9 Let's imagine

Materials

1 Work in pairs. Write a list of some things that are often made of:

steel	wool	silver	concrete
cardboard	wood	ceramic	plastic
polystyrene	glass	leather	foam rubber
cotton	wax	rubber	silicone

2 Why are these materials used? What properties do they have?

Example

Steel is strong and hard, so it's often used to construct the framework of tall buildings.

3 You're going to read a blog about smart materials. Before you read, look at the photos.

1 What do you think the materials are?
2 What do you think they can do?

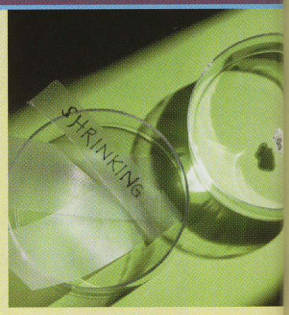
Read the blog and find out if you were right.

4 Work with a partner and discuss the materials.

1 Which material do you think would be the most useful and why?
2 Can you think of any more applications for these materials?

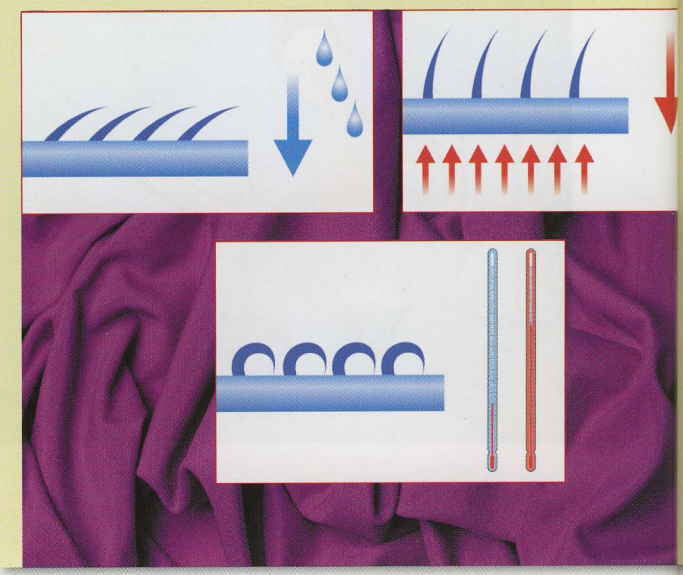
Matt's Smart Materials Blog

Welcome! You've come to the best place on the web to find the smartest new materials around – materials with built-in intelligence. So read, explore, and post a comment. Tell me how you think you could use them.



You know how a sponge expands in water? This thin, transparent film does the opposite. When you put it in water, it contracts. It's soft and pliable so it could be used to make the heel straps on flippers when you go swimming. Then when you got into the sea, they'd shrink to fit your feet. Or you could make a rescue rope with it. When it got wet, the rope would shrink and you'd be able to pull people out of the water. Would that be cool or what?

This fabric's really smart. When it's dry, the tiny spikes on its surface stand up, and it's porous. When it's wet, they close and it becomes impervious. The spikes also curl up in extreme temperatures to trap air and provide insulation. It'd make a great raincoat to wear in either winter or summer.



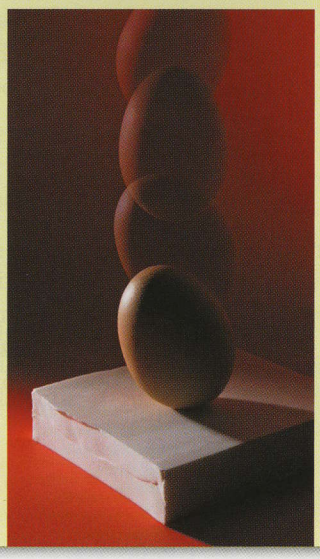
5 Match these adjectives to their meanings.

1 transparent	a able to last a long time
2 pliable	b hard, but easily broken
3 porous	c has a high mass to volume ratio
4 impervious	d easy to bend without breaking, flexible
5 durable	e light can pass through it
6 brittle	f clear, allows you to see through it
7 translucent	g doesn't allow any liquid or gas to pass through
8 dense	h has many small holes that allow water and air to pass through slowly

Look back at the materials in **1**. What other materials could have these properties?

Concrete is soft when newly mixed, but it becomes very hard when it sets. It's durable, but it isn't normally something that brightens the room. This stuff is different. It's made from layers of concrete and optical fibres and it's translucent. Imagine living in a building where light comes from the walls. Or imagine a motorway where the layout of the lanes was changed by switching on lights in the ground. And what about dance classes where lights on the floor could show you where to put your feet? Fun stuff, huh?

This dense, impact-absorbing silicone has important safety applications. It's only an inch thick, but you can drop an egg on it and the egg won't break. It could be used to make car bumpers that would absorb the impact of a crash. Or you could put it under baby's crib, or in a children's play ground area. I'd like to install it in my kitchen. Then I'd be able to drop brittle objects like plates without breaking them.



6 Look at Matt's blog again. Find examples of *would* and *could*.

1 What's the contracted form of *would*?
2 When do we use these words?

Would and *could*

We use *would* when we're imagining possibilities.
When it got wet, the rope ***would*** *shrink.*
*I'****d*** *be able to drop brittle objects without breaking them.*
Instead of *would be able to*, we can also say *could*.
I ***could*** *drop brittle objects without breaking them.*
Lights on the floor ***could*** *show you where to put your feet.*

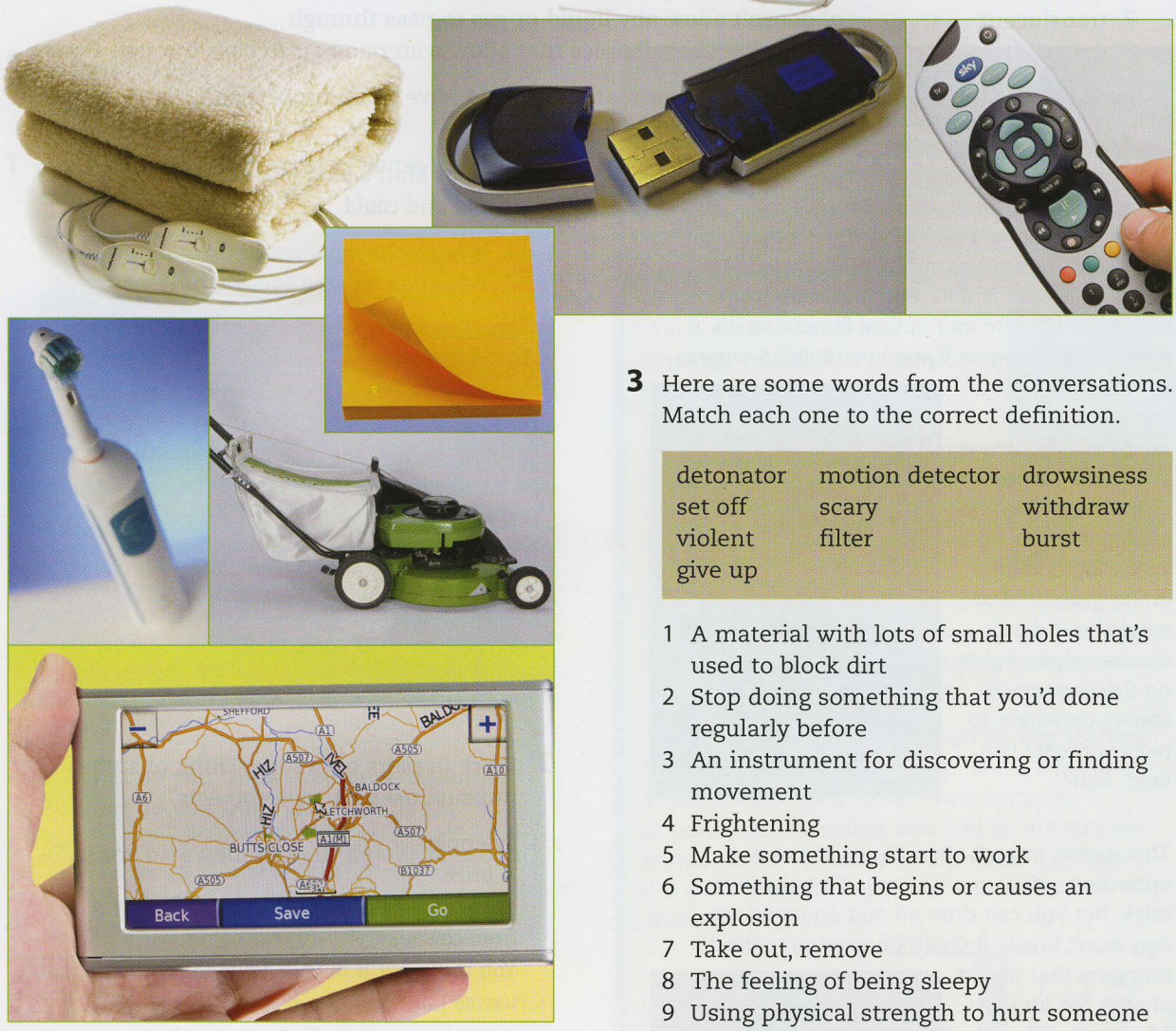
7 Work in pairs or groups. Think of some unusual uses for these objects.

Example
A brick
You could use it as a door stop. It'd stop a door from closing.
You could put it in your toilet tank. You wouldn't use so much water when you flush.

1 A brick	6 A coil of wire
2 An old tyre	7 An oil drum
3 An empty biscuit tin	8 A fish tank
	9 A garden hose
4 A bed sheet	10 Some wire coat hangers
5 A space blanket	

Inventions

1 Name these inventions. Then think of ten more great inventions. Which ones would you hate to live without? Brainstorm a list.



2 15 Listen to five conversations about different inventions. For each one make a note of:

1 what the invention is.
2 whether the speakers are looking at a prototype of the invention or just imagining it.
3 how the invention works (or could work if it were built).

3 Here are some words from the conversations. Match each one to the correct definition.

detonator	motion detector	drowsiness
set off	scary	withdraw
violent	filter	burst
give up		

1 A material with lots of small holes that's used to block dirt
2 Stop doing something that you'd done regularly before
3 An instrument for discovering or finding movement
4 Frightening
5 Make something start to work
6 Something that begins or causes an explosion
7 Take out, remove
8 The feeling of being sleepy
9 Using physical strength to hurt someone
10 Break open suddenly because of too much pressure

4 15 Listen to the conversations again and discuss these questions.

1 Do any of these inventions already exist?
2 Can you see any reasons why any of these inventions might not work?
3 Which invention do you think sounds most useful?

5 Match each beginning with a suitable ending to make some sentences about the inventions.

1 If you get sleepy,	a it'd call the police
2 If you typed in the emergency number,	b the detonator will explode
3 If you wave your hand in front of it,	c you could drive over them smoothly
4 If you were going at the correct speed,	d an alarm will go off
5 If it burns down to the filter,	e the alarm will stop ringing

Which invention is each sentence describing?

6 Compare these sentences. What's the difference in meaning?

If you get sleepy, an alarm will go off.
If you got sleepy, an alarm would go off.

Real and unreal possibilities

We use both first and second conditional forms to refer to future possibilities. First conditional forms are used to talk about real possibilities.
*If it **burns** down to the filter, the detonator **will** explode.*
(I think it could burn down.)

We use second conditional forms with *would* and past tenses to talk about situations we think are unreal or imaginary.
*If it **burnt** down to the filter, the detonator **would** explode.*
(I don't think it will burn down.)

7 Look at these events and decide whether they are:

a possible.
b possible in theory, but unlikely to happen in practice.

1 You gain a little weight.
2 The Earth is hit by a very large meteorite.
3 Someone steals your identity.
4 You have some free time this evening.
5 Your English improves.
6 You have difficulty finding a place to park tomorrow.
7 You buy a new car next year.
8 Fuel prices increase to a point that you cannot afford to drive a car.
9 You have difficulty falling asleep tonight.
10 You finish work on time tomorrow.
11 You get a promotion.
12 Your boss gives you a big pay rise.
13 You win a lot of money in a competition.
14 Your English teacher gives you some homework at the end of this lesson.

8 Work with a partner. Compare your answers. If the events in **7** are possible, say what'll happen. If they are possible but unlikely, say what'd happen.

Examples
If I gain a little weight, I'll have to cut back on carbohydrates.
If the Earth were hit by a very large meteorite, I'd be lucky to survive.

9 Work in small groups. You have some money to invest in developing a new invention.

1 Take turns to present different inventions to the group. Inventions can be found in files 4, 7, 10, 14, and 22 at the back of the book.

2 Consider these questions:

a Which invention would be most practical and useful? (Why?)
b Which would be cheapest and easiest to produce?
c Which would make the most money? (Why?)

3 Compare your decision with some other groups. Did you all agree on the same invention?