



Misconceptions (Re) Lay the foundations

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KS3 Light topic Core Knowledge

Light waves travel <u>very</u> fast in straight lines, which we call 'rays'		
Know that the frequency of light waves sets the colour and the amplitude of light waves sets the brightness		
Light travels fastest in a vacuum and air, but slower in when travelling through more dense materials like water or clear glass and <u>perspex</u> . The material sets the speed of light.		
<u>Luminous</u> objects emit light. Objects which do not emit light are non-luminous		
Know that when light encounters a new material (medium) it is partially or fully reflected, transmitted/refracted depending on the material. Different colours of light refract differently for the same material.		
Know that <u>opaque</u> materials transmit no light		
Know that <u>smooth</u> surfaces reflect light in a regular way		
Know that <u>rough</u> surfaces reflect light in an irregular way, because their surfaces are uneven		
Know that <u>scattered</u> rays of light from a light source reflect/are scattered in all directions and some of the scattered light enters our eyes		

Many students have vague ideas about what light is as they have not been given accurate, age-appropriate definitions, or have been given conflicting definitions



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Showing 32 results

Light waves travel very fast in straight lines, which we call 'rays'

Many students do not recognize light as an entity between a source and the effect it produces.

Some students depict light around the sources with straight lines.

When constructing ray diagram or when asked to draw the path of light, students rarely draw the lines from source to object.

Luminous objects emit light. Objects which do not emit light are non-luminous

Some students may think light is projected from a source.

Some students believe light is intentionally designed to allow us to see.

Know that opaque materials do not transmit any incident light, but transparent materials transmit all incident light

Some students believe shadows are a reflection of an object and therefore always expect the shape of a shadow to be the same shape as the object.

Some students consider darkness as important a concept as light e.g. shadows can exist on their own.

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Many students have vague ideas about what light is as they have not been given accurate, age-appropriate definitions, or have been given conflicting definitions.

- Number of Resources **3**
- Number of References **6**
- Number of Diagnostic Resources **14**

IOPRESOURCES

Focusing on the learners:

Distinguishing–eliciting–connecting. How to:

- identify source and detector
- separate luminous from non-luminous
- draw out children's ideas about seeing
- connect seeing to the source–medium–detector model
- build an explicit model of seeing

Teacher Tip: “These are all related to findings about children's ideas from research. The teaching activities will provide some suggestions. So will colleagues, near and far.”

Focusing on the physics

Representing–noticing–recording. How to:

- construct the source–medium–detector model

- Ideas to emphasis
- Strategies to support learners
- Teacher tips
- Things to avoid
- Focus on learners
- Focus on Physics

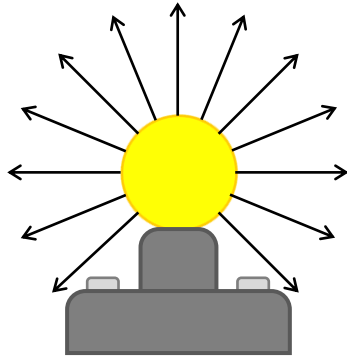
The following worksheets may help to identify whether students hold this particular misconception.

For more information, see the University of York **BEST** website.

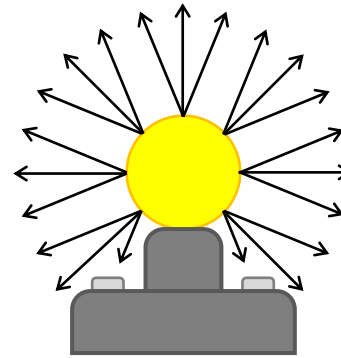
- BEST Diagnostic - Light bulb moment.doc ›**
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- BEST Diagnostic - Pinhole penguin.pptx ›**

Light bulb moment

a. Which drawing best shows how light moves from the bulb?



A



B

<https://www.stem.org.uk/best-evidence-science-teaching>

Physics > Big idea PSL: Sound, light and waves > Topic PSL3: Making images > Key concept PSL3.1: The ray model of light to explain images

Diagnostic question

Light bulb moment

Overview

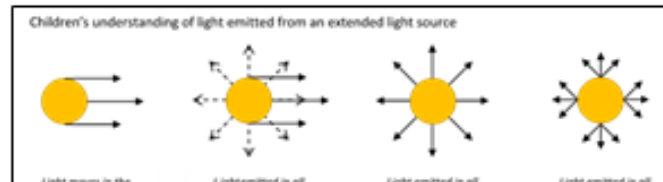
Learning focus:	Only some light rays from through a pinhole, hitting image.
Observable learning outcome:	Describe how light rays from source.
Question type:	Two-tier multiple choice
Key words:	Light ray

- Overview
- What does the Research say
- Ways to use this question
- Expected answer
- How to respond – what next?

What does the research say?

Galili and Hazan (2000) found over half of 14- to 16-year-olds (n=166) consider rays to be actual physical things that are the constituents of light. The fact that rays are imaginary lines that show the direction in which light is travelling is rarely made explicit in teaching (Andreou and Raftopoulos, 2011).

Students' understanding of image formation is largely dependent on the way they perceive light emission from extended light sources. Rice and Feher (1987) found when students are presented with a lamp in front



Resources

Best Evidence Science Teaching

<https://www.stem.org.uk/best-evidence-science-teaching>

Common Misconceptions

<https://spark.iop.org/misconceptions>