Concept Cartoons®
Talking sport and fitness
A science-focused cross-curricular resource for ages 8-14

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Produced by Millgate House Education in partnership with The Association for Science Education and Schoolscience

Sample set
Concept Cartoons® are cartoon-style drawings that put forward a range of viewpoints about a particular situation. They are designed to intrigue, provoke discussion and stimulate thinking. Concept Cartoons make concepts problematic and provide a stimulus for developing ideas further.

The Concept Cartoons in this resource explore all aspects of sport and fitness. Many of the Concept Cartoons relate to aspects of science, but they also connect to other areas of the curriculum including mathematics, history, geography and ethical problems. Each Concept Cartoon can be used to stimulate a free standing discussion and enquiry. Alternatively, the Concept Cartoons can be linked together to form a larger topic or to create a project related to major sporting events.

Some Concept Cartoons may look as if they are too easy for some learners, but their deceptive simplicity can stimulate discussion about more challenging concepts and can often reveal some basic misunderstandings. Learners can create their own Concept Cartoons as a way of assessing and reviewing their current understanding.

Concept Cartoons do not always have a single right answer.

Each Concept Cartoon has support material, including ideas for follow up and some possible answers.

* Concept Cartoons are normally used near the start of the lesson, followed by group discussion.
* Ask learners to discuss why each character in the Concept Cartoon might hold their particular idea. Do they have any other ideas that might go in the blank speech bubble?
* Avoid being judgemental when learners are sharing their ideas. The uncertainty created by Concept Cartoons is productive.
* The main body of the lesson should provide an opportunity for learners to explore, challenge or consolidate the ideas raised through the Concept Cartoon(s).
* Allow time at the end of the lesson to share ideas.
* Have they changed their minds and why?

To learn more about Concept Cartoons and how they are used, visit:

www.millgatehouse.co.uk  Twitter: @MillgateHouseEd

When printing out the Concept Cartoons please select the landscape setting on your printer options.

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What do YOU think?

Big countries always win the most medals in international sporting events.

Small countries never win any medals.

Some countries don’t play every sport so they can’t win medals.

Some small countries win lots of medals.

Some big countries always win the most medals in international sporting events.

Some small countries never win any medals.

What do YOU think?
In groups have a look at a medal table for a big sporting event. See if you can identify which counties are big and which are small. Use a map to help you. Where are they on the table? Are all the big countries at the top and all the small ones at the bottom? Do some small countries still win medals? What do you think might make a difference? Does the number of people who live in the country make a difference? Does every country enter competitors for all the sports?
The USA, Russia and China have topped the medal chart in recent Olympics. These are all large countries with large populations. However, the answer is not as simple as that. The United Kingdom also does well even though it is a small country with a fairly small population. Small countries are successful in many different international sports. Putting a lot of emphasis on sports, having good training facilities, and giving sportspeople a high status make it more likely that people with potential can perform well. What else makes a difference? Use a map of the world to share what you have found out.
There should be a separate race for people with artificial legs.

People can run just as well with artificial legs.

Some types of artificial legs might give the runner an advantage.

People with artificial legs should choose which race to enter.

What do YOU think?
Have you ever seen people running with artificial legs and seen how fast they are able to run? You can research the achievements of athletes who use artificial legs, such as Oscar Pistorius and Annette Roozen. Do you think that having artificial legs is an advantage or a disadvantage? Talk to your friends and do some research on the internet. Find out about their running results and compare them with athletes without disabilities to help you decide. Share your ideas with others in your class. Do you all agree? If not why not?
People will have different views about this question. There isn’t one simple answer. If you have made a decision, you should be able to give reasons for your answer. People who run sporting events generally decide which rules to apply, but this decision can be a hard one for them to make and they do not always agree. What other sports do people with disabilities engage in? Compare records for athletes with and without disabilities. What effects do different types of disability have on athletes? What other aids can help disabled athletes to compete?
Who has heard the term "pulse" before? What does "pulse" mean? Would you say your heart beats faster when you run? Why or why not? If you are fit, how does your heartbeat differ when you do some kinds of exercise? Your heart doesn’t beat faster, it’s only your pulse rate that changes.
Follow up

Talk about what your heartbeat and your pulse are. Carry out some research to check your ideas. You can check each other’s heartbeat and pulse. Measure someone’s pulse by holding the first (index) and middle finger of your hand on the inside of their wrist. Count how many times it pulses in a minute. Use a stethoscope to listen to their heartbeat at the same time. Are the pulse and the heartbeat the same or different? Is each person’s pulse the same or different? What happens when you do exercise?

SAFETY Ensure that each child is physically fit for any exercise-related investigation that she or he is going to undertake. See ASE Be Safe! page 10.
Your pulse is the rate at which your heart beats, measured in beats per minute. Your pulse depends on what you are doing. It is slower when you are sleeping and faster when you are exercising. Normal resting heart rate is between 60 and 100 beats per minute. Usually the fitter you are, the slower your resting heart rate is. Some athletes’ heart rates can be as low as 40 beats per minute. Measure your pulse rate before and after exercising to test this. How long does it take to return to your resting pulse after you finish exercise? How will you show what you’ve found out?
What do YOU think?

It's best to throw the javelin as high as you can.

It goes further if you do a low, hard throw.

It goes furthest if you throw it at 45°.

I think the angle is different for the javelin, shot, discus and hammer.

It goes further if you do a low, hard throw.
Follow up

In groups, discuss which statement you agree with and give reasons. If you decide that the special angle is different for each of the throwing sports, try to explain why. Think about the shape of each piece of equipment. You can use the internet or books to help you decide. You can use lengths of foam to model the javelin. How does throwing a ball compare with throwing a javelin? Practise throwing and observe which kind of throw improves your score the most. Does the angle make a difference?

SAFETY Ensure objects are directed well away from spectators when launched. See ASE Be Safe! page 27. (Foam javelins are available from TTS)
Experts say the best angle to throw a javelin is about 33°, about 42° for shot, 35° for discus and 43-44° for hammer. Does this match what you found with your investigation? If not, why do you think it might be different? Do you think other sports might involve different techniques? Think about different kinds of jumping e.g. high jump, long jump, hurdles, etc. Use what you have learnt to produce a guide to throwing and jumping.