

English
Light
Orchestra
a module on patterns
and expressions

Pupil task

CORNERSTONE
MATHS

About the cover

Once upon a time, a design collective came upon the idea of creating art installations made of lights and developed the English Light Orchestra campaign.

The stories in this work are fictional. All characters and events appearing in this work are fictitious. Any resemblance to real persons, living or dead, is purely coincidental.

English Light Orchestra - A module on patterns and expressions

Developed jointly by SRI International, Center for Technology in Learning (United States) & UCL Knowledge Lab, UCL Institute of Education, (UK)

U.S. contributors: Jennifer Knudsen, Ken Rafanan, Teresa Lara-Meloy, Daisy Rutstein, Phil Vahey, Jeremy Roschelle

UK contributors: Bola Abiloye, Alison Clark-Wilson, Celia Hoyles, Richard Noss, Teresa Smart

English Light Orchestra: A module on patterns and expressions (Cornerstone Maths Module 3) is based on the work of the MiGen project led by Professors Richard Noss and Celia Hoyles at London Knowledge Lab, Institute of Education with colleagues Dr Manolis Mavrikis and Dr Eirini Geraniou. The project - full title, Intelligent Support for Mathematical Generalisation - was part of the UK's Technology Enhanced Learning (TEL) Research Programme funded by the Economic and Social Research Council (ESRC) and the Engineering and Physical Sciences Research Council (EPSRC) from 1st October 2007 to 30th June 2011 (ESRC ref: RES-139-25-0381)

Full details: http://tel.ioe.ac.uk/?page_id=3567. The MiGen project team's work has continued in a follow-on project "A Computer- enhanced Package for Learning School Algebra" also funded by ESRC (1st May 2013 –31 July 2014 ESRC ref: ES/J02077X/1).

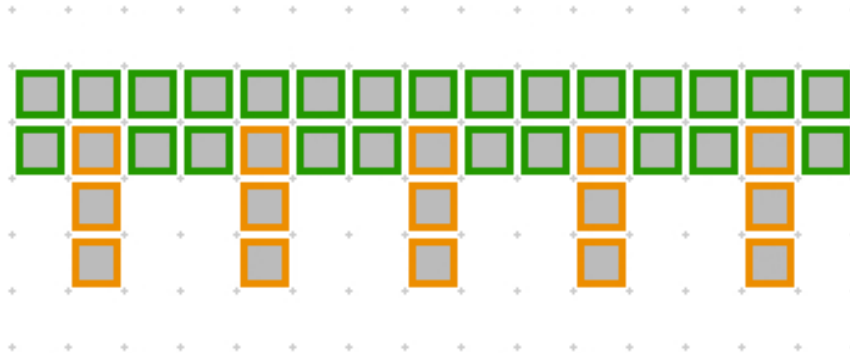
These Cornerstone Maths materials are provided through a grant from the Li Ka Shing Foundation and Hutchison Whampoa Limited. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the Li Ka Shing Foundation or Hutchison Whampoa Limited.

Copyright © 2013 by SRI International (revised 2017)

All graphics are by Ken Rafanan. Graphics may incorporate works by others made available through Creative Commons 2.0 licenses; as such, the derivative graphics are likewise made available under the Creative Commons 2.0 license with attribution, remix, noncommercial, and share alike conditions. Original works: Loz Pycock (<http://www.flickr.com/photos/blahflowers/>)

All others by Ken Rafanan

Designing a lighting pattern



It is great to have you as part of our English Light Orchestra Campaign Team. As a lighting designer, you need to understand the structure of patterns that you will be making in lighting displays.

Open the Demo Activity Patterns and Expressions.

The Pattern Player window shows a lighting design that is playing in a random order. Someone has begun to create the pattern in the Designer's Grid - they need your help to complete this task.

You will need to build an expression for the total number of lights needed to make any figure in the pattern.

If you are successful, the original pattern will light up brightly.

- 1) Watch the pattern playing in the Pattern Player. Describe the pattern.



- 2) Describe the pattern that has already been started in the Designer's Grid.



In the Expression Builder, select the name 'tops' and drag the slider that appears.

3) Describe what happens.



4) Sketch the building block for the 'tops' below.



5) Think about the building Block that you will need to create using orange lights in order to complete the whole pattern. Sketch this below.



Drag the orange lights and use the Block and Pattern buttons to recreate the whole pattern.

- i) Use one colour to create the building block for the orange light pattern.
- ii) Use the **Block** and **Pattern** buttons to recreate the pattern.
- iii) You should now see something in the **Expression Builder** that relates to your pattern.
- iv) Edit your expression so that it gives you the total number of lights for your particular figure in the Pattern Player.
- v) Drag the icon for your block to the **Expression for Total** row.

6) Record your **Expression for Total** and **Check**: Did your expression colour in the pattern you made in the Designer's Grid? If not, why not? Modify your expression to ensure that the pattern colours properly.



7) **Explain** how the numbers and variables in your expression are related to the lights in the pattern.

