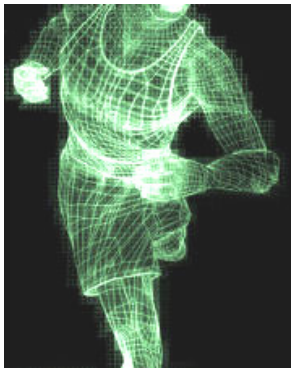
Sports Hall Activity Tasks

Tasks:

1. Exercise, heart lungs and fitness
2. Friction
3. Forces - absorption
4. Heart rate and exercise intensity
5. Aerodynamics
6. Projectile - jumping
7. Gravity – hanging in the air

Produced for the Science Learning Centre Yorkshire and the Humber course:

YH57 Learning together – the partnership between science and sport

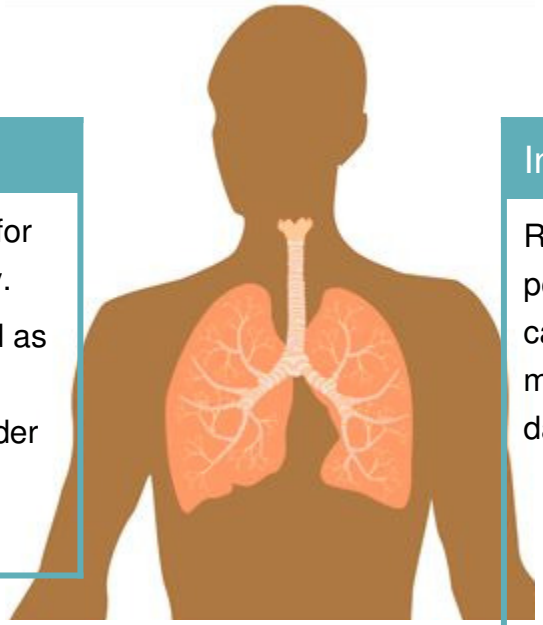


Task 1: Exercise, heart, lungs and fitness

Context:

There are a variety of forms of exercise, and for each one there are different levels of intensity.

In this activity an exercise bicycle will be used as a means of improving cardio-vascular fitness. This requires a specific level of intensity in order to maximise fitness gains.



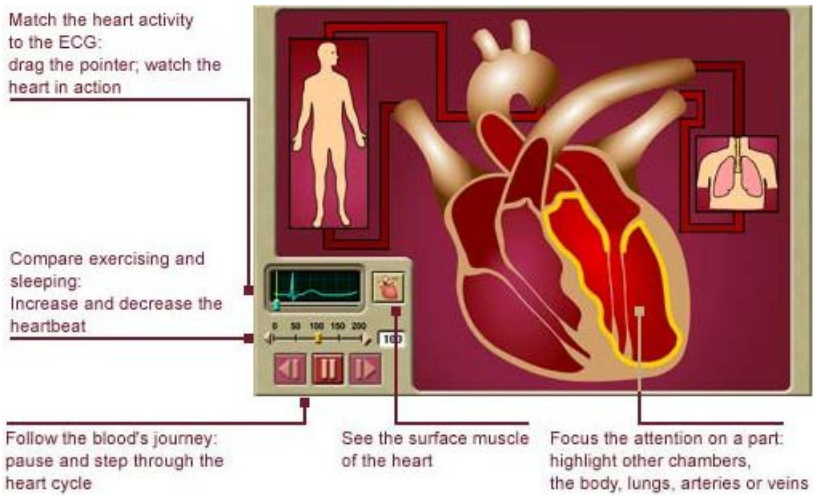
Instructions:

Record heart rate for two minutes whilst pedalling at low intensity. Maintaining cadence change down one gear for two minutes and continue recording heart rate data. Repeat until run out of gears or puff.

1. Does each change in gearing produce a similar effect on the heart?
2. What gearing arrangement produces the optimum aerobic training effect?

This can be checked over time using a second technique. Spirometry gives an indication of lung and breathing function. The resulting graph needs to be compared with previous data to observe the effect of training.

Equipment: exercise bicycle, heart rate monitor, spirometer



Task 2: Friction

Context:

In sport there are a variety of different specialist footwear to help suit the needs of a performer:

- Spikes for running on tartan tracks/cross-county
- Football boots with studs to use on grass
- Basketball boots for grip on varnished wooden floors
- Specialist throwing shoes used in turning throw techniques (eg discus, hammer)

Instructions:

Record the time it takes for each member of your group to complete the 10m sprint whilst wearing trainers, socks and bare feet.

1. Which of these do you think with give the fastest times?
2. Which of these will give the slowest time?
3. For each of these, discuss with your group why this might be the case?
4. What do you think are the most important considerations when designing footwear for different sports?

Equipment: stopwatch, start/finish line

Task 3: Forces, absorption

Context:

As high jumpers strive to be *faster, higher, and stronger*, they develop new techniques and training methods to exceed existing levels of performance. In order to ensure that athletes can compete safely technology to cushion their landing must keep pace.

- 1900- Grass
- 1920 - Sand/sawdust
- 1968 – Foam

Instructions:

Using the equipment available to you try to develop a test that you could use to determine the most appropriate materials to cushion a high jumper landing from height.

- Which material provides the greatest “cushion” per cm of thickness?
- Why?

Equipment: Gym mats (x4), basketball

Task 4: Heart Rate and Exercise Intensity

Context:

Exercise affects the body whether as a short term, immediate response through sweating, fatigue etc. or though longer term adaptations (training) to the efficiency of the cardio-vascular system, muscle endurance, strength etc.

Does all exercise affect the body in the same way?

Put these activities in order according to how hard your heart would have to work:

- Cross-country skiing
- Arm wrestle
- 10km walk
- 100m Freestyle swim
- Pole vault
- Rock climbing

Questions:

What happens to your Heart Rate?

Which activity raises your Heart Rate most?

How do you know how hard you are working?

What do you think would happen to your Heart Rate in a 10 second sprint?

What do you think would happen to your Heart Rate in a 30 min bike ride?

Instructions:

As a group sit still on the bench and find your pulse - record your resting value. Choose an activity to perform for 30 seconds. Activities:

- Tricep dips on the bench – Legs straight/hips still
- Sit ups on the mat – knees bent to 90° / arms folded
- Burpees/Bench Squat

Try to complete as many repetitions as you can.

Record your pulse rate immediately you finish and then again 1 and 2 minutes later (you should have 4 readings for each activity including your resting score)

Repeat this process for the other 2 activities each time recording your resting, immediately post –exercise, 1 & 2 minutes after.) Alternatively choose different activities to perform the task (arms/legs/whole body)

Equipment: stopwatch

Task 5: Aerodynamics

Context:

Many sports are concerned with flight. Whether sending a javelin, spinning a cricket ball, vaulting in gymnastics or bending a free-kick into the top corner of a net, how an object moves through the air can be very significant to a sports performer.

Instructions:

Each member of your group must record 3 hits with each of the shuttlecocks 1-4. For each attempt record the distance that the shuttlecock travels. For each attempt try to ensure that you use the same amount of force.

1. Which shuttlecock do you think will travel the furthest - why?
2. What other issues might you need to be aware of that might influence your results when attempting this task?
3. Which shuttlecock do you think would be easiest for a beginner to play with - why?

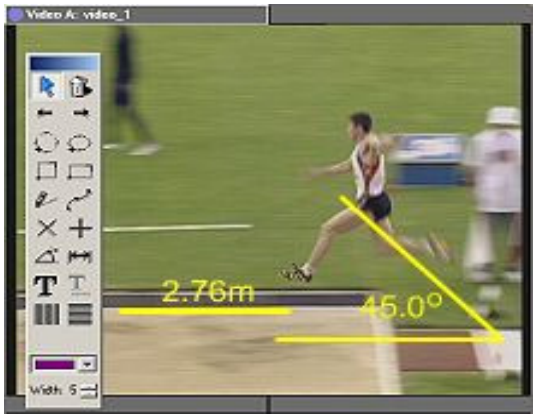
Can you think of any alterations to the rules or the court size that might make the game of badminton more enjoyable if you used the different shuttlecocks?

Equipment: shuttlecocks, racket, tape measure

Task 6: Projectile - jumping

Context:

Many sports work with angles and distances. As long jumpers look to jump further, certain aspects of technique become more important to them. Which aspects of technique can be enhanced by looking at angles of joints at key stages of a standing long jump?



Instructions:

Please stretch before jumping

You are going to take part in 4 different jumps. All will be videoed and the clip then analysed.

Jump 1- No knee bend on take off

Jump 2- No use of arms at all

Jump 3- No backward motion with the arms

Jump 4- No restrictions

Each jump will be measured for distance and the angles joints at key stages on the jump.

Equipment: Video Camera and Laptop and Dartfish software

Task 7: Gravity - hanging in the air

Context:

How are some people able to stay in the air for what seems like seconds?

Are these people naturally gifted at jumping, or are there techniques we all can learn?

In this investigation we are going to take the first steps at answering these questions by seeing who can stay in the air for longest.

Instructions:

Connect two timing mats to channels A and B of a data logger. Start Easy and choose 'Timing'.

Select:

- 'Time
- from A to B'
- click the green start arrow

Stand on mat A and then jump onto mat B, trying to keep both feet off the ground as long as possible. Each person in group tires activity.

When complete, click the red stop box in the menu bar, and save the file.

Analyse the results to see how much the variation there is in times. Describe any patterns in the data and discuss your various explanations. If time allows collect more data to check explanations.

Equipment: timing mats and data logger