# Candy Vending Machine





Scan this QR code to view a step-by-step assembly video and tips on how to build and use the Candy Vending Machine.





#### KIT CONTENTS

# Good to know!

Do you have any questions or are you missing any parts? Our tech support team will be happy to help you! support@thamesandkosmos.com or 1-800-587-2872

√ No. Description

O P23 Pegboard ramp, long

O P24 Coin wheel, front

O P25 Coin wheel, back

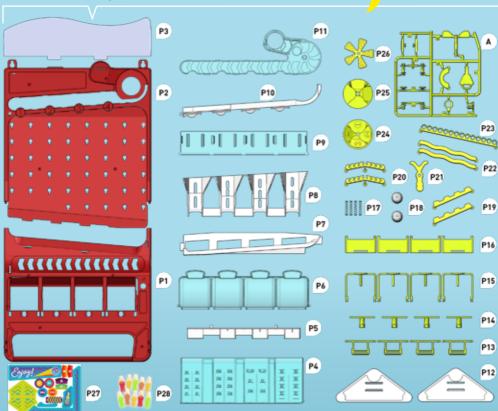
Qty.

1

1

1

## What's inside your experiment kit:



# Checklist:

|      | <b>①</b> | YOU WILL ALSO NEED:<br>Coins (quarters, dimes, nickels<br>pennies), optional: screws or<br>nails to hang on the wall |             |     |  |  |  |
|------|----------|--|-------------|-----|--|--|--|
| Qty. | J        | No.  | Description | Qty |  |  |  |
|      | $\sim$   |  |             |     |  |  |  |

| J No.                                   | Description        | Qty. | J | No. | Description               | Qty. | O P2 | 6 Pegboard spinner   | 1  |
|---|--------------------|------|---|-----|---------------------------|------|------|----------------------|----|
| O P1                                    | Base bottom        | 1    | 0 | P12 | Foot                      | 2    | O P2 | 7 Sticker sheet      | 1  |
| O P2                                    | Base top           | 1    | 0 | P13 | Prize door coin slot      | 4    | O P2 | 8 Soda bottle gummy  | 10 |
| O P3                                    | Cardboard header   | 1    | 0 | P14 | Prize door button stopper | r 4  | O A1 | Pegboard half circle | 2  |
| O P4                                    | Coin holder        | 1    | 0 | P15 | Prize door button         | 4    | O A2 | Bell peg             | 2  |
| O P5                                    | Slider base        | 1    | 0 | P16 | Prize door                | 4    | O A3 | Peg                  | 2  |
| O P6                                    | Prize window       | 1    | 0 | P17 | Spring                    | 4    | O A4 | Spinner peg          | 2  |
| O P7                                    | Coin sorter        | 1    | 0 | P18 | Bell                      | 2    | O A5 | Coin wheel crank     | 1  |
| O P8                                    | Coin funnel, front | 1    | 0 | P19 | Pegboard ramp, medium     | 2    | O A6 | Pegboard coin catch  | 1  |
| O P9                                    | Coin funnel, back  | 1    | 0 | P20 | Pegboard randomizer       | 2    | O A7 | Key                  | 1  |
| O P10                                   | Coin ramp          | 1    | 0 | P21 | Pegboard pendulum arr     | n 1  | O A8 | Lock, front          | 1  |
| O P11                                   | Coin ramp cover    | 1    | 0 | P22 | Pegboard bumpy ramp       | 2    | O A9 | Lock, back           | 1  |
| *************************************** |                    |      |   |     |                           |      |      |                      |    |



#### TABLE OF CONTENTS

| Kit Contents Inside front cove                  | r |
|---|---|
| Table of Contents, Safety Information, and Tips | 1 |
| Introduction                                    |   |
| ASSEMBLY STARTS ON PAGE 3                       |   |

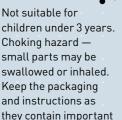
ADDITIONAL INFORMATION CAN BE FOUND ON PAGE 16 AND THE INSIDE BACK COVER.



| ASSEMBLY STARTS ON PAGE 3              |   |
|--|---|
| Candy Vending Machine Assembly         | 3 |
| Candy Vending Machine Experiments 1    | 3 |
| Math with Money1                       | 6 |
| Cool Vending Machines Inside back cove | r |

### **WARNING**

information.



Refer to the packaging for the nutritional information and the ingredients list for the gummy candies.

## Dear parents and adults,

Children as young as eight years of age can enjoy experimenting with the built Candy Vending Machine, but most children under ten will need some help building it. Regardless of their age, please support your child with advice and a helping hand, especially during tricky assembly steps. Before beginning, read the instructions together and discuss the safety instructions.

To prevent damage to the work surface on which your child is building, provide them with a mat or other surface protection.

When cutting the plastic parts out of the frames with the diagonal cutter or scissors. special care must be taken, not just because of the sharp edges on the tools, but also because the plastic parts can yield sharp edges or burrs. These can be removed with the help of the diagonal cutter or a nail file. Supervise your child when they are using the sharp tools until you trust that they can handle the tools independently.

We hope you and your child have a lot of fun building and playing with the Candy Vending Machine!

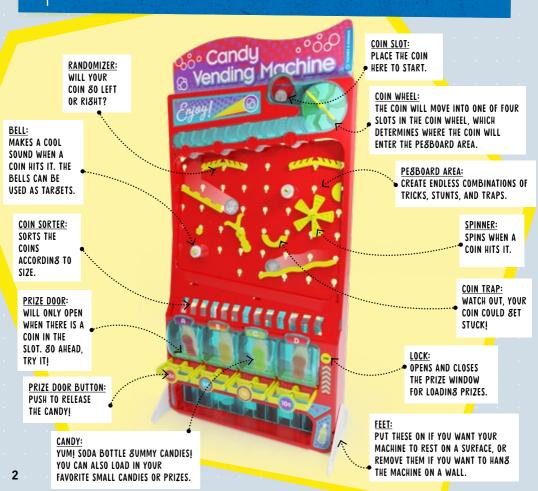
# IMPORTANT TIPS

- You must carefully cut the plastic parts out of their frames with diagonal cutting pliers (diagonal cutters) or scissors.
- Remove the parts from the frames only when they are needed.
- Remove excess material (burrs) from the parts before assembling them. Normal scissors do not cut as precisely as diagonal cutters, so if you only have those, you may need to file some of the rough edges down with a nail file or sandpaper.
- Assemble everything in the order shown. Don't jump ahead!

# **Candy Vending Machine**

You have probably seen **vending machines** that sell all sorts of things, from soda and snacks to electronics. Most vending machines exist in public places, and dispense goods without needing a store clerk to sell them. The money that enters the vending machine remains there until a vending machine technician comes to collect the money.

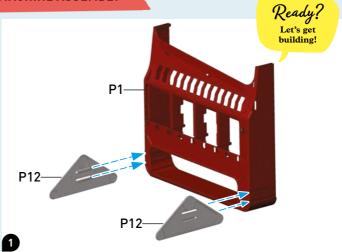
With this kit, you can build a **mechanical** vending machine that dispenses candy or other small prizes. Your machine requires no electricity or electronics — just simple machines and the power of your hand. You are both the customer and the technician! Your coins are automatically sorted and saved in the bank at the back of the machine. The best part? Change up the pegboard to create endless combinations of stunts and tricks. And you can learn cool engineering and physics concepts along the way.

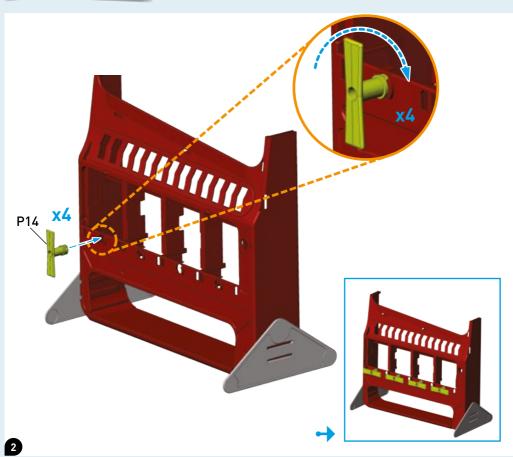


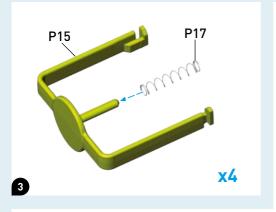
# **ASSEMBLY VIDEO!**

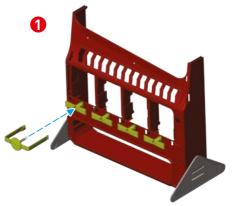
Scan this QR code to view a step-by-step assembly video and tips on how to use the Candy Vending Machine.

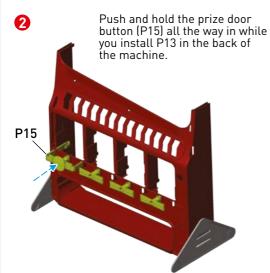






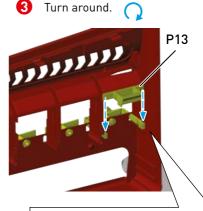






Repeat 3 more times.



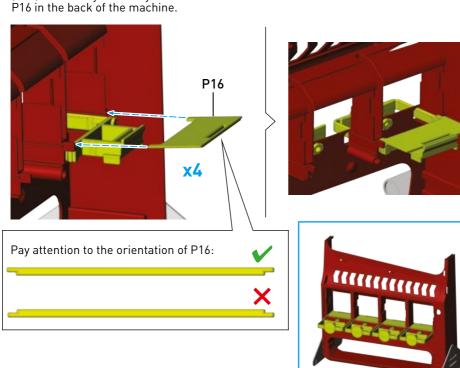


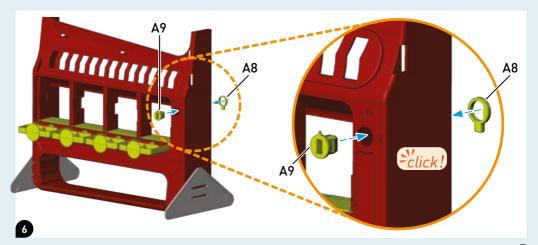


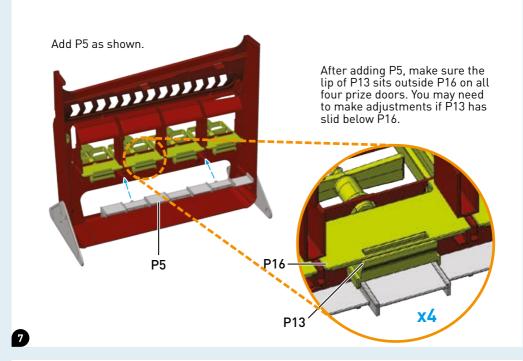


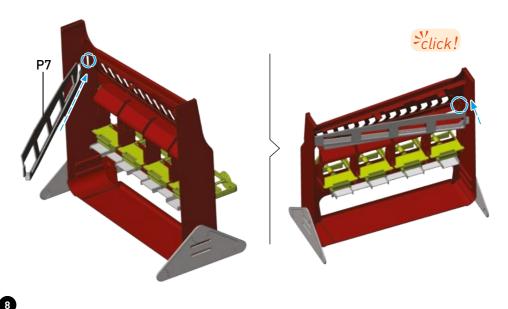
Push and hold the prize door button (P15) all the way in while you install P16 in the back of the machine.

5



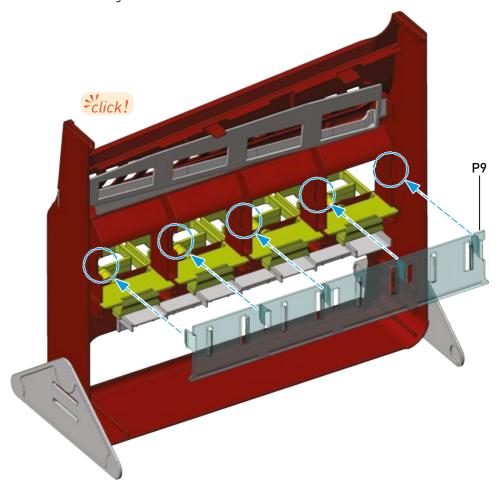


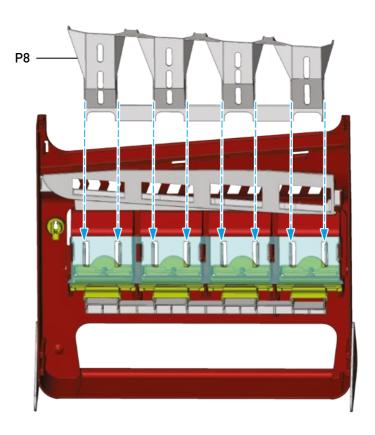




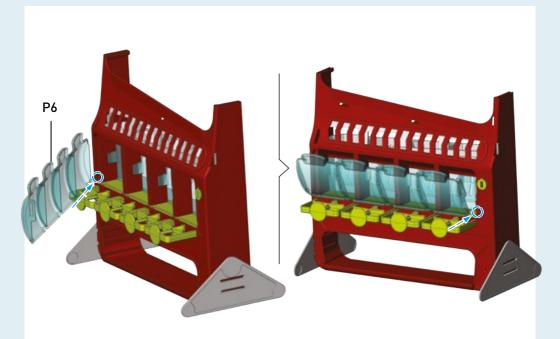


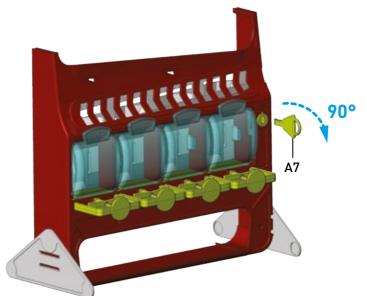
Make sure that P9 is securely clipped into place in P1 (there are five clips). Also make sure that the edges of P9 are flush with P1.





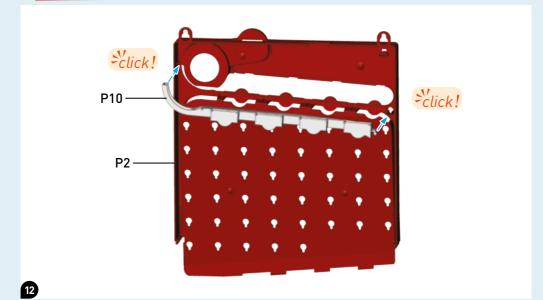


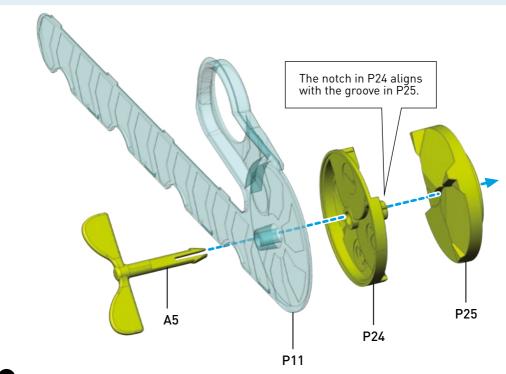




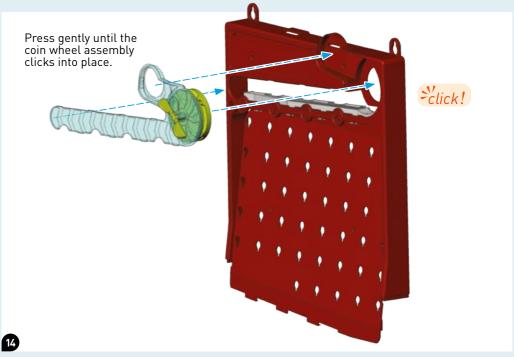
Turn the key 90° clockwise to lock.

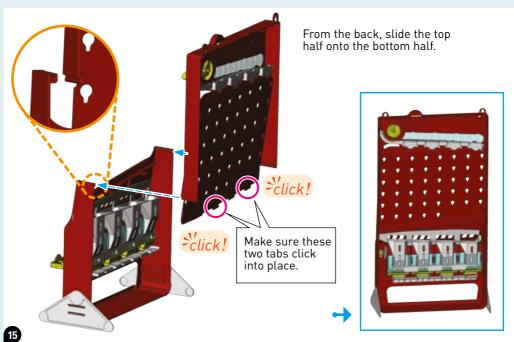
If you lose the key, you can use a flathead screwdriver.

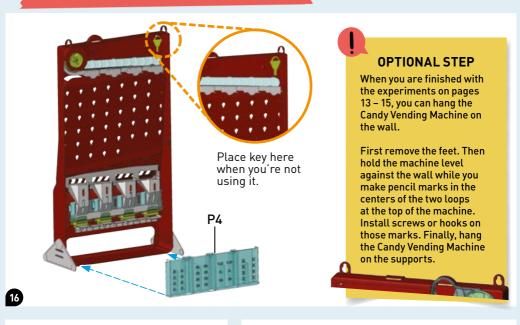




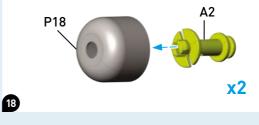


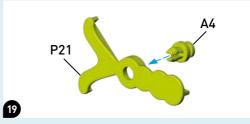


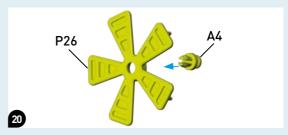














#### **FXPFRIMENT 1**

1. Place a quarter in the coin slot at the top of the machine and turn the crank clockwise. Which prize door does the quarter fall behind? Place the 25 ¢ sticker on that prize door button



25¢

- 2. Repeat for a dime (10 ¢), a nickel (5 ¢). and a penny (1¢).
- 3. Add the rest of the stickers to the machine. Refer to the box.



How does the coin sorter work? Look closely at the back of the machine, at part P7. What do you notice about the holes?

WHAT'S HAPPENING

The holes get progressively bigger. Take a nickel (5 ¢) for example. As the nickel rolls down P7, it is too big to fall through the first and second holes, but when it gets to the third hole, it falls right through.

So why is a dime smaller than a nickel and penny, even though it's worth more money?

When the new United States government established coins in the 1790s, the basic unit

was the silver dollar, which was actually made of silver. The halfdollar, the quarter, and the dime were also made of silver. The dime had to be very small because it contained only one tenth of the amount of silver in a

silver dollar. The penny and the nickel were introduced later. The U.S. Treasury decided to make these new coins out of cheaper metals: copper for the penny, and nickel for the nickel, so they could be larger and wouldn't get lost in people's pockets.

#### **EXPERIMENT 2**

- 1. Turn the coin wheel crank until the number 1 is lined up with the coin slot at the top of the machine.
- 2. Place a coin in the coin slot, then rotate the coin wheel crank clockwise. Where does the coin come out?
- 3. Repeat steps 1 and 2 with different coins. What do you notice?
- 4. Repeat steps 1 and 2, first lining up a different number on the coin crank.



At the top of the machine, you can use the numbers on the coin wheel to determine which slot the coin will drop out of. How does it work? Look closely at the back of the machine. Part P10 has four tracks for the coin to travel in. The track is determined by where the coin is placed in the coin wheel. To understand this mechanism, slowly rotate the coin wheel crank as you watch the back of the machine.

#### **EXPERIMENT 3**

- Use the key to unlock the prize window, then fill each prize area with a gummy soda bottle candy or other prize. Then close and lock the prize window.
- 2. Before placing a coin in the machine, press one of the prize door buttons.
  Does the prize come out?
- 3. Now put a coin in the machine. When the coin reaches the bottom, press the prize door button where the coin landed. What happened?







# WHAT'S HAPPENING!

No coin, no candy! To understand the prize door mechanism, watch the back of the machine as you repeat steps 2 and 3 in slow motion. You might need to repeat several times to figure it out.



#### **EXPERIMENT 4**

- 1. Set up the pegboard as shown to the right.
- 2. Feed a coin into the #3 slot. Does it hit the bell? Now try feeding a coin into the #2 and #1 slots.
  What do you notice?

#### **EXPERIMENT 5**

 Now experiment with feeding coins with different masses (quarter, dime, nickel, penny) into the same slot. What do you notice?



# WHAT'S HAPPENING!

Experiments 4 and 5 demonstrate the properties of projectile motion. Coins that start at the top of the ramp build up speed as they roll down the ramp. By the time they get to the bottom of the ramp, coins that drop out of slot #1 are going faster than coins that drop out of slot #3. This horizontal speed remains constant, so the coins that drop out of slots #1 and #2 have enough speed to carry them to the left to hit the bell.

In the 16th century in Italy, Galileo Galilei performed an experiment: he dropped two spheres of different

masses from the top of the Leaning Tower of Pisa. Both spheres hit the ground at the same time, which demonstrated that all objects fall to Earth with the same acceleration. That is the explanation for what you see in experiment 5.





# **EXPERT SETUP #1**



## **EXPERT SETUP #2**



# **CHALLENGE #1:**

Use the pegboard pieces to create the slowest track possible. Use a stopwatch and

compete with your friends to see who can maximize the time it takes for a coin to reach the prize door coin slot.

#### **CHALLENGE #2:**

Design a track where the coin hits both bells on the way down. Can you make a track where this works for all coins, no matter which slot they drop from?



## **CHALLENGE #3:**

Create an impossible track! Frustrate your friends and family by setting up a track that does not allow coins to reach the prize slots, no matter where they start from.

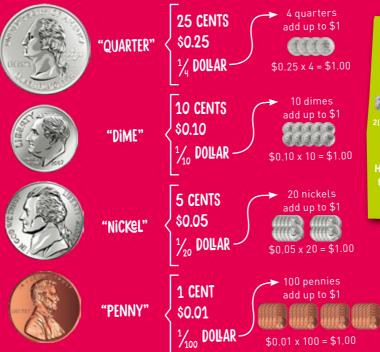
# Math with Money

Working with money is a great way to learn about many different math operations. Coins represent fractions of dollars. For example, a quarter, which is worth 25 cents, gets its name from being one quarter (1/4) of a dollar. That means four quarters add up to one dollar. Because a dollar is equal to 100 cents, the fractions represented by coins translate nicely to percentages. A nickel, which is worth five cents, is 5% of a dollar. You can practice your addition and subtraction skills by making change, like a cashier does at a store. As you stack up change in the coin holder at the back of the Candy Vending Machine, use your skills to figure out how much money you have.



# MANY WAYS TO MAKE A DOILAR

There are many ways to make a dollar, and learning them will teach you about fractions, percentages, addition, subtraction, multiplication, and division.



# OTHER **OMBINATIONS?**

81.00

How many other ways to make a dollar can



# ? CHECK IT OUT

THE WORLD'S
Coolest
Vending
Machines?

# CRABS!

A vending machine in Shanghai, China keeps crabs cooled to a chilly 5° Celsius, the temperature at which they hibernate, so the crabs stay alive until they are sold.



# PiZZA!

Got three minutes and a few extra bucks? In Europe, you can buy hot, fresh pizza out of a vending machine. For the best vending machine pizza, head to Italy, where the machine kneads fresh dough right before your eyes.





# ART!

Local artists in
Massachusetts can
sell their creations in
this awesome art
vending machine, conveniently
located right outside an art many

located right outside an art museum.
Prices range from \$2 to \$50. Artists
apply to sell their work in the machine.
One rule: the art must be small!



Sell your art!

Instead of candy, you can put your own small artworks into the Candy Vending Machine and sell them to your friends and family.

1st Edition ©2022 Thames & Kosmos, LLC, Providence, RI, USA Thames & Kosmos® is a registered trademark of Thames & Kosmos, LLC.

This work, including all its parts, is copyright protected. Any use outside the specific limits of the copyright law is prohibited and punishable by law without the consent of the publisher. This applies specifically to reproductions, translations, microfilming, and storage and processing in electronic systems and networks. We do not guarantee that all material in this work is free from other copyright or other protection.

Invented by David Yakos, Streamline Design LLC Text and editing: Hannah Mintz and Ted McGuire Technical product development: Streamline Design LLC, Longshore, Hong Kong Manual illustrations: Streamline Design LLC Manual photos: Jamie Duplass (all adhesive strips); Art Vending North Adams (inside back cover); all other images Adobe Stock. Package design: Dan Freitas

The publisher has made every effort to locate the holders of image rights for all of the photos used. If in any individual cases any holders of image rights have not been acknowledged, they are asked to provide evidence to the publisher of their image rights so that they may be paid an image fee in line with the industry standard.

Distributed in North America by Thames & Kosmos, LLC. Providence, RI 02903 Phone: 800-587-2872; Web: www.thamesandkosmos.com

We reserve the right to make technical changes.

Printed in China / Imprimé en Chine

Do you have any questions? Our technical support team will be glad to help you!