SEEING STRESS

Challenge

Screen

Shapes

Light box

Before you start

Place the shapes under the screen but on top of the light box. Stretch and squeeze the shapes in different ways and observe the colour changes.

Use the light box to investigate the effects of forces on the different shapes.

SEEING STRESS

When we bend an object we are applying a force. If this force is focused more on one area than another, it will break at the place where it is concentrated.

Looking at objects under polarised light allows us to see the stress point – called stress risers.

Try bending and squeezing the shapes provided.

What do you notice?

1. On the shapes below, indicate the areas where stress is concentrated.
   The first one is completed for you.

   \[
   \begin{align*}
   &\text{\hspace{1cm}}
   \begin{array}{c}
   \includegraphics[width=2cm]{shape1}\hspace{1cm}
   \includegraphics[width=2cm]{shape2}\hspace{1cm}
   \end{array}
   \\
   &\text{\hspace{1cm}}
   \begin{array}{c}
   \includegraphics[width=2cm]{shape3}\hspace{1cm}
   \includegraphics[width=2cm]{shape4}\hspace{1cm}
   \end{array}
   \end{align*}
   \]
SEEING STRESS

Materials are strongest when forces on them are evenly spread out or distributed, as in diagram A.

![Diagram A](image)

Lines evenly spread out

A reduction in area causes forces to be unevenly distributed and concentrated (focussed) on some places more than others. See diagram B.

![Diagram B](image)

Lines are closer together, showing the stress is concentrated here

2a) Add lines to diagram C and D to show how the forces are distributed.

![Diagram C](image)

![Diagram D](image)

2b) Which shape is stronger C or D and why?