



Engineering at Home:
Bye Bye Bug
Activity Book

Try engineering as a family!

Kenji and Emi have a problem. It's bedtime and they just found a small bug crawling in their room. Kenji is afraid of bugs and cannot fall asleep. Thankfully, they know how to think like engineers. **Engineers are people who figure out how to make things that solve problems.** Try this activity as a family and you'll be thinking like engineers, too!

Bye Bye Bug challenges you to design a way to catch a crawling bug and release it safely outside. What will you design? Here's what you will need to get started.

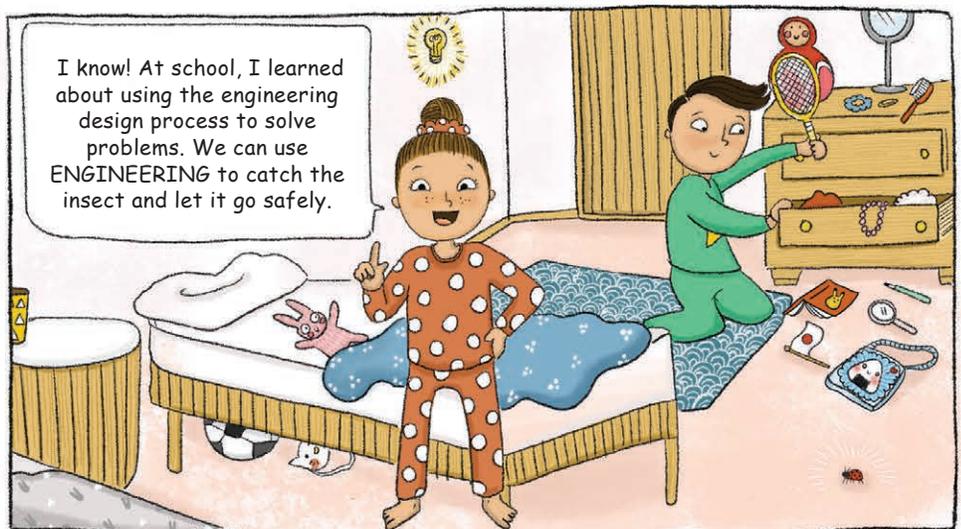
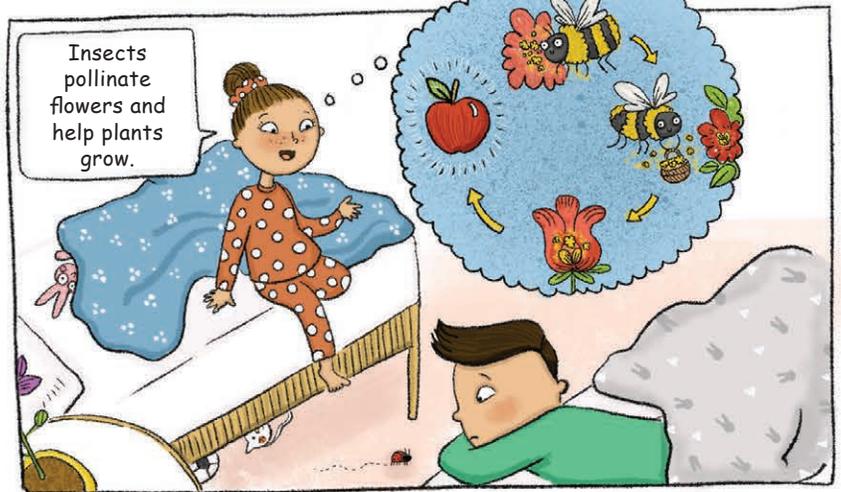
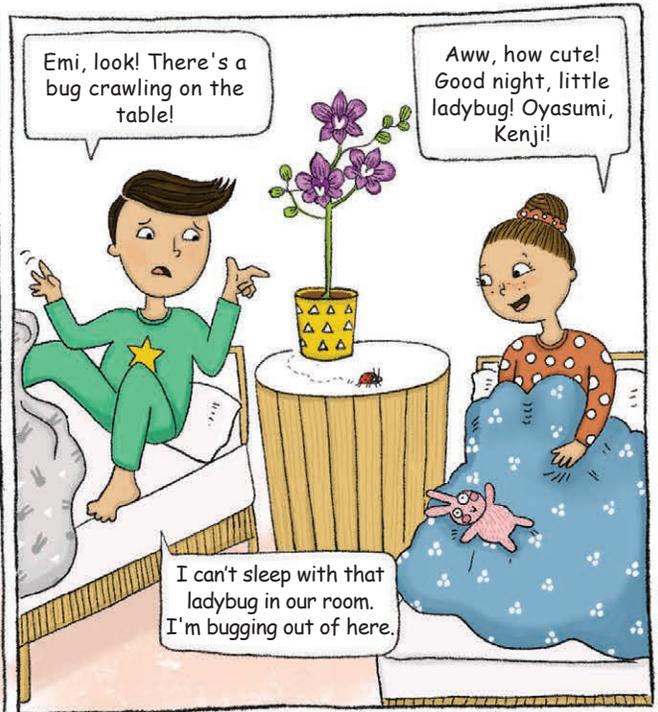
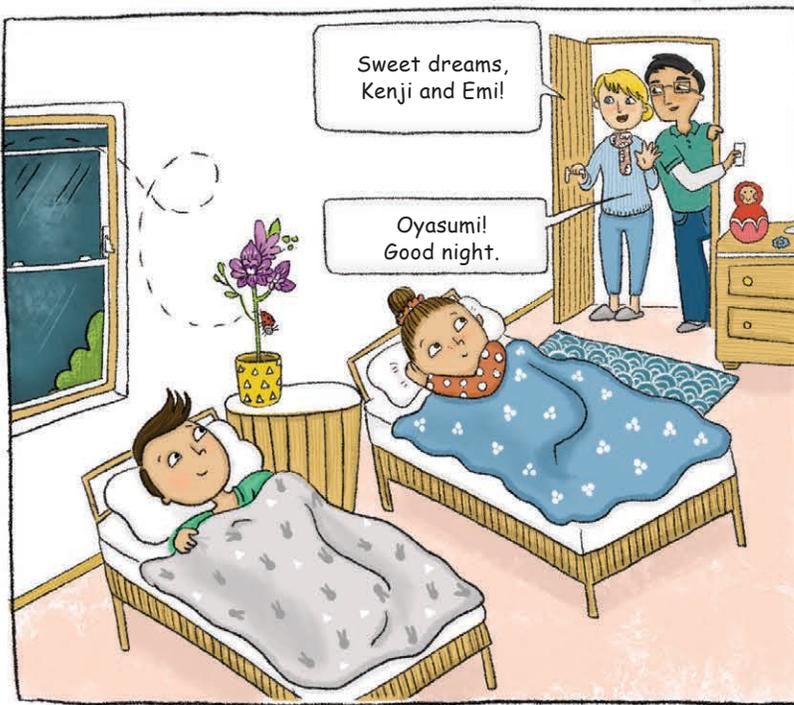
- **Materials** – You'll need to gather some materials that your family can use to create your design. Inexpensive, non-breakable items such as recyclables work well. The more materials you gather, the more creative you can be!
- **The Bug** – You'll need to find something to "catch" so you can test your design without an actual bug. Consider items that are small and lightweight and that won't break if they get dropped. Notice how the size and shape of the model bug affect your design requirements.
- **Testing Station** – In the story, Kenji and Emi want to catch a bug crawling on the floor while they are sitting on their beds. You might want to start with something easier. First, try designing a way to catch a bug while you are sitting on the floor next to it. Then increase the distance between you and the bug, such as by sitting on top of a bed, to make the challenge harder!



Engineers use a variety of skills when they design solutions to problems. This activity supports the development of critical thinking, communication, creativity, and persistence among children. Best of all, it's a fun way to connect as a family!

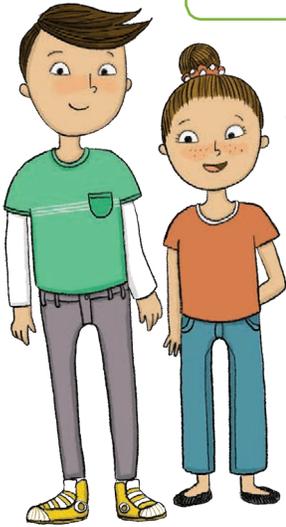
Children as young as four can participate, though they may need a bit more support. Older kids can use their imaginations to create more complicated design solutions. You can read this activity book with your child, or, if they're ready, let them read it to you!

For more engineering resources, visit families.eie.org.



Turn the page to help Kenji and Emi catch the bug!

Engineers are people who figure out how to make things that solve problems.



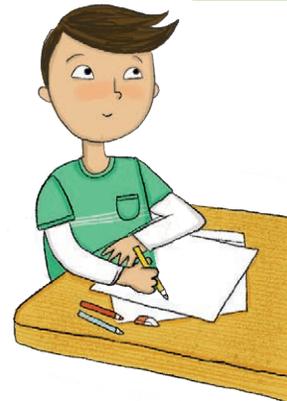
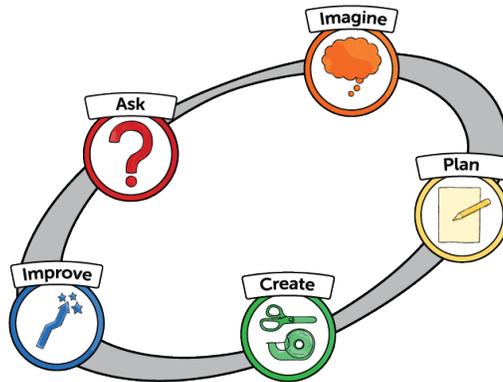
They break the problem down into steps that are easy to follow. First, they **ask** questions about the problem ...



... then, they **imagine** possible solutions.



Next, engineers make a **plan** ...



... then, they **create** and **test** their solution.

Finally, they **improve** it to make it better!



Let's think like engineers! We'll follow these steps to make something to catch and release the bug safely!

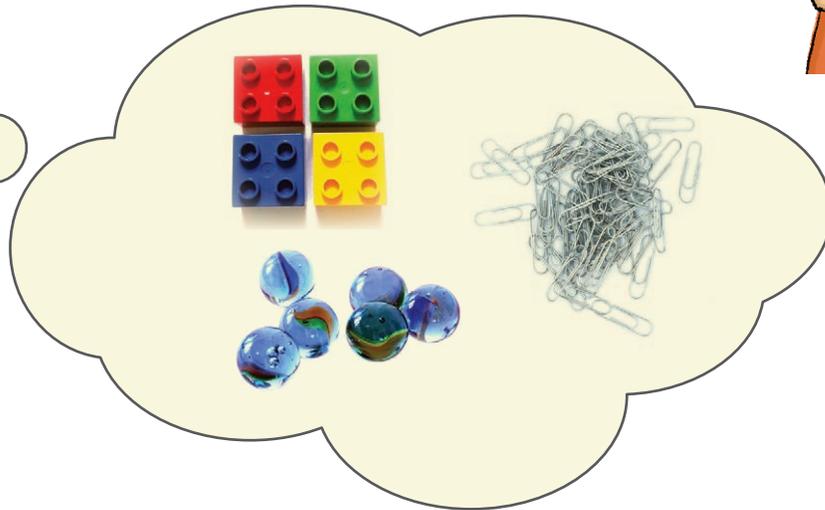
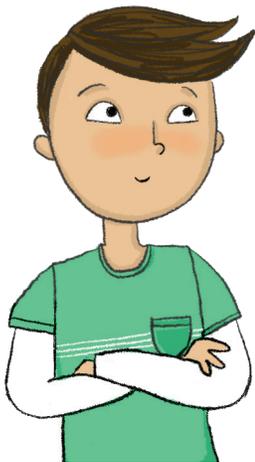
We can work together! Let's start by **asking** questions.





Hmm . . . what do we need to know to get started?

How big is the bug? How fast does it move? How far away is it? We'll need to think about these things as we choose our materials.

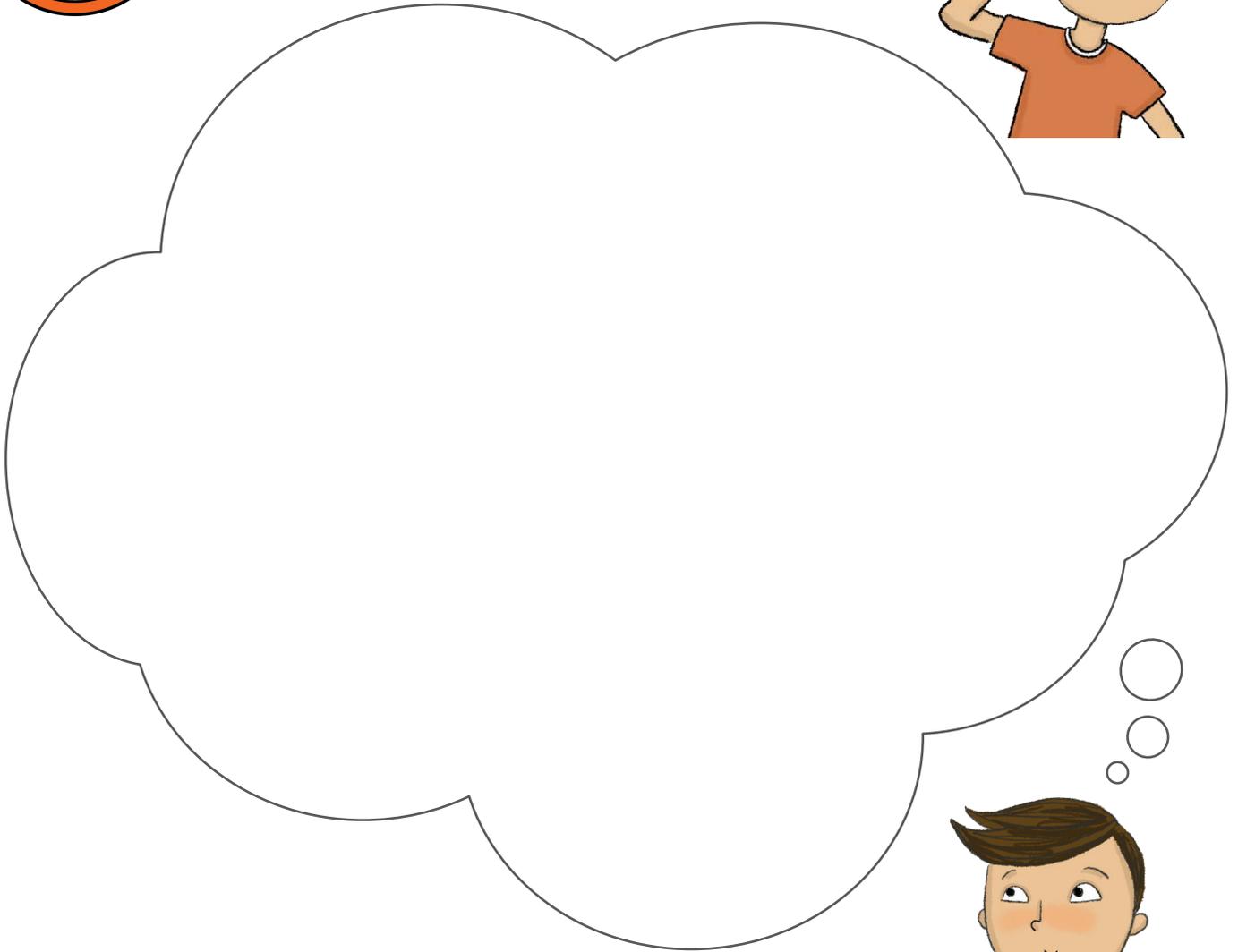


I don't want to test with the real bug until we're sure our design works. What could we use instead of a bug?

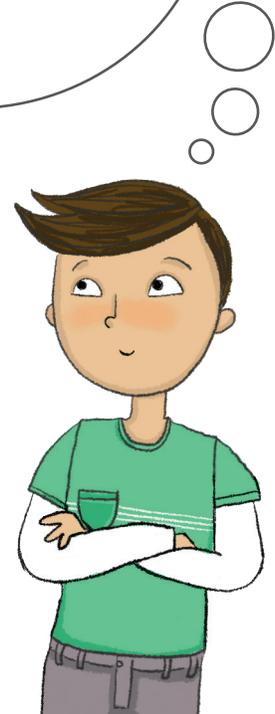
**What will you use as a bug?
Where will you test your design?
Find something to represent the bug and a location to test.**



I know what's next! Engineers **imagine** many creative ideas to solve the problem before they pick one.



Hmm . . . what are some different ways to catch and release a bug without touching or hurting it?



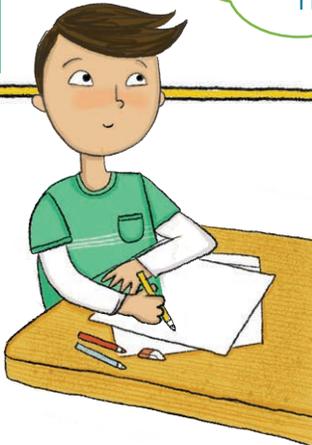
What ideas do you have? Write or draw them above.

**Talk as a family about what you want to try.
Find some materials you can use to build it.**



**What will your design look like?
Draw a picture of your plan!**

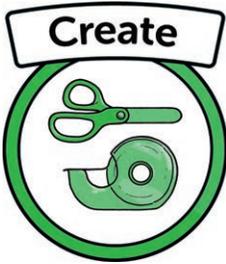
We're almost ready to build, but first we need a **plan**.



Drawing a picture of our design helps us remember how all the parts fit together.

List your materials here.

_____	_____
_____	_____
_____	_____



Create



It's time to **create** our design!



We're excited to test it out! I sure hope it works!

Create and test your design! Did it work?
Talk as a family about how your design worked.
What worked well?
What didn't work well?



Improve



Engineers LOVE to **improve**.
They learn from their mistakes and make their designs even better!



If it doesn't work, that's okay.
We can always **improve**!



How can you make your design even better?

Talk about it together or
draw a picture of your new idea.
Then create and test it again!

It can take many tries to make a
design work. We've got to keep at it!

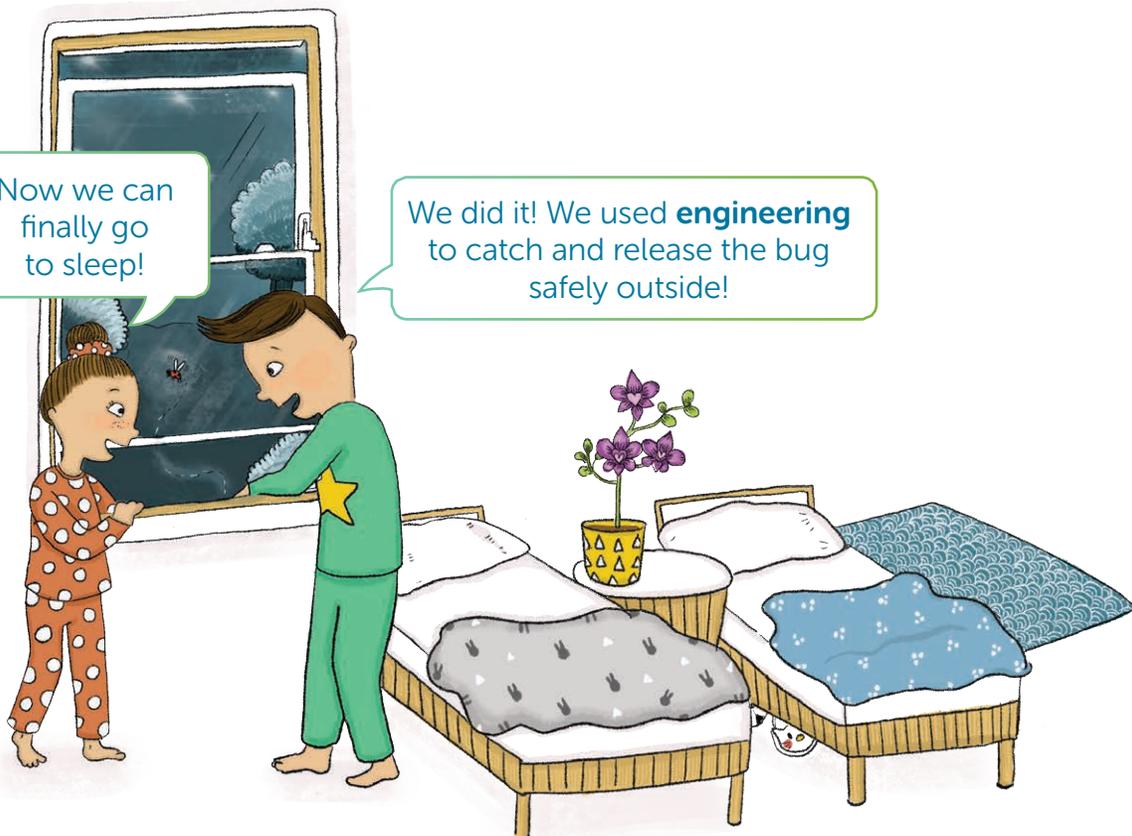


Congratulations!

You followed the steps of
the engineering design process
and solved a problem!

Now we can
finally go
to sleep!

We did it! We used **engineering**
to catch and release the bug
safely outside!



Engineering activities like *Bye Bye Bug* are a great way to develop useful skills like critical thinking, communication, creativity, and persistence. They're also a lot of fun! Here are a few ways that you can extend the activity and continue the fun as a family.

- 1. Do you like to share your ideas?** Tell friends or other family members about your design. You can take photos or videos to show them how it works.
- 2. Do you like to create?** Find more materials and create a whole new design to help Kenji and Emi catch and release the bug.
- 3. Do you like bugs?** Read books or visit websites to learn more about bugs and their important roles in nature.
- 4. Do you want a challenge?** Make the activity harder by thinking about different types of bugs. What if the bug was a different shape or size? What if the bug could fly or jump? What if the bug could sting or bite? How would these factors change your design?
- 5. Do you like solving problems?** Think about a new problem you can solve using engineering.
 - What is the problem?
 - What could you create to solve it?
 - What materials will you need?
 - How will you test your design?



Keep engineering together!

Visit families.eie.org for more free engineering activities from the Museum of Science, Boston.

Families: Share your designs with us!
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Facebook: @eie-mos #eiefamilies