

# Chapter 9: Transformations and reactions

## Thaumatrope or spinner

### Ratings

MESS  DANGER  DIFFICULTY 

### Theme

Holy Spirit; sin; forgiveness

### Equipment needed

White card; felt-tip pens or coloured pencils; small circular lid or mug to trace; scissors; string; small hole punch

### Before you begin

All ages will have fun making this spinning toy known as a thaumatrope (or mini-movie). It appears magically to create one picture from two and demonstrates one of the visual concepts behind movies.

There are two science concepts to bring out here. The first is about the transformation of your energy to make the card spin and the second is how the brain works to make the images appear to be one.

### Experimental method

Either pre-cut 5 cm circles of card or make that part of the activity depending on the ages and time available.

For each spinner, cut two lengths of string about 30 cm long. Make two small holes through your card with a small hole punch or the end of pointed scissors. Tie one piece of string to each side. Draw a design on one side and then upside down on the other.

Hold each end of the string and move your hands in circular motions about 10 to 15 times to wind up the string. Pull tightly on the end of the string and watch what happens to the card.

### Big thinking

What happens to the card? It should spin quickly as the string unravels. This shows how energy is transformed into different forms. When you moved your arms to twist the string you used your energy and this transferred to the string as potential energy, or energy which hasn't been used yet. When you pull the string taut, the potential energy transforms into kinetic or moving energy and spins until all the energy is used.

As a bonus science fact, you also will have noticed that the images on your circle spun around and looked like one picture. This is because your brain holds the image for a moment after it goes, so that your brain sees both images together.

### Big questions

We are filled with 'potential' energy through the Holy Spirit. But we need to 'release' that energy and allow it to work. How can you use that energy to transform our world?

Proverbs 3:6 (NRSV): 'In all your ways acknowledge him, and he will make straight your paths.'

God is always with us, but when he's moving in our lives—that's when we live life to the full. Sometimes we feel we have run out of energy and action; the things we do drag us down; and we feel lifeless like the string. We need to 'straighten out' and put God in charge before we can use God's good energy. What happens when we do that?