

LOCATION:	TARGET AGE GROUP:
Classroom	KS2
TARGET GROUP SIZE:	DURATION:
10-20 (scale resources for larger group)	Min. 1 hour (ideally 1.5 hrs)

# PLPS CITY SCIENCE STARS

## Fixture 10: Roar of the Crowd

### SUMMARY:

Football crowds can make a huge amount of noise and 'thunder clappers' have been introduced to encourage more noise and make spectating more entertaining. In this teacher-led session, children will have the chance to record individuals, pairs and small groups clapping, stamping their feet, cheering and using the thunder clappers to see how much noise is generated. They will consider whether 2 people are twice as loud as one. Children will have the opportunity to take and record measurements and use their evidence to find patterns and draw conclusions.

### LEARNING OBJECTIVES:

1. To know that sounds are created by vibrations
2. To recognise that sounds travel through the air and that volume is affected by distance from the source
3. To use a datalogger to collect data
4. To collect data in a table and use this to draw conclusions.
5. To explain possible patterns through scientific knowledge and understanding of sound

### PRIOR LEARNING AND LINKS TO KS2 NATIONAL CURRICULUM:

- ✓ Pupils should have learned that sounds are made through materials vibrating.
- ✓ Pupils should be able to find patterns between the pitch of a sound and features of the object that produced it and between the volume of a sound and strength of the vibrations that produced it.

### PREPARATION AND RESOURCES:

- ✓ This workshop works best with the use of a computer and projector or a computer-linked smartboard to display the 'ROAR OF THE CROWD' PowerPoint slides. If none are available, printouts could be used instead, but these will be less engaging and less environmentally friendly.
- ✓ Each group of 2 to 3 pupils will require a datalogger or datalogging app (on a tablet computer or similar).
- ✓ Results table - this can be created by the children or supplied by the teacher.

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## ACTIVITY PLAN:

### Introductory activity

%! g!b[ 'hY Dck YfDc]b!x!g!V!gg'hY'gci bXg'h!Uha ][ \hVY' \YUFX'!b'U!Z!chVU'g!hUX] a . '

&'5g\_'hY V!X]XfYb'hc'g' [ [ YghUfYUgcb'k \m'h]g]a dcf!ub!h' h!Uh'hY'fY'Z'fY'Y'g!k \!ghY'g!ci 'XVY'\YUFX'U'Wcj Y'hY'bc'g!gY' cZ'hY'W!ck X" .

' "9!d'U!b'h!Uh'g!hUX] a g!UfY'Vi ]h!rc'fY'ZYV!gci bXg"

( "b!rc'Xi W'hY V!X]XfYb'hc'hY'XU!U'c[ [ Yfg'h!Uh'k ]'VY'i gY'X' hc'V!c'YV!X!U!U'Z!ca 'hY'f'!b]Y'g!h[ U!h!cbg!' [ ] Y'h!Ya 'Ub' cddcf!b]m!rc'Y!d'cfY'h!g!UbX'XY'hY'fa ]bY'\ck ]h'k'cf\_g" B!ch'h!Uh'hY'XU!U'c[ [ Yf'a U!mVY'U'Y'hc'fY'V!c'fX'ch!Yf' a Y!Ug' fYa Ybhg'hY'di d]g!g!ci 'XVY'U'Y'hc'W!ccgY'hY'fY'Y'Ubha Y!Ug' fYa Ybh!UbX'U'g'VY'U'Y'hc'V!b!rc'hY'f' XY] W!V!m!d!U' g!b[ 'XU!U'V!c'YV!g!cb'UbX'fY'gY'h]b[ ]h'

### Main activity

%!9!bg' fY'U'U'X [ fci d'\Ug'U'W!dV!c'U'FX'UbX'g' ]h!U'Y'fY'g' 'hg' h!U'Y'cb'k \!W!hc'fY'V!c'fX'XU!U'a Y!Ug' fYa Ybhg'

&'5g\_'hY V!X]XfYb'hc'XYV!XY'k \U!h!m!Y'g!c'Z!gci bXg'h!Y' W!ck X'a ][ \h[ YbYfU'h'UbX'k \!W!h!Y'm!k'ci 'X' ]Y'hc' ]b]Y'g!h[ U'h'UbX'fY'V!c'fX' .

' "9!d'U!b'h!Uh'g!hUX] a g!UfY'Vi ]h!rc'fY'ZYV!gci bXg"

( "Ga U' [ fci dg!c'Z!&' V!X]XfYb'g!ci 'X'g!U'fY'U'XU!U'c[ [ Yf' UbX'fY'V!c'fX'a Y!Ug' fYa Ybhg'Z!ca 'hY'g!h'W!ff]Y'X'ci hV'm'h!Y' W!Ug!g!U'k \c'Y"

9! "7!Udd]b[ . '

CbY V!X]X'W!Udg!gY' YfU'h!a Yg!g'c'h!UhY'U'U'X [ fci d'V!c'YV!g'hY'XU!U'cb]c'i a Y'h!g]g!fY'dY'U'hY'X" 'h!a Yg!g'c'h!Uh' V!X]XfYb'g!fY'g' 'hg'U'fY'a c'fY'fY' ]U'Y'f!h!Y'm!W!b'U'g' YfU' Y'h'e' XU!U'U'hY'f!"

B!Y!h&V!X]XfYb'W!U'hc' [ Y'h!Y'f'UbX'U' [ U!b!Z!XU!U'g!V!c'YV!X and the test repeated for accuracy" fY'dY'U'h!g'd!c'W!gg' k ]h' ) 'h!Y'b' %\$ V!X]XfYb'clapping! 'in each case, each person should make the same sound so that it is the number of people involved that changes, not the sound each makes.

- Repeat this activity with another 'football sound', aiming for at least 3 different sounds such as clapping, cheering, chanting, stamping, or using thunder clappers.
- Ask children to consider how their results would differ if they were closer to or further away from the sound source. They could test their theory.

### Plenary activity

- Bring all the children together to share their data and look for patterns in the data. Are there similarities/ differences in results collected for different sounds?
- Do they think cheering helps their team to win?
- Ask the children to describe what happens to sounds in space. Can they explain why this is the case?

## TAKE HOME CHALLENGE IDEAS:

- Prompt children to find out about the 'Vardy Quake' - can they discover what scientists discovered about the vibrations caused by the crowd when goals were scored at the King Power Stadium and how they took measurements to find this out?
- How are sound waves similar to earthquakes?
- Prompt them to find out about how loud noises can affect hearing. Why do some people need to wear ear defenders? Are these the same as headphones?

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## TASK/ASSESSMENT DIFFERENTIATION:

### ✓ Minimum pupil goals:

- Produce one prediction that they can assess and evaluate
- Successfully measure sound data with a datalogger

### ✓ Target pupil goals:

- Produce two or more predictions that they can assess and evaluate
- Measure sound accurately and take repeated measurements
- Identify the importance of distance from sound source

### ✓ Further goals:

- Consider why sound cannot be produced in space and account for this
- Propose future experiments that could represent environmental conditions on other planets

## PUPIL MONITORING AND EVALUATION:

- Ensure that each child uses the datalogger and demonstrates that they can collect data.
- During the whole-class activity and plenary, ask children to explain patterns in the data and account for these.
- Are pupils able to compare their group's results with those of another and make sensible inferences?

## DELIVERY NOTES AND ADDITIONAL SCIENTIFIC INFORMATION:

### Delivery notes and science information

- Sound volume is measured in decibels (dB).
- Sound travels in compression or longitudinal waves - the air or other medium vibrates backwards and forwards in the same plane that the energy travels.
- Earthquakes also travel as compression waves.

### Vocabulary:

- sound, vibrations, decibels, pitch, volume, sound source, eardrum, amplitude, absorb, reflect.