BBC TEN PIECES
GET CREATIVE WITH CLASSICAL MUSIC

BBC Philharmonic

PRIMARY CLASSROOM LESSON PLAN

Science and Music

Inspired by

Mars from Gustav Holst's *The Planets*

Written by Patrick Bailey

For:

- Key Stage 2 in England and Wales
- Second Lever, P5-P7 in Scotland
- Key Stage 1/Key Stage 2 in Northern Ireland

This is a write up of a workshop given for teachers with musicians from the BBC Philharmonic Orchestra. The following notes could make a series of 2 or 3 lessons or you could pull out ideas to make one lesson.

Learning outcomes

Learners will use work scientifically to:

- identify characteristics of some of the planets in the solar system
- explain the way sounds are produced by a variety of musical instruments

Learners will use the information they research to help create a musical, orbiting solar system.

Curriculum checklist (England & Wales)

Science

- work scientifically:
  - gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
  - setting up simple practical enquiries, comparative and fair tests
  - reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

Solar system:

- describe the movement of the Earth and other planets relative to the sun in the solar system
- learn that the sun is a star at the centre of our solar system and that it has 8 planets

Sound:

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it

Music

- experiment with, create, select and combine sounds using the inter-related dimensions of music
- improvise and compose music for a range of purposes
- play and perform in solo and ensemble contexts, using their voices and playing musical instruments with increasing accuracy, fluency, control and expression
- listen with attention to detail and recall sounds with increasing aural memory

Lesson 1

Introduce the class to the music by playing them the performance of Mars found on the Ten Pieces website. You can explain that Holst was interested in the Roman gods that the planets were named after.

After listening to the music, ask the learners:

- what do they think Mars was the god of?
- how does Holst create this effect in the music?

Physical properties of the planets

We are going to look at the physical properties of the planets and create our own musical solar system (though you may not end up with 8 planets! NB Pluto was downgraded to 'dwarf planet' in 2006.)

Eventually, we will divide the class up in to groups of 6-8. Work out how many groups you will have. If you have 2 or 3 very gifted and confident musicians, there could be a separate task for them.

How many planets you compose for will depend on how many groups you have. If you have 5 groups, then get the class to choose 5 planets. Here are mine:

- Mercury
- Mars
- Jupiter
- Saturn
- Earth

Ask the learners to think about each planet's size. Learners should work scientifically to:

- gather and record data about the planets
- use the data to compare the relationship between planets and organise them in order of size

Lesson 2

How sounds are created

Now we are going to think about the instruments available to us: - either an instrument they are learning or one from the school's supply. Do use pitched instruments (xylophones, glockenspiels, chime bars, keyboards, relevant apps) as well as unpitched percussion (drums, shakers, tambourines). The greater the variety, the better.

Learners should work scientifically to identify the way sounds are produced by each instrument:

- is something vibrating? (a string? the skin? the column of air in a wind instrument?)
- is the sound high or low?
    - for a high sound we need something taut and small
    - for a low sound something large or the string/skin tension to be less taut

Learners can record the data from their explorations and use the results to:

- organise the instruments into groups
    - the group with the highest sounding instruments will compose music for Mercury;
    - the lowest sounding group for Jupiter and so on

Instruments such as keyboards with a capacity to play high or low can be distributed among the groups and we can limit their range later. The same goes for young flute or trumpet players etc.

You should now have 5 groups and with each group containing instruments of roughly the same size.

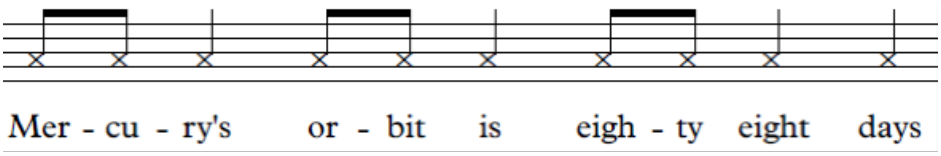
Each group could now do some research about their planet – try to come up with 3 or 4 facts about that planet's physical properties or relationship to Earth.

- how long is its orbit around the Sun?
- how many miles from Earth is it?
- what elements are most common there?
- anything about its colour, atmosphere etc

Each group should then write a sentence incorporating one of these facts e.g.:

- "Mercury's orbit is eighty-eight days"

Make a rhythm out of this and learn to play it on your instruments, repeating it over. Here is mine:



Lesson 3

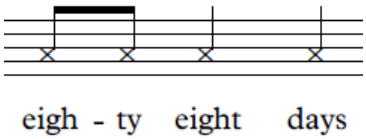
Composing musical, spinning planets

For each planet, we are going to start with a different time-signature or groups of beats.

smallest	3
	4
	5
	6
largest	7

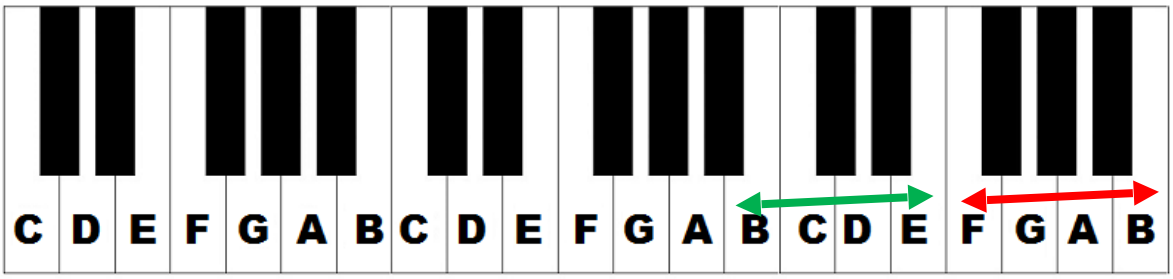
Each group should practice counting their time-signature out loud, clapping or playing on '1'.

Revisiting their rhythmic sentence, can they pull out a part of it that lasts for the number of beats of their time-signature. So, for my Mercury rhythm (3 beats), I get this:

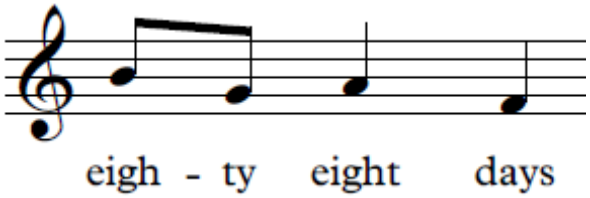


Pitches:

Each group or planet is going to have their own distinct set of pitches – four per planet. Give Mercury the highest, Jupiter the lowest. Stick to white notes and they will sound great. For example:



Each planet can now add some pitches to their rhythmic phrase. I now have this:



Those with unpitched instruments can decide whether to play the whole pattern or just on one of the syllables.

Composing music to make the planet spin

To create a cyclical, orbit feel for each planet, each group now needs to make a pattern that is ONE BEAT longer than the pattern they already have. For my Mercury music, I will need to make a pattern lasting FOUR beats. Looking at the table above, Jupiter would need to make a pattern lasting eight beats.

Go through the same process as before:

- make a sentence
- make it rhythmic
- find part of it that lasts four beats
- add pitches (I would suggest starting on the same pitch as the previous pattern)

(If you don't have enough pitched instruments, then you can make the second part entirely unpitched.)

If you play the three beat pattern and the four beat pattern at the same time, they will come back to the same starting point every 12 beats, a musical orbit.

- each group should compose a simple introduction
- they need to decide how many times they work through the pattern
- they need to decide how to stop (or when to fade out)
- they can include some spoken/sung text if they like
- practice their planet

Putting your solar system together

You should have 5 distinct pieces now. Each piece should use four pitches and instruments grouped together by their pitch. Each piece should have a musical orbit where one phrase is x number of beats long and the second is x+1.

Now we arrange our piece according to the order of the planets, relative to the sun, in the solar system. So in my piece this would be:

- Mercury
- Earth
- Mars
- Jupiter
- Saturn

Playing throughout, I suggest the drone of a Tanpura, an instrument central to Indian music. You can download free Tanpura apps. Set the drone to the note C. For me, this represents the Sun, the binding power of the Solar System.

Then, play your pieces in order. They can overlap a bit or have simply the sound of the Tanpura in between.

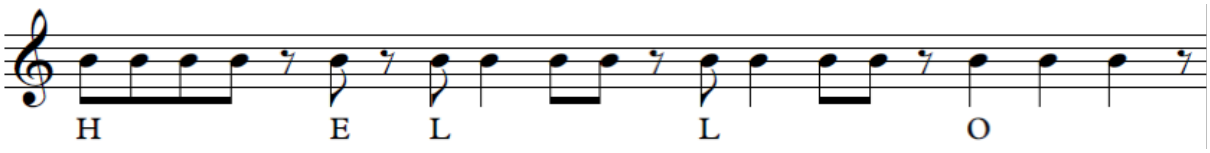
You could stage the pieces by having the groups fanning out from the Tanpura, like the orbits of the planets. You could add some lighting for atmosphere.

Differentiation:

If you happen to have one or more leaners who are musically more advanced, they could work on a separate task. They could be a musical satellite, moving between the planets, linking our musical journey.

The beeps that emanate from satellites remind me of Morse code. We can ask our satellite to play a musical message:

HELLO in Morse code is ···· · ·−·· ·−·· −−− or, musically:



This rhythm can form the basis of a short piece of music that links our planets.

Finally rehearse and perform your piece to the whole school!

Further exploration

BBC The House of Sound – Clips in which Fran Scott and Greg Foot explore the science of sound, music and musical instruments

BBC Ten Pieces Mars from The Planets – Further lesson plans and other resources based on Holst's masterpiece