



Under the Invisibility Cloak

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Level 4



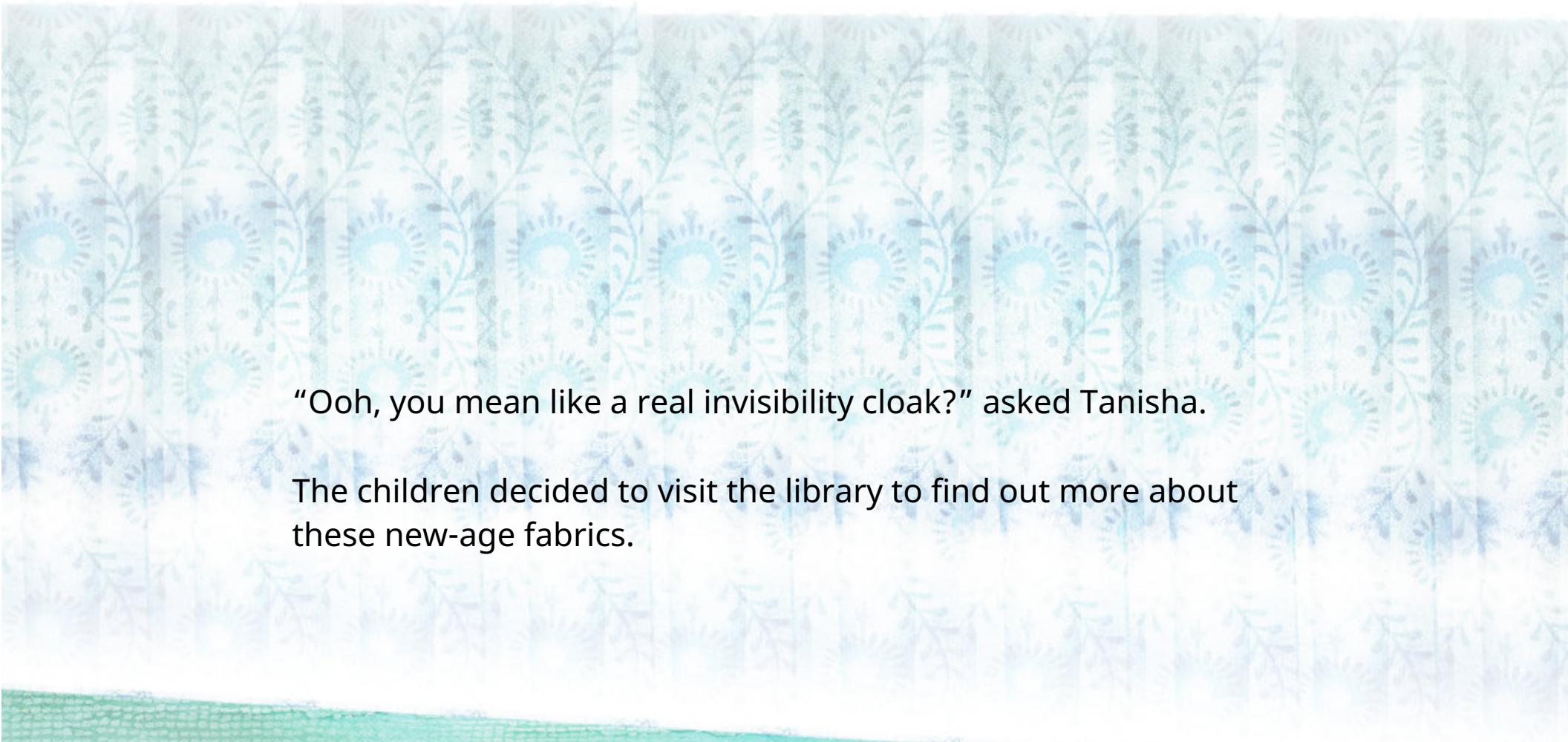
Arnav and Tanisha loved to play hide-and-seek. Every evening, this is what they did with their friends. One day, Arnav said to Tanisha, "What fun hide-and-seek would be if I could disappear and no one could see me!"

They decided to ask Mamma and Papa if it was possible to become invisible.

Papa smiled and said, "That sounds like science fiction."

Mamma designed curtains and cushion covers for people's homes and knew a lot about different kinds of cloth. She said, "I think scientists are working on fabrics that could make the wearer invisible."





“Ooh, you mean like a real invisibility cloak?” asked Tanisha.

The children decided to visit the library to find out more about these new-age fabrics.





Arnav and Tanisha browsed through shelves and shelves of books to trace the history of fabrics. The oldest fibre that makes up fabric, they found out, is linen. This is made from the stalk of a plant called flax.

Cotton is an old fabric too. Like linen, this also comes from a plant.

They borrowed some books and left.



Cotton

Flax



At home, Arnav looked at his clothes and said, "Mamma, my shorts are thick and my shirt is thin. But aren't they both made of the same fabric, cotton?"

"Good question, Arnav," said Mamma. "How thick a fabric is depends on the quality of the fibre it's made from..."

"...and the way the fabric is woven," Papa chipped in.



"Are there other plant fibres?" asked Tanisha.

"Yes, coconut, bamboo, jute are some of them," Mamma replied.

"There are insect and animal fibres too," added Arnav. "Like silk from silkworms and wool from sheep."



Tanisha asked, "Mamma, I know you are wearing a silk sari and Papa's shirt is made of linen and my muffler is made of wool. But what is my frock made of?"

"It's polyester, an artificial fibre. It doesn't come from a plant or an animal and is made in a laboratory," said Mamma.



The siblings were very excited to learn that fabrics could be made in laboratories. They began looking through chapters on artificial fibres. They knew that some fibres were elastic. Like spandex, which track pants are made of.

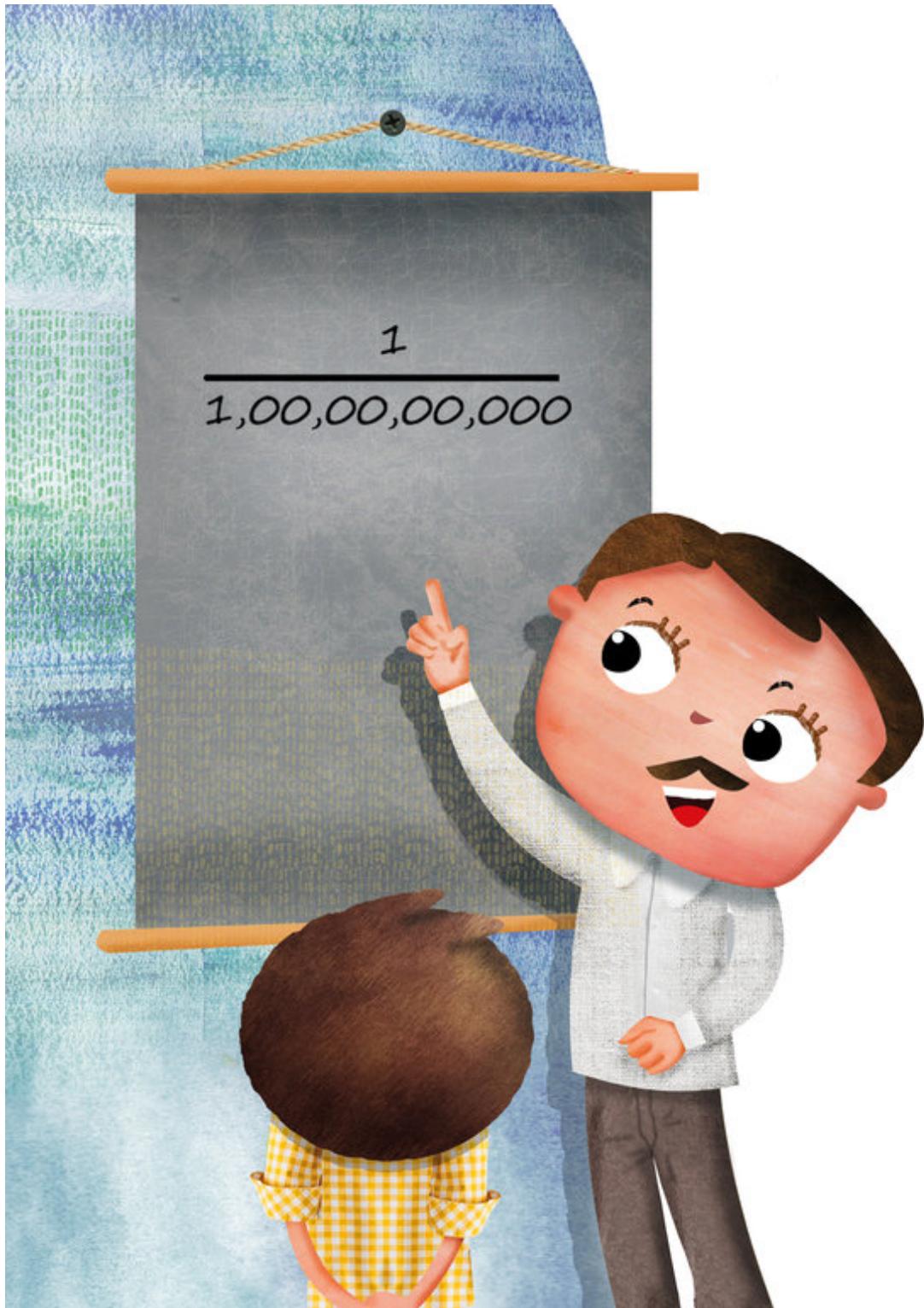
They read about how scientists developed high-performance fibres. These could resist heat, electricity and chemicals.

“Some new fibres are shock-absorbent; they are useful to the police and soldiers. Some don’t catch fire easily; these are great for the fire brigade,” read aloud Tanisha.



Just then, Mamma said, "Arnav, Tanisha, look what I have found in one of the library books you brought home." It was a book on high-tech fibres!

She read aloud an interesting bit that said nanofibres made from carbon were called smart fibres. And smart fibres could sense temperature, pressure and radiation.



"Nanofibres...why are they called that?" asked Arnav.

"Nanofibres are really thin fibres. When you divide one metre by a hundred crore, you get one nanometre. Nanofibres have a diameter of just a few nanometres," said Papa.

$$\begin{aligned} & \text{1 metre} \\ & \text{1,00,00,00,000} \\ & = \text{1 nanometre} \end{aligned}$$



As Arnav and Tanisha browsed through the pile of books, they also found out that cloth made from smart fibres is called intelligent material or e-textile. This is used in health wear. Such materials have tiny sensors in the fabric, which can pick up a patient's breathing, heart rate and body temperature. This information can be sent to the doctor and the patient can stay at home.



"Now to return to your first question – is it possible to become invisible?" said Mamma.

She had just read an article in a science magazine, which explained that scientists in a university had made a cloak that would make the wearer invisible. The fabric was made of fibres with a diameter of 80 nanometres.

She pointed to an illustration and added, "We can see any object – say, a pair of red glasses or a blackboard – because it reflects some of the light falling on it. But this cloak does not reflect light. Instead, the fabric bends the light a little so that it goes around it. So you can't see the cloak, or anyone under it."



"Can I get a shirt made with that material?" asked Arnav, excited. He'd laugh so much at his friends' expressions when they saw just his head and legs moving about, with nothing connecting them.

"Newspaper reports tell us that scientists and manufacturers are working on the idea. Such fabrics are being developed in some countries. But they are not available yet," said Mamma.



"Playing hide-and-seek wearing an invisibility cloak would be such fun..." said Tanisha. "Can this smart fabric be used by grown-ups for anything important?"

"Yes, soldiers can wear this when they're out fighting the enemy," Papa said. "And when I need to work and you want me to play with you, I can play hide-and-seek by slipping under the invisibility cloak," he joked.

At school, Arnav and Tanisha told their friends all about smart fabrics.

"I have an idea. Since Kelkar Sir hasn't come to class yet, why don't we go to the laboratory and do some exciting experiments," said Tanisha with a twinkle in her eye.

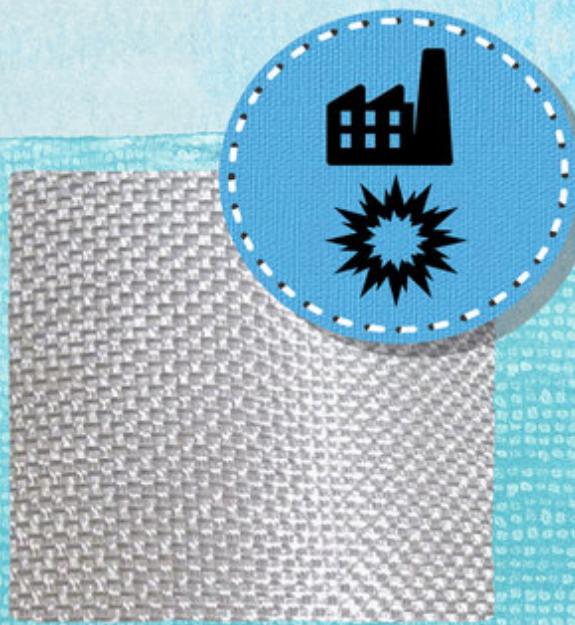
"Wait," whispered Arnav, "what if he is actually hiding under an invisibility cloak to find out what mischief we might be up to?"

Smart fabric **facts**

Some smart fibres are used to make cloth to clean lenses of spectacles, mirrors and jewellery.



Clothes made from heat resistant fibres are used by people working in factories manufacturing explosives.



Some fibres are hollow and can store perfumed liquid in them.
These are used to make mattress and pillow covers.





What would you do if you had an invisibility cloak?

Let's see what Arnav and Tanisha plan to do!

1. When someone throws a plastic bottle, get under the cloak, pick up the bottle, and walk in front of the person. Imagine his horror when he sees the bottle moving in front of his eyes!
2. See Teacher's glasses on the table? Cover it with the cloak. Teacher will never find his glasses. So no class!
3. Ring the recess bell early – TAN-TAN-TAN!



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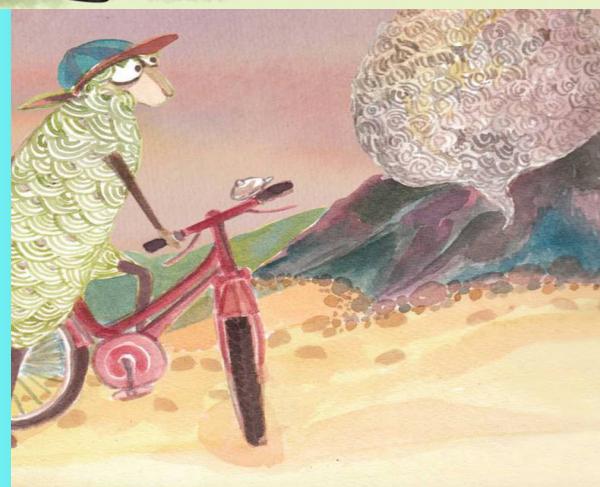
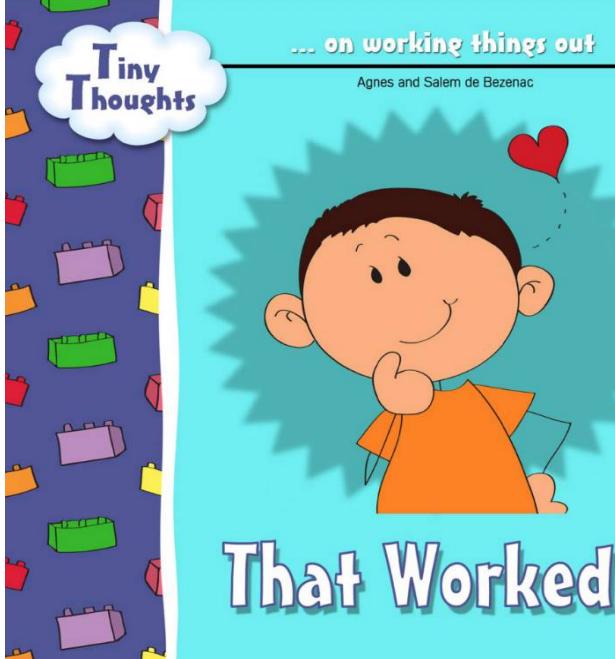
(English)

What would you do if you had an invisibility cloak? For one, playing hide-and-seek would be great fun. But is anyone making invisibility cloaks? Or do they exist only in science fiction and fantasy stories? Arnav and Tanisha head to the library to find out. Let's follow them quietly – they can't see us, we are invisible in their world.

This is a Level 4 book for children who can read fluently and with confidence.



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