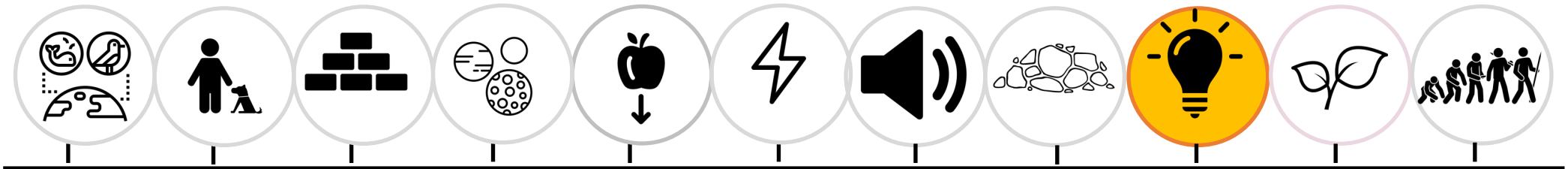
Year 3: Light

SCIENTIFIC CONTEXT: Physics



KEY VOCABULARY:

Light source	**A source of light makes light**. The Sun and other stars, fires, torches and lamps all make their own light.
Dark	Darkness is **when there no light**.
Transparent	**A material that light completely passes through it, and**
Translucent	**A material that some light passes through, but the light is scattered, so you can't see clearly through it**.
Opaque	Something that is opaque **cannot be seen through and does not allow light to pass through it**.
Shadow	**Shadows are formed when light from a source is**
Surface	A surface is the outer layer of an object.
Reflect	**To bend or throw back waves of light**.
Sunlight	Sunlight is **the light and energy that comes from the**
UV rays	Ultraviolet rays are **short light waves produced by the**

As Scientists we will:

- recognise that we need light in order to see things and that dark is the absence of light,
- notice that light is reflected from surfaces,
- recognise that light from the sun can be dangerous and that there are ways to protect our eyes,
- recognise that shadows are formed when the light from a light source is blocked by an opaque object,
- find patterns in the way that the size of shadows change.

Working scientifically:

- Use straightforward scientific evidence to answer questions,
- Record findings using tables, drawings and bar graphs,
- Gather and record data to answer questions,
- Use results to draw simple conclusions.

Key Questions:

1) What do we need to see?
2) What happens when light hits surfaces?
3) How can we protect our eyes from the sun?
4) How are shadows formed?
5) What patterns can be found in shadow size?

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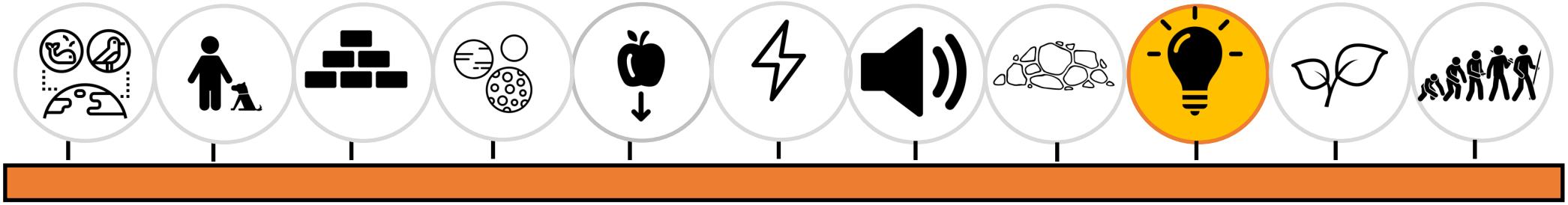

What I need to know:

We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective. The light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light. Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface.

Opportunities for science capital:

Potential for a class trip to for a 'Light and shadow workshop' at We are the Curious.

Part of science capital includes scientific media consumption- documentaries, reports etc. So, I have added a couple of links which give daily science news for children. Checking in on these every now and then would be beneficial to help children see science in the wider world.

https://www.sciencenewsforstudents.org/

https://www.sciencejournalforkids.org/

Assessment:

By the end of this topic, pupils will be able to recognise that we need light in order to see things and explain that dark is the absence of light; explain that light is reflected from surfaces, explain why light from the sun can be dangerous and how we can protect our eyes; explain how shadows are formed and describe patterns in the way that the size of shadows change.

When working scientifically, pupils will be able to use straightforward scientific evidence to answer questions; record findings using tables, drawings and bar graphs; gather and record data to answer questions and use results to draw simple conclusions.

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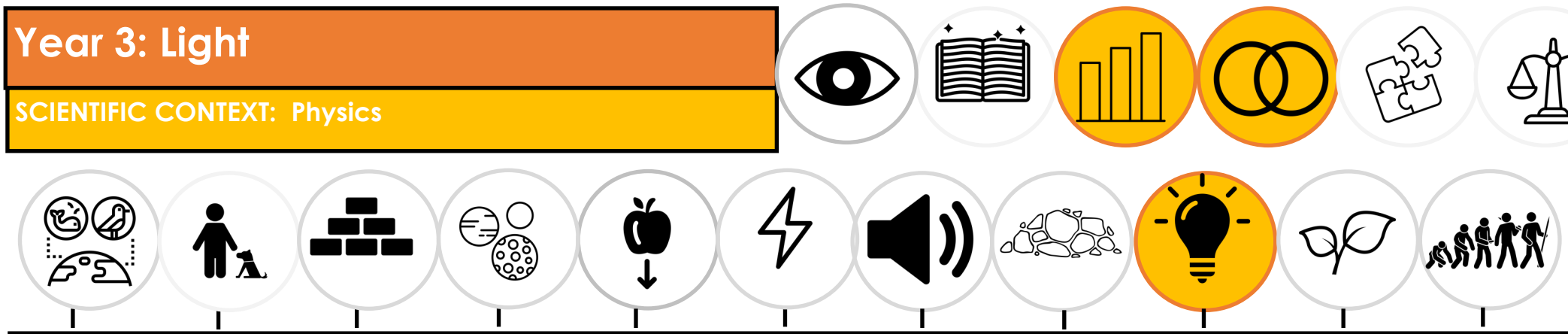

Theme 1: The dark

Starter:

KWL grid

Class discussion: What is light?

- Write the word **"Light"** in the middle of a large sheet of paper or whiteboard.
- Ask the children what they know about light.
- Write or draw each answer. Similar ideas can be connected.

Note down any questions or uncertainties the children discuss. You can return to these during this or future lessons with corrected ideas or answers.

Main:

Substantive knowledge

Play video: https://www.tigtagworld.co.uk/film/what-is-light-PRM00001/

Sum up that light is form of energy that allows us to see. Ask: so what happens when there is no light?

Plenary/assessment:

Disciplinary knowledge:

Working scientifically objective: using straightforward scientific evidence to answer questions

To answer this question, get children in to pairs. Ask children to write a quick list of the things they can see in front of them. Children then take it in turns to put on blackout goggles (in resource room). What happened? Can they write a list of what they saw without light? Explain that darkness is the absence of light and we cannot see without light.

Get children to write a short explanation about what happened when they put the blackout goggles on and get them to describe that dark is the absence of light e.g. *'When I put the blackout goggles on I couldn't see anything because we need the light to see…'*

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Theme 2: Reflector or light source?

Starter:

Recap:

Concept cartoon – dark cave

Main:

Substantive knowledge:

Explain that we see things because light hits objects, the object reflects light back. The reflected light from the object reaches our eyes and we can see!

But how do we know if something is a light source, or a reflector?

Play film: https://www.tigtagworld.co.uk/film/light-sources-PRM00002/

Plenary/assessment:

Disciplinary knowledge:

Grouping

Working scientifically objective: recording findings using a table

Give children a selection of light sources and reflectors. Explain to the children that they are going to investigate which objects in the classroom are light sources and which are light reflectors.

Model drawing a table with two columns, one headed light sources, the other reflectors. Get children to draw their own table in books.

Remind pupils that light sources emit their own light, reflectors do not. Run investigation and record results in tables.

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Theme 3: Reflection

Starter:

Recap: Beat the clock! List 5 reflectors and 5 light sources in 5 minutes.

Main:

Substantive knowledge

Work through the films and activities on tigtag: https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00306/activities/main

Now, explore what happens when light reflects off a mirror by playing mirror games to help them to answer questions about how light behaves.

Mirror games:

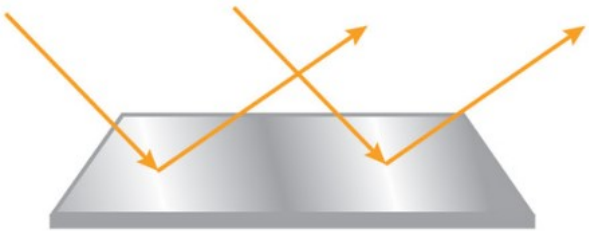
- **Post-it note:** Ask the children to get into pairs.Tell child A to draw a simple picture on a Post-It note and stick it onto the back of their partner (B). Give the pair of children some mirrors and ask child B to use the mirrors to work out what picture has been drawn.
- **What's on top of the table?**: Ask a child to sit carefully underneath a table at the front of the room. Place an object on top of the table and ask them to identify what it is... without moving. Ask them how this task could be made easier. Give them a mirror and ask them to identify the object now. Can they explain how they can see the object, even though they are under the table and the object is on top?

Plenary/assessment:

Disciplinary knowledge

Working scientifically objective: recording findings using drawings

Using the diagrams from tigtag to model- https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00306/activities/main ask children to create their own drawing from what they found with the mirror games to show their understanding of how light behaves. E.g.



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Theme 4: Dangers of the sun

Starter:

Recap:

Discussion starter: What if we didn't have mirrors?

https://explorify.uk/en/activities/what-if/we-didnt-have-mirrors

Main:

Full lesson via link below:

science-lesson-4.notebook

Plenary/assessment:

Pupils create a sun safety poster with a particular focus on how to protect our eyes.

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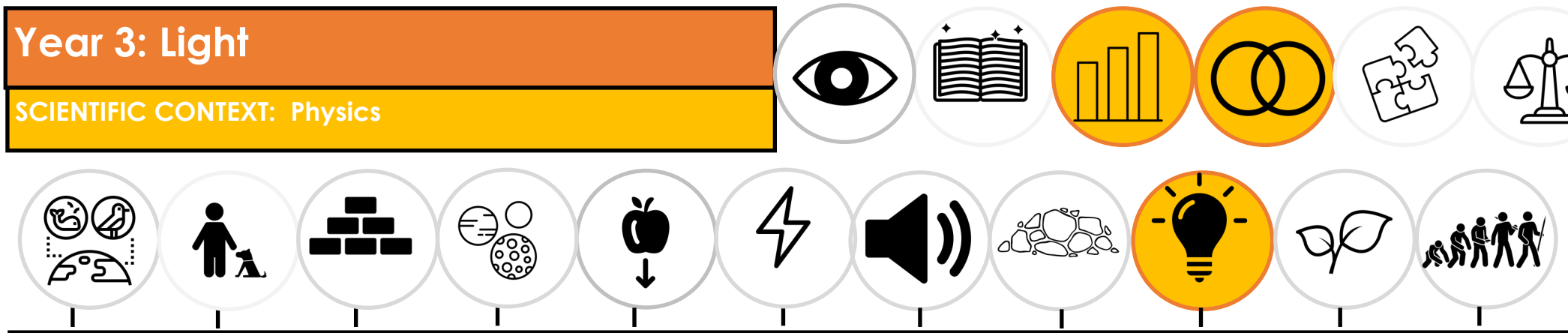

Theme 4: Shadow formation

Starter:

Recap:

Last lesson, last topic, last year. Create a table of questions that recaps learning from previous Y3 topics, this current topic and topics from Y2.

Main:

Disciplinary knowledge

Identifying and classifying

Working scientifically objective: Gather and record data to answer questions.

Today we are going to be physicists

Provide the children with a collection of materials to explore (some transparent, some translucent and some opaque).

Ask the children to investigate which materials form shadows when a torch is shone on them (e.g. colour, darkness, no shadow?)

Ask them to record their observations to answer the question about which materials form a shadow (e.g. draw, write, sort, photo, order, table). Can they categorise or order the materials and/or shadows in some way?

See TAPS full plan: Making shadows

Plenary/assessment:

Disciplinary knowledge

Working scientifically objective: using results to draw simple conclusions

Get children to write a short conclusion to their findings answering:

- Which materials made the best shadow?

(opaque materials)

- Why were opaque materials that best at making shadows?

(they blocked light more effectively)

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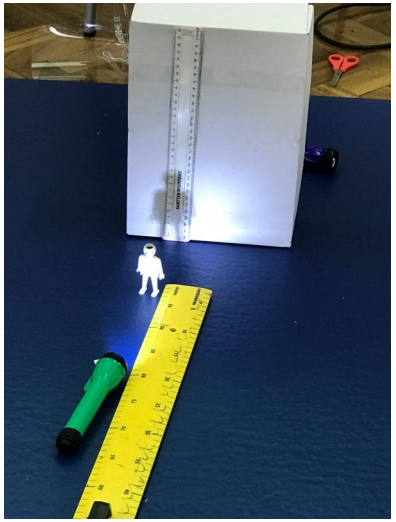
Theme 5: Pattern seeking with shadows

Starter:

Recap

Odd One Out- In the Shadows



Main:

Disciplinary knowledge

Pattern seeking

Working scientifically objective: taking accurate measurements using standard units and recording findings using bar charts and tables

Explain to the children that they are going to investigate the changing size and position of a shadow using a torch and a model. Explain that you're going to move the torch further away from the model to change the size of the shadow, but apart from that, everything else needs to stay the same to ensure it is a fair test e.g. model, angle of torch etc.

Re-model how to draw a table to record results, children draw independently in their books and record measurements in the table as they work. Run investigation moving torch further back from the toy and get children to measure the size of the shadow using a ruler on the backdrop (see photo).

Once all of the results have been gathered, model how to take those results and present a bar graph On squared paper, pupils draw their own bar graph using their results in their books.

Pupils should find: the closer an object is to the light source, the larger the shadow it casts. This is because an object closer to the source will block a larger area of the light, increasing its shadow size.

Plenary/assessment:

Ask:

Is there a pattern? What happened to the shadow when the torch got closer/further away? Record their ideas.

Why did this happen? Record their answers.

Complete KWL grid