the group to pass it around the circle as smoothly and as rapidly as possible. To end this exercise the leader 'collects' the pulse by simply not passing it on.

Additions and variations

- 1 All players keep their eyes closed and feel and sense the pulse.
- 2 The leader can send more than one pulse around the circle at a time and send the pulse in the other direction too. The players need to be warned of these developments.

Science application

This is a good closing exercise after a session looking at the blood system or heat transfer through convection.

activity 3 **Count to Twenty**

General applications

Listening.
Concentration.
Working as a group.

Materials

None.

Instructions

Players squat in a circle. Everyone counts together from one to twenty and, as the group counts, everyone gradually moves from the squatting position to a standing position and finally to jumping up as they shout out "Twenty!" The second time around everyone does exactly the same until the count reaches ten, then everyone counts silently in their heads and leaps up and shouts "Twenty!" out loud when they reach that number. Hopefully everyone will have kept to the same rhythm and will jump and shout at the same time. A third or fourth attempt can be made.

Additions and variations

- 1 The game can be made more difficult by counting out loud only as far as five, so the time to establish the rhythm is shorter.
- 2 The group can do away with the visual prompt of everyone slowly moving towards 'twenty' by simply standing still until everyone jumps at 'twenty'.
- 3 The counting can be done in different multiples or in a different language.

Science application

Instead of counting to twenty the group could recite a list such as the order of the planets in the solar system or the colours of the rainbow or the parts of the electro magnetic spectrum etc.

Tips

- 1 It is important to stress that the aim is to see how together the group can be rather than to encourage the more anarchist and individualistic elements who may be tempted to shout "Twenty!" at any time!

activity 4 **Bat & Moth**

...the more often the bat shouts “BAT”, the more often the moths are forced to reply “MOTH” and give away their position.

+ General applications

Listening.
Working Together.
Concentration.

- Materials

A blindfold, or several of them, one for each 'bat', if they do not wish to share.

o Instructions

The players all stand in a circle with their hands joined, or at least their arms stretched out, in order that no-one is able to get out of the circle. They must all be totally silent and focussed.

Choose a 'bat' and blindfold them. Choose several 'moths', as many as there is space for them to move to avoid being caught.

The bat must call out “BAT” and the moths **MUST** reply “MOTH”. The bat must find their prey by listening for where they are, and the moths must avoid capture. Once the bat has caught a moth all the players can be swapped for a new bat and moths, while the previous ones return into the circle.

+ Additions and variations

- 1 With a large group, the circle will be larger so introduce a time limit in which the bat catches the moths. This way every player gets to be a bat or a moth.

It is very important that the circle is maintained to ensure the safety of the bat and moths.

It is very important that the silence of the rest of the circle is maintained, as the bat must listen for every little sound that shows where the moths are.

The more often the bat shouts “BAT”, the more often the moths are forced to reply “MOTH” and give away their position.

In different multiples or in a different language.

u Science application

Could be used to review food chains and food webs.

activity 5 **Group Sculpture**

➔ General applications

Physical.
Working as a Group.
Awareness.

➔ Materials

A clear space.

➔ Instructions

One at a time the players move into the space and take up a position that represents something they have done or learned in the lesson. Each player must take into consideration the images other players have already made. They may add to these images, or mirror them, or make another aspect of the lesson. The exercise is done without speaking. If players can remember the order in which they entered the sculpture, then they can leave the sculpture in that same order.

🎯 Tips

- 1 If players are shy of going into the space to make the sculpture the leader can indicate what order the players go into the space by calling players' names or touching players on the shoulder.
- 2 A 'photo could be taken of the final Group Sculpture and copies given to players to use in their exercises book as a record and reflection on the topic.

activity 6 **Get Knotted!**

➔ General applications

Group work.
Humour.
Co-ordination.

➔ Materials

None.

➔ Instructions

Players stand in a tight circle holding their arms out in front of them across the circle. The players then close their eyes and catch hold of two different hands across the circle. The leader watches over the proceedings to check that players have the hands of two other players. Once all hands are held, then the players open their eyes and, without letting go, have to try to untangle themselves.

➔ Additions and variations

- 1 The players have to untangle themselves without speaking.
- 2 One player stays out of the tangle and then directs the untangling of the knot.



activity 7 Applause Game

General applications

Communication.
Working as a group.
Supporting each other.

Materials

None.

Instructions

A volunteer leaves the room. The rest of the group agree upon what they wish the volunteer to do, e.g. sit on a particular chair, walk to a certain part of the room, touch a book etc. The volunteer is invited back into the room and the rest of the group has to get them to do what they have agreed upon without speaking. The group communicates with the volunteer only by clapping. If the volunteer walks towards the chosen chair, for instance, then the group applauds. If the volunteer is walking away from the chosen chair, the group stops clapping. No words or gestures are allowed. When the volunteer does what has been decided, then they are rewarded with a wild round of applause!

Tips

- 1 When the volunteer enters the room, they should be greeted with applause to encourage them.
- 2 The volunteer must be encouraged to try out lots of different things and gauge, by the applause or lack of it, if this is what the group wants them to do.

activity 8 Science Blog

General applications

Reflection.
Listening.

Materials

One computer mouse.

Instructions

Everyone sits in a circle. The computer mouse is placed in the middle of the circle. Players think about what they would make as an entry in their Science Blog; perhaps something they have discovered in the session, something new they have learnt or the thing that sticks most in their mind. In no pre-ordained order players pick up the mouse, sit back down and make their Blog entry verbally to the rest of the group as they hold the mouse. When they have completed their entry they return the mouse to the centre of the circle ready for the next Blogger to make their entry. They must try and make it interesting so they get as many hits as possible on the Science Blog site.

Additions and variations

- 1 Make the Blog entry very specific e.g. 'A fact you have learnt about mammals' or 'One thing everyone should know about genetics', A difficult thing to understand about the Electro Magnetic Spectrum' or 'A question you still have about Fair Tests'.
- 2 The player beginning can also name and date the Blog, e.g. Science Blog, 1st January 2006.

activity 9 **Twenty**

...the players stand in a circle keeping a gentle rhythm going by clicking their fingers or tapping their right foot.

General applications

Physical co-ordination.
Group work.
Co-operation.
Listening.
Concentration.

Materials

None.

Instructions

The players stand in a circle keeping a gentle rhythm going by clicking their fingers or tapping their right foot. They are going to count up to twenty in time to this rhythm. The first player says 'One', then the second player standing beside them says 'One'. The third player standing next to the second player says 'Two'. The group aim is to count up to twenty but every time a new number is added the counting begins at 'One' again.

For example :

Player 1: One
Player 2: One
Player 3: Two
Player 4: One
Player 5: Two
Player 6: Three
Player 7: One
Player 8: Two
Player 9: Three
Player 10: Four
Player 11: One
Player 12: Two
Player 13: Three
Player 14: Four
Player 15: Five
Player 16: One... etc.

Additions and variations

- 1 The game can be played seated.
- 2 If the group is a large one, it can be split into two smaller groups each following their own count. The exercise could then become a race to see who can get to twenty first.

Tips

- 1 When someone makes a mistake or the count is dropped everyone must do a forfeit.

activity 10 Secret Agent

➔ General applications

Concentration.
Non-verbal communication.
Co-operation.

➔ Materials

None.

➔ Instructions

Players sit in a circle. Each player chooses another player to be their secret agent, without communicating to anyone else who that person is. Their aim is to sit beside their secret agent (so that they can pass on a message perhaps). To do this they must make eye contact with either of the people sitting next to their secret agent, if that person is not already sitting next to their own secret agent they must swap places with them. Only if you are sitting beside your own secret agent can you refuse to move. It is important that players don't give away to the rest of the group who their secret agent is, so the subtlest of nods and eye contact must be used. Players can only move two at a time so everyone has to be aware of everyone else in the group. After a time the leader counts down to the end of the game and everyone remains where they are sitting. Those people who are sitting next to their secret agent are asked to stand up, and everyone reveals who their secret agent was.

🎯 Tips

- 1 This is a good game for quietening things down at the end of the session.
- 2 It's a good idea to encourage the secretive nature of the game so when people have chosen their secret agent they can show the leader they are ready to begin by making a sign like rubbing the side of their nose or surreptitiously crossing their legs etc.



Sample Sessions

These sessions took place in and amongst more conventional lessons exploring the same topic. They were aimed at a variety of Year groups and can be adapted to suit any age or topic. All the sessions took place in Science Laboratories, where pupils soon got into the routine of moving benches and stools aside to make space for the activities. It became a little like the time in class when books or equipment are passed around. If this is not practical then it's good to book the hall or other larger space for some of these activities.

The topics looked at in this section are:

- 1 The Earth and Beyond**
- 2 Food and Digestion**
- 3 Pressure and Moments**
- 4 Electricity**

All the activities can be adapted to look at any science topic. These sessions are not intended to be strictly adhered to but are included in the handbook to give some idea of how the exercises can be put together in a lesson or be integrated as part of a lesson.

You can use the exercises to respond to different groups' needs and tailor-make sessions to fit with your classes and your curriculum. Here are some examples of our experiences using this work with different groups.

One group was a large group; bright and quick and quite self-conscious and initially they had poor listening skills with each other and with the teacher. The group improved greatly at working together and listening and were willing to put themselves on the line with new techniques once the drama had proved itself and they could see the connections with the science. Initially a lot of focussing and listening exercises were played to bring the group together and to encourage co-operation. The group responded well to feedback about their own learning styles and what they could do to improve them. As a group they picked up the drama techniques well. Some boys and girls were self-conscious about offering up their ideas and opinions but, in the atmosphere of playing games and being allowed to be wrong, they picked up new skills to communicate their knowledge.

Another group was much smaller and was quite a disparate group. They had issues of commitment and interest in the science. The opening exercises worked particularly well to focus this group and to bring them to work together. This group responded really well to exploring the science in a visual, physical way and they quickly took to and owned the work. The group's enthusiasm and commitment greatly increased.

One particular group arrived at the science laboratory bringing many personal and social issues with them and with this group I concentrated on working on their co-operation and listening skills and brought the science in later on when the group had made some changes in their behaviour to each other and the subject. I believe we made some improvement in adapting their behaviour so they became aware of and began to remove some of the obstacles they put in the way of their own learning. Again this group engaged well in the focussing activities and used the science to play the games.

At one of the schools there was an awareness that, overall, girls did not engage in science or contribute greatly during the lessons. In this instance the drama activities harnessed the energy of the more forthcoming boys and also made a space for the more reticent girls. For example, the first volunteers to make a tableau would often be a group of boys. By using this tableau for a focus, the more reticent pupils then had an opportunity to make additions to the tableau - such as labels and sound effects - and develop the work while not being overwhelmed by the more forthcoming pupils (who were occupied by holding their positions in the tableaux.)

The Earth and Beyond

Session 1 Planets of the Solar System

(These sessions were geared towards Year 6 science)

Aims

To review the planets of the solar system and vocabulary.

Focus

'ON THE BANK / IN THE RIVER'

'NAME GAME'

name plus sound and action round the circle.

'RECIPE GAME'

played as UNIVERSE – galaxy / star / planet / moon/ asteroid.

Intro

'PEOPLE TO PEOPLE'

Main

'MILL AND GRAB AND SHAPES'

What have you been learning in science?

What is science for?

The Solar System – in small groups create a TABLEAU, then make it move.

Closing

'SOUNDSCAPE' of 'space sounds'.

Developed as homework for next session.

Session 2 The Earth Structure

Aims

To be able to identify the different components of the earth's structure.

Focus

'KEEPY UPPY'

using the vocabulary : core / mantle / plates / crust/ rift / drift / tectonics.

'TOUCH THREE THINGS'

something red / blue / green, something wood/ metal / plastic, something translucent / opaque/ transparent.

Intro

'SOUNDSCAPE'

they present their prepared pieces from previous session.

Main

'TABLEAUX' Work on the technique.

'True or False' – players move to one side of the space nominated True or to the other side nominated False when each of the statements below are read out in turn. Players return to the middle of the space for each new statement to be read out.

- (a) The core of the earth is molten metal.
- (b) There is a land where dinosaurs still exist.
- (c) Britain is on a major fault line.
- (d) Earthquakes occur in the centre of plates.
- (e) Volcanic activity occurs between plates.
- (f) Magnesium is the name of the molten rock which forms volcanoes.
- (g) The movement of plates causes global warming.
- (h) Earthquakes are caused by the friction of plates moving against each other.
- (i) The earth's crust is like its skin.

Closing

'TWO TRUTHS AND A LIE'

in small groups. They select a presenter to present their group's offerings to the whole group. The other groups vote as to which is the lie.



The Earth and Beyond

Session 3 Rocks

Aims

To identify sedimentary / igneous / metamorphic rocks and their features.

Intro

'LINES'
without speaking: birthday month / height / eyes/
hair / shoes.

'1, 2, 3 Alternate Counting'
then introduce gradually the words and a gesture
for each of the terms sedimentary / metamorphic/
igneous.

Main

'ROLE PLAY'
Introduce role playing techniques with scenes created
around who, what, where.

They create presentations – 'Rock Stories' to define
and describe the three rock types.

Followed by 'How hot are your rocks?'
An ANIMATED DIAGRAM looking at the temperatures
of different types of rock.

Creating, in two groups, a scene in which earthlings
attempt to sell dodgy, second-hand volcanoes to
Martians for their planet.

Closing

Sharing and feedback.

Session 4 Summary

Aims

To review and consolidate the work of the previous
sessions on solar system, earth's composition,
continental drift, volcanoes, earth's atmosphere
and rock types.

Focus

'HAND CIRCLE' (SLAPPER)

Main

PRESENTATION to younger pupils.

Rock Stories role play.

Solar System role play.

Deep Space soundscape.

Scene : Salesroom on Mars.

'KEEPY UPPY' with earth's composition vocabulary.

'1 - 2 - 3' using sedimentary / igneous / metamorphic
vocabulary.

Continental Drift moving picture.

Closing

'ON THE BANK / IN THE RIVER'

'BONNY'

Food and Digestion

Session 1 Food Groups

Aims

To introduce the different food groups. To look at which foods contain the different food groups

Focus

'RECIPE GAME'

Play the recipe game with the seven types of foods. For example, name the players around the circle 'carbohydrate', 'protein', 'fibre', 'minerals', 'vitamins', 'water', 'fat'. Then, the player in the middle without a seat calls one of the foods out and all those who are named that food type must get up and change seats while the player in the middle takes the opportunity to get a seat themselves, leaving a different player in the middle without a seat. If the player calls out 'Food Types', then all players must move. The game can be played with different categories, e.g. carbohydrates, fats and proteins.

Intro

'MEAL GAME'

Keeping the names from the previous game, the player in the middle calls out a food (e.g. baked beans) and all those food types contained in that food must change seats. Develop this so the player says a meal and the food types included in this meal have to change seats. All move on 'Dinner's Ready!'

Main

'ON A PLATE'

In small groups players make a tableau of a meal on a plate using their bodies to represent this meal. For example one group could be a full English breakfast with one person as the sausage, two more a fried egg plus some beans etc. Then each food has to introduce itself and which group they represent, e.g. "I'm a bacon rasher and I represent protein".

This exercise could be developed as a labelling exercise. When the group has made the physical picture of the meal on the plate the other players name and label them using a written label, e.g. 'protein'. Using a metre rule to point at the protein part of the meal. A more detailed label can be added which labels the food type label, so for protein this may read, 'Used for growth and repair of tissues'.

Books

Either take photos or draw the meals into books and transfer the information from the labels to the photo or drawing.

Closing

'IF I WAS SOMETHING TO EAT, I'D BE A
BECAUSE

Session 2 Food Groups and their Uses

Aims

To identify what the different food groups are used for.

To explore which food groups are needed by different groups of people.

Focus

KEEPY UPPY

played calling out different foods rather than numbers trying not to repeat the same food. If the group is large, work in two or three teams and the teams not playing can observe and count how many different foods are called out.

Intro

RECIPE GAME

with 'Carbohydrates', 'Vitamins and Minerals', 'Fats' and 'Proteins'

Develop the game by looking at what each food group does for the body and devise a movement that expresses this. Play the game using these movements rather than the words.

For example; Carbohydrates provide Energy and could be represented by a star jump, Protein builds and repairs the body so could be represented by a body builder pose, Vitamins and Minerals maintain health so could be represented by a big smile (to show off shiny teeth) and wagging fingers (to show off strong nails), Fats store Energy for warmth and future use so you could clap flippers and bark like a well-fed seal pup!

Main

TABLEAUX

In groups make tableaux of people engaged in different activities e.g. Athletes at a track meet, office workers, a group of babies or toddlers, a group of elderly people, a pregnant woman, workers on a building site. Encourage detail in the tableaux to express how much energy is being used or clear detail of the activity being portrayed.

Share the Tableaux. As each one is presented to the whole group discuss which food group would be most needed for each activity e.g. Carbohydrates for the building site workers for Energy.

Closing

TWENTY

Food and Digestion

Session 3 Enzymes and the Small Intestines

Aims

To show how food is absorbed in the small intestine.
To show how enzymes work.

Focus

'RECIPE GAME'

Use the food groups Fat, Carbohydrate and Protein and play the game as Enzymes with Lipase, Carbohydrase and Protease. Everyone moves if you call 'Enzymes'. Mix the two games and call out a food group at which the enzyme that breaks down that food group has to move.

Intro

'FIND YOUR ENZYME'

Use specially shaped cards for food groups Protein, Fat and Carbohydrate plus their corresponding enzymes. The parts of the card should fit together like two pieces of a jigsaw and only the correct enzyme will fit with the related food group. Explain that enzymes are specific to a particular food group and are unaffected by the process – they are catalysts. Hand out the cards and give a time limit for enzymes to find their matching food. Why are larger food molecules broken up into smaller molecules?

Main

'SMALL INTESTINE ROLE PLAY'

Make up molecules of each food group using people linked together with labels.

Fat:

One person is the glycerol and three people are fatty acids and have to attach themselves to the glycerol.

Protein:

A number of people with different labels representing amino acids linked together in a chain.

Carbohydrate:

A number of people with the same labels representing glucose linked together in one chain.

Make the wall of the small intestine with two rows of chairs with small gaps between them, or use people instead of chairs if it is a big group.

Give out the role of the blood stream on the other side of the small intestine wall. Get the blood to encourage the food to be absorbed by beckoning and calling out.

Make enzymes with their own labels – Carbohydrase, Protease, Lipase.

Introduce one food type into the small intestine without the enzyme and show what happens, e.g. the food is too big to go through gaps in the small intestine wall.

Now introduce the enzyme into the small intestine and see what happens. The appropriate enzyme will break up the food into smaller molecules (e.g. break the chain) which can pass through the intestine wall and be absorbed into the welcoming blood to be carried away to different parts of the body to be used.

Closing

Complete the sentence 'MY FAVOURITE FOOD IS' around the circle.

Food and Digestion

Session 4 The Digestive System – Review

Aims

To review the whole digestive system.
To piece together the different parts.
To find out what happens to food throughout.

Focus

'HAND CIRCLE – aka SLAPPER'

Main

'THE FOOD'S JOURNEY'

Role-play. Each stage in the digestive system is represented by different groups of players who agree upon an image and action to show what that part of the system does. Each part is created as the food travels the digestive tract. Maybe four or five people could represent the food.

1 Mouth

Teeth – make a chomping sound and action.
Saliva – added to food and flows in between food to lubricate, making appropriate sounds.

2 Gullet

Players form the walls of the gullet and make the muscular contractions to pass the food and saliva down to the stomach.

3 Stomach

Another set of players form the elastic walls by, for example, holding hands in a circle and churning the food around.

Two players represent gastric juices added to the food to break it up. They will go into the stomach and make some action such as nipping to represent their role. Also add two hydrochloric acid, perhaps appearing to be bouncers on the look out for bacteria.

4 Small Intestine

Add enzymes into the intestine to take out useful parts of food, therefore at this point food and some of the saliva etc. will cross over into the blood and leave the role play.

5 Large Intestine

Water and salts pass over into the blood leaving only waste materials.

6 Rectum & Anus

Whatever / whoever is left is expelled! Sound effects!!

Closing

'DIDDLE DEE'



Pressure and Moments

Session 1 Pressure, Force and Area

Aims

To explore the different uses in everyday life of pressure. In particular to look at instances of a large pressure being exerted and a small pressure being exerted.

Focus

'ON THE BANK / IN THE RIVER'

Intro

'RECIPE GAME' Using Force, Area, Pressure and then using Newtons, Metres Squared and Pascals.

Main

'MILL AND GRAB AND TABLEAUX' Use tableaux to show one instance where low pressure is utilised and one instance where high pressure is utilised e.g. skis, snow shoes, drawing pin, hammer and nail, knife and vegetables, ice skates, foundations of buildings, ladder across frozen ice etc.

'SHARE'

Written exercise

'ADVERTISEMENTS' make an advertisement for snowshoes that make you sink, or a nail that won't be hammered into the wall.

Closing

'ON THE BANK / IN THE RIVER'

Session 2 Pressure in Gas and Liquids

Aims

To show how pressure affects gasses and liquids.

Focus

'SLAPPER'

Intro

'TRUST CIRCLE' Players stand in a close circle with no gaps. A volunteer stands in the middle with their eyes closed and walks to the edge of the circle. In silence, the players forming the circle gently stop the volunteer from bumping into the circle and gently turn them around and direct them across the circle again. After a while, the player in the circle is asked to come to a stop and open their eyes. Are they where they thought they were? Another player now takes a turn in the centre.

Main

'ROLE PLAY – PRESSURE IN GAS' Use the circle formed by the trust game as the 'skin' of an under-inflated beach ball or football. Get three volunteers to enter the circle and move in the space as gas particles would, e.g. not touching, constantly moving, not sticking to the side of the circle or each other. 'Pump' three more gas particles / pupils in and ask them all to move in the space for thirty seconds and get the circle to count how many times a 'gas particle' collides with them. Add up the number of collisions. Then, add three more 'gas particles' and repeat the above. The constant hitting of the inside surface creates gas pressure. The more air particles, the more collisions with the inside surface and the greater the pressure.

'ROLE PLAY – PRESSURE IN LIQUIDS' Using two heavy ropes or some chalk, mark out a 'U' bend on the floor. Pour liquid / pupils into the 'U' bend. The liquid particles / pupils will be packed tightly together, taking up the shape of the 'U' bend and will be at equal levels to each other. Then place a stool at one end of the bend and apply pressure/ push the liquid / pupils at the other end. The pressure should force the liquid to move up to the end of the bend and knock the stool over – because liquid/ pupils cannot be pressurised!

Closing

'PASS THE PULSE'

Pressure and Moments

Session 3 Force Multipliers - levers

Aims

To introduce the idea of levers and how they increase the effort to move a load force.

To be able to label diagrams with 'pivot', 'load force' and 'effort force'.

Materials

Small ball.

Small plank, soft juggling ball or other weight, and a piece of thick dowling.

Three one-metre rules.

Three large labels – 'Pivot', 'Load Force' and 'Effort Force'.

Focus

'KEEP UPPY'

Intro

Show small model of lever in action using block, load and small plank. Ask one volunteer to hold down one end of the plank and another to push down on the opposite end of the plank. Move the block to different positions along the plank. Now ask the volunteers to describe what they have experienced. Show how either increasing the effort force or moving the pivot closer to the load can move a greater load force. Elicit the names of the different parts of the force multiplier, e.g. 'pivot', 'load force' and 'effort force'.

'RECIPE GAME AS FORCE MULTIPLIER' using 'Pivot', 'Load Force' and 'Effort Force'.

Main

'TABLEAUX' Play 'Mill and Grab and Tableaux' to break into groups. In groups, show an example of using a Force Multiplier / Lever in everyday life.

SHARE Show each of the tableaux and get the pupils watching to label the 'pivot', 'load force' and 'effort force' using the metre rules and labels.

Closing

Draw and label a diagram showing a 'Force Multiplier / Lever' in action.



Pressure and Moments

Session 4 Revision

1 'Keepy Uppy'

Using vocabulary from the topic. Pressure, Force, Area, Newtons, Metres squared, Pascals, Compressed, Load Force, Effort Force, Pivot, Force Multiplier.

2 True Or False

For this exercise players stand in the middle of the room in a line one behind the other. The leader names one side of the room 'False' and the other 'True'. The leader reads out the following statements and asks 'True or 'False?' The leader then calls out 'Go!' and players have to immediately move to one side or the other according to whether they think the statement is true or false. Once everyone has chosen a side the leader can ask why players have chosen that side and then makes clear whether the statement was true or false. Players then return to the line in the centre of the room for the next statement.

- a) Gas pressure is created when gas particles constantly hit the inside surface of their container. (T)
- b) A pivot is the point about which a lever moves. (F)
- c) If the area is small (i.e. a stiletto), a large pressure is exerted. (T)
- d) Pressure equals Force divided by Area. (T)
- e) Pressure is measured in Newtons. (F)
- f) Liquids are incompressible. (T)
- g) A Force Multiplier enables a small effort force to overcome a large load force. (T)
- h) Pascal is another word for Newtons Metre Squared. (T)
- i) The further from the pivot the load is, the easier it is to lift it. (F)
- j) To stop a crane lifting a load from falling over, you increase the weight of the counter balance. (F)
- k) Two people each have the same weight, each have different sized feet and each exert the same pressure. (F)
- l) Snow skis prevent you from sinking into the snow by using a large area over which to exert the pressure. (T)
- m) Forces on both sides of the pivot must be balanced. (T)

3 Recipe Game

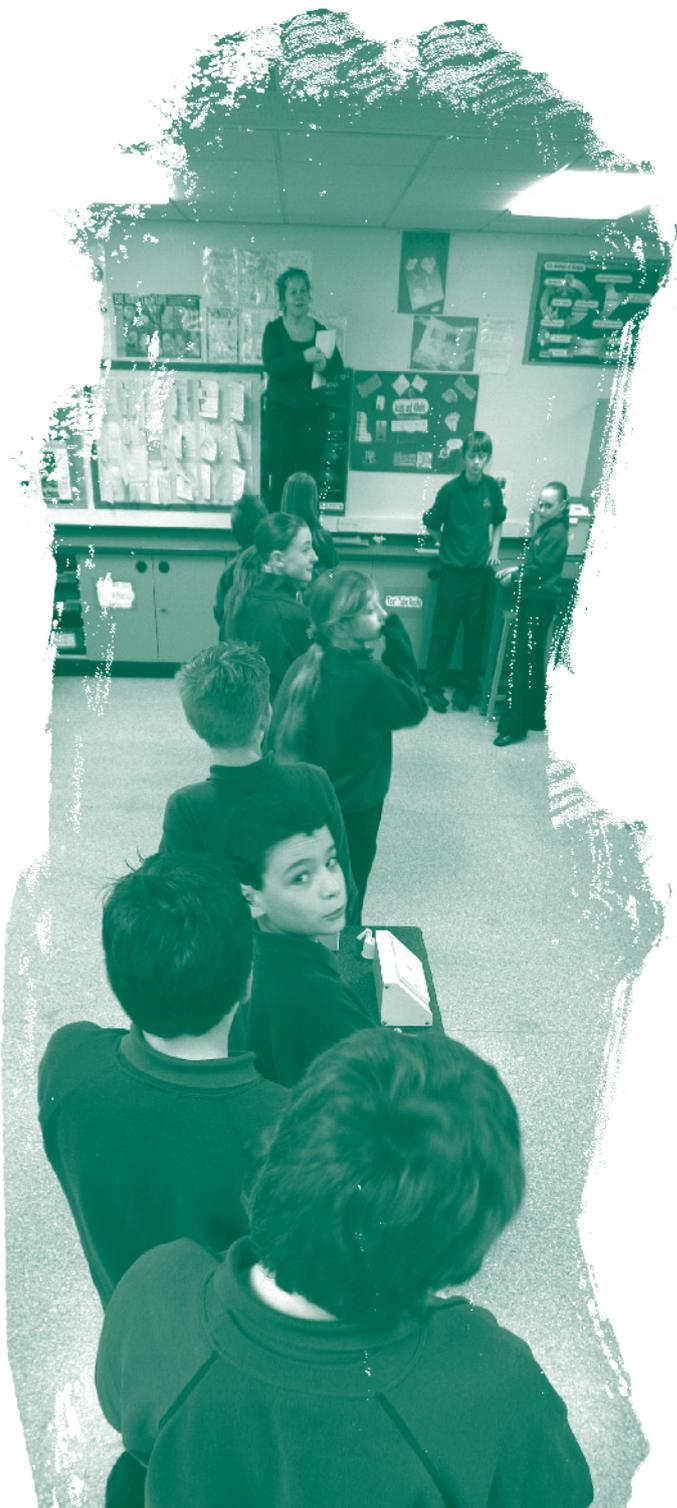
Using Pressure / N/m^2 , Force / N, Area / m^2 and Pressure Formula.

4 Formula Kits

In groups of three, make, label and show the formula using themselves, a pair of scissors and a metre rule.

5 Force Multiplier Tableaux

In groups of three, make a tableau of a force multiplier. Label each others tableaux with 'pivot', 'effort force' and 'load force', e.g. group one labels group two, group two labels group three etc.



Electricity

Session 1 Circuits

Aims

To introduce the different parts of an electrical circuit and identify what role they play.

To understand that electricity flows around a complete circuit.

Focus

ON THE BANK / IN THE RIVER

NAME AND FOOD

PASS THE PULSE – liken this to a complete circuit, what happens if two people don't hold hands / if the circuit is broken?

Intro

TWO TRUTHS AND ONE LIE: about electricity. In pairs think of two truths and one lie about electricity. Choose one to share with the rest of the group and the group has to decide if it's a truth or a lie.

An electric current flows around a complete, unbroken circuit.

Elicit what is in a circuit including electricity source (battery / cell or mains), an appliance (bulb), a switch and a conductive wire to connect all these.

Main

RECIPE GAME – 'CIRCUIT'- Cell, Bulb, Switch, Wire

Replace spoken words with a physicalisation or action for each part of the circuit. This is similar to the drawn symbols for drawing circuit diagrams.

Closing

SLAPPER

Session 2 Series and Parallels

Aims

To show how electrons travel around a circuit.

To explore series and parallel circuits and show their differences.

Focus

SLAPPER

Intro

RECIPE GAME – 'CIRCUIT' – Cell, Bulb, Switch, Wire, Electron. Recap physical symbols and play without words.

Main

PEOPLE TO PEOPLE - as a physical warm up and to encourage people to work with people they wouldn't usually.

MILL / GRAB / SHAPE – make shapes e.g. circle, triangle, square.

SERIES CIRCUIT – in groups of six and using the physical symbols from Recipe Game to make a circuit.

Each group shows their circuit and they are tested by sending electrons around the circuit. Experiment with using the switch and also breaking the circuit elsewhere.

PARALLEL CIRCUIT – as whole group make a parallel circuit, send electrons around and explore breaking the circuit in different places.

Closing

SCIENCE BLOG

Electricity

Session 3 Resistance

Aims

To understand the difference between conductor and resistors.

To show the effect of resistance in an electrical circuit.

Focus

HANDS INTO THE MIDDLE

Intro

RECIPE GAME

Resistance – Conductor, Insulator, Electron

Show how insulators won't let electrons through and have a high resistance. They turn their backs on Electrons. What kind of materials are insulators?

Conductors let electrons through and have a low resistance. They beckon and encourage electrons. What kind of materials are conductors?

What effect does this have on a circuit?

Main

CIRCUITS

In groups, make circuits using the physical symbols from the previous lesson. Make a series circuit with a light bulb or buzzer then add an insulator or a conductor and show how it effects the circuit and the electrons. The conductor will encourage the electrons and the insulator will block the path of the electrons. Share these circuits with the rest of the class.

Experiment with placing a longer or shorter piece of wire in the circuit. Send electrons around and see the effect this has on them, on the current, on the bulb or buzzer. Share these circuits with the rest of the class.

As a whole group make a circuit using a dimmer. What use is there for this?

Closing

COUNT TO TWENTY

Session 4 Plugs and Fuses

Aims

To be able to name the different parts of the plug.

To explore how a fuse works.

Focus

ZIP ZAP BOING

Intro

Talk about what is inside a plug, why they are often sealed on shop bought electrical appliances, elicit words for Recipe game;

RECIPE GAME 'Plug' - Earth (green / yellow), Neutral (blue), Live (brown), Fuse.

Main

HUMAN DIAGRAMS

PLUG – using people make a diagram of a plug. You will need people to represent;

- the cable entering the plug
- the cord grip
- the Earth, Live and Neutral wires using appropriately coloured ribbons
- three pins
- the fuse

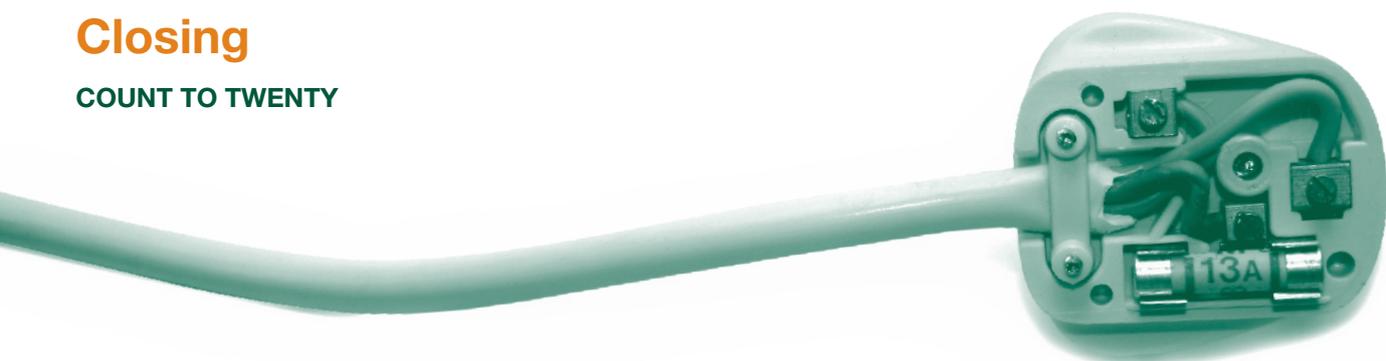
Make the diagram with people and send electrons along the cable and into the plug.

FUSE – Look in more detail at a fuse, what is it there for, make a circuit with one in and BLOW THE FUSE!

NB. A fuse is like a thin suspension bridge that can only carry one person at a time and will break under the strain if overloaded.

Closing

COUNT TO TWENTY



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“Intuition is the source of scientific knowledge”

Aristotle

Some pupils soak up science like sponges soak up water. Some don't!

Even the most able students can benefit from new ways of learning.

Even the most able teachers can benefit from new ways of teaching.

Young people who have danced their way through atomic theory will never forget it.

The evolve project is a two year initiative which brings together a comprehensive package of exciting and inspiring activities for young people, teachers, PGCE students, artists and arts graduates in the Tees Valley. evolve is a professional development opportunity which aims to embed new and innovative ways of delivering cross curricular activity through creativity.

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