girl scouts river valleys

Wizardly Science

Calling all Harry Potter fans and wishful wizards! Come for a magical day of experiments, potions, and wands. Learn basic scientific principles through fun and magic.

Program Grade Level: Girl Scout Junior

School Grade(s): 4–5

Program Essentials Focus Area: STEM (Science, Technology, Engineering, and Math)

Program Duration: 3 hours

Optimal Setting: Room with tables and chairs. Area should include an open space for launching gliders.

Optimal Group Size: 50–80 girls

Learning Objectives: Girls use hands-on activities to learn about basic scientific topics, including:

- Acids, bases, and indicators
- Optical illusions
- The benefits of flowers
- Surface tension of water
- Density
- Chemistry
- Flight

Journey Links:

☐ ***It's Your World–Change It!*** ☒ ***It's Your Planet–Love It!*** ☐ ***It's Your Story–Tell It!***

Outcome Indicators:

☐ Girls develop strong sense of self
☒ Girls seek challenges in world
☒ Girls promote cooperation and team-building
☐ Girls identify community needs
☒ Girls gain practical life skills
☒ Girls develop healthy relationships
☒ Girls can resolve conflicts
☐ Girls are empowered to make a difference

Award Requirements Met:

1. Flowers Badge—Step 3
2. Detective Badge—Step 2

Program Overview

Time Allotment for Activity	Activity	Description	Materials Needed
20 minutes	Sorting Hat	Girls are assigned their "house" and given their textbooks and schedules.	Sorting hat chart Textbooks Schedules
60 minutes	Stations 1–4	Girls complete 4 of the following 8 stations: • Marauder's Map 1 • Olivander's Wands • Herbology • Marauder's Map 2 • Water Spells • Transfiguration • Potions • Flying	See activity descriptions
20 minutes	Sorcerer's Snacks	Girls eat "Bertie Bott's any flavor beans" and can use the restroom, get a drink, etc.	Jelly beans Small cups
60 minutes	Stations 5–8	Girls complete 4 of the following 8 stations: • Marauder's Map 1 • Olivander's Wands • Herbology • Marauder's Map 2 • Water Spells • Transfiguration • Potions • Flying	See activity descriptions
20 minutes	Exams	Girls clean up their final station and discuss what they learned.	

Possible Adaptations (special needs, materials, etc.): Stations can be run four at a time (girls cycle through four before snack and four after snack) or eight at a time, depending on the size of your group and your space. There are different schedules based on how many groups you have. You should divide the groups □□□□□□ the event based on the number of girls in each troop to ease the assignment of groups and the handing out of the schedule.

Schedules may need to be altered based on what time your program starts.

Notes to the Facilitator: This event is designed to run in stations. The table handouts go at each station and provide all the information girls need to complete the activities. While you can have facilitators at each station, it is not required.

You should print one textbook per girl and have them pick them up at the sign-in table as they arrive.

Table signs can be placed on the table at each station or hung on the wall by the stations.

First topic: Sorting Hat
Background Information: The **Sorting Hat** is a sentient Hogwarts artifact that magically determines to which of the four school Houses each new student is to be assigned. These four Houses are [illegible], [illegible], [illegible] and [illegible]. The Sorting Hat originally belonged to Godric Gryffindor, one of the founders of Hogwarts. It normally lives in the Headmaster's office until it is needed.

During the opening banquet at the beginning of each school year, the first-year students are lined up and their names read aloud alphabetically. Each then takes a seat on a stool and the hat is placed on their head. After a moment of consideration, the hat announces its choice aloud for all to hear, and the student joins the selected house. The moment of consideration varies in length, from nearly a minute, to less than a second.

Activity 1: Sorting Hat
Time Allotment: 15 minutes
Prep Needed:

- Divide the group into four or eight houses based on the total size.
- Print enough schedules for each troop in a house to have one. For example, if there is one large troop that makes up Gryffindor, but three smaller troops in Hufflepuff, print 1 Gryffindor schedule and 3 Hufflepuff schedules.

Materials Needed:

- Textbooks
- Sorting hat assignments
- Schedules (based on sorting hat assignments)
- Pens/Pencils

Steps:

1. Introduce yourself. Explain the stations, housekeeping, etc.
2. Go over details about the stations (materials, etc)
3. Announce which troops are in each house, hand out their schedules, and have girls find their first station. Make sure everyone writes their name and house on their textbooks.

Second topic: Marauder's Map 1
Background Information: The **Marauder's Map** is a magical map of Hogwarts created by James Potter, Sirius Black, Remus Lupin, and Peter Pettigrew while they were at Hogwarts. They gained extensive knowledge about the school grounds, including various hidden passages, from their frequent night-time adventures together.

At first glance, the Map is simply a blank piece of parchment; but when the user points his wand at the Map and says, "I solemnly swear that I am up to no good," the message, "Messers. Moony, Wormtail, Padfoot, and Prongs, purveyors of aids to magical mischief-makers, are proud to present the Marauders Map," appears along with a detailed layout of Hogwarts, including its occupants, secret passageways (and instructions on how to access them), and other mysteries. Saying, "Mischief managed!" returns the map to its original blank state.

Some brands of goldenrod printer paper contain a type of chemical called an [illegible]. This means that the chemical changes color based on the pH of the chemicals surrounding it. This means it is a different color in the presence of an acid than it would be in the presence of a base. While the paper is mildly acidic, baking soda is a base. The wax blocks the baking soda from reaching the paper. The portions of the paper that were painted with baking soda would be basic, while the portions that were not painted are acidic. This difference causes the difference in color.

Activity 1: Chemical Disappearing Act
Time Allotment: 7 minutes
Prep Needed:

- Put tablecloths on the tables being used for this station.

Materials Needed:

- Table handout
- Baking soda
- Warm water (in pitchers)
- Mixing bowl
- Small bowl
- Measuring cups and spoons
- Index card
- Cotton swabs
- Pencils
- Blue painter's tape
- Table cloths

Steps: Girls follow instructions on the table handout (see activity resources).

Activity 2: Aparecium
Time Allotment: 8 minutes
Prep Needed:

- Put tablecloths on the tables being used for this station.

Materials Needed:

- Table handout
- Goldenrod printer paper
- Baking soda solution (from Activity 1)
- Foam paint brush
- A piece of clear wax or candle

Steps: Girls follow instructions on the table handout. (See activity resources)

Third topic: Olivander's Wands
Background Information: **Ollivander** is the proprietor of Ollivander's Wand Shop in Diagon Alley. Ollivander is widely considered the best wand maker in the British Wizarding world, and many wizards and witches buy their wands from him.

Ollivander supplied Harry Potter with a wand, and as he did so, he told Harry a few facts about wands. He explained that a wand has a core, and in Harry's case, a Phoenix feather. He told Harry that the body of the wand is made from a choice of different woods with different magical properties. Ollivander said he made a similar wand using another feather from the same phoenix, but using a different wood. Harry's wand is holly, which symbolises protection, rather than Voldemort's yew, which suggests poison. He also explains that the wand chooses the wizard, rather than the other way around. Thus, he considered it remarkable that the wand suited to Harry is the "brother" to the one Voldemort uses.

Activity 1: Make Your Wand
Time Allotment: 15 minutes
Prep Needed:

- Spread seed beads onto several trays.

Materials Needed:
- Table handout
- Wooden dowel
- 18 inches of Terrifically Tacky Tape per wand
- Seeds beads
- Trays
- Scissors

Steps: Girls follow instructions on the table handouts. Girls may need assistance in putting tape on their wands (see activity resources).

Instructor's note: Girls should wrap the tape down the entire wand and then remove the red layer. Tape cannot overlap.

Fourth topic being covered: Herbology
Background Information: Herbology is the study of magical and mundane plants and fungi. In Herbology, students learn how to care for and utilize plants, discover magical properties, and determine what they are used for. Many plants provide ingredients for potions and medicine, while others have magical effects of their own right.

Aromatherapy is a form of alternative medicine that uses essential oils and other aromatic compounds for the purpose of altering a person's mind, mood, cognitive function, or health.

Some essential oils such as tea tree oil have demonstrated anti-microbial effects, but there is still a lack of clinical evidence demonstrating efficacy against bacterial, fungal, or viral infections. Evidence for the efficacy of aromatherapy in treating medical conditions remains poor; however, some evidence exists that essential oils may have therapeutic potential.

Activity 1: Magical Draught
Time Allotment: 15 minutes
Prep Needed:
- Lay tablecloths on tables to be used for this activity.
- Put instruction labels on plastic baggies.
- Set ingredients out for girls. Do not put out the lavender fragrance oil.

Materials Needed:
- Table handout
- Large bowl
- Mixing spoon
- Paper towels
- Scratch paper
- Plastic bags (one per girl)
- Bath bead instruction labels (one per girl)
- Permanent markers
- Powdered milk
- Powdered borax
- White flour
- Lavender water
- Red and blue food coloring
- Lavender fragrance oil
- Mineral oil

Steps: Girls follow instructions on the table handouts. Girls will need adult assistance in calculating amounts of ingredients and in combining them (see activity resources).

Fifth topic: Marauder's Map 2
Background Information: Like the goldenrod paper, grape juice contains a type of chemical called an [illegible]. This means that the chemical changes color based on the pH of the chemicals surrounding it (it is a different color in the presence of an acid than it would be in the presence of a base). While grape juice contains an acid, baking soda is a base. The portions of the paper that were painted with baking soda would be basic, while the portions that were not painted are acidic (from the grape juice). This difference causes the difference in color.

Activity 1: Chemical Appearing Act
Time Allotment: 15 minutes

Materials Needed:
- Table handout
- Grape juice
- Plastic tray
- Foam brush
- Note cards with messages written from "Maurader's Map 1" activity

Steps: Girls follow instructions on the table handout (see activity resources).

Activity 2: Scytale Messages
Time Allotment: 15 minutes

Materials Needed:
- Table handout
- Paper
- Scissors
- Tape
- Pens/pencils
- Soda can

Steps: Girls follow the instructions on the table handout (see activity resources).

Sixth topic: Water Spells
Background Information: Surface tension of a liquid happens because of the strong cohesive forces near the surface. The attraction between surface molecules causes the surface to contract and give it properties similar to those of an elastic membrane. In other words, surface tension is like a "skin" on the surface of water; it's what allows water bugs to walk on water. This is also what allows the needle to "levitate" above the water if placed properly and the water to bubble over the penny.

Soap weakens the surface tension of water. Not good for water bugs, but good for blowing bubbles – bubbles in pure water collapse because the surface tension pulls the water molecules into each other. In soapy water, there's less cohesion, so you can push the water molecules further apart, and they will stay there longer (that is, the bubble hangs around without popping). However, this also keeps the water from "holding together" around the surface of the water, which is what causes it to pop.

Activity 1: Wingardium Leviosa
Time Allotment: 7 minutes
Prep Needed:
- Fill the bowls with a small amount of water.

Materials Needed:
- Table handout
- Bowl
- Needle
- Water (in pitchers)
- Paper Towels

Steps:
Girls follow the instructions on the table handout (see activity resources).

Tip: This should be done very gently. For the trick to work, the needle and your fingers should be dry.

Activity 2: Penny Pile
Time Allotment: 8 minutes

Materials Needed:
- Table handout
- Eyedropper
- Penny
- Bowl
- Water (in pitchers)
- Dish soap
- Paper Towels

Steps:
Girls follow the instructions on the table handout.

Seventh topic: Transfiguration
Background Information: **Transfiguration** is the art of changing the form and appearance of an object and the vanishing of objects. This magical art is governed by Gamp's Law of Elemental Transfiguration which acknowledges the limits to the power of this branch of magic. Hogwarts School of Witchcraft and Wizardry devotes an entire section of their curriculum to Transfiguration. Transfiguring can be done to most, if not all objects. Sometimes if it is done improperly the transfigured object can become half-transfigured or permanently stuck.

Optical illusions involve visual deception. Due to the arrangement of images, effect of colors, impact of light source, or other variable, a wide range of misleading visual effects can be seen. Most optical illusions are caused by physiological effects of the eyes or by how our brain interprets the images we see.

Activity 1: See What?
Time Allotment: 15 minutes
Prep Needed:
- Print several sets of the optical illusion cards.

Materials Needed:
- Table handout
- Textbook
- Optical illusion cards
- Pen/pencils

Steps:
Girls follow the instructions on the table handout. Girls may need to ask you to explain some of the illusions. (see activity resources).

Explanation of Optical Illusion Cards
1–6: Are pictures that include two separate images in one

1. Old lady and a young woman
2. Woman and a saxophone player
3. Native American head and an Eskimo
4. Rabbit and a duck
5. An older man and a couple with a baby
6. An elderly couple and a city scene

7–9: These pictures contain 2 words

7. Teach/Learn
8. Me/You
9. Love/Hate

10–14: These are all pictures of impossible objects or scenes

10. How many columns does the structure have?
11. How many legs does the elephant have?
12. Person is touching a person who is part of the puzzle
13. Can this exist?
14. Can you make this structure out of dice?

15–18: There are hidden images in the pictures

15. Faces in the rocks
16. A face in the coffee beans (bottom left corner)
17. Horses in the rocks
18. A gorilla in the handprint

19–23: These are still pictures that give the illusion of movement. These images work better on a computer screen if possible.

19. The waves appear to move
20. There are no dots in this picture, only black squares and white lines. Black dots seem to appear and disappear.
21. If you stare at the dot in the middle the gray cloud will appear to shrink
22. Circles appear to rotate
23. Stare at the spot in the middle and move your head toward and away from the picture. The circles will appear to move.

24–29: Surrounding conditions change how objects are perceived.

24. All three men are the same height
25. Both central circles are the same size
26. The horizontal lines are all straight and parallel
27. The horizontal lines are straight and parallel
28. The main lines are straight and parallel
29. Line AC and AB are the same length

Eighth topic: Potions
Background Information: **Potions** are magical mixtures commonly brewed in cauldrons and used to create various effects on the drinker.

A **pensieve** is a shallow stone basin with symbols carved around the edge. When in use, a silvery light shines from its contents, which are bright, whitish silver, and cloud-like, moving ceaselessly. The pensieve can show the user others' memories.

The **mass density** or **density** of a material is defined as its mass per unit volume. Different materials usually have different densities, so density is an important concept regarding buoyancy, purity and packaging. Osmium and iridium are the densest known metal elements at standard conditions for temperature and pressure but not the densest materials.

Less dense fluids float on more dense fluids if they do not mix. This concept can be extended, with some care, to less dense solids floating on more dense fluids. If the average density (including any air below the waterline) of an object is less than water (1000 kg/m^3), it will float in water; and if it is more than water's, it will sink in water.
The mass density of a material varies with temperature and pressure (the variance is typically small for solids and liquids and much greater for gasses). Increasing the pressure on an object decreases the volume of the object and therefore increases its density. Increasing the temperature of a substance (with some exceptions) decreases its density by increasing the volume of that substance. In most materials, heating the bottom of fluid results in convection of the heat from bottom to top of the fluid due to the decrease of the density of the heated fluid. This causes it to rise relative to more dense unheated material.

The chemicals in dish soap break down fats. This is how they remove dirt and oils from our dishes, by breaking down the chemical structure. When the soap is added to the milk, it breaks down the pressure. This creates a low-pressure area. Materials tend to flow from high pressures to low pressures, so the milk rushes in to fill the void. As it does this, the food coloring is brought with the milk, causing the colors to swirl.

Activity 1: Cauldron Bubbles
Time Allotment: 10 minutes
Prep Needed:
- Put tablecloths on tables that will be used for this activity.

Materials Needed:
- Table handout
- Tablecloths
- Several clear glasses
- Water (in pitchers)
- Oil
- Salt
- Sugar
- Sand

Steps:
Girls follow instructions on their table handout (see activity resources).

Activity 2: Magical Pensieve
Time Allotment: 5 minutes
Prep Needed:
- Put tablecloths on tables that will be used for this activity
- Make sure milk has been out of the refrigerator long enough to reach room temperature.

Materials Needed:

- Table handout
- Tablecloths
- Small bowls
- 3 different bottles of food coloring
- Milk
- Dishwashing detergent

Steps: Girls follow the instructions on the table handout. (See activity resources)

Ninth topic: Flying
Background Information: **Flying**, also known as Broom Flight Class is a subject taught at Hogwarts School of Witchcraft and Wizardry. It is taught by Madam Hooch to first-years only. The subject teaches students how to fly broomsticks.

Quidditch is a wizarding sport played on broomsticks. It is the most popular game among wizards and witches, and, according to Rubeus Hagrid, the equivalent to Muggles' passion for football (soccer).
The game is played by two teams of seven people (three [illegible], two [illegible], one [illegible], and one [illegible]) and involves four balls (a [illegible], two [illegible], and a [illegible] [illegible]).

The Keeper guards the goal posts, while the three Chasers score goals with the Quaffle by tossing it into one of the opposing team's three goal posts. The two Beaters keep the Bludgers away from their team and hit the Bludgers towards the opposing team, and the Seeker catches the Golden Snitch to end the game. The team whose Seeker catches the Snitch is awarded 150 points, but this does not necessarily mean they will win if the other team still has more points than the other team before the Snitch is caught.

The object of the game is to score more points than your opponents. Each goal is worth ten points and catching the Snitch is worth 150 points. The game ends when the Snitch is caught or an agreement is reached between the captains of both teams.

Flight is the process by which an object moves either through an atmosphere (especially the air) or beyond it (as in the case of spaceflight) by generating lift or propulsive thrust, or aerostatically using buoyancy, or by simple ballistic movement.

Some things that fly do not generate propulsive thrust through the air (for example, the flying squirrel). This is termed gliding. Others have a source of propulsion and can climb. This is termed powered flight.

Activity 1: Quidditch Practice
Time Allotment: 15 minutes
Prep Needed:

- Make an example hoop glider for the girls to follow while building.
- Cut construction paper into strips that are 1 inch wide and 5 or 10 inches long.
- Remember to set up this station near an open area where girls can launch their gliders.

Materials Needed:

- Table handouts
- Straw (1 per girl)
- A 1-inch-by-5-inch piece of construction paper (1 per girl)
- A 1-inch-by-10-inch piece of construction paper (1 per girl)
- Tape
- Markers
- Small strip of tissue paper (1 per girl)

- Scissors

Steps:

1. Girls follow instructions in table handout (see activity resources).
2. Let the girls know that there are instructions in their textbook for “Quidditch for Muggles” that they can play with their troop or their friends.

Activity Resources

Table Handouts
Textbooks
Schedules (4 groups and 8 groups)
Trivia Questions (time filler in case a group finishes a station early)
Bath Bead Direction Labels
Transfiguration Optical Illusion Cards

Wizardly Science

Maurader's Map 1

[illegible]

Activity 1: Chemical Disappearing Act

Materials Needed:
Baking soda
Warm water
Mixing bowl
Small bowl
Measuring cups and spoons
Index card
Cotton swabs
Pencils
Blue tape

Steps
1. Each participant needs an index card. Write name on the back.
2. Mix baking soda solution: 3 tablespoons of baking soda into 1 cup of lukewarm water. Pour a small amount into your own bowl.
3. Dip a q-tip into the baking soda solution and make a simple drawing or secret message on the paper.
4. Tape the corners of your paper to the wall to keep it from curling. Baking soda solution is colorless, so when it is dry, nothing will show up on the paper.

As with all science experiments, use caution with chemicals.

The message with be revealed later at today's event.

Wizardly Science

Maurader's Map 1

[illegible]

Activity 2: Aparecium

Materials Needed:
Goldenrod printer paper
Baking soda solution (from activity 1)
Foam paint brush
A piece of clear wax or candle

Steps:
1. Use the wax to write a short message on the goldenrod paper
2. Put a small amount of baking soda solution on the paint brush and paint a thin coat onto your message.
3. Your secret message will be revealed. What do you think happened?

Magical Mysteries: An acid is a chemical that dissolves items that water can't. Common examples of acid are orange juice and vinegar. A base is a chemical that is the opposite of an acid and can neutralize and acid (make it less acidic). Toothpaste and milk are examples of bases.

Goldenrod color printing paper is dyed with a type of chemical called an indicator. This means that the chemical changes color whether it is near an acid or a base. The paper is slightly acidic, while baking soda is basic. When you add baking soda to the paper, it becomes basic and the color of the indicator changes. The wax keeps the baking soda from reaching the paper. While goldernrod paper is no

longer made for printing, you can find it at science supply stores.

Wizardly Science

Maurader's Map 2

[illegible]

Activity 1: Chemical Appearing Act

To reveal your message, you will brush grape juice over your drawing.

Materials Needed:
Grape Juice
Plastic tray
Foam brush
Note cards with messages written from "Maurader's Map 1" activity

Steps:
1. Place your invisible message or drawing into a tray.
2. Dip the foam brush into the grape juice solution and, taking care not to rub, gently stroke over the original painting.
3. Observe what happens. Why do you suppose there is a change?

Magical Mysteries: Just like the goldenrod paper, grape juice contains an indicator. Grape juice is also mildly acidic while baking soda is basic. When the grape juice hits the baking soda and becomes basic, it changes color. It remains the same color on the parts of the paper that are not soaked in baking soda.

Congratulations! You have now completed step 2 of the Detective badge found in the "It's Your Planet – Love it!" skill building badge set!

Wizardly Science

Maurader's Map 2

Activity 2: Scytale Messages

Have you ever written a secret note to a friend, only to have someone else find it and read it? Next time, try writing your message in code. You can make a coded message called a scytale message by writing on strips of paper wrapped around a soda can.

Materials Needed:
paper
scissors
tape
pen or pencil
Soda can

Steps:
1. Start by cutting a piece of paper into a couple of long strips.
2. Tape the strips together so you have one really long strip. The longer your message is, the longer the strip should be.
3. Tape on end of the long strip of paper to a soda can.
4. Wrap the strip around the can and tape the other end in place. Make sure the paper doesn't overlap as you wrap it around the can. (Wrap it in a spiral so it looks like the stripes on a candy cane.)
5. Write your message across the can. Write one letter on each "stripe" of paper. The letters should all be next to each other. If you have more than one word in your message, leave a space in between.
6. Now here's the sneaky part. Write some nonsense letters above and below your message, where the paper is blank. This will make your message look like it's in code when you unwrap it.
7. Unwrap the message. It's hard to read, right? No one will be able to figure out what the message says unless they wrap it around a cylinder that's the same size as the one it was written on.

Magical Mysteries: When cylinders are two different sizes, the circumferences, or distances around the cylinders, are

different and the letters won't match up.

Wizardly Science

Transfiguration

[illegible]

Activity 1: See What?

Study the images on the provided cards. Use the worksheet in your textbooks to record what you see.

Magical Mysteries: Optical illusions involve visual deception. Due to the arrangement of images, effect of colors, or impact of light source, a wide range of misleading visual effects can be seen. Most optical illusions are caused by properties of the eyes or by how our brain interprets the images we see.
Ask your professor for the secrets behind the illusions.

Wizardly Science

Ollivander's Wands

[illegible]

Materials needed:
- Wooden dowel
- 18 inches of with Terrifically Tacky Tape per wand
- Seeds beads
- Trays
- Scissors

Steps:
1. Wrap the tape around the dowel creating a spiral.
2. Remove red coating from tape.
3. Roll the dowel in beads on the tray, careful not to get any on the floor.
4. Practice your spells. See the list on the next page for some ideas
5. Last group only: using a paper funnel, return the beads to the plastic container.

Magical Mysteries: Check your textbooks for spells to practice with your new wand!

Wizardly Science

Herbology

[illegible]

Activity 1: Magical Draught

In this activity, you will make relaxing bath beads to take home with you. You will also finish step 3 of the Junior Flowers badge (found in the Girls Guide to Girl Scouting) by finding out how flowers help people.

Materials Needed:
Large bowl
Mixing spoon
Paper towels
Scratch paper
Plastic bags with instruction labels (1 per girl)
Permanent markers

Bath bead ingredients (beads for 2 girls):
¼ cup powdered milk
2 tablespoons powdered borax
2 tablespoons white flour
¼ cup lavender water
1 drop red food coloring
10 drops of lavender fragrance oil
2 teaspoons mineral oil

Steps:
1. Have each girl take a plastic bag and label it with her name using the markers.
2. Combine dry ingredients in a bowl and stir until thoroughly mixed. If you have more than 6 girls, make a 1 ½ batch (ask your adult to help with the math)
3. Add the liquid ingredients and stir until a thick dough is formed. **Adults should add the lavender water. Ask your instructor to add the fragrance oil.**
4. Each girl should roll a teaspoon of the dough into a ball with her hands and place the ball in a plastic bag. Continue to do this with the rest of the dough. Each girl should make approximately 2 - 3 beads.

Magical Mysteries: Some people believe that the scent of flowers does more than smell nice – it can help people feel better. The use of flower scents is called aromatherapy. Aromatherapists say that lavender helps people de-stress and relax. (Junior Girls Guide to Girl Scouting)

Wizardly Science

Congratulations! You have now completed step 3 of the Plants badge found in the Junior Girl's Guide to Girl Scouting. If you want to make more beads, you can find the recipe in the badge requirements.

Wizardly Science

Water Spells

Activity 1: Wingardium Leviosa

[illegible]

Materials Needed:
Bowl
Needle
Water
Paper Towels

Steps:
1. Make a needle float on water. You might need a few tries. Why do you think the needle floats?

Activity 2: Penny Pile

Materials Needed:
Eyedropper
Penny
Bowl
Water
Dish Soap
Paper Towels

Steps:
1. Using the eyedropper, how many drops of water can you get to stay on the top of a penny?
2. Try this activity a second time and put a dab of soap on your finger.
3. Then touch the water. What happens when the soap meets the skin of water molecules on your penny? Any idea why?

Magical Mysteries: Surface tension of a liquid happens because molecules on the surface of the water “stick” to each other forming a “skin”. This “skin” is what allows the

needle to “levitate” above the water if placed properly and the water to bubble over the penny.

Soap weakens the surface tension of water. When you add soap to the water on the penny, the “skin” breaks and the water can no longer bubble.

Wizardly Science

Potions

[illegible]

Activity 1: Cauldron Bubbles

Materials Needed:
Several clear glasses
Water
Oil
Salt
Sugar
Sand

Steps:

1. Fill a glass half full of water.
2. Add about a half-inch of oil. The oil will float on top because it is less dense than the water.
3. Pour in some salt. What do you see?
4. Repeat the experiment with the other substances you have.
5. Make predictions about what you think will happen with each different material and write them in your textbooks.
6. Record your results in your textbooks.

Magical Mysteries: Whether and object sinks or floats in water or another liquid (or even gas) depends on it's density. Density is a measure of how packed together the molecules are in an object. It you have two objects of the exact same size, the more dense object will be heavier. If an object is less dense than water, it will float in it. If an object is more dense than water, it will sink.

Wizardly Science

When you pour in the salt, it brings a bubble of oil down with it. The salt and the oil together are more dense than the water, so they sink. When the salt dissolves in the water, the oil floats.

Wizardly Science

Potions

Activity 2: Magical Pensieve

[illegible]

Materials Needed:
1 small pensieve (bowl)
3 different bottles of food coloring
Milk
Dishwashing detergent

Steps :
1. Put a small amount of warm milk in one of your pensieves.
2. Add drops of food coloring in a triangle or square pattern.
3. Put a drop of soap in the middle of the food coloring design and watch the colors move.

Magical Mysteries: Milk has fat in it that the soap breaks up. The food coloring swirls into the places where the fat used to be.

Wizardly Science

Flying

Activity 1: Quidditch Practice

[illegible]

Materials Needed:
Straw
A 1 inch by 5 inch piece of construction paper
A 1 inch by 10 inch piece of construction paper
Tape
Markers
Small strip of tissue paper
Scissors

Steps:
1. Use the markers to color your straw. This will be the handle of your broom.
2. Wrap a small piece of tissue paper around one end of your straw and secure with tape. The tissue paper should be "half off" the end of the straw. Use the scissors to cut strips in the tissue paper. This is the bottom of the broom.
3. Curl each paper strip into a hoop. Tape the ends together. Now you have a big hoop and a small hoop.
4. Tape the small hoop to one end of the straw that does not have tissue paper on it.
5. Tape the big hoop on the other end of the straw. Make sure the big hoop lines up with the small hoop.
6. Hold your broom in the middle of the straw, with the small hoop in front. Throw it gently like a spear. It might take some practice to get the hang of it. How far does your broom fly?
7. Try to make your broom go the longest possible distance by making one change to its design. What happens if you make the straw smaller? What happens if you change the size of the hoops? Or, what happens if you add a third hoop? Choose one thing to change (that's the variable), and make a prediction.

Magical Mysteries: If you throw a plain straw, it doesn't go very far. But when you add paper hoops, the straw glides through the air. That's because the hoops act like wings.

Wizardly Science

Things that fly—like insects, birds, and airplanes—all have wings. But wings are not all the same shape and size. Different wings can be better for different kinds of flight. For example, an eagle has long, wide wings that help it glide. An airplane has wings with small flaps that move up and down to turn the plane.

Wizardly Science Textbook

House:

_____

Name:

_____

Date:

_____

Wizardly Science

Ollivander's Wands

Glossary of Spells and Terms:

Alohomora	Opens locked objects
Aparecium	Reveals invisible ink
Apparate	spell to transport oneself instantly to any destination
Avis	Launches birds from your wand
Densaugeo	Enlarges Teeth
Diffindo	Splits seams
Disapparate	Spell to make one disappear at will
Expecto Patronum	Creates a Patronus
Expelliarmus	Disarms your opponent
Flipendo	Spell that shoots a ball of energy in a straight line.
Impediment Jinx	Used to slow down and obstruct attackers
Impervius	Makes an object repel water
Incendio	Starts a fire
Locomotor Mortis	Locks opponents legs
Lumos	Creates light at wand tip
Mobiliarbus	Moves objects with wand
Mobilicorpus	Moves unconscious bodies
Nox	Counter to Lumos
Obliviate	Erases memories
Petrificus Totalus	Spell to bind arms and legs together; a full body bind
Peskipiksi Pesternomi	Spell used by Professor Lockhart to round up those pesky pixies
Prior Incantato	Reveals a wands last spell / cast
Relashio	Releases user from binding
Rictusempra	Tickles opponent
Serpensortia	Produces Snake
Splinching	An injury caused by careless apparating. A part of the Apparating person's body is left behind
Tarantallegra	Forces opponent to dance
Waddiwasi	Unsticks an object
Wingardium Leviosa	Levitation spell

Wizardly Science

Write your own spell:

Wizardly Science

Transfiguration

Activity 1: See What?

How is your brain challenged by optical illusions? Study the optical illusions provided and describe what you see.

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Ready for more challenges?
Visit the websites below for more Optical illusions:
http://gsrv.gs/1KgA07x
http://www.eyetricks.com/
http://gsrv.gs/1P4Qpjb

Wizardly Science

Potions

Activity 1: Cauldron Bubbles

Record your predictions and observations for what the different materials will do when inside your cauldron.

Material	What I think will happen	What did happen

Wizardly Science

Quidditch for Muggles

Materials Needed:

- One foam soccer ball (quaffle)
- 4 to 8 solid-color foam balls, each about 8 inches in diameter (bludgers)
- 1 small super-bouncy ball (snitch); and 6 hula hoops (goals). The hoops need to hang about 6 feet off the ground from a soccer net crossbar, tree branch, or something similar (three at each end).
- Each team should wear same-color shirts.

Rules:

To begin the game, 8 to 10 players per team are assigned positions. If more kids want to join in the fun,
additional players can easily be added. Here's what the positions do:

Chaser: Three to four per team. Chasers are offensive players similar to forwards in soccer. They try to throw the quaffle through one of the hoops to score 10 points.
Beater (or Tagger): Three to four per team. They use the bludger to tag out chasers and the seeker. The beaters are defensive players, like soccer fullbacks.
Seeker: One to two people per team (depending upon your team size), who, when the snitch is
released, try to catch it to score 150 points.
Keeper: This person guards the goals and tries to block any attempt to score. Each team has one keeper.

Game Play:

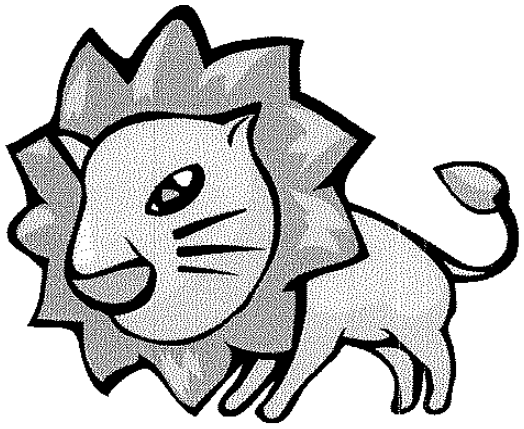
1. The game begins with a chaser from each team standing in the center with the other teammates positioned around them (much like a basketball game tip-off). The beaters stand back some, protecting their goals.
2. The quaffle is tossed into the air by the referee (adult) and the center chasers try to tip the ball to another chaser on their team. Seekers and beaters don't touch the quaffle.
3. Once the quaffle is caught by a chaser, she runs with it toward the three hula hoop goals. If she throws the quaffle through one of the opposing team's hoops, she earns 10 points for the team.
4. Meanwhile, beaters are playing defense, attempting to stop the chasers from advancing or scoring by throwing the soft foam bludgers at them.
5. Once tagged with the bludger, the chaser must stop moving and try to pass the quaffle to another chaser on the same team (once she makes the pass, she can move again).
6. If the quaffle is dropped or intercepted by a chaser on the opposing team, that team takes possession.
7. When a goal is scored, players return to the center for a new tip-off.
8. At some point in the game, the referee will release the snitch and throw it to another referee (if no other referee available, the referee can throw the snitch hard, allowing it to bounce. If the snitch stops, without being caught, then it goes back to the referee).

9. As the only players who can touch the snitch, this is where the seekers come into play. The seekers try to catch the snitch.
10. If the snitch stops rolling or bouncing without being picked up, it goes back to the referee to be released again later in the game.
11. The first seeker to catch the snitch scores 150 points for his team, the game immediately ends, and the points are tallied to determine a winner. Usually, but not always, it's the team that earned an extra 150 points by catching the snitch.

	1:20-1:35	1:35-1:50	1:50-2:05	2:05-2:20	2:40-2:55	2:55-3:10	3:10-3:25	3:25-3:40
Marauder's Map 1	R	G	H	S				
Transfiguration	S	R	G	H				
Olivander's Wands	H	S	R	G				
Herbology and Stones	G	H	S	R				
Marauder's Map 2					R	G	H	S
Water Spells					G	R	S	H
Divination					H	S	R	G
Ford Anglia Races					S	G	G	R

Gryffindor	Troop ##### - # girls	**Slytherin**	Troop ##### - # girls Troop ##### - # girls
Hufflepuff	Troop ##### - # girls	**Ravenclaw**	Troop ##### - # girls Troop ##### - # girls Troop ##### - # girls

Gryffindc

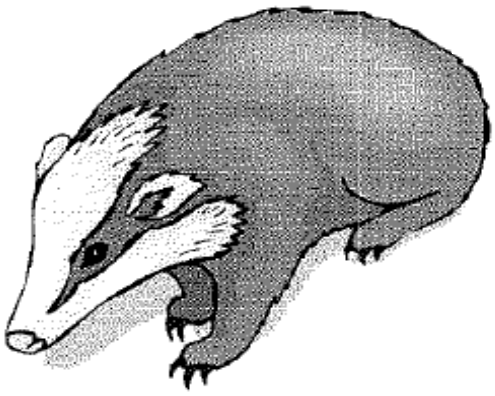


Class Schedule

1. Sorting Hat 1:00 – 1:20
2. Herbology 1:20 – 1:35
3. Marauder's Map 1 1:35 – 1:50
4. Transfiguration 1:50 – 2:05
5. Ollivander's Wands 2:05 – 2:20
6. Sorcerer's Snacks 2:20 – 2:40
7. Water Spells 2:40 – 2:55
8. Marauder's Map 2 2:55 – 3:10
9. Flying 3:10 – 3:25
10. Potions 3:25 – 3:40
11. Exams 3:40 – 4:00

Hufflepuf

Class Schedule



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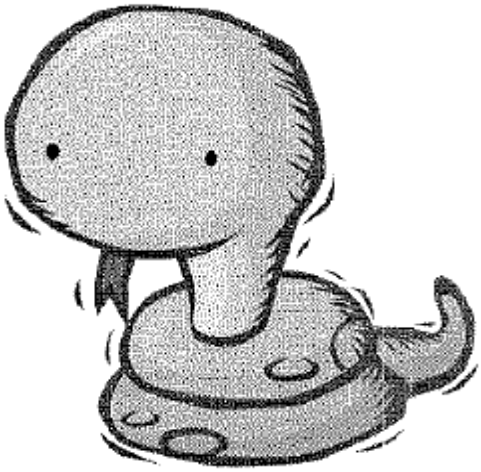
7. Potions 2:40 – 2:55
8. Flying 2:55 – 3:10
9. Marauder's Map 2 3:10 – 3:25
10. Water Spells 3:25 – 3:40
11. Exams 3:40 – 4:00

Ravenclaw

Class Schedule

1. Sorting Hat 1:00 – 1:20
2. Marauder's Map 1 1:20 – 1:35
3. Transfiguration 1:35 – 1:50
4. Ollivander's Wands 1:50 – 2:05
5. Herbology 2:05 – 2:20
6. Sorcerer's Snacks 2:20 – 2:40
7. Marauder's Map 2 2:40 – 2:55
8. Water Spells 2:55 – 3:10
9. Potions 3:10 – 3:25
10. Flying 3:25 – 3:40
11. Exams 3:40 – 4:00

Slytherin



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1. Sorting Hat 1:00 – 1:20
2. Transfiguration 1:20 – 1:35
3. Ollivander's Wands 1:35 – 1:50
4. Herbology 1:50 – 2:05
5. Marauder's Map 1 2:05 – 2:20
6. Sorcerer's Snacks 2:20 – 2:40
7. Flying 2:40 – 2:55
8. Potions 2:55 – 3:10
9. Water Spells 3:10 – 3:25

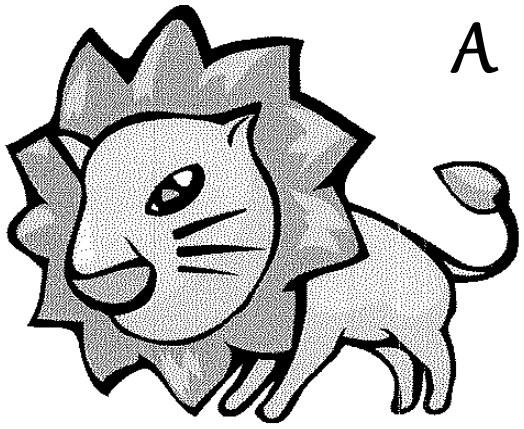
10. Marauder's Map 2 3:25 – 3:40
11. Exams 3:40 – 4:00

	1:20-1:35	1:35-1:50	1:50-2:05	2:05-2:20	2:40-2:55	2:55-3:10	3:10-3:25	3:25-3:40
Marauder's Map 1	R1 R2	G1 G2	H1 H2	S1 S2				
Transfiguration	S1	R1	G1	H1	G2	R2	S2	H2
Olivander's Wands	H1	S1	R1	G1	H2	S2	R2	G2
Herbology and Stones	G1	H1	S1	R1	S2	H2	G2	R2
Marauder's Map 2					R1 R2	G1 G2	H1 H2	S1 S2
Water Spells	S2	R2	G2	H2	G1	R1	S1	H1
Divination	H2	S2	R2	G2	H1	S1	R1	G1
Ford Anglia Races	G2	H2	S2	R2	S1	G1	G1	R1

Gryffindor A	Troop 12876- 5 girls	**Slytherin A**	Troop 23913 – 8 girls
Gryffindor B	Troop 25203 – 6 girls	**Slytherin B**	Troop 33162 – 4 girls
Hufflepuff A	Troop 22217 – 13 girls	**Ravenclaw A**	Troop 25411 – 8 girls
Hufflepuff B		**Ravenclaw B**	Troop 43012 – 5 girls

Gryffindc

A



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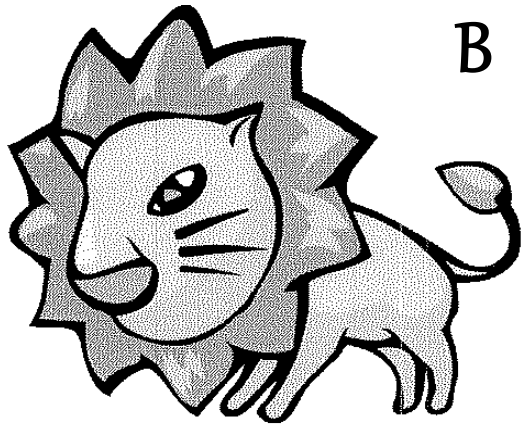
8. Marauder's Map 2 2:55 – 3:10
9. Flying 3:10 – 3:25
10. Potions 3:25 – 3:40
11. Exams 3:40 – 4:00

Gryffindc

B



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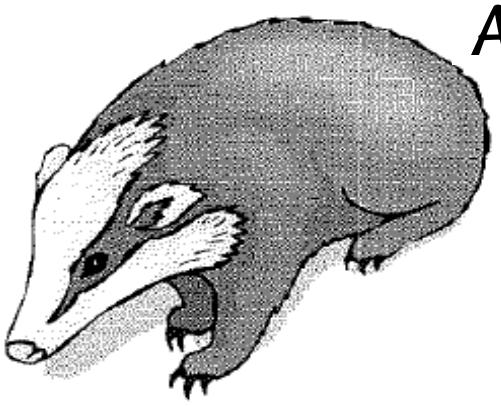
3. Marauder's Map 1 1:35 – 1:50
4. Water Spells 1:50 – 2:05
5. Potions 2:05 – 2:20
6. Sorcerer's Snacks 2:20 – 2:40
7. Transfiguration 2:40 – 2:55
8. Marauder's Map 2 2:55 – 3:10
9. Herbology 3:10 – 3:25
10. Ollivander's Wands 3:25 – 3:40
11. Exams 3:40 – 4:00

A

Hufflepuf



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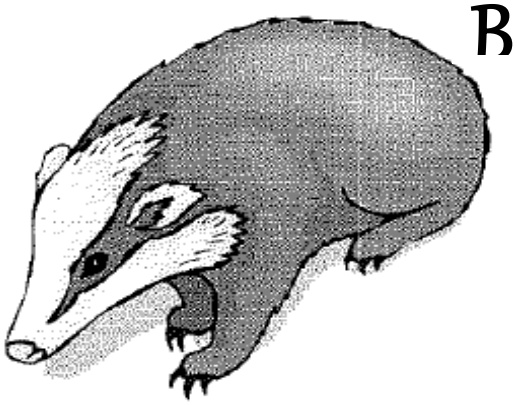
Hufflepuf



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8. Herbology 2:55 – 3:10
9. Marauder's Map 2 3:10 – 3:25
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11. Exams 3:40 – 4:00

Ravenclaw

Class Schedule

1. Sorting Hat 1:00 – 1:20
2. Marauder's Map 1 1:20 – 1:35
3. Transfiguration 1:35 – 1:40
4. Ollivander's Wands 1:40 – 2:05
5. Herbology 2:05 – 2:20
6. Sorcerer's Snacks 2:20 – 2:40
7. Marauder's Map 2 2:40– 2:55
8. Water Spells 2:55 – 3:10
9. Potions 3:10 – 3:25
10. Flying 3:25 – 3:40

11.	**Exams**	**3:40 – 4:00**

Ravenclaw

Class Schedule

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9. Ollivander's Wands 3:10 – 3:25
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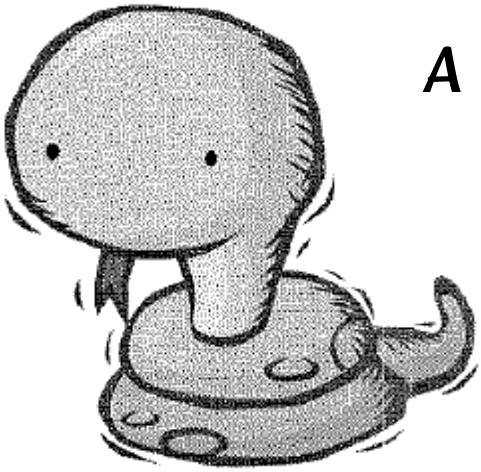
Slytherin



A

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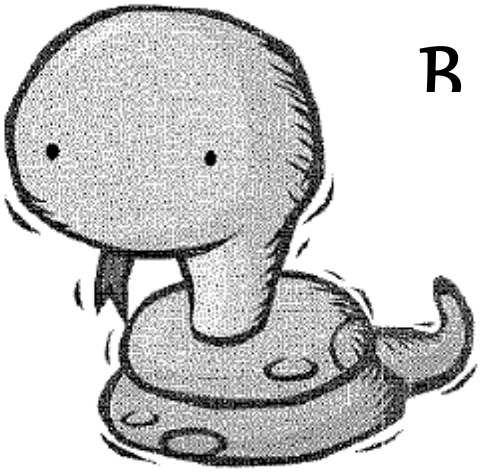
Slytherin



R

Class Schedule

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2. Water Spells 1:20 – 1:35
3. Potions 1:35 – 1:50
4. Flying 1:50 – 2:05
5. Marauder's Map 1 2:05 – 2:20
6. Sorcerer's Snacks 2:20 – 2:40
7. Herbology 2:40 – 2:55
8. Ollivander's Wands 2:55 – 3:10
9. Transfiguration 3:10 – 3:25

10. Marauder's Map 2 3:25 – 3:40
11. Exams 3:40 – 4:00

SO YOU THINK YOU KNOW HARRY POTTER? by Clive Gifford

EASY QUESTIONS:

1. **On which floor of Hogwarts was the forbidden corridor?**
   A) First
   B) Second
   C) Third
   D) Fourth

2. **How old is Harry when he is summoned to Hogwarts?**
   A) 10
   B) 11
   C) 12
   D) 13

3. **What type of creatures are Ronan and Bane?**
   A) Dragons
   B) Ghosts
   C) Werewolves
   D) Centaurs

From HARRY POTTER AND THE CHAMBER OF SECRETS

4. **Which creature sang a Valentine to Harry?**
   A) A frog
   B) A dwarf
   C) A cat
   D) A dog

5. **For how long was Hermione in the hospital wing?**
   A) Several hours
   B) Several days
   C) Several weeks
   D) Several months

6. **What sort of creature do the Weasleys have in their attic?**
   A) A ghoul
   B) A poltergeist
   C) A house-elf
   D) A dragon

From HARRY POTTER AND THE PRISONER OF AZKABAN

7. **Which exam was held at midnight?**
   A) Astronomy
   B) Geometry
   C) Philosophy
   D) History

8. **What injury did Ron suffer from being dragged away by the giant black dog?**
   A) A broken arm
   B) A broken leg
   C) A bruised head
   D) A bloody nose

From HARRY POTTER AND THE GOBLET OF FIRE

9. What color is the Slytherin banner?

A) Blue
B) Brown
C) Red
D) Green

10. Which country plays Ireland in the Quidditch World Cup final?

A) Bulgaria
B) Romania
C) Slovenia
D) Germany

MEDIUM QUESTIONS

1. What does drinking the Elixir of Life do to a person?

A) It makes them disappear
B) It makes them shake uncontrollably
C) It makes them immortal (live forever)
D) It makes them very sleepy

2. What did Hagrid do on the train to London?

A) Sleep
B) Sing
C) Read
D) Knit

From HARRY POTTER AND THE CHAMBER OF SECRETS

3. How does Professor Binns often enter his classroom?

A) Through the blackboard
B) Through the door
C) Through the ceiling
D) Through the floor

4. What sort of flying broom does Ron have?

A) A Comet 260
B) A Shooting Star
C) A Nimbus One Thousand
D) A Nimbus Two Thousand

5. How many house points did Gryffindor lose as a result of Harry and Ron's journey in the flying car?

A) 10
B) 25
C) 50
D) None

From HARRY POTTER AND THE PRISONER OF AZKABAN

6. What movement should you make when approaching a Hippogriff?

A) A wave
B) A bow
C) Fall to your knees
D) Shake your head left and right

7. Who does Sirius Black say was the Secret-Keeper for Harry's parents?

A) Lupin
B) Snape
C) Peter Pettigrew
D) Dumbledore

8. Which of the following was not a maker of the Marauder's Map?

A) Padfoot
B) Prongs
C) Wormhead
D) Moony

From HARRY POTTER AND THE GOBLET OF FIRE

9. Who repairs Harry's injured leg with tears?

A) Fawkes
B) Dumbledore
C) Sirius Black
D) Madam Pomfrey

10. Which language do Goblins often speak?

A) Veela
B) Bulgarian
C) Banshee
D) Gobbledygook

HARD QUESTIONS

From HARRY POTTER AND THE SORCERER'S STONE

1. How many house points did Professor Dumbledore award Harry for courage?

A) 30
B) 40
C) 50
D) 60

2. How many Galleons did Harry's wand cost from Ollivanders?

A) 5
B) 6
C) 7
D) 8

3. In what month was Harry's first Quidditch match?

A) September
B) October
C) November
D) December

From HARRY POTTER AND THE CHAMBER OF SECRETS

4. Which of the following items is not in the student store-cupboard?

A) Leeches
B) Knotgrass
C) Bicorn horn
D) Fluxweed

5. What creature is Mrs. Mason very afraid of?

A) Wolves
B) Birds
C) Dogs
D) Snakes

From HARRY POTTER AND THE PRISONER OF AZKABAN

6. What mark did Hermione get in her Muggle Studies exam?

A) 99%
B) 100%
C) 200%
D) 320%

7. What creature did Harry conjure up to repel the Dementors?

A) A unicorn
B) A stag
C) A Boggart
D) A Brownie

From HARRY POTTER AND THE GOBLET OF FIRE

8. How many items are there on Mr. Filch's list of forbidden objects at Hogwarts?

A) 159
B) 342
C) 437
D) 982

9. Where do Bode and Croaker work?

A) The Department of Mysteries
B) The Department of Magical Games and Sports
C) The Department of Muggle History
D) The Department of Science

10. What is the name of the strange mirror Professor Moody uses to check on his enemies?

A) An Enemy-Glass
B) A Foe-Glass
C) A Villain-Glass
D) A Spy-Glass

Bath Bead Directions:

Remove bath beads from the plastic bag and place on a sheet of wax paper or silver foil (beads may need to be reshaped when removed from the bag). Leave beads to dry for 24 hours.

Beads may be stored in an open basket, decorated jar, or decorative fabric pouch.

To use, dissolve 1 – 2 beads in a warm bath to release the relaxing flower scent. The oil and milk will also leave skin soft and smooth.

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To use, dissolve 1 – 2 beads in a warm bath to release the relaxing flower scent. The oil and milk will also leave skin soft and smooth.

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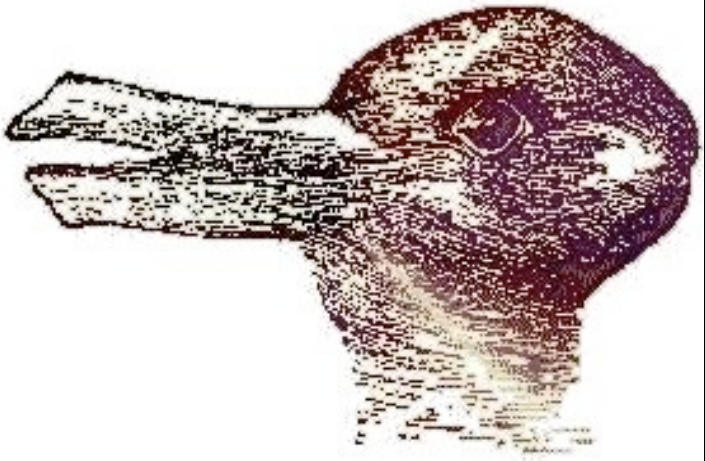
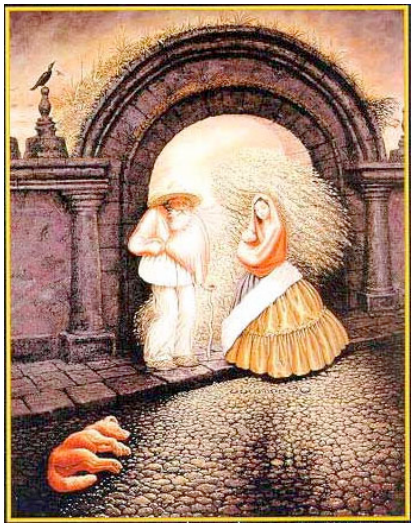
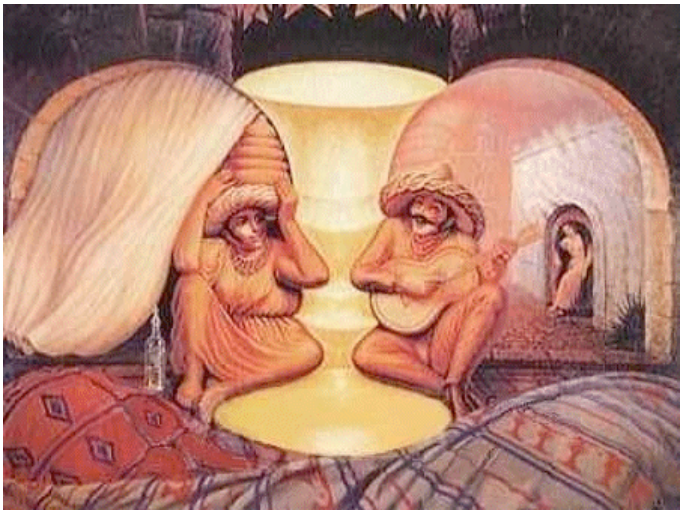
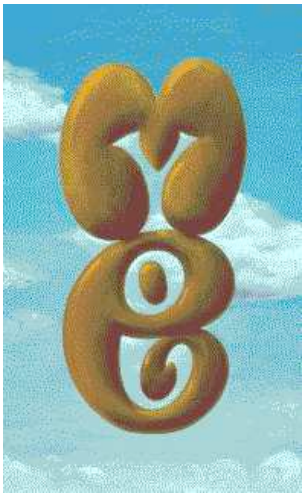
3 	4 

5 	6 
7 	8 

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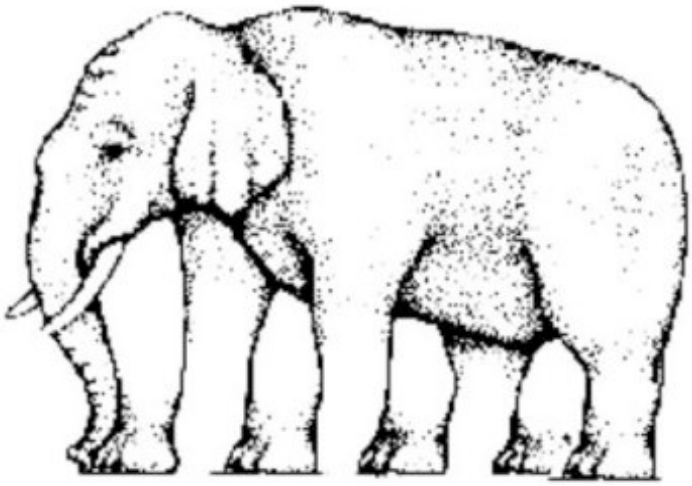

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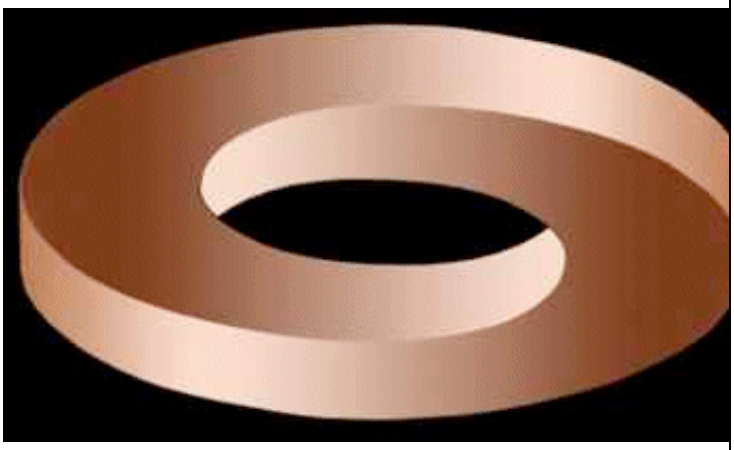

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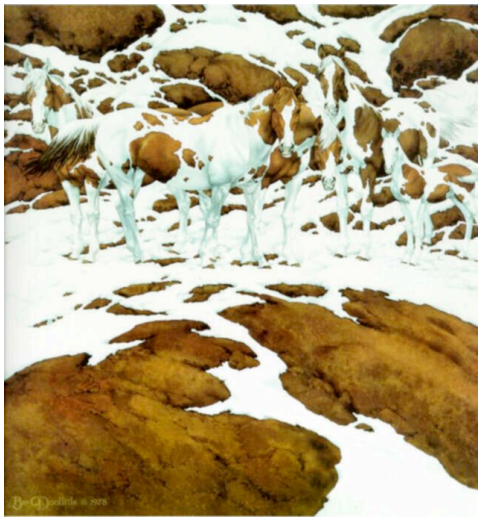

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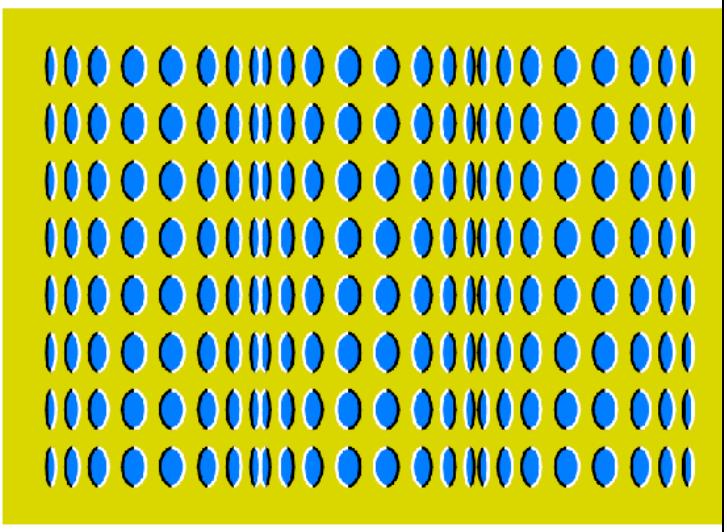

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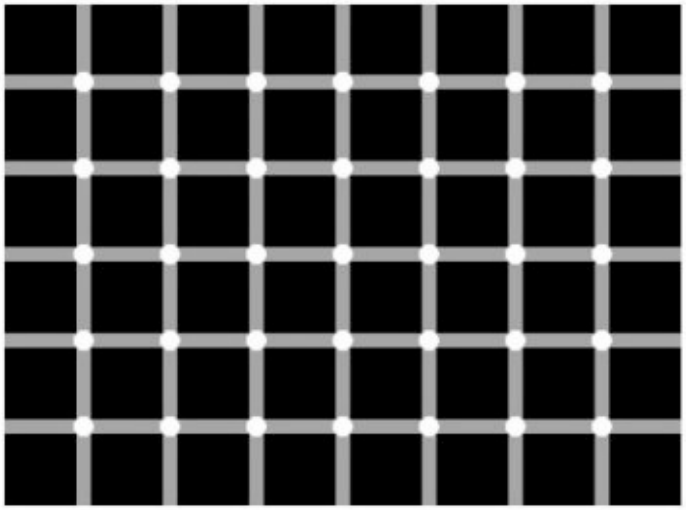
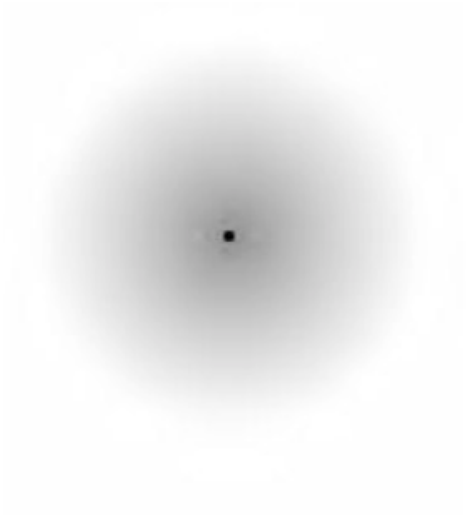
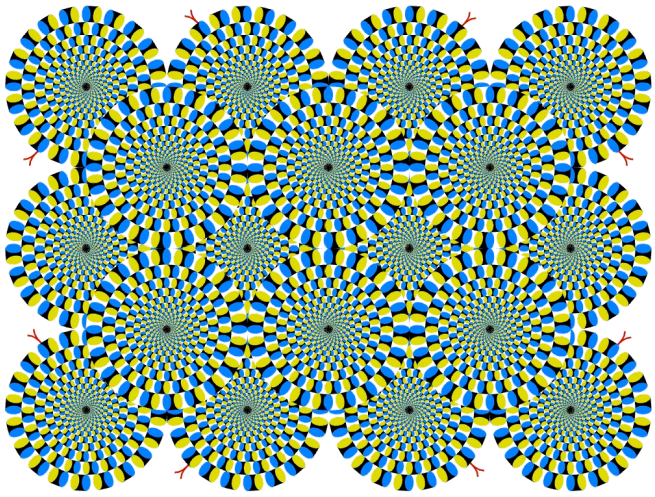
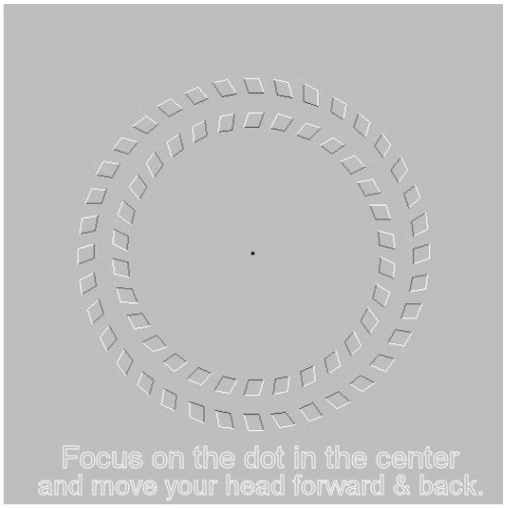
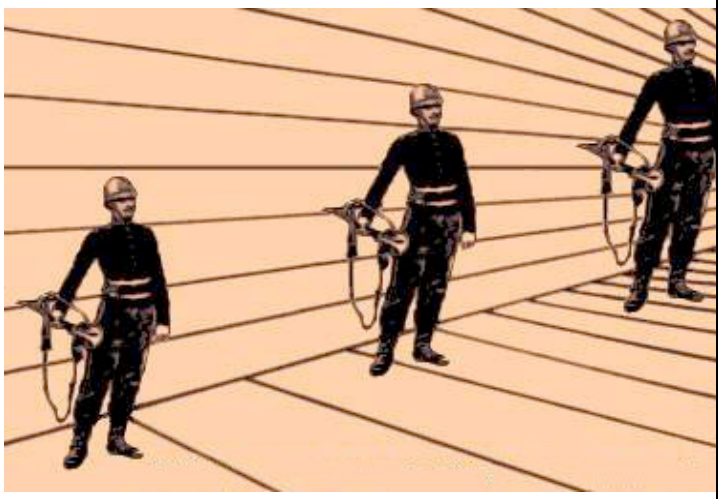


21 	22 
23  	24 

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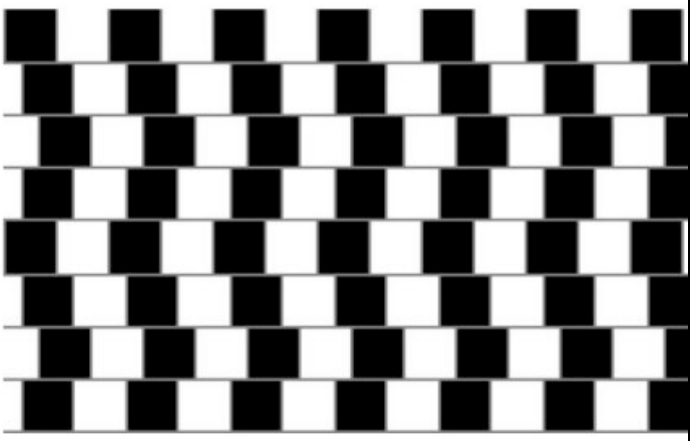

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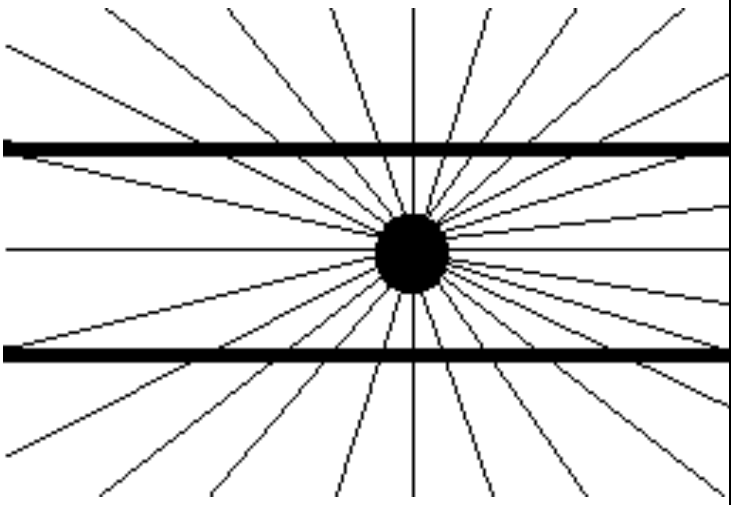

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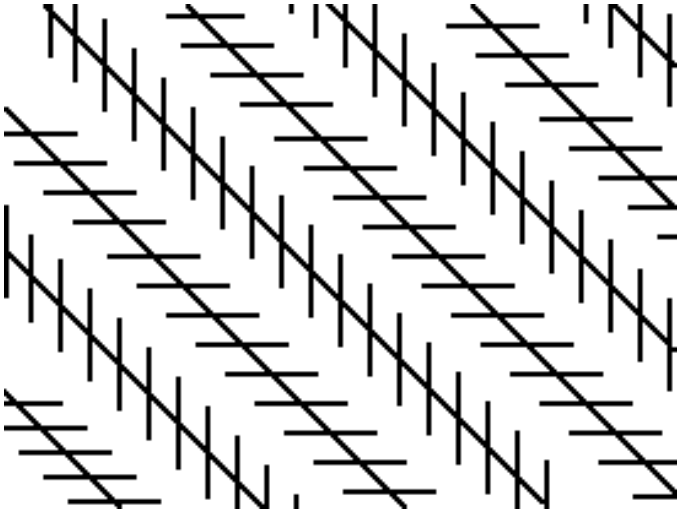

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