Transcript

Rough science

Washing machine experiment

Jonathon
I want to build a washing machine.

Female presenter
As usual, the team can use natural resources and anything they find lying around under the mill.
For Jonathon, it's one of the toughest challenges yet, he has to make a working washing machine, and the raw materials don't exactly look promising.

Jonathon
I think the key to the washing machine is that we've got to devise some piece of equipment which is going to agitate the clothes in water because things like sweat, and most sort of dirt will probably come off just by moving them around in the water a lot.
So this might actually be a top loader, we just need some way of making it move, maybe you could even do it like that.
Mount it somehow on the wheel and I could drive the wheel around so that things spin.

Female presenter
Can Jonathon turn a bucket, some tennis balls, and an old cordless drill into a washing machine?

Has there been some sort of a misunderstanding?
I thought we were going for a washing machine? It's very beautiful, wooden seat, we all like that, but could you keep it down, please.
But for clothes washing, I wouldn't have said it was the ideal contraption.

Jonathon
I tried my best, not to make it look like a toilet. But it has to be said, it does look a bit like a toilet.

Female presenter
Can Jonathon convince me that he's not making a loo?

Jonathon
But it will work though, hot water will be in here. That will come down into the clothes, but we now got movement. It's not a toilet, toilets don't do this do they.

Female presenter
Mercifully no, your very own spinning loo. Actually, that is quite good.

Jonathon is working on a way of controlling the flow of water into the washing machine, he's making a valve.

Jonathon
This is going to be the water tank, so we're upside down at the moment, so if you imagine there was a hole here where this little ball goes, if that ball was in the hole it would block it and stop the water from coming out, so I'm just fiddling around with designs.

Female presenter
Meanwhile, I'm finding out how Ellen's planning to make washing soap from a yucka plant.

What are we doing now?

Woman 2
So this is the exciting part. In the root and in the leaves are saponins, it's a really cool molecule. Basically, one end really loves grease and oil and the other end doesn't it only likes water. Okay, so when you put it in a washing machine, and the washing machine starts to agitate, the end that likes the grease starts to dig in, grab the grease and surround it. And because the other end likes water, it takes that surrounded grease and it becomes part of the water suspension.

Female presenter
So basically, what these molecules do, is they effectively imprison grease and then the watery bits of the molecule takes it away?

Woman 2
Yes

Female presenter
Okay, so what do you need to release those supponents?

Woman 2
Actually, what I'm going to try and do is make concentrated liquid, so I won't use this much water and I'll pound the rest of this and just basically wash it into the water and we'll have a concentrated liquid.

Female presenter
Do you want hands bashing?

Woman 2
You know, this one is pretty easy.

Female presenter
I'll leave you to it then. Good luck!

Woman 2
Thanks

Female presenter
This may look like pointless vandalism, but in fact, Jonathon is after a vital component for his washing machine.

Jonathon
Okay, so this is going to be the hot water tank for the washing machine. What I've got here is a disc of rubber inside here.

If I push that up, the water will be allowed to come through, so this is a coil of wire, it goes over the magnets and if I put a current through that coil of wire it should attract the magnets pulling this down so I'm using a bulb from the car as a sort of series resistance because if I put this straight in the car battery, it will just burn it out.
So let's try it out.

Woah! It's a bit messy, but it's working.
It's actually got very few volts on the coil so its completely safe to do this, although there is water everywhere. It seems to be working quite well.

Woman 1

The Yucca juice is foaming. And the washing machine is looking less like a toilet.
Meanwhile, Ellen's helping Jonathon by painting the washing machine's water container black. That way it will absorb the sun's heat and give them a hot water wash.
Jonathon's also hard at work, trying to get the washing machine finished in time for the final test.

I have for you, a special garment. This is a rough science, wait for it, t-shirt. So I think this will probably put everything to the test, fairly comprehensively don't you?

Jonathon
It certainly will, I'm sure.

Female presenter
Clothes in first?

Jonathon
Yup, clothes in.

Female presenter
Okay, in that revolting shirt.

Jonathon
Then the soap goes in.

Woman 2
That t-shirt looks so dirty, we're going to use it all.

Female presenter
Now I have to say, if you're judging just by sight, that doesn't look like the most effective thing to make anything clean. If anything, it's making it look browner, but we'll see.

Right Jonathon, do you want to fire her up?

Jonathon
Yeah, so this little kitchen timer, so when you turn it, it just clicks slowly back. So I put a contact on that arm that turns. which makes electrical contact to all the bits and pieces here, so shall we start it?

Female presenter
I think we should

Jonathon
So it should start off with a fill, here we go.

The current's going around the coil, and it's opening the valve, filling the washing machine

Female presenter
How does it change direction?

Jonathon
Well you can see there's a bit of wood here, and it flicks the switch and that reverses the connections of the motor and so there's another bit of wood at the other end, which conveniently flips it back.

Coming to the end of its wash now, there a period then

Female presenter
Aha perfect timing!

Jonathon
That's amazing. I just put my hand in to let the water out.

Female presenter
Okay

Jonathon
And then we can put it on a rinse, basically, that's all the dirty water come out. There still water up in the hot tank.
We throw in pure clean water, we can spin it with the hole so it's basically rinsing it.

Female presenter
We're getting to the end now, the bucket's emptying.

Jonathon
Put that onto there. Get some freshwater in.

Female presenter
Now, it is the final big test, as the storm comes in Jonathon, what do you reckon?

Jonathon
Well, there's no water coming out now so it's spun most of the water out. Turn it off.
I guess, let's see.

Female presenter
Shall I reveal? The T-shirt.

Jonathon
That looks better to me

Female presenter
I would say, hang on, let's look at the front first.
What do we think?

Woman 2
Oh that is less stained, definitely

Female presenter
Do you think?

Man 2
It wasn't set on colours anyway, was it?

Woman 2
It needs a better rinse

Female presenter
It does need a better rinse, what about the back?
It's a tough test, I can't say you're going to beat other biological powders, but it washed, there is definite fading.
Is that fair?

Jonathon
Yeah, I think so

Female presenter
There you are, that's for you to play with.