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How to Use Brainstrains

At School

As a teacher you can choose to use the full range of exercises that *Brainstrains* offers, or just some. You might arrange for the work to be completed solely in your own class, for homework, or have other teachers follow up on other parts of the book.

A problem might be initiated in a maths class, then continued in the school library, history class, geography or a philosophy/social skills discussion group.

Do whatever you feel comfortable with, in a way that will most benefit the students. These steps to using *Brainstrains* will help:



1 Check the *Index* for an area of mathematics your class is familiar with; or, choose a subject or theme from the *Brainstrain Contents* that is relevant to their work. Then check whether your students could cope with the full range of mathematics involved (see *Brainstrain Contents*) — use the *Difficulty Rating* (DR) as a guide. If yes, go to Step 2.



2 Read through the *Steps to Solution* for the selected Brainstrain after reading the problem. Do you understand how it is solved? If you do, and think it is appropriate for your students, go to Step 3.




3 Work out how many photocopies you will need of the Brainstrain as well as any of the *Outline Maps* that might be given out later. Check that students have the materials — calculators, protractors, atlases, etc. — needed to solve the Brainstrain.





4 Read the *Historical Facts* section and become more familiar with the subject. Decide how, when and where you want your students to tackle issues in the *Debate, Decide and Design* section. You should now be ready to start.





5 Just before handing out the Brainstrain, ask students to tell you what they know about the subject or theme. This will enable others to get a feel for the topic and create greater interest. Hand out the Brainstrain, explaining that the first part in *italics* is historical fact, while the problem itself is usually fictional.

- ⑥  Make sure that you have encyclopaedias and /or some of the *Outline Maps* available for those who finish early. They can do research on the subject or identify and label relevant areas.

⑦  While students are working on solving the Brainstrain, resist the temptation to give advice or assistance other than encouraging them to read the problem carefully. They must learn to organise material, establish an appropriate work sequence and reason for themselves. The problems aren't called Brainstrains for nothing!

- ⑧  When students have finished, go through the work as a whole group. Ask individuals to explain how they went about solving the problem. Make sure you have the *Steps to Solution* as a backup.

⑨  Allow students time to do research (see *Research Levels* and *Research Guide*), to tackle the *Design* task and to work with the *Outline Maps* and *Time Line Blank*, in class or for homework. You may even ask them to do a project.

- ⑩  Have students complete the *Decide* section activity before they do any work on the *Debate* (see these sections for an explanation).

Have work of high quality displayed in the room.

How to Use Brainstrains

At Home



Use the *Index* or the *Brainstrain Contents* to find a problem that both interests you and contains mathematics that you are familiar with. The *Difficulty Rating* (DR) will provide a guide as to the difficulty of the mathematics and the complexity of the problem.



What do you know about the history related to the selected Brainstrain, in addition to what is mentioned on the problem page? Make a brief note of some points.



Read through the selected Brainstrain. Remember that the first part (in *italics*) is historical fact while the rest is generally fictional.



Try to resist the temptation to peek in the back of the book at the *Steps to Solution* or *Solution Summary* sections until you have finished. Tackle the Brainstrain then check the Solution Summary. Go through the *Steps* if you came up with a different solution.



Return to your list of historical points. Compare it with the information in the *Historical Facts* section. How did you go? Use an encyclopaedia to find out more information (see *Research Levels* and *Research Guide*).



Use an atlas to fill in relevant areas of the *Outline Maps* and the *Time Line Blank* to fill in relevant dates (see also *Brainstrain Chronology*).



Turn to the *Debate, Decide and Design* section for the Brainstrain you have just completed. Involve your friends and relatives if possible in the activities (see that section).

Brainstrain 1: The Ships of Christopher Columbus

DR:5

In 1492, Christopher Columbus led a three-ship expedition west across the Atlantic. He had hoped to reach the spices and treasures of Asia's East Indies.

While voyaging around the New World, the *Nina*, the *Pinta* and the *Santa Maria* started to take in water.

Sailing in a straight line, the flagship, the *Santa Maria* was 5 km ahead of the *Nina*, which was the same distance ahead of the *Pinta*.

When the flagship was 88 km due west of Barbados, at 11.59 p.m. on 11 August, it was noticed that it was 15% full of water. At the same time, the *Pinta* was 12% and the *Nina* 17% full of water.

All the sailors knew that once 60% of their boat was filled with water, it would sink.

The ships were sailing east but covering only $\frac{2}{3}$ km a day, a speed they were expected to maintain despite taking in water.

The *Nina* was twice the size of the *Pinta*, which was one third the size of the *Santa Maria*.

- a. If the percentage of water inside the *Pinta* increased by 1 every day from then on, when and where would the *Pinta* sink?
- b. If the same amount of water entered the other ships each day, as entered the *Pinta*, when and where might they sink?
- c. Would any reach Barbados?



Christopher Columbus
Types of Sailing Ships
Spices
The Americas – Map and
Exploration History

Brainstrain 2: A Sword for Saladin

DR:2

The Muslim armies of Saladin captured the city of Jerusalem from the Christian Franks in 1187, triggering the Third Crusade.

Saladin, of Kurdish origin, became renowned for his fairness as well as his compassion for the poor of all religions.

A member of Saladin's guard had brought in a merchant who wished to see the conqueror of the Holy City.

"Oh Great One!" the man pleaded on his knees. "Take this gift – it is one of the great swords of Christendom. The weight of the handle is three parts gold, two parts silver and one part bronze. The blade of steel is five times the weight of the silver in the handle. It is yours – but please, spare the markets!"

Saladin moved to the balcony and gazed out across the city. Fires lit up the evening sky and the air was filled with the sound of wailing women and children. "Your markets will not be touched – there has been too much killing and destruction in the past few months. There will be no more."

"You are truly the Great and Merciful One!" the merchant cried in thanks, handing over the sword.

After the merchant had slid outside, Saladin turned to the commander of his guard. "This sword has probably been stolen. Have it sold to a Christian trader so that it might reach its owner, then use the money to feed the homeless and needy."

If one quarter of the weight of the handle was 624 grams:

- a. How much did the handle weigh?
- b. What weight of bronze was there in the handle?
- c. What did the steel blade weigh?
- d. What was the total weight of the sword?



Saladin
The Crusades
Types of Swords
Jerusalem – Map and History