

ONCE UPON A
STEM

Jack **and the** Beanstalk

How could a giant beanstalk grow over night?

Could STEM help the giant guard his treasures from Jack?

The Science **of** Fairytales

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Jack **and the** Beanstalk



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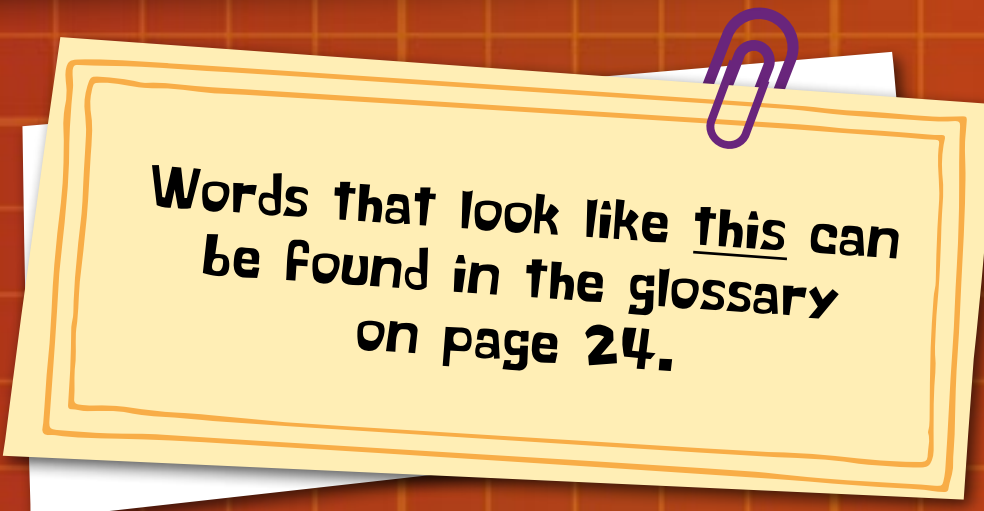
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Words that look like this can
be found in the glossary
on page 24.



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Professor Everafter's lab, around bedtime...

Welcome, I am Professor Everafter and I really like STEM subjects. These are science, technology, engineering and mathematics.

Some parts of these fairy tales would never work in real life! I've been trying to see if I can make them work using STEM! Here are my notes on Jack and the Beanstalk.

Jack and the
Beanstalk

Once upon a STEM...

... a young boy named Jack lived with his mother in a cottage by a deep, dark wood. Jack and his mother were very poor. One day his mother sent Jack to the market to sell their cow.

Why is there always a deep, dark wood?

Daisy the cow is worth ten gold coins.
Go and sell her at the market.



On the way, Jack met a man selling magic beans.

I will give you three beans for that cow!

Deal!

1 bean = 2 gold coins
Grows overnight!

Deep, dark
wood

Market


Wait a minute. I don't think Jack has thought this through. His mother said that the cow was worth ten gold coins. How many beans should Jack get for his cow?

Answer: 5 beans


When Jack got back home and showed his mother the magic beans, she became very angry. She threw the beans out of the window and sent Jack to bed.

Only three beans! That's not enough for dinner!



An illustration of a giant beanstalk scene. A young boy with dark skin and curly hair, wearing a purple jacket and blue pants, stands on a small patch of ground, looking up in awe with his hand to his forehead. A small white chicken with a red comb stands next to him. The beanstalk is a massive green vine with large green leaves and thick, yellow, curved tendrils that reach across the sky. The background shows a blue sky and green hills. A purple paperclip is attached to the top of the text box.

In the morning, Jack awoke to find that the beans had grown into a giant beanstalk.

A cartoon illustration of a scientist character. He has a large, bushy yellow wig, round glasses, a yellow mustache, and a friendly expression. He is wearing a white lab coat over a blue shirt, an orange tie, and a pink bow tie. He is pointing his right index finger towards the beanstalk. A blue speech bubble is attached to his finger.

Now wait a minute. That doesn't sound right. Plants can't grow without sunlight. I wonder if science can help us here.

Plants need energy to grow. Plants make energy by doing something called photosynthesis. To carry out photosynthesis, plants need sunlight.



Let's give this beanstalk a helping hand with its photosynthesis. This grow lamp should help. It gives off the type of light that the plant needs in order to photosynthesise. This plant will also need water, so I have set up this sprinkler.

Grow lamp

Sprinkler




Jack decided to climb the beanstalk to see just how high it went.

Helmet


Harness

Knee pads

He did what? First, a warning: climbing up 'magic' beanstalks seems very dangerous. He should be wearing some protective equipment. Secondly, how strong is this beanstalk?



A normal beanstalk would collapse under its own weight if it grew straight up like that. This is why gardeners normally put a stick or pole into the ground for the beanstalk to grow up. This enormous beanstalk would need something to give it structural strength, such as scaffolding.



Builders sometimes use scaffolding to shore up a building or structure. Shoring just means to support something such as a wall or even a beanstalk.

Jack climbed for what felt like hours until he had climbed so high that he had reached the clouds. To his surprise, there was ground above the clouds and there in front of him stood a giant castle.




Jack decided to get into the castle by climbing the walls. The castle was so big that climbing the wall was like climbing a cliff to Jack, but eventually he made it to a window and let himself in.



When Jack was inside the castle, his eyes lit up. The castle was full of treasure. If he could just get some of it back down the beanstalk, he and his mother would never go hungry again.





The giant was sleeping in another room. In his sleep, the giant began to sniff. Then he woke and said...

Fee-fie-fo-fum,
I smell the blood
of an Englishman.

Be he alive,
or be he dead,
I'll grind his bones
to make my bread!

That is one powerful nose.
Somehow that just doesn't
seem believable to me.



Now, if the giant had a modern security system with alarms and laser sensors, then I could understand how he would know Jack had got into the treasure room.

Security camera



IF Jack stepped through these lasers, he would have set off an alarm.

The giant would have woken up because of the alarm. Then the giant could have seen exactly what was happening in his treasure room using the security camera. This technology is much better than relying on your nose for home security.



A monitor, or closed-circuit television (CCTV), is used to show what a security camera sees.

Fee-fi-fo-fee. Who is that on my CCTV?

With the giant coming, Jack didn't have much time. He grabbed what he could carry and ran back to the beanstalk.



If Jack can carry around 36 kilograms of treasure, what items should he take?

Giant gold pen
= 38 kilograms

Golden harp
= 20 kilograms

Bag of gems
= 10 kilograms

Games console
= 5 kilograms

Goose that lays
golden eggs
= 6 kilograms

Answer:
I golden harp, I bag of gems and I goose is the most that Jack could carry.

With the full sack on his back, Jack ran for the beanstalk. But the giant's long legs meant that he was quickly catching up...



Maybe there is some science that Jack could have used to help him get away.




If Jack spilled that cooking oil on the floor, he would have been more likely to get away. The giant needs friction to run. Friction is the force that stops objects from just sliding off each other. The oil makes the floor very slippery by reducing friction!



Ha ha ha!



Even though the giant slipped and fell (thanks to science) he was still close behind Jack as he sped down the beanstalk. As Jack got close to the ground, he called for his mother to fetch his axe.

A colorful illustration of a young boy with dark curly hair, wearing a red shirt and blue pants, climbing a large green beanstalk. A white goose is perched on his back, carrying a woven basket. The background shows a giant's foot and a blue sky. A speech bubble from the boy says "Quick, get my axe!". The page is decorated with a purple paperclip at the top and a yellow and orange paper cutout at the bottom right.

Quick, get my axe!

Aha, I think Jack is going to try to cut down the beanstalk. That could take a while with that axe. Maybe technology could have helped Jack out. A chainsaw would have been much quicker, as long as Jack was wearing the correct protective equipment.




With his chainsaw, Jack chopped down the beanstalk and the giant fell to his death. With the treasure that Jack brought back from the giant's castle, Jack and his mother were never hungry again and lived happily ever after.




Jack and the
beanstalk

Well, I feel that STEM really helped Jack make the most of his adventure.

Glossary



<i>collapse</i>	to fall down or give way suddenly
<i>force</i>	a push or pull on an object
<i>laser sensors</i>	special equipment that uses lasers and computers to tell if something has moved through an area
<i>photosynthesis</i>	the way that plants make energy from sunlight
<i>protective equipment</i>	special clothing that is worn to protect someone from harm
<i>reducing</i>	making something smaller or less in amount, bit by bit
<i>scaffolding</i>	platforms that help strengthen buildings when they are weak or when building work is being done to them
<i>security system</i>	special equipment that works together to keep something safe
<i>structural</i>	to do with the strength of a building or large object, or how the parts are put together



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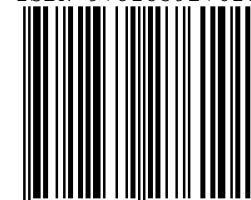
Have you heard the story of Jack? You know, the one where he plants the magic beans and a giant beanstalk shoots up into the sky. Did you ever wonder what a scientist would make of that beanstalk? Well wonder no longer, because Professor Everafter is here, and he is going to put this fairy tale under the microscope.

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