

## Print Tray activities

### What's it all about?

Activities using the IR camera, print tray, and objects which can be heated.

These activities work best with one presenter and a small group (up to six), eg for a family at a drop-in event.

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### General

Objectives:

1. IR provides additional, invisible, information which can be useful
2. In space, some objects are hidden within dust clouds (nebulae)

Set up:

- IR camera (optionally attached to laptop and/or external display)
- Wooden print tray
- Bin-bag 'lid' for tray
- Plastic star buttons / ball bearings (choke hazard)
- Heat pad (requires mains power)

Note that the heat pad will automatically turn off after a long period of time.

Do not fold or crush heat pad, as this may cause it to overheat and automatically cut off, requiring factory reset. Although it does not get very hot, it is hot enough for the activity.

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### Star Hunt

Set up:

- As above plus option to display A4 title sign to help attract attention

Presenter-led activity. Challenge people to find 'stars' (heated items) hidden within the 'nebula' (behind the plastic).

If there are two people, you can get one to challenge the other (they can take turns). Or perhaps you challenge them for the first game to show how it works, then let them play each other.

One person covers their eyes, while the other takes a number of heated items and places them in positions of their choice, before covering the tray. Don't touch the cover other than by the edges.

The one who had their eyes hidden then can use the IR camera to tell where the items are, and how many were used. They can mark these positions with plastic stars.

Note: it can be hard to relate the IR picture to locations on the tray lid. Option to use your finger as a guide. But don't touch the plastic or it will get warm and glow itself!

Carefully lift the plastic cover off so that the plastic stars retain their pattern. Compare their pattern with that of the heated items to see if they were right. This works best with enough stars to make a recognisable pattern.

People may question whether the IR is truly going through the plastic, or if it's just transferring its heat to the plastic. Things to try to investigate this:

- Hold the camera pointing at a hidden star, while slowly sliding the plastic lid across its position.
- Hold the plastic in front of your face and have them use the camera to look at you through it.

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## Alternative games

If people want to make up their own games, or use the camera in other ways, then that is to be encouraged so long as they are still thinking about infrared and/or astronomy.

Ideas might include:

- Use coins from their pockets
- On a hot day, find something cold to hide
- Compare ambient-temperature ball bearings to warmed ones
- See how long the signal lasts from heat that has transferred to the wood
- Double up the plastic to see how many layers the camera can see through
- Try looking through other materials

I can't help thinking there's a 'Battleships' style game in this somewhere too. Can you create one?

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## Science

Most things that are black are good absorbers of infrared. We already know they are good absorbers of visible light, as this is why they look black.

Bin bag plastic is unusual as it is specifically designed NOT to absorb infrared. This is done to reduce the heating the bags experience when left in sunlight, and the resulting chemical breakdown of the plastic.

It may feel weird to think that infrared can go through bin bag material, but consider that visible light can go through glass well enough.

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## AstroBoost Project

The Royal Astronomical Society's AstroBoost project was funded by a STFC Spark Award and supported by project partners Guildford Astronomical Society, Hampshire Astronomy Group, Newbury Astronomical Society and the STFC's UK James Webb Space Telescope campaign. The project was managed and developed by Dr Jenny Shipway.