ISSUE 01

# Tweenkerama

— LAB MAG —

NAME:

# Look out for these workshops coming your way!


**My Photo Journey**
10 & 17 Aug 2018
3.00pm – 5.00pm
Woodlands Regional Library

**My Photo Journey**
31 Aug & 7 Sept 2018
3.00pm – 5.00pm
Jurong West Public Library

**Augmented Reality Through Art**
14 & 21 Sept 2018
3.00pm – 5.00pm
Sengkang Public Library

**Augmented Reality Through Art**
12 & 19 Oct 2018
3.00pm – 5.00pm
Serangoon Public Library

**Augmented Reality Through Art**
2 & 9 Nov 2018
3.00pm – 5.00pm
Woodlands Regional Library

**Augmented Reality Through Art**
23 & 30 Nov 2018
3.00pm – 5.00pm
Jurong West Public Library

# What is Tweenkerama Lab Mag?

The only magazine you need for cool, creative and out-of-this-world ideas and easy DIY projects.

Each issue of Tweenkerama Lab Mag is packed with information about STEAM topics and activities for you to complete.

Every completed activity earns you a corresponding number of stars, as indicated on the activity page.

**For every four stars earned per issue, you can redeem a limited edition token at our workshops and Tweens STEAM Lab Party. You can redeem up to two tokens per issue.**

*Note: All Tweenkerama Lab Mags and tokens are available while stocks last.*


# The Rise of Comics and Superheroes

**In the late 19th century, comic strips began to appear in the Sunday edition of newspapers. In 1897, comic strips were then compiled as a booklet that were priced at 5-cents each. From there, the comic industry was born.**

**Fun Fact**

**What's the difference between comics and graphic novels?**
Comics are often published in daily or weekly episodes, whereas a graphic novel is a complete story drawn in a comic strip format. Sometimes, several comic strip episodes are placed together to make a graphic novel.

The first superheroes were the gods from myths and folklore. Like our superheroes today, they were full of personality, and not above getting into all kinds of scrapes! They also had enemies to fight or quests to complete. For instance, the Norse gods were always fighting with the giants. Thor, with his mighty hammer, was their designated giant-killer. (Read more cool comic book facts on discoveReads!)

What makes comics and superheroes come alive on the page? It's not the action or the drama. Rather, it's the comic writers and illustrators who have a hand (sometimes literal) in how every character and panel should look like.

You can learn to be a comic writer or illustrator at any age. The creators of Superman, Jerry Siegel and Joe Shuster, were still in school when they created this crime-fighting hero.

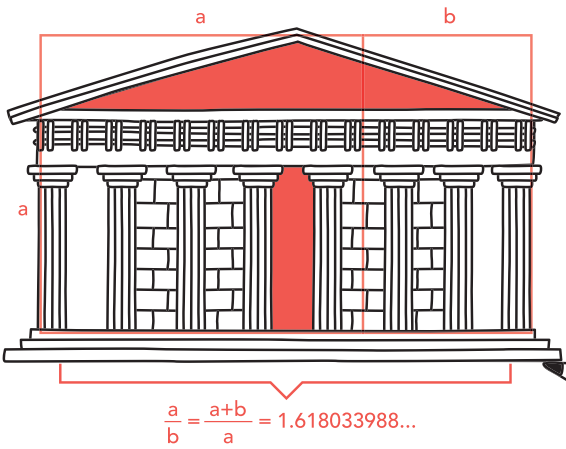
Other than creativity and imagination, a comic book illustrator needs a working knowledge of mathematics and science as well. When it comes to drawing superheroes, we need to learn about proportion, ratio, composition and even the physics behind how they move.

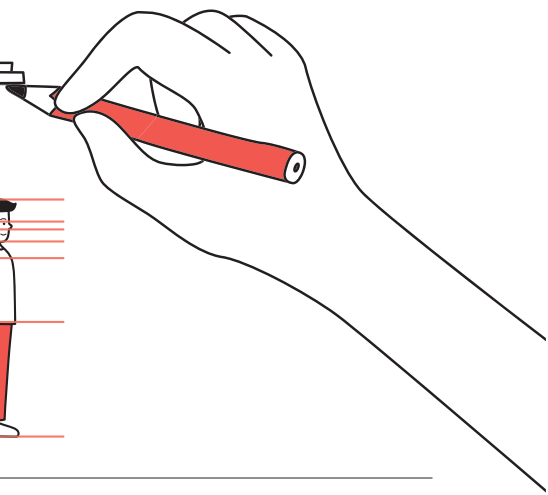
In this first issue, we will explore the maths behind drawing a superhero.

# DISCOVERING PROPORTION IN COMICS

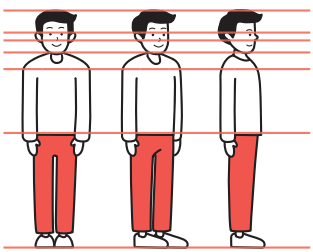
To ensure that the superheroes we draw look realistic in any situation, we need to know how to draw them proportionately. Artists often turn to a concept called the **GOLDEN RATIO**.

The **GOLDEN RATIO** is the ratio between two numbers where the ratio of the smaller one to the larger one is equal to the ratio of the larger to the sum of the whole. This ratio occurs regularly in nature and is used to govern proportions in art and architecture.



Likewise, when drawing characters, especially people, cartoonists and animators need to ensure that the head, torso and lower body are proportionate!



## References



**So, You Want to Be a Comic Book Artist? The Ultimate Guide on How to Break into Comics!**

**Author:** Philip Amara

**Call No.:** Y 741.51 AMA

*All Rights Reserved, Aladdin/Beyond Words, 2012.*

*(This book is also available on eReads at www.nlb.gov.sg)*


**Draw Out the Story: Ten Secrets to Creating Your Own Comics**

**Author:** Brian McLachlan

**Call No.:** J 741.51 MAC

*All Rights Reserved, Owlkids Books, 2013.*

*(This book is also available on eReads at www.nlb.gov.sg)*


**Mad About Cartoons (Mad About)**

**Author:** Judith Heneghan

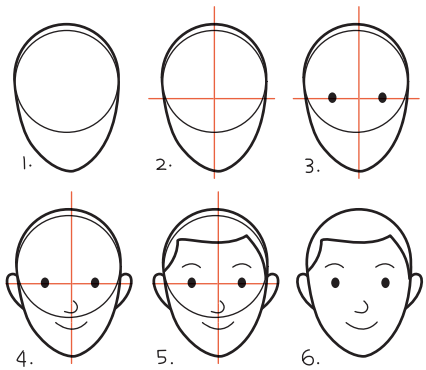
**Call No.:** J 741.5 HEN

*All Rights Reserved, Wayland, 2014.*


## Additional References


**Gifford. D. (1992, August 7).** ***Obituary: Joe Shuster.***
*Retrieved from http://www.independent.co.uk/news/people/obituary-joe-shuster-1538812.html*

## DRAWING A HEAD PROPORTIONATELY

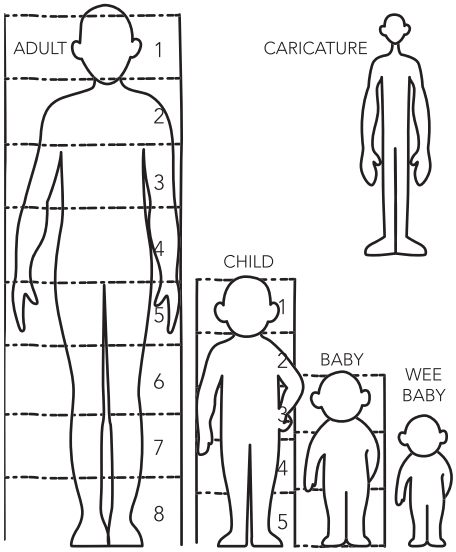



**STEP 1 & 2:** Draw two lines that cross at the centre.

**STEP 3:** This is called the eye line. The eyes rest on top of this line. In order to look balanced, the eyes are both the same distance from the centre line. In manga characters, this line is placed low on the head.

**STEP 4-6:** Fill in the rest of the features like the nose, mouth, hair and ears. Make sure the features are balanced. Use the centre lines to guide you to create a face that is symmetrical. The nose is drawn near or on the centre line.

## DRAWING THE BODY PROPORTIONATELY




**8 HEADS** ADULT

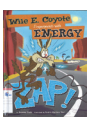
**5 HEADS** CHILD/ TEENAGER

Typically, as a rule of thumb, you need to use eight heads to represent the height of an adult. To represent the height of a child, use five heads, as shown above.

## References



**Everyone Can Draw People (*Everyone Can Draw*)**
**Author:** Peter Gray
**Call No.:** J 743.4 GRA
*All Rights Reserved, Windmill, 2013.*




**Zap!: Wile E. Coyote Experiments with Energy (*Warner Brothers. Wile E. Coyote, Physical Science Genius*)**
**Author:** Suzanne Slade
**Call No.:** J 531 SLA
*All Rights Reserved, Capstone, 2014.*

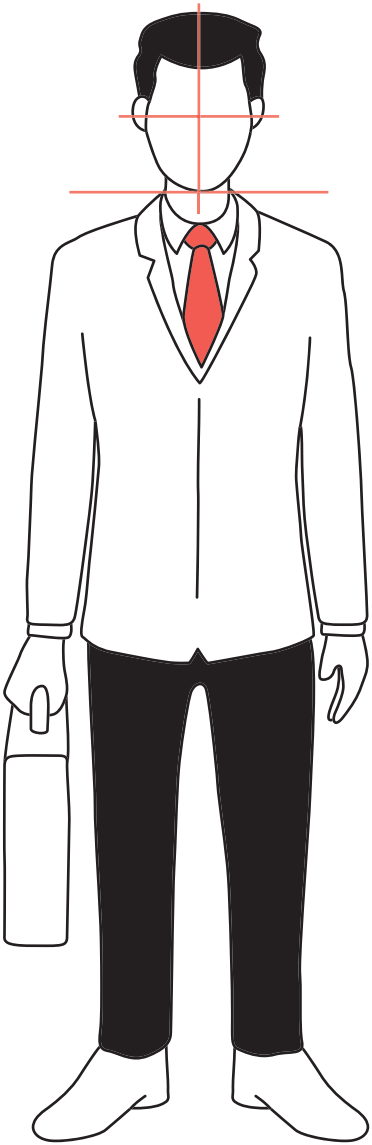

**Drawing: The Only Drawing Book You'll Ever Need to be the Artist You've Always Wanted to Be (*Art for Kids*)**
**Author:** Kathryn Temple
**Call No.:** J 741.2 TEM
*All Rights Reserved, Sterling Children's Book, 2014.*

ACTIVITY

★ *1 star for this activity*

## Create Your Own Characters!

**Divide the pictures below into "HEAD" portions and fill in the facial details using the centre lines.**



# Robotics

The term **"ROBOT"** was first used by Czech playwright, Karel Capek in his 1921 play called Rossum's Universal Robots. The word comes from the Czech word *robota*, which means "hard work".

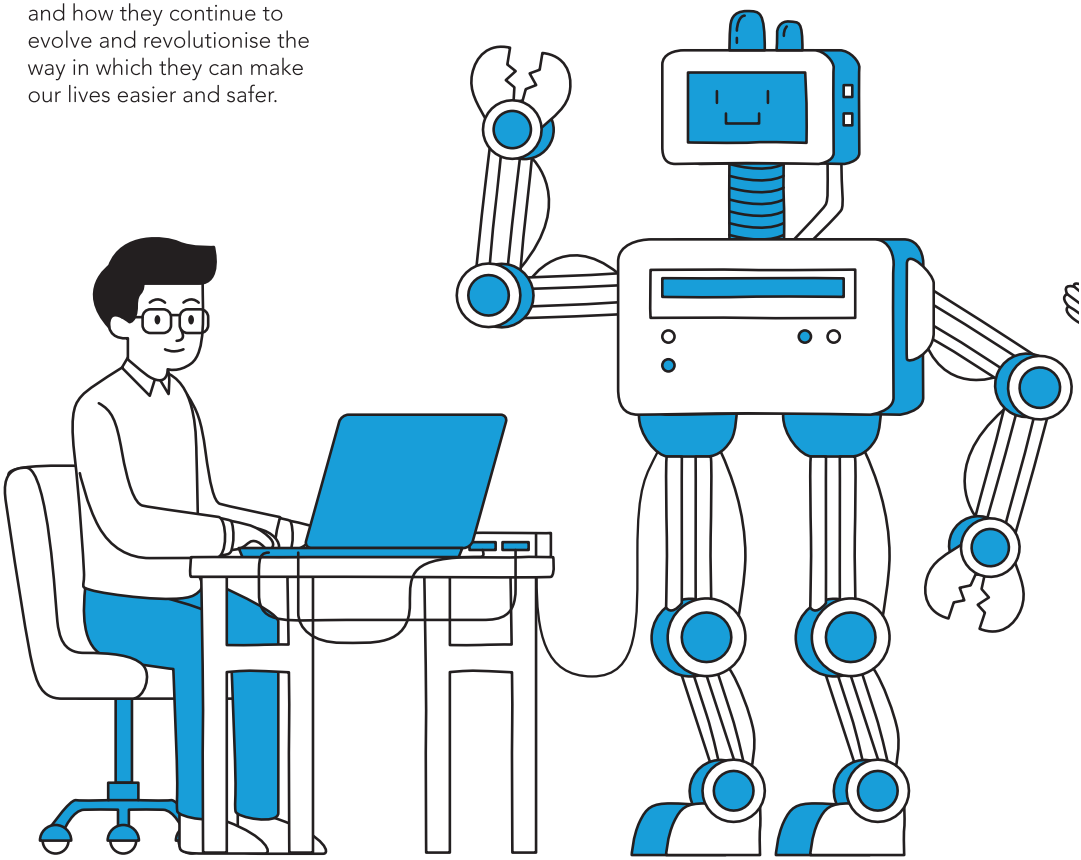
A robot is basically any machine that is designed to do a task and can range from industrial robots to thinking machines.

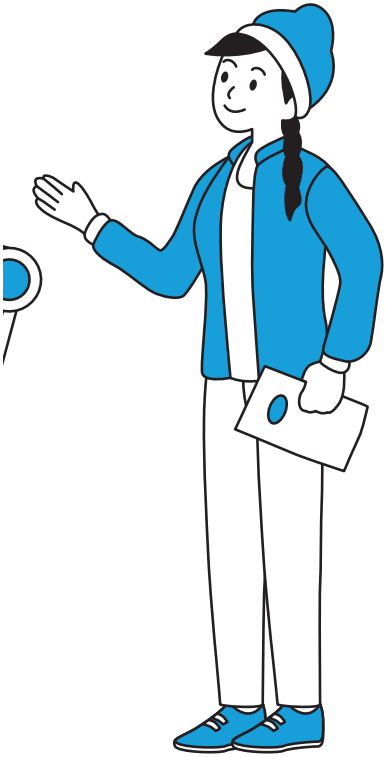
Read on as we find out about the origins of robots and how they continue to evolve and revolutionise the way in which they can make our lives easier and safer.

In 1961, Unimate became the first robot to work on an industrial assembly line. Its job was to weld automobile parts, which was normally difficult and dangerous work.

Compared to today's advanced industrial robots, Unimate was a simple machine that consisted of a single 1,814kg arm. However, to be able to work for long periods without needing a break was revolutionary at that time! It could even complete various tasks through step-by-step commands by programmers.

You can say that a robot is a prop for the magic that is programming, done by magicians who are the programmers.





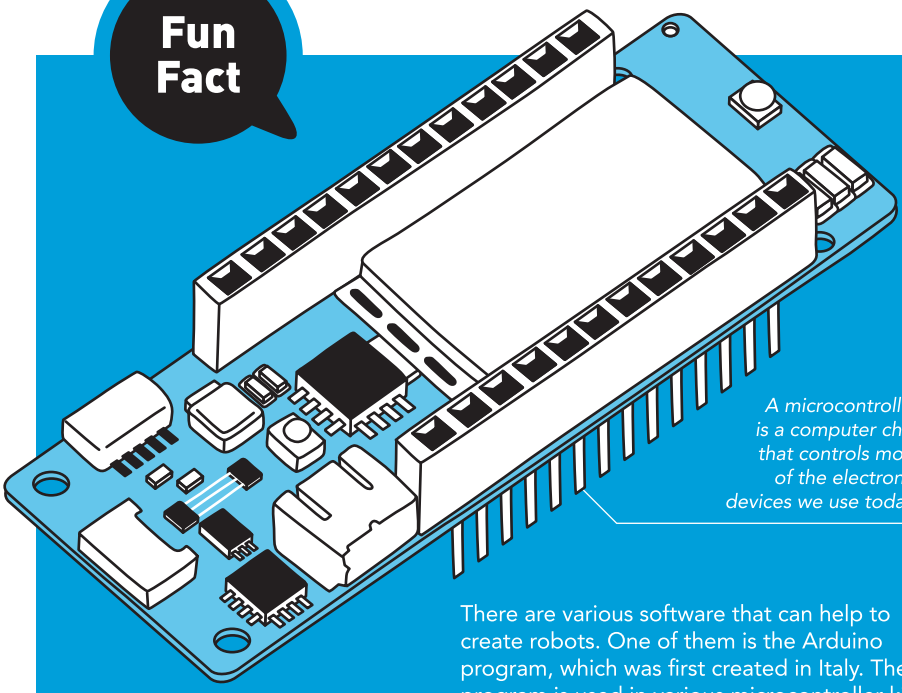
# Coding

A program is like a list of instructions that tells a computer or a robot what to do. Without a program, the computer is just a really expensive paperweight.

When you think of a computer programmer or a coder, what sort of person pops into your mind? A man or a woman? An adult or a kid? Actually, anyone can become a coder or programmer. Many people start out learning code as a hobby but end up enjoying it so much that they turn it into their full-time job, often with the job title of "computer programmer" or "software engineer".

Coding is in everything – from games and smartphone apps to the software that controls your washing machine to online banking and electronic car dashboards. In fact, if you already have a blog and are able to edit the HTML code to customise the designs and fonts on your site, then you're already on your way to becoming a really cool coder!

## Fun Fact



*A microcontroller is a computer chip that controls most of the electronic devices we use today.*

There are various software that can help to create robots. One of them is the Arduino program, which was first created in Italy. The program is used in various microcontroller kits for digital projects and interactive electronic devices. To find out more, check out the Arduino website **https://www.arduino.cc** or pick up the books below at the public libraries.

## References


**Getting the Most Out of Makerspaces to Explore Arduino and Electronics**

**Author:** Don Rauf

**Call No.:** Y 629.8955133 RAU

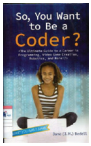
*All Rights Reserved, Rosen, 2015.*

**National Geographic Kids. Everything Robotics (*Everything Series*)**

**Authors:** Jennifer Swanson and Shah Selbe

**Call No.:** J 629.8 SWA

*All Rights Reserved, National Geographic, 2016.*



**So, You Want to be a Coder?: The Ultimate Guide to a Career in Programming, Video Game Creation, Robotics, and More! (*Be What You Want Series*)**

**Author:** Jane M. Bedell

**Call No.:** J 005.1 BED

*All Rights Reserved, Beyond Words, 2016.*

*(This book is also available on eReads at www.nlb.gov.sg)*

## ACTIVITY

★★ *2 stars for this activity*

# Do you have what it takes to be a successful roboticist?

**Take the quiz below to find out!**

**Q What does 111 1111 1111 100 1010 1111 10 mean to you?**

A They are just numbers, aren't they?

B Hugs and kisses in numerical form.

C This code forms the phrase "good job" when it is mapped onto the letters of the alphabets.

**Q What is Ohm's Law?**

A Ohm's Law states that voltage equals current times resistance.

B Ohm's Law states that energy cannot be created or destroyed. It can only change from one form to another.

C Ohm's Law states that an object at rest will remain at rest unless a force acts upon it.

**Q What is a servo motor?**

A A wire that shrinks when an electrical current is passed through it and elongates when the current is switched off. This shrinking and elongating movement of wire helps to move robots.

B A DC motor and reducing gears within a rectangular box. The electronic circuits interpret the signals from a controlling computer to switch the motor on and off, and this powers the robots.

C A compact, cylindrical shaped motor that takes steps to power itself. The system requires a computer to provide signals to turn the motors one step at a time.

**Q What does the term, "robot swarm" mean?**

A We are under attack from robots! HIDE!

B A group of similarly sized robots that can work together to complete an assignment.

C You mean this is a real term?!

**Q Which of the options below is a computer language?**

A TXX

B D+D

C C++

**Find out the answers on discoveReads! How many did you answer correctly?**

1. Looks like being a roboticist might be a little challenging for you. Try again next time!
2. Good job! Try just a little harder next time!
3. Wonderful! You might just be our next roboticist!
4. Amazing! You have what it takes to be an awesome roboticist!
5. GENIUS! When can you start working?

# The Beginnings of Photography

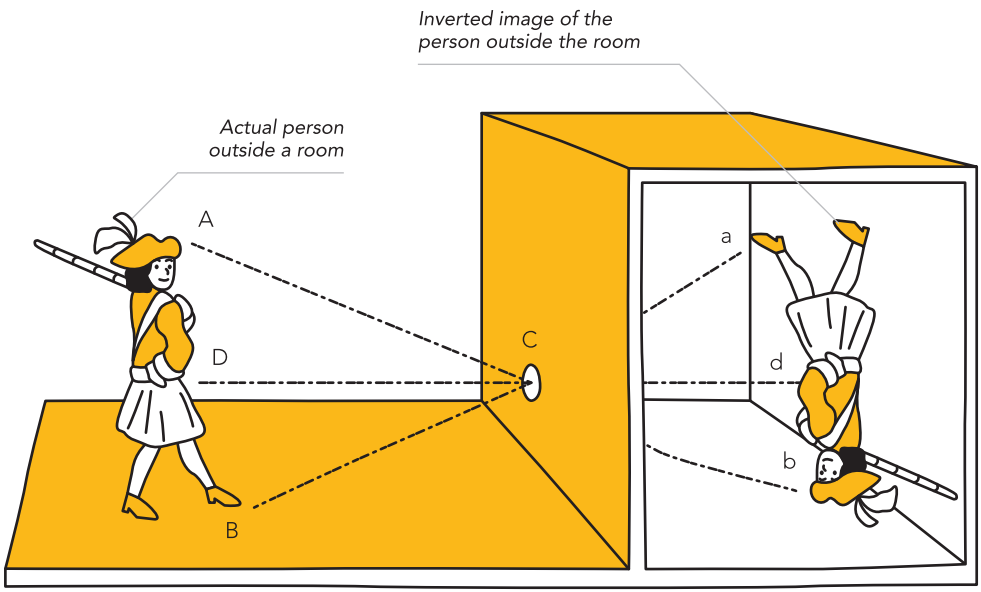
Anyone can be a photographer these days thanks to the inclusion of cameras in smartphones. There are apps that let you take professional-looking photos, complete with filters to enhance them immediately.

Aspiring photographers no longer need to worry about spending all their money on expensive equipment. It is no surprise then that there is an emergence of a specialised group of photographers who only take photos with smartphones, as well as people who overindulge in selfies. But how did cameras come about, and why was there a need to invent them?

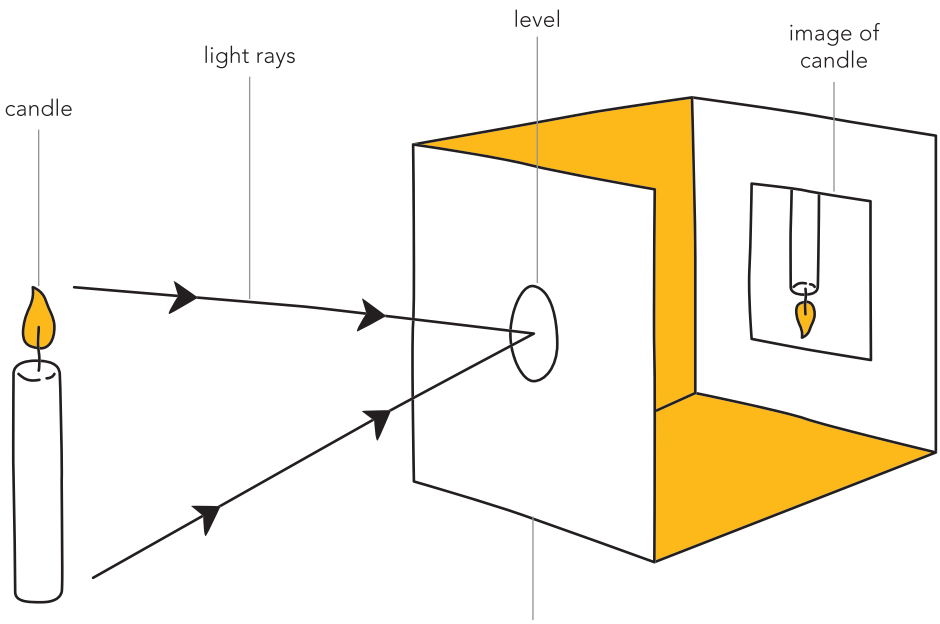
In the past, anything of importance or aesthetic value was only captured through art such as statues or paintings that you see in museums today. This means that only the wealthy or artists could leave records of their existence or what was happening around them.

But about a thousand years ago, it was discovered that when light passes through a small pinhole into a dark room, an upside down image of the scene outside was reflected on the opposite wall.

Inventors took to this incredible principle and recreated a smaller version of this dark room into a box and named it **CAMERA OBSCURA**. Lens and mirrors were added later on to enable a clearer projection of the image on the top of the box.



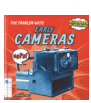

*This diagram shows how light travels through the hole to project an upside-down image.*




*This diagram shows how an image is formed inside a simple box camera*

Since **CAMERA OBSCURA** was portable, it was easier for artists to travel while practising their art as they would be able to trace a small image first as reference for their masterpieces. From 1830s onwards, inventors found different ways to record these images using chemicals. As the photography process gradually improved, it gained popularity as taking a photo was undeniably cheaper and faster than commissioning an artist. The **CAMERA OBSCURA** has since evolved into the cameras we know today but the science behind capturing images remains fundamentally the same.

## References

**The Problem With Early Cameras (*Bloopers of Invention*)**
**Author:** Ryan Nagelhout
**Call No.:** J 771.3 NAG

*All Rights Reserved, Gareth Stevens, 2016.*

**Maker Projects for Kids Who Love Photography (*Be a Maker!*)**
**Author:** Kelly Spence
**Call No.:** J 770 SPE

*All Rights Reserved, Crabtree, 2016.*

**Genius Optical Inventions: From the X-Ray to The Telescope (*Incredible Inventions*)**
**Author:** Matt Turner
**Call No.:** J 621.36 TUR

*All Rights Reserved, Hungry Tomato, 2018.*

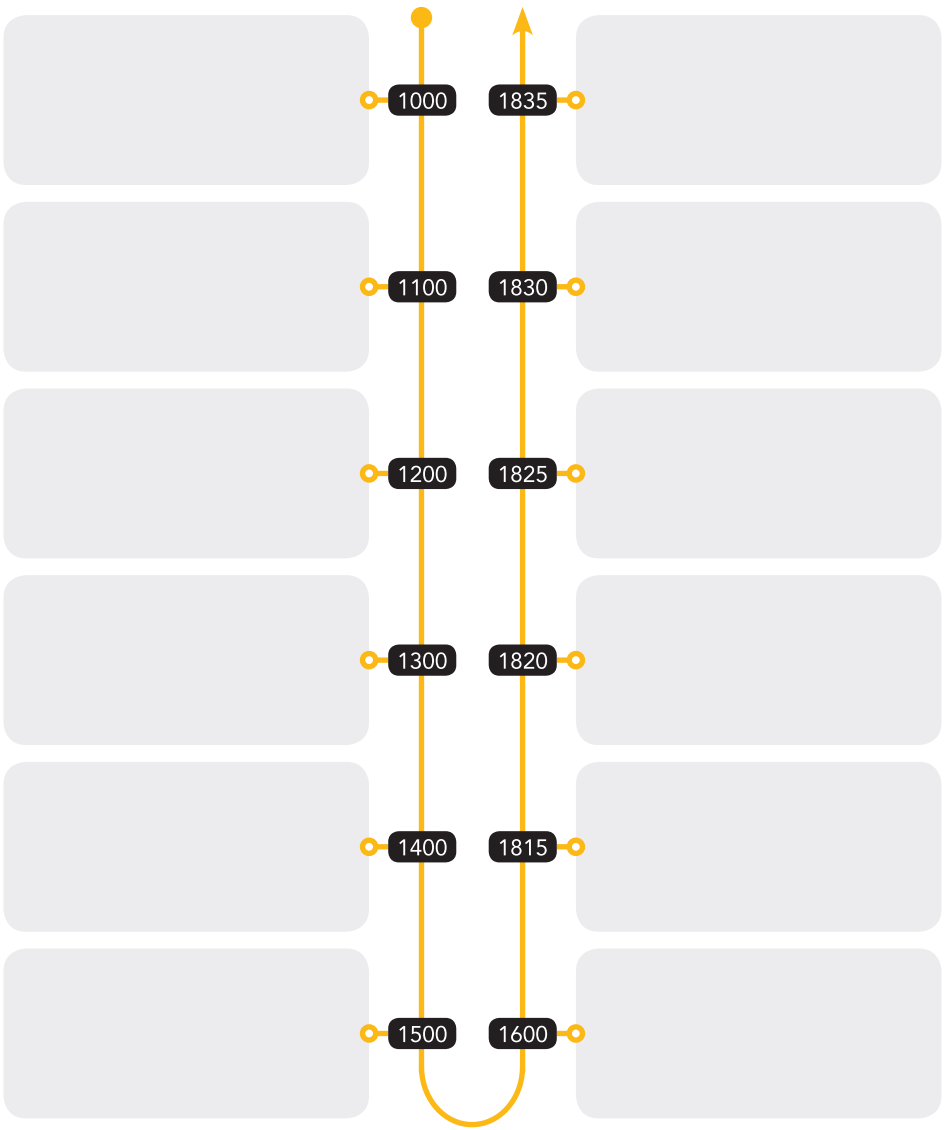
## ACTIVITY

★★ *2 stars for this activity*

**Timeline of evolution of camera**

# How well do you know the history and evolution of cameras?

**Complete the timeline below by filling in the boxes.**



MAKE!

## Create your own camera obscura at home.

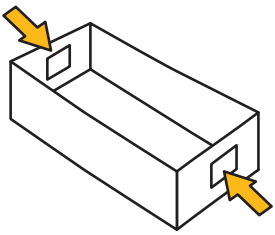
**WHAT YOU'LL NEED**

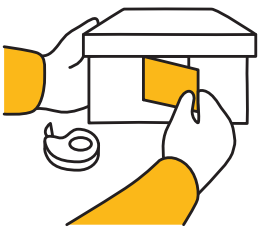
- An empty shoe box with lid
- Pencil
- Scissors
- Lamp
- Tape
- Tracing paper (7cm by 7cm)

**Instructions:**

1. Use a pencil to punch a hole in one of the shorter ends of the shoe box.

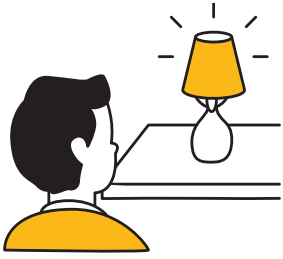
2. Cut a 5cm by 5cm square on the opposite end of the shoe box.





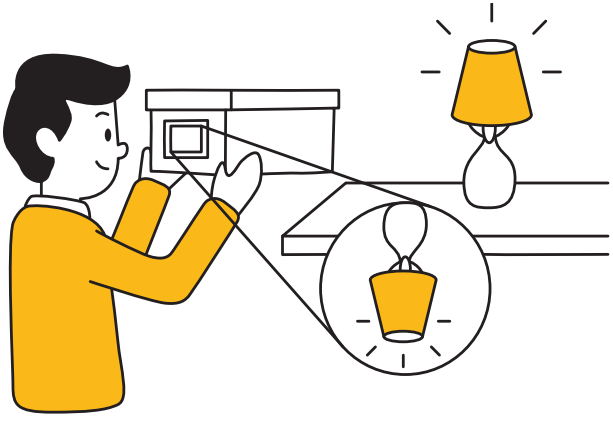
3. Tape the tracing paper on top of the square hole.

4. Turn on a lamp in a dark room.



5. Stand two metres away from the lamp.

6. Aim the pinhole camera at the lamp at arms' length.

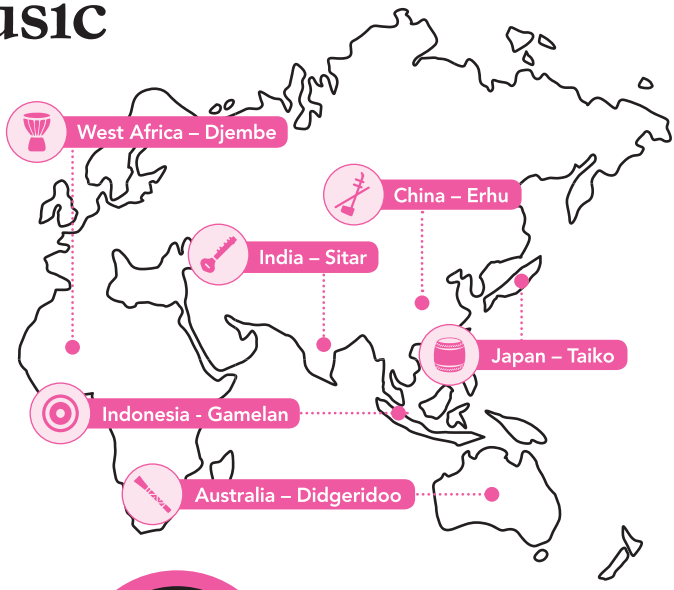


7. Ta-da! An upside down image of the lamp will appear on the tracing paper.

# Grooving to the Beat of the Music

You may be familiar with Pop, Hip Hop and Rock but did you know that there are many other types of music? That's because music is largely influenced by the cultures producing it. If you were to compare the popular music of the 80s with today's pop music, you will be able to sense the difference in vibes, styles and even messages relayed through music.

Aspiring to be a musician? You can start expanding your music knowledge by listening to different genres. Who knows, you might find the one genre that clicks and inspires you to pick up an instrument or two. Just like how there are many music genres, there are also many instruments for you to choose from. Some instruments are used in multiple genres while some, such as those used in traditional music, are unique to one genre.




**Fun Fact**

In the past, instruments were handcrafted from the natural materials available such as wood and horse hair. Nowadays, although there are instruments still handcrafted by masters, most instruments are mass manufactured with a mix of natural and man-made materials.

## References


**50 Things You Should Know About Music**

**Author:** Rob Baker

**Call No.:** J 780.9 BAK

*All Rights Reserved, QED, 2016.*

**I Can Make Music: Easy-to-Make Instruments for Kids, Shown Step-by-Step (*Show Me How*)**

**Author:** Michael Purton

**Call No.:** J 781 PUR

*All Rights Reserved, Armadillo, 2014.*

**The School of Music**

**Authors:** Meurig and Rachel Bowen

**Call No.:** J 781.1 BOW

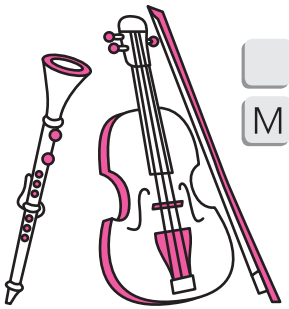
*All Rights Reserved, Wide Eyed Editions, 2017.*

ACTIVITY

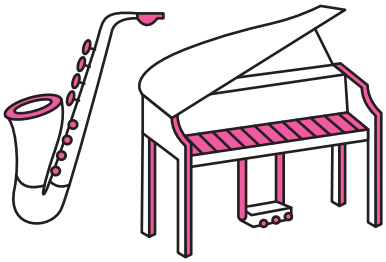
★★ *2 stars for this activity*

## Guess the music genre!

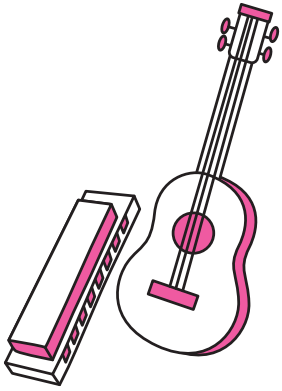
**How well do you know the various genres of music? Fill in the blanks below based on the given instruments.**



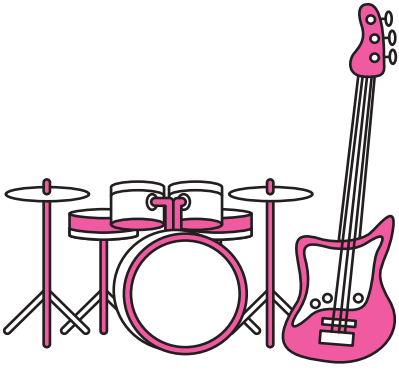
_ _ a _ _ _ _ _ _
M _ _ _ _



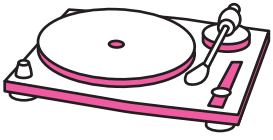
J _ _ _



F _ _ _ &
T _ _ d _ _ _ _ n _ _
M _ _ _ _



_ _ c _



E _ _ c _ _ _ _ _ _
D _ _ _ _ M _ _ _ _

MAKE!

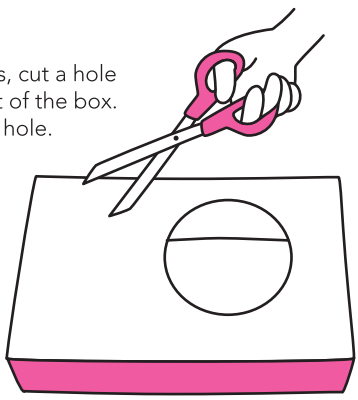
# Build your own guitar with recycled materials

**WHAT YOU'LL NEED**

- Shoebox or cereal box
- Cardboard tube from a kitchen towel roll
- Scissors
- Rubber bands
- Duct tape

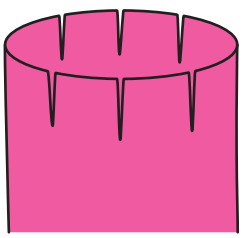
**Instructions:**

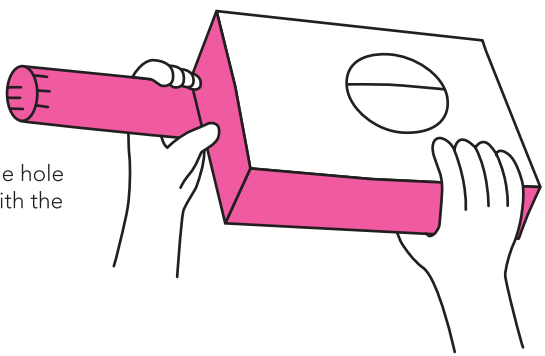
1. Using the scissors, cut a hole in the widest part of the box. This is the sound hole.



2. Cut a hole that is of the same diameter as the cardboard tube on top of the box.

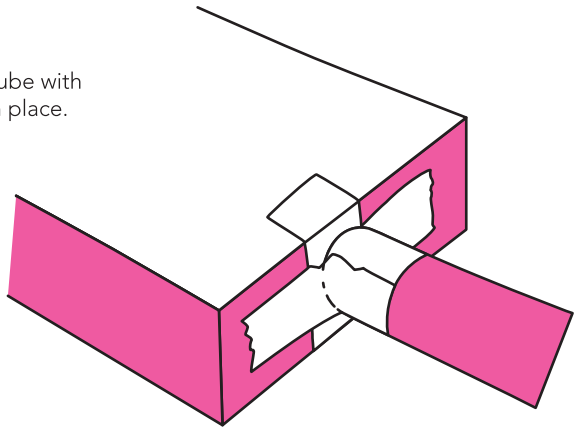
3. Make six small cuts around one end of the cardboard tube.

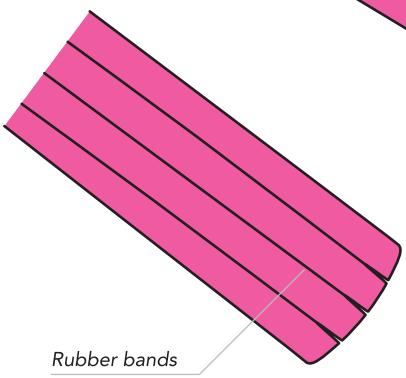




4. Insert the cardboard tube into the hole at the top of the box. The end with the small cuts should be on top.

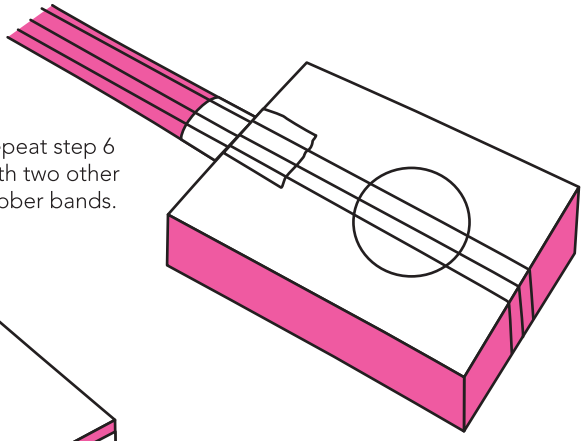
**5.** Wrap the cardboard tube with duct tape to keep it in place.



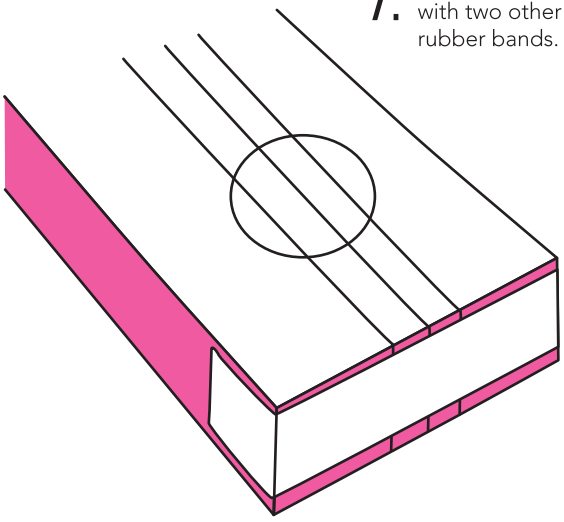


*Rubber bands*

**6.** Grab a rubber band and wrap it around the box starting from the top of the box. It should be secured with the small cuts on the cardboard tube.



**7.** Repeat step 6 with two other rubber bands.



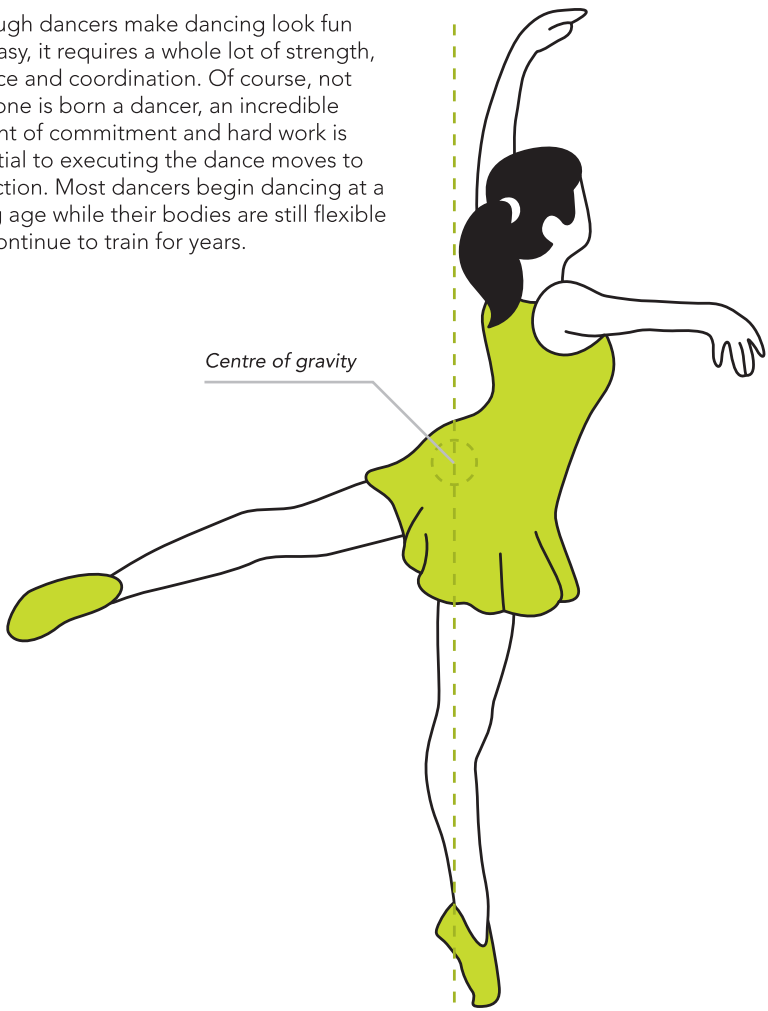
**8.** Tape the rubber bands to the bottom of the box to keep them in place.

# Mastering the Centre of Gravity Through Dance

Dance is a form of expression created with the movement of the body to music. Just like in music, there is a wide range of dance genres ranging from classical genres like Ballet to modern ones like Hip Hop, which are developed by the cultures surrounding them. In recent years, dance has been gaining popularity thanks to reality TV shows and musicals.

Although dancers make dancing look fun and easy, it requires a whole lot of strength, balance and coordination. Of course, not everyone is born a dancer, an incredible amount of commitment and hard work is essential to executing the dance moves to perfection. Most dancers begin dancing at a young age while their bodies are still flexible and continue to train for years.

Learning to dance begins with the basics such as getting the body to move according to the rhythm of the music and learning to balance on the centre of gravity. A lot of time is spent practising these basics because in the execution of high-level moves or complicated choreography, one wrong move could cause an injury.



## Fun Fact

Did you know that traditional Irish dancing requires the dancers to leap and kick while keeping the upper body still? The reason is to draw the gaze of the audience to the legs and feet of the dancers to appreciate the skills of the dancers. The dancers perform with a straight back and pleasant smile, to make dancing seem effortless.

## References



**Mad About Dance**
**Author:** Judith Heneghan
**Call No.:** J 792.8 HEN
*All Rights Reserved, Wayland, 2014.*

**Dance: A Practical Guide to Pursuing the Art (*Performing Arts*)**
**Author:** Rebecca Love Fishkin
**Call No.:** Y 793.3 FIS
*All Rights Reserved, Compass Point Books, 2011.*

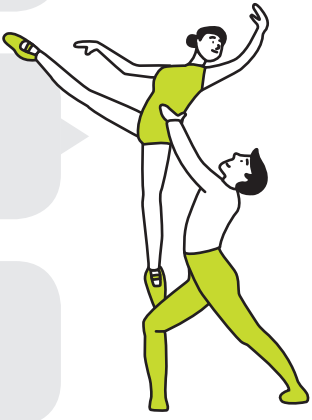

**You Can Be a Dancer (*Let's Get Moving*)**
**Author:** Alix Wood
**Call No.:** J 792.8 WOO
*All Rights Reserved, Gareth Stevens, 2014.*

## ACTIVITY

★ *1 star for this activity*

**Below are some signature dance moves. Can you guess which dance genres they are from?**

Write down the answers in the boxes provided.



**Dance Genre**

## MAKE!

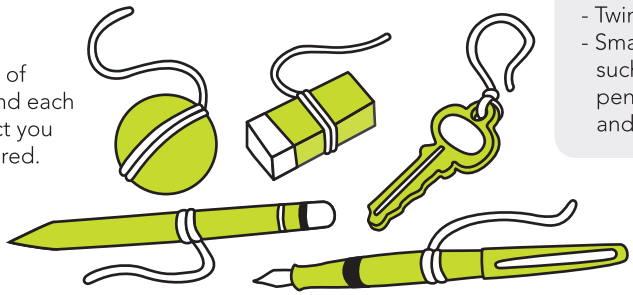
# Test how size and weight affect the centre of gravity with a hanger mobile.

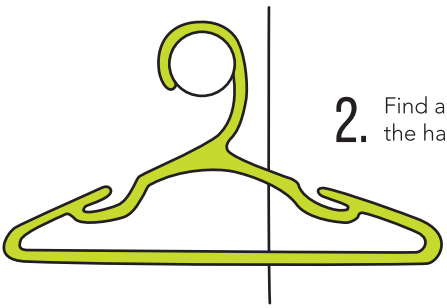
**Instructions:**

**WHAT YOU'LL NEED**

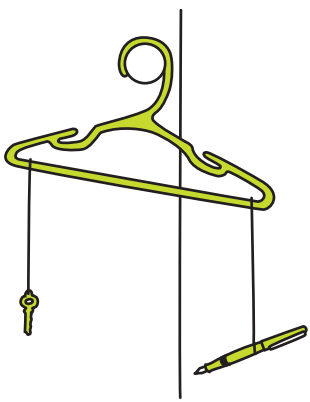
- Hanger
- Twine
- Small objects such as pencil, pen, eraser, coin and key

1. Tie a piece of twine around each small object you have gathered.

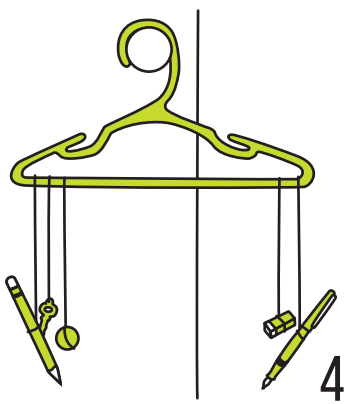




2. Find a place to hang the hanger.



3. Place the objects one by one on the hanger at different points.



4. Keep adding and shifting the objects until the hanger is balanced on its centre of gravity.

National Library Board
Singapore

Supported by
LIFELONG LEARNING COUNCIL

**National Library Board**
100, Victoria Street
#14-01 National Library Building
Singapore 188064



Printed in July 2018.