STEM Starters

Drops on a Penny
Early Education Edition

KESLER SCIENCE .COM + stevespangler AMAZING SCIENCE EXPERIENCES

Drops on a Penny

Teacher Directions
STEM Starters are activity sheets that pair with Steve Spangler's SICK Science! videos. STEM Starters are leveled to provide differentiated activities for Early Education through 8th grade.

Early Ed *K - 1* *2 - 3* *4 - 5* *6 - 8*

The beaker in the lower left corner of each page represents the grade-level edition of the worksheet.

Each STEM Starter should take approximately 10-15 minutes to complete. No materials are required beyond whatever method you choose to play the video for the class.

To send these pages home with students, just print the worksheet; the link to the video is on the page as a QR code.

Meet Steve Spangler
Steve Spangler is a best-selling author, educator, and Emmy award-winning science communicator who finds the most creative ways to make science fun.

Engage/Activate Prior Knowledge
Before showing the video, ask students to think about a time they filled a glass with water. Ask students, "How high could you fill the glass before the water spilled over? Can you fill a glass above the rim?"

Link to Video
stevespangler.com/ss-video/455961449

Video Description
Fill a micropipette with water and add drops one-by-one to the top of a penny. Count how many drops the penny can hold before the water overflows. Compare to other coins.

Standards
These activities support the following standards; additional materials will be required to cover the standard completely.

- **TEKS V.A.8:** Child verbally identifies, without counting, the number of objects from 1 to 5.
- **TEKS V.A.9:** Child recognizes one-digit numerals, 0–9.
- **TEKS V.C.1:** Child names common shapes.

Background Information
Did you know that water is sticky? Water molecules are attracted to each other by cohesion. The cohesion between the molecules creates a "skin." This surface tension can be strong enough to hold water molecules together above the rim of a glass or hold small insects on its surface.

Adhesion is the property of water sticking to surfaces like the coin or a glass. Cohesion and adhesion forces work together to build a water bubble on top of the coin. Once the bubble gets too big, the force of gravity is too great and overcomes the cohesion and adhesion forces. The bubble spills over the edge of the coin.

Drops on a Penny

Name: _____

Look

Color the shape that looks like the penny in the video.

Think

Color the number that matches the number of drops on the penny.

1

2

3

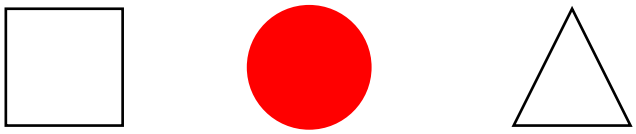
Drops on a Penny

Find the 5 pennies in the picture below. Circle each penny you find. Color the picture.

Drops on a Penny

Answer Key

Look
Color the shape that looks like the penny in the video.



Think
Color the number that matches the number of drops on the penny.

Extension Activity

STEM Starters

Drops on a Penny

Kindergarten – Grade 1 Edition

KESLER SCIENCE .COM + stevespangler AMAZING SCIENCE EXPERIENCES

Drops on a Penny

Teacher Directions
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The symbol in the lower right corner of each page represents differentiation.

Dependent: This version is suggested for on-level learners.

Modified: This version provides more support for learners with modifications.

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Meet Steve Spangler
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Engage/Activate Prior Knowledge
Before showing the video, ask students to think about a time they filled a glass with water. Ask students, "How high could you fill the glass before the water spilled over? Can you fill a glass above the rim?"

Link to Video
stevespangler.com/ss-video/455961449

Video Description
Fill a micropipette with water and add drops one-by-one to the top of a penny. Count how many drops the penny can hold before the water overflows. Compare to other coins.

Standards
These activities support the following standards; additional materials will be required to cover the standard completely.

- **NGSS K-2-ETS1-2:** Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

- **TEKS K.2 D:** Record and organize data and observations using pictures, numbers, and words.
- **TEKS K.5 A:** Observe and record properties of objects, including bigger or smaller, heavier or lighter, shape, color, and texture.
- **TEKS 1.2 D:** Record and organize data using pictures, numbers, and words.
- **TEKS 1.5 A:** Classify objects by observable properties such as larger and smaller, heavier and lighter, shape, color, and texture.

Background Information
Did you know that water is sticky? Water molecules are attracted to each other by cohesion. The cohesion between the molecules creates a "skin." This surface tension can be strong enough to hold water molecules together above the rim of a glass or hold small insects on its surface.

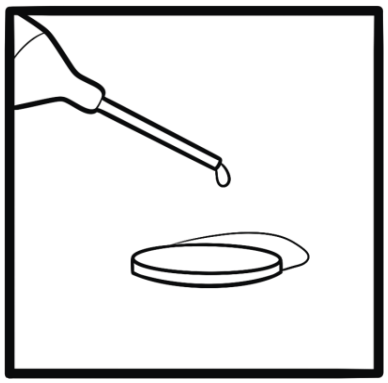
Adhesion is the property of water sticking to surfaces like the coin or a glass. Cohesion and adhesion forces work together to build a water bubble on top of the coin. Once the bubble gets too big, the force of gravity is too great and overcomes the cohesion and adhesion forces. The bubble spills over the edge of the coin.

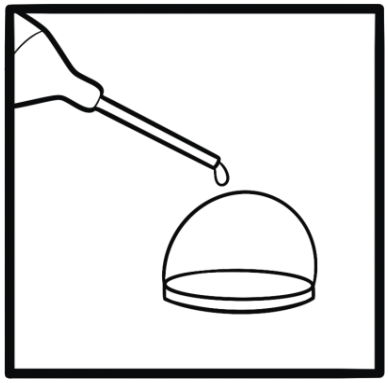
Drops on a Penny

Name: _____

I can look!

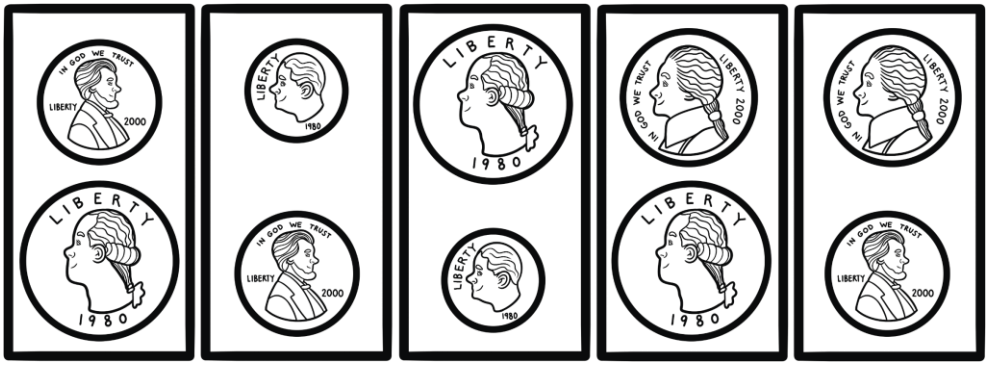
Circle what you saw happen **first** in the video.





I can think!

Circle the bigger coin in each picture.



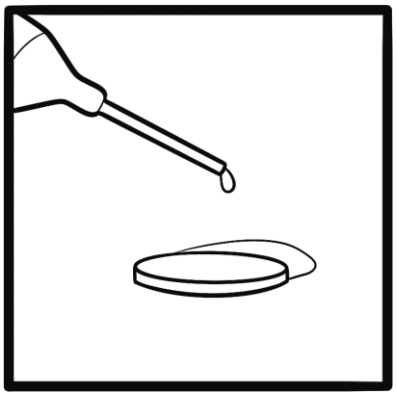
Color the coin that you think would hold the most water drops.

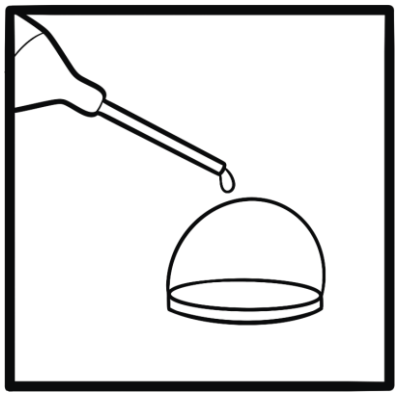
Drops on a Penny

Name: _____

I can look!

Circle what you saw happen **first** in the video.





I can think!

Circle the bigger coin in each picture.

Color the coin that you think would hold the most water drops.

Drops on a Penny

How many pennies can you find in the picture below? Look closely. Circle each penny you find. Then, color the picture.

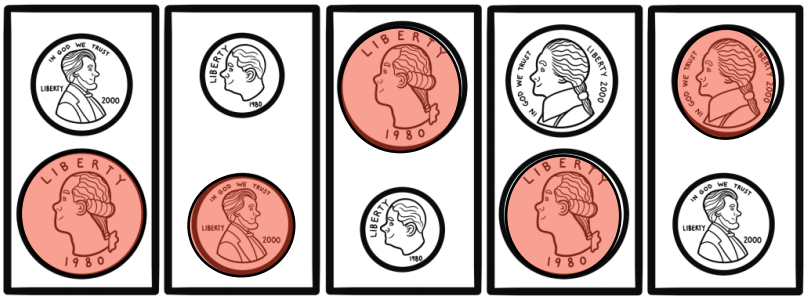
How many pennies you were able to find? _____

Drops on a Penny

Answer Key

I can look!
Circle what you saw happen **first** in the video.

I can think!
Circle the bigger coin in each picture.



\

Color the coin that you think would hold the most water drops.

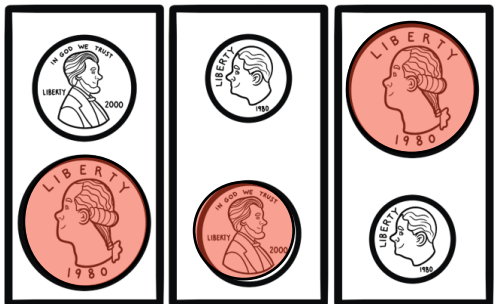
Extension Activity

Drops on a Penny

Modified Answer Key

I can look!
Circle what you saw happen **first** in the video.

I can think!
Circle the bigger coin in each picture.



Color the coin that you think would hold the most water drops.

Extension Activity

STEM Starters

Drops on a Penny
Grades 2-3 Edition

KESLER SCIENCE .COM + stevespangler AMAZING SCIENCE EXPERIENCES

Drops on a Penny

Teacher Directions

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Pre-K *K - 1* *2 - 3* *4 - 5* *6 - 8*

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Dependent: This version is suggested for on-level learners.

Modified: This version provides more support for learners with modifications.

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To send these pages home with students, just print the worksheet; the link to the video is on the page as a QR code.

Meet Steve Spangler

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Engage/Activate Prior Knowledge

Before showing the video, ask students to think about a time they filled a glass with water. Ask students, "How high could you fill the glass before the water spilled over? Can you fill a glass above the rim?"

Link to Video

stevespangler.com/ss-video/455961449

Video Description

Fill a micropipette with water and add drops one-by-one to the top of a penny. Count how many drops the penny can hold before the water overflows. Compare to other coins.

Standards

These activities support the following standards; additional materials will be required to cover the standard completely.

- **NGSS K-2-ETS1-2:** Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- **NGSS 2-PS1-2:** Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

- **TEKS 2.2 E:** Communicate observations and justify explanations using student generated data from simple descriptive investigations.
- **TEKS 2.3 B:** Make predictions based on observable patterns.
- **TEKS 2.5 A:** Classify matter by physical properties, including relative temperature, texture, flexibility, and whether a material is a solid or liquid.
- **TEKS 3.2 D:** Analyze and interpret pattern in data to construct reasonable explanations based on evidence from investigations.
- **TEKS 3.2 F:** Communicate valid conclusions supported by data in writing, by drawing pictures, and through verbal discussion.
- **TEKS 3.5 A:** Measure, test, and record physical properties of matter, including temperature, mass, magnetism, and the ability to sink or float.

Background Information

Did you know that water is sticky? Water molecules are attracted to each other by cohesion. The cohesion between the molecules creates a "skin." This surface tension can be strong enough to hold water molecules together above the rim of a glass or hold small insects on its surface.

Adhesion is the property of water sticking to surfaces like the coin or a glass. Cohesion and adhesion forces work together to build a water bubble on top of the coin. Once the bubble gets too big, the force of gravity is too great and overcomes the cohesion and adhesion forces. The bubble spills over the edge of the coin.

Drops on a Penny

Name: _____ Date: _____

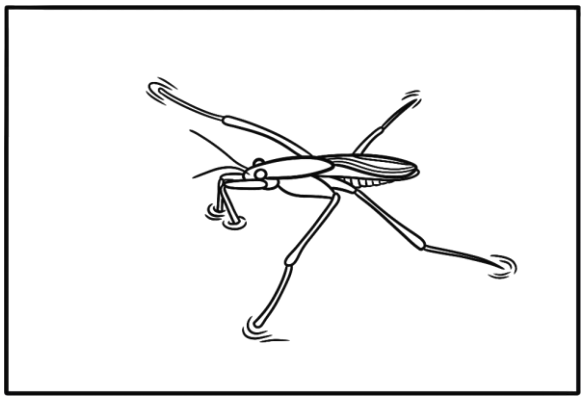
I can watch like a scientist!

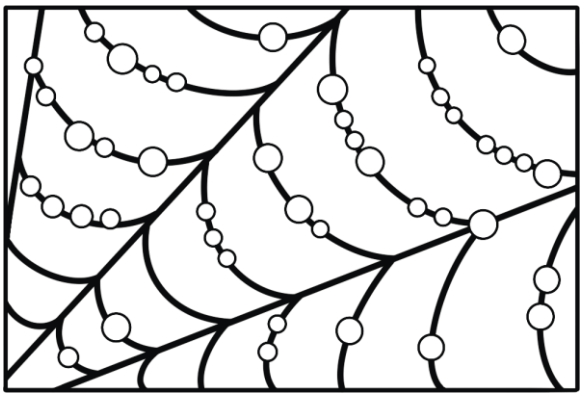
Circle the words that describe the penny. Put a box around the words that describe the water.

metal	solid	liquid	clear
hard	soft	flexible	plastic

I can study like a scientist!

Did you know that water is sticky? The shape of water makes it stick to itself. This "stickiness" is how bugs can walk on water! Water is also able to stick to other objects like grass, spider webs, and glass. When too much water is added, the drop becomes too heavy, and it falls.





I can think like a scientist!

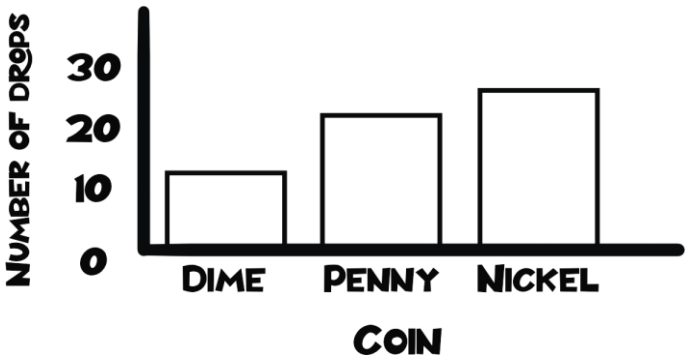
Draw three pictures of a penny at different points in the demonstration.

- ✓ Picture 1: Penny at the beginning with only a few drops of water on it.
- ✓ Picture 2: Penny holding the maximum number of drops on it.
- ✓ Picture 3: Penny when too many drops of water have been added.

Few Drops	Maximum Drops	Too Many Drops

I can create like an engineer!

You and your friends want to find out how many drops of water can fit on other coins like a dime and a nickel. Look at the graph below and answer the following questions:



1. Which coin held the most drops of water? _____

2. Why do you think that coin held the most water drops? _____

3. Make a prediction! Based on the graph, predict how many drops of water you think would fit on a quarter: _____

Drops on a Penny

Name: _____ Date: _____

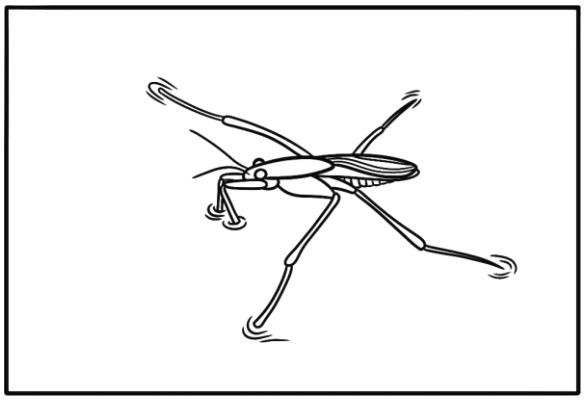
I can watch like a scientist!

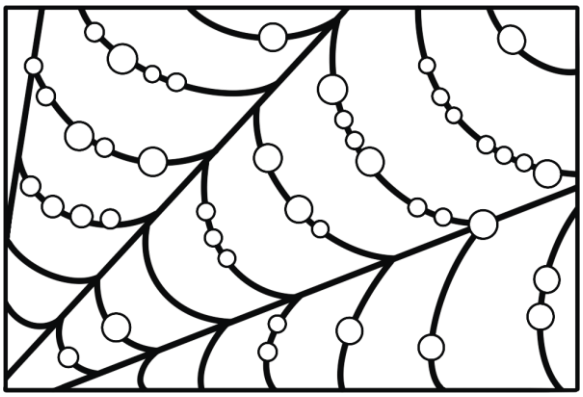
Circle three words that describe the **penny**.

metal	solid	liquid	clear
hard	soft	flexible	plastic

I can study like a scientist!

Did you know that water is sticky? The shape of water makes it stick to itself. This "stickiness" is how bugs can walk on water! Water is also able to stick to other objects like grass, spider webs, and glass. When too much water is added, the drop becomes too heavy, and it falls.

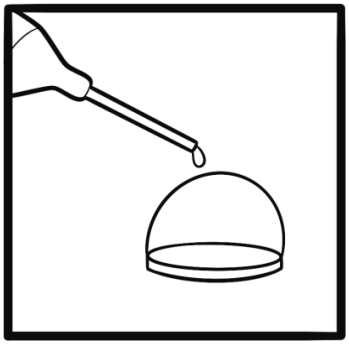




I can think like a scientist!

Draw two pictures of a penny at different points in the demonstration.

- ✓ Picture 1: Penny at the beginning with only a few drops of water on it.
- ✓ Picture 3: Penny when too many drops of water have been added.

Few Drops	Maximum Drops	Too Many Drops
		

I can create like an engineer!

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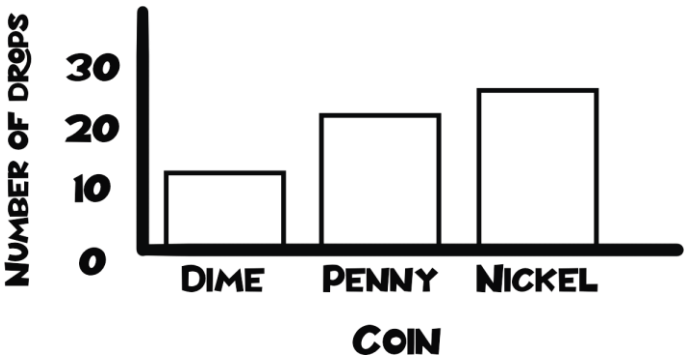


1. Which coin held the **most** drops of water? _____

2. Which coin held the **least** drops of water? _____

3. Make a prediction! Based on the graph, predict how many drops of water you think would fit on a quarter: _____

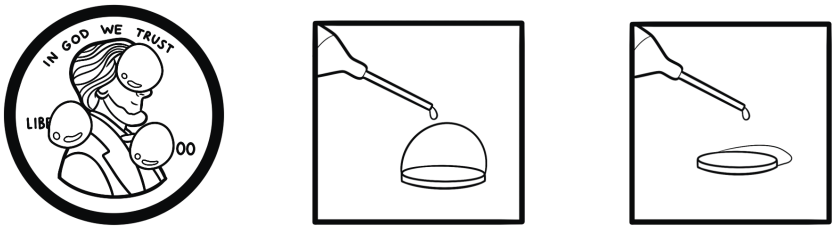
Drops on a Penny

Answer Key

I can watch like a scientist!
Circle the words that describe the penny. Put a box around the words that describe the water.

metal	solid	liquid	clear
hard	soft	flexible	plastic

I can think like a scientist!
From left to right, students should draw a penny with (1) a few drops, (2) the maximum number of drops, and (3) too many drops. Examples below.



I can create like an engineer!

1. Which coin held the most drops of water? The nickel held the most drops.
2. Why do you think that coin held the most water drops? The nickel is the biggest.
3. Make a prediction! Based on the graph, predict how many drops of water you think would fit on a quarter. Answers may vary but should be greater than 25 drops.

Drops on a Penny

Modified Answer Key

I can watch like a scientist!
Circle the words that describe the penny.

metal	solid	liquid	clear
hard	soft	flexible	plastic

I can think like a scientist!
From left to right, students should draw a penny with (1) a few drops and (3) too many drops. Examples below.



I can create like an engineer!

1. Which coin held the **most** drops of water? The nickel held the most drops.
2. Which coin held the **least** drops of water? The dime held the least drops.
3. Make a prediction! Based on the graph, predict how many drops of water you think would fit on a quarter. Answers may vary but should be greater than 25 drops.

STEM Starters

Drops on a Penny
Grades 4-5 Edition

KESLER SCIENCE .COM + stevespangler AMAZING SCIENCE EXPERIENCES

Drops on a Penny

Teacher Directions

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Modified: This version provides more support for learners with modifications.

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To send these pages home with students, just print the worksheet; the link to the video is on the page as a QR code.

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Engage/Activate Prior Knowledge

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Link to Video

stevespangler.com/ss-video/455961449

Video Description

Fill a micropipette with water and add drops one-by-one to the top of a penny. Count how many drops the penny can hold before the water overflows. Compare to other coins.

Standards

These activities support the following standards; additional materials will be required to cover the standard completely.

- **NGSS 4-LS1-1:** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

- **TEKS 4.2 A:** Plan and implement descriptive investigations, including asking well defined questions, making inferences, and selecting and using appropriate equipment or technology to answer his/her questions.
- **TEKS 4.10 A:** Explore how structures and functions enable organisms to survive in their environment.
- **TEKS 5.2 A:** Describe, plan, and implement simple experimental investigations testing one variable.
- **TEKS 5.2 B:** Ask well-defined questions, formulate testable hypothesis, and select and use appropriate equipment and technology.
- **TEKS 5.2 E:** Demonstrate that repeated investigations may increase the reliability of results.
- **TEKS 5.10 A:** Compare the structures and functions of different species that help them live and survive in a specific environment such as hooves on prairie animals or webbed feet in aquatic animals.

Background Information

Did you know that water is sticky? Water molecules are attracted to each other by cohesion. The cohesion between the molecules creates a "skin." This surface tension can be strong enough to hold water molecules together above the rim of a glass or hold small insects on its surface.

Adhesion is the property of water sticking to surfaces like the coin or a glass. Cohesion and adhesion forces work together to build a water bubble on top of the coin. Once the bubble gets too big, the force of gravity is too great and overcomes the cohesion and adhesion forces. The bubble spills over the edge of the coin.

Drops on a Penny

Name: _____ Date: _____

Observe Like a Scientist

After watching the video, answer the following questions:

1. What materials were used in the video demonstration? _____

   _____

2. What happened as more drops of water were added to the penny? _____

   _____

3. Describe the shape of the water on the penny when it was holding the maximum number of water drops. _____

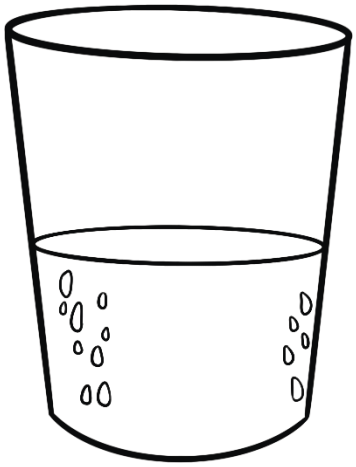
   _____

4. What happened to the water when too many drops were added? _____

   _____

Study Like a Scientist

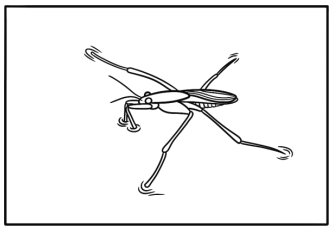
Did you know that water is "sticky"? The shape of water allows water particles to stick together. This "stickiness" pulls water particles close together. Water can also stick to other surfaces like grass and glass.



In the video demonstration, water was held on the coin by a **force** called **surface tension.** This occurs because the water molecules like to stay together, especially on the surface of the coin, causing a layer of liquid to act like an elastic sheet. That is why the drops of water are able to stick together on top of the penny without falling off! When too much water is added to the drop, it gets too heavy and falls off.

This happens in nature, too. There are insects that walk across the surface of the water. They need two things to do it: special legs and the force of surface tension. The insects use the ability to walk on water to survive in their environment.

Reflect Like a Scientist



Water striders are small insects with a thin body and long legs. Their legs contain tiny hairs that repel water. They like to eat small insects like mosquitos and larvae on the surface of water.

1. Why do you think water striders are able to walk on water? _____

   _____

2. How are they adapted to their environment? _____

   _____

Apply Like a Scientist

Your group of friends wants to compare how many drops of other liquids can fit on a penny. Design a simple experiment to do this by answering the following questions:

1. Pick three liquids other than water that you could test: _____

   _____

2. Out of the three liquids you picked, which one do you think would hold the most drops on a penny?

   I think the _____ would hold the most drops on the penny because

   _____.

3. What materials would you need to conduct this investigation? _____

   _____

4. Do you think it would be better to test each liquid one time, three times, or five times? Why?

   I think testing each liquid _____ times is the best because _____

   _____.

5. What data would you collect for each liquid you test?

   For each liquid, I would collect _____.

Drops on a Penny

Name: _____ Date: _____

Observe Like a Scientist

After watching the video, answer the following questions:

1. What materials were used in the video demonstration?

   The materials used were _____.

2. What happened as more drops of water were added to the penny?

   When more drops were added _____.

3. Describe the shape of the water on the penny when it was holding the maximum number of water drops.

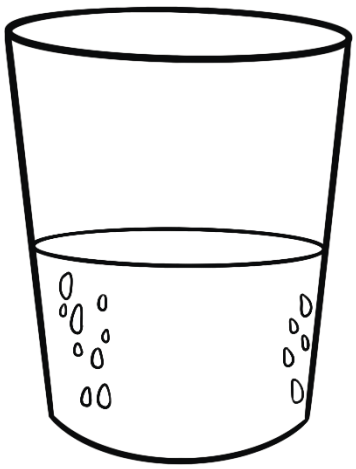
   The water was shaped like a _____.

4. What happened to the water when too many drops were added?

   When too many drops were added _____.

Study Like a Scientist

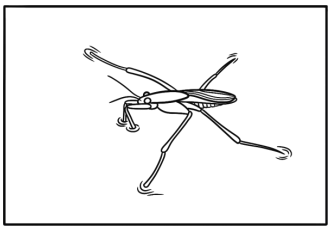
Did you know that water is "sticky"? The shape of water allows water particles to stick together. This "stickiness" pulls water particles close together. Water can also stick to other surfaces like grass and glass.



In the video demonstration, water was held on the coin by a **force** called **surface tension.** This occurs because the water molecules like to stay together, especially on the surface of the coin, causing a layer of liquid to act like an elastic sheet. That is why the drops of water are able to stick together on top of the penny without falling off! When too much water is added to the drop, it gets heavy and falls off.

This happens in nature, too. There are insects that walk across the surface of the water. They need two things to do it: special legs and the force of surface tension. The insects use the ability to walk on water to survive in their environment.

Reflect Like a Scientist



Water striders are small insects with a thin body and long legs. Their legs contain tiny hairs that repel water. They like to eat small insects like mosquitos and larvae on the surface of water.

1. Why do you think water striders are able to walk on water?

   Water striders can walk on water because_____

   _____.

2. How are they adapted to their environment?

   They adapted by_____.

Apply Like a Scientist

Your group of friends wants to compare how many drops of other liquids can fit on a penny. Design a simple experiment to do this by answering the following questions:

1. Pick **two** liquids other than water that you could test:

   A) _____ B) _____

2. Out of the **two** liquids you picked, which one do you think would hold the most drops on a penny?

   I think the _____ would hold the most drops on the penny because

   _____.

3. What materials would you need to conduct this investigation? _____

   _____

4. Do you think it would be better to test each liquid one time, three times, or five times? Why?

   I think testing each liquid _____ times is the best because _____

   _____.

5. What data would you collect for each liquid you test? Choose one.

   For each liquid, I would collect (number of drops on the coin / height of the water bubble).

Drops on a Penny

Answer Key

Observe Like a Scientist

1. What materials were used in this demonstration? water, coin, micropipette
2. What happened as more drops of water were added to the penny? The water bubble got bigger as more drops were added.
3. Describe the shape of the water on the penny when it was holding the maximum amount of water drops. The water was in a mound, dome, or another similar answer.
4. What happened to the water when too many drops were added? The water spilled off the coin. The water overflowed.

Reflect Like a Scientist

1. Why do you think water striders are able to walk on water? The water strider isn't heavy enough to break the surface tension of the water.
2. How are they adapted to their environment? Water striders have hair on their legs that repel water.

Apply Like a Scientist/Create Like an Engineer

1. Pick three liquids other than water that you could test. Answer will vary but may include milk, juice, oil, syrup, soda, or other liquids. Ensure that students list three.
2. Out of the three liquids you picked, which one do you think would hold the most drops on a penny?
   "I think the oil (for example) would hold the most drops on the penny because oil is thicker than water.
3. What materials would you need to conduct this investigation? chosen liquids, water, coin, micropipette
4. Do you think it would be better to test each liquid one time, three times, or five times? Why?
   I think testing each liquid five (for example) times is the best because the data will be more reliable.
5. What data would you collect for each liquid you test?
   For each liquid, I would collect number of drops on the coin.

Drops on a Penny

Modified Answer Key

Observe Like a Scientist

1. What materials were used in this demonstration?
   The materials used were water, coin, and micropipette.
2. What happened as more drops of water were added to the penny?
   When more drops were added the water bubble got bigger.
3. Describe the shape of the water on the penny when it was holding the maximum amount of water drops.
   The water was shaped like a mound, a dome, or other similar shape.
4. What happened to the water when too many drops were added?
   When too many drops were added the water spilled off the coin or the water overflowed.

Reflect Like a Scientist

1. Why do you think water striders are able to walk on water?
   The water strider can walk on water because it isn't heavy enough to break the surface tension of the water.
2. How are they adapted to their environment?
   They adapted by having hair on their legs that repel water.

Apply Like a Scientist/Create Like an Engineer

1. Pick two liquids other than water that you could test. Answer will vary but may include milk, juice, oil, syrup, soda, or other liquids. Ensure that students list three.
2. Out of the two liquids you picked, which one do you think would hold the most drops on a penny?
   "I think the oil (for example) would hold the most drops on the penny because oil is thicker than water.
3. What materials would you need to conduct this investigation? chosen liquids, water, coin, micropipette
4. Do you think it would be better to test each liquid one time, three times, or five times? Why?
   I think testing each liquid five (for example) times is the best because the data will be more reliable.
5. What data would you collect for each liquid you test?
   For each liquid, I would collect number of drops on the coin.

STEM Starters

Drops on a Penny
Grades 6-8 Edition

KESLER SCIENCE .COM + stevespangler AMAZING SCIENCE EXPERIENCES

Drops on a Penny

Teacher Directions

STEM Starters are activity sheets that pair with Steve Spangler's SICK Science! videos. STEM Starters are leveled to provide differentiated activities for Early Education through 8th grade.

The beaker in the lower left corner of each page represents the grade-level edition of the worksheet.

The symbol in the lower right corner of each page represents differentiation.

Dependent: This version is suggested for on-level learners.

Modified: This version provides more support for learners with modifications.

Each STEM Starter should take approximately 10-15 minutes to complete. No materials are required beyond whatever method you choose to play the video for the class.

To send these pages home with students, just print the worksheet; the link to the video is on the page as a QR code.

Meet Steve Spangler

Steve Spangler is a best-selling author, educator, and Emmy award-winning science communicator who finds creative ways to make science fun.

Engage/Activate Prior Knowledge

Before showing the video, ask students to think about a time they filled a glass with water. How high could you get it before it spilled over? Is it possible to fill a glass above the rim?

Link to Video

stevespangler.com/ss-video/455961449

Video Description

Fill a micropipette with water and add drops one-by-one to the top of a penny. Count how many drops the penny can hold before the water overflows. Compare to other coins.

Standards
These activities support the following standards; additional materials will be required to cover the standard completely.

- **NGSS MS PS1-1:** Develop models to describe the atomic composition of simple molecules and extended structures.

- **TEKS 6.2 A, 7.2 A, and 8.2 A:** Plan and implement comparative and descriptive investigations by making observations, asking well defined questions, and using appropriate equipment and technology.
- **TEKS 6.5 A:** Know that an element is a pure substance represented by a chemical symbol and that a compound is a pure substance represented by a chemical formula.

Background Information
Did you know that water is sticky? Water molecules are attracted to each other by cohesion. The cohesion between the molecules creates a "skin." This surface tension can be strong enough to hold water molecules together above the rim of a glass or hold small insects on its surface.

Adhesion is the property of water sticking to surfaces like a coin or a glass. Cohesion and adhesion forces work together to build a water bubble on top of the coin. Once the bubble gets too big, the force of gravity is too great and overcomes the cohesion and adhesion forces. The bubble spills over the edge of the coin.

Drops on a Penny

Name/Date:

_____

Observe

1. Describe how water was added to the penny. _____

   _____

2. Describe how the drops of water were added to the penny. How did the appearance of the liquid change from the beginning to the end? _____

   _____

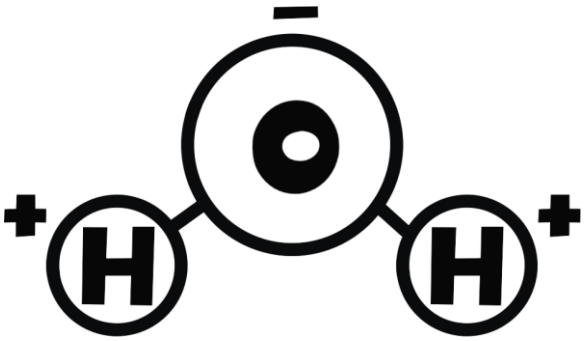
3. Estimate how high the micropipette was held above the penny. _____

Study

Did you know that water is "sticky"? The structure of water molecules allows them to slightly stick together.

A water molecule is composed of two hydrogen atoms and one oxygen atom. The hydrogen atoms have a slight positive charge while the oxygen atom has a slight negative charge. This gives the water molecule an overall neutral charge. However, the hydrogen atoms of one water molecule are attracted to the negative charge of the oxygen atom of another molecule. This attraction is called **cohesion**.

Cohesion between water molecules pulls them closer together creating **surface tension**. Surface tension is a property of liquids, like water. Surface tension allows the liquid to resist outside forces, like gravity or a bug landing on top of it. This is why bugs are able to land on water without sinking!



Reflect

1. The chemical formula for water is H_2O. Using a periodic table, identify the elements that make up water. _____
2. Use the study information from the previous section to explain how the penny was able to hold so many drops of water on it.

_____

_____

_____

Apply

Three of your classmates watched the video with you. When it was done, they discussed some ways they could turn this demonstration into an experiment.

- ❑ Alex wonders if different coins could hold different amounts of water.
- ❑ Autumn thinks the temperature of the water makes a difference in how many drops can fit on a penny.
- ❑ Brandon wants to find out if you could fit more drops on the penny if you used different liquids.

1. Which friend would you partner with? _____
2. What materials would you need to conduct your experiment? _____

   _____
3. Do you think it would be better to test each variable one time, three times, or five times? Why? _____

   _____
4. What steps would you follow to test each variable? _____

   _____

   _____

   _____

   _____
5. What data would you collect? _____

   _____

   _____

Drops on a Penny

Name/Date:

_____

Observe

1. Describe how water was added to the penny.

   Water was added to the penny by _____

2. Describe how the drops of water were added to the penny. How did the appearance of the liquid change from the beginning to the end?

   The water changed from looking like _____

   to looking like _____

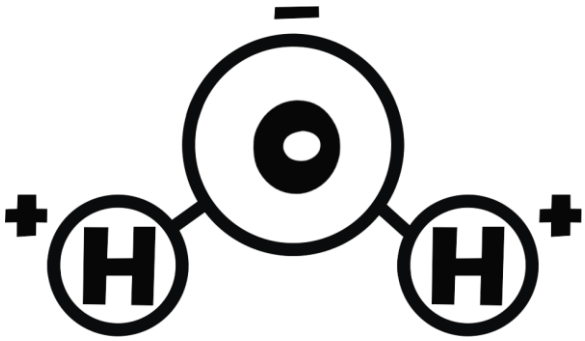
3. Estimate how high the micropipette was held above the penny. _____

Study

Did you know that water is "sticky"? The structure of water molecules allows them to slightly stick together.

A water molecule is composed of two hydrogen atoms and one oxygen atom. The hydrogen atoms have a slight positive charge while the oxygen atom has a slight negative charge. This gives the water molecule an overall neutral charge. However, the hydrogen atoms of one water molecule are attracted to the negative charge of the oxygen atom of another molecule. This attraction is called **cohesion**.

Cohesion between water molecules pulls them closer together creating **surface tension**. Surface tension is a property of liquids like water. Surface tension allows the liquid to resist outside forces like gravity or a bug landing on top of it. This is why bugs are able to land on water without sinking!



Reflect

1. The chemical formula for water is H_2O. Using a periodic table, identify the elements that make up water.

   There are two atoms of _____ and one atom of _____.

2. Use the study information from the previous section to explain how the penny was able to hold so many drops of water on it.

   _____

   _____

Apply

Two of your classmates watched the video with you. When it was done, they discussed some ways they could turn this demonstration into an experiment.

- ❑ Alex wonders if different coins could hold different amounts of water.
- ❑ Brandon wants to find out if you could fit more drops on the penny if you used different liquids.

1. Which friend would you partner with? _____
2. What materials would you need to conduct your experiment? _____

   _____

3. Do you think it would be better to test each variable one time, three times, or five times? Why? _____

   _____

4. What steps would you follow to test each variable? _____

   _____

   _____

   _____

   _____

5. What data would you collect? _____

   _____

   _____

Drops on a Penny

Answer Key

Observe

1. Describe how water was added to the penny. A micropipette dropped water onto the penny.
2. Describe how the drops of water were added to the penny. How did the appearance of the liquid change from the beginning to the end? Drops were added one by one. The drops started out separately. Then, they joined together into one big water bubble.
3. About how high was the micropipette held above the penny? Answers will vary. Estimates should be around 2 cm.

Reflect

1. The chemical formula for water is H_2O. Using a periodic table, identify the elements that make up water. hydrogen and oxygen
2. Use the study information from the previous section to explain how the penny was able to hold so many drops of water on it. Water sticks together by cohesion and surface tension.

Create/Apply

1. Which friend would you partner with? Answers will vary.
2. What materials would you need to conduct your experiment? Items may include water, coin, thermometer, different liquids (oil, juice, milk, syrup).
3. Do you think it would be better to test each variable one time, three times, or five times? Why? Each variable should be tested 3-5 times because the more times you do an experiment the more reliable the data will be.
4. What steps would you follow to test each variable? Answers will vary but should be similar to the demonstration.
5. What data would you collect? Number of drops on the coin

Drops on a Penny

Modified Answer Key

Observe

1. Describe how water was added to the penny.
   Water was added to the penny by a micropipette.
2. Describe how the drops of water were added to the penny. How did the appearance of the liquid change from the beginning to the end?
   The water changed from looking like single drops.
   to looking like one big water bubble.
3. About how high was the micropipette held above the penny? Answers will vary. Estimates should be around 2 cm.

Reflect

1. The chemical formula for water is H_2O. Using a periodic table, identify the elements that make up water.
   There are two atoms hydrogen and one atom of oxygen.
2. Use the study information from the previous section to explain how the penny was able to hold so many drops of water on it. Water sticks together by cohesion and surface tension.

Create/Apply

1. Which friend would you partner with? Answers will vary.
2. What materials would you need to conduct your experiment? Items may include water, coin, thermometer, different liquids (oil, juice, milk, syrup).
3. Do you think it would be better to test each variable one time, three times, or five times? Why? Each variable should be tested 3-5 times because the more times you do an experiment the more reliable the data will be.
4. What steps would you follow to test each variable? Answers will vary but should be similar to the demonstration.
5. What data would you collect? Number of drops on the coin