1. **Farm inventory**

A farmer is talking about the farming equipment of his medium-sized farm. Listen to the text and fill in the gaps with your notes, according to the example (0) .

**Tractors:**

The first piece of ………… ***equipment***………. (0) we have is a **John Deere 1420**, (1969)

Features:

Side-……………………………………. (1)

syncro-range transmission

cab (could be ……………………………… (2) )

added:

John Deere 148 loader with 2 ……………………………………(3) outputs at the back, and a

.……………………………………….(4). in the cab for the loader

**Minneapolis Moline ……………** (5) tractor, used as a …………………………………..(6) tractor.

(family connection: grandfather had Minneapolis Moline ……………………………….. (7))

**John Deere 4430** (newest tractor)

Features:

sound-guard cab,

………………………… (8),

heat,

windshield ……………………… (9),

blinky lights

………………………….. horse power (10)

**Hay equipment.**

a John Deere 935- mo-co- (mower-conditioner)

a new Holland hay rake,

a new Holland ………………… (11) baler,

a bale accumulator, - accumulates ……………. (12) bales,

a bale …………………….. (13)

a bale spear

a gravity wagon

a grinder- ………………. (14)

1. **Tunnels**

Listen to the text about some interesting facts about tunnels, and fill the gaps with your short notes, according to the example (0).

* The Thames Tunnel  built in ….. **1843**………..(0) - the first underwater tunnel.
* Today Tube (London Underground) is a ……………….. (1) system, used as a

……………….. in World War II.

* Other famous tunnels:

Longest road tunnel opened in 2000, in ……………………. (2)

Turkey: Marmaray Tunnel, 47 miles long,  it ………………. (3) Asia to Europe

Japan: Seikan tunnel, deepest tunnel. Lowest point: ……….(4) feet below sea level

Tunnel of love:- Ukraine: trees

Bund Sightseeing Tunnel – China: lights, music

Colorado: [elevation](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down) of 11,013 feet. It’s the highest ……………(5)  tunnel.

-Worries about tunnels falling

Engineering works

Tunnels have to stand up to forces of [tension](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down), ……………, (5)  [compression](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down), and [shearing](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down).

They need to carry the ………………………. (6) of people and machines

Use strong materials, such as steel, …………….. (7) and concrete.

First step: planning, studying soil and …………….. ……………. (8)

Decision: flat roofs or ……………………………….. (9) shape or Gothic ceilings?

Engineers may add ……………………………………… (10) to make tunnels more stable,

e.g. ……………… rock bolts

1. **How do helicopters work?**

Listen to the text about helicopters, and fill the gaps with your short notes, according to the example (0).

Most amazing types of ***…… aircraft……….. (0)*** are sleek and fast airplanes.

Helicopters are not so impressive at first sight. But:

They have …………………(1) on top, → „lift” → helicopter ……………..(2) into the air

Back (rear) rotor: allows helicopter to move foreward and ……………………(3) and sideways.

Also able to move straight up and down or ……………………….. (4)

Uses:

* Military
  + Move troops
  + ……………………..(5) supplies
  + Flying ambulance
  + Rescue people from mountains and …………………. (6)
* Media
  + Report on news
  + Report on ………………………... (7)
* - ideal for
  + moving ………………… …………………….. (8)
  + fighting forest ……………………….. (9)

Inventor of modern helicopter is a Russian ………………………… engineer (10)

Patent: in ………… (11)

Working prototype: ……………..(12) years later

1. **Voice assistants**

Listen to the text about voice assistants, and answer the questions briefly, according to the example (0).

What are voice assistants? (0) They are programs that run on digital devices.

What kind of things do people ask about?

Give 2 examples. 1. ……………………..

2. ……........................

How does a request start? 3. ……………………………….

What does this first word do? 4. ……………………………..

What shows the end of the request? 5. ……………………..

Where will the request be sent? 6. …………………………

What will be sent back? 7. ………………………………..

How fast does this happen? 8. ……………………………

How do voice assistants learn and develop? 9. ……………………………

What parts of a smart home can voice assistants control? 10. ……………………..

11. ……………………..

1. **Women plumbers**

**Task:** Listen to the text aboutwomen plumbers, and fill the gaps with your short notes, according to the example (0).

Usual picture of a plumber: man with a big ….. toolbelt…… (0)

The profession is stubbornly ………………………………. (1)

**Women interviewed:**

**Hattie Hassan**: plumber for nearly …………….. years (2)

Founded a …………………….(3) business of female plumbers

**Judeline Cassidy**: New York

Founded …………………(4) and Tiaras, introducing women to trade professions

**Why are most plumbers still men?**

- Men don’t see it as a ……………….. (5)

**-** Lack of visibility. You can’t be it, if you ………… …………… it. (6)

**-** huge part: in schools girls don’t tend to …………… ………. (7) for plumbing or technical subjects

- society show plumbers as beneath them

**Why plumbing:**

**Hattie:**

Wanting to do a ……………….. (8) even at school (give 1 example)

Loves ……………. (9)

**Judeline:**

At school, did boys’ subject, e.g. …………………………. …………………….. (10)

Chose between …………………………….(11) and plumbing

Strengths: love using …………………….(12) . and solving …………………….. (13)

Great to ………………….(14) the autonomy of water

1. **Women Nobel prize winners**

Listen to the text about two Nobel Prize winner women scientists, and fill in the gaps with 1-2 words, according to the example (0).

Name of programme: the Conversation (0)

Topic: …………………. (1) and struggles of women

Today’s guests have already met. Place and time of first meeting: Sweden,

………………….. ………………….. (2) at the Nobel Prize Award.

Nobel prizes they won: …………………………… (3) and physics.

Up to last year, only ………… (4) prizes were awarded to women in physics

**Donna Strickland**: award for …………… ………………………. (5) laser pulses.

* Chirped Pulse Amplification: a technique used in ………… …………. (6) and laser eye surgery
* Professor in Canada, with her own ……………… …………….. (7)

**Frances Arnold**, professor in …………………………. (8) Engineering in California

* Director of Rosen Centre for Bioengineering
* Award for revolutionising how enzymes are ………………… (9) – allowing production of cleaner and cheaper drugs
* One in 5 Nobel Prize women winners in this field
* Significance: 2 women winners at the same time- …………………………. (10)
* Fact: women are …………………………. (11) into these fields
* Women have to be storytellers, have to ……………………(12) what you do, to
* make people interested.
* can draw …………………….(13). and work on keeping it.

1. **Space era**

Listen to the text about recent discoveries in connection with space, and fill in the gaps with 1-2 words, according to the example (0).

**Beginning of new space era: ….. Moon landing … (0)**

**Speaker 1:**

Current age: renaissance of ………………………. …………………….. (1)

Achievement to single out: **asteroid** ……………… **return** (2) mission

Two elements:

* send a kit (equipment) to a ……………………… body (3)
* ………………………. a sample (4)

Another interesting field of discovery: **exoplanets**

**Speaker 2:**

Reason that she became interested in ………………………. (5)

Next discovery: **detection of** ……………………….. …………………….. (6)

First detection took ………………… (7) and ……………………. (8) of scientists

Currently doing …………………… (9)

New way of …………………….. (10) our universe

1. **Rebooting**

Listen to the text about rebooting, and answer the questions briefly, according to the example (0).

What do we automatically think of when rebooting is mentioned? – **0. computers.**

What does today’s expert, Rob Miles, do at the University of Hull? 1. ………………..

Since when rebooting has been a good solution? 2. ……

What did simple computers or machines do previously? 3. ….

What is built in in cars and TV remote controls? 4. ………..

What other machine is a further example for being operated by a single program? 5.

…………….

In what ways are modern computers are more complicated than the ones with a single program? 6. …….

What does the operating system have to co-ordinate? 7. ……

What is also important when coordinating several pieces of information? 8. ……….

What happens after a while to the memory of computers? 9. ….

What should handle this situation? 10. …..

What happens when it cannot fix the problem? 11. …..

1. **Concrete- an environmentalist’s view**

Listen to the text and fill in the blanks with your notes of 1-2 words, according to the example (0). Follow the numbers carefully, as they are in the order of appearance of the information.

Concrete: second most widely used …………… **substance**………… (0)

|  |  |
| --- | --- |
| **ADVANTAGES** | **DISADVANTAGES** |
| Foundation of modern development | Huge carbon ……………………… (1) |
| Provides ……………………….. (2) for billions |  |
| Fortifying defences against natural ……………………………. (3) |  |
| Provides …………….. (4) for branches of society e.g healthcare |  |
| Protect us from the ………………………. (5) |  |
|  | Entomb fertile soil |
|  | Block rivers |
|  | Choke ……………………… (6) |
|  | Makes the world ……………………… (7) |
|  | outgrows the natural environment |
|  | Degrades ……………………….. (8) |
| Not derived from ……………… …………….. (9) |  |
| Doesn’t harm animals directly |  |
| It has …………………………… (10) and endurance, solidity |  |
|  | does not soak up the rain |
|  | Huge amount of …………….. (11) use |
|  | Adds to the ……………… .……………… (12) effect in cities |
| Better than …………… …………….. (13) |  |
|  | Worsens the problem of silicosis and respiratory diseases |

**10.carbon capture**

Listen to the text and fill in the blanks with your notes of 1-2 words, according to the example (0).

**Carbon capture with air conditioners**

Air conditioners and fans: **………… 10%...................** (0) of the world’s electricity.

Inventor of the idea: Roland Dittmeyer, ……………………… ………………………… (1)

in Germany.

His view about CO2: …………………………..(2) in the air is low.

Enough to cause ……………….. …………………… (3) , but only …………….. (4) parts

per million.

A possible solution:

* retrofit air conditioners with …………………… (5) that capture carbon
* Use materials that ……………….. (6) carbon from the air
* Then convert captured CO2 into ………………….. (7)

Problem: energy-intensive process

* Solution: use clean, carbon-free, ………………………….. (8) energy

By-product: synthetic, renewable . …………. (9)

Example:

Calculation: outfitting Fair Tower (largest ………………….. (10) in Fankfurt) with these

carbon-capture devices → ………………….. (11) barrels of by-product

The idea could be used in ……………. and ……………… (12) to help cool the planet

**Keys and tapescripts:**

1. **Farm inventory**

The first piece of equipment we have is a John Deere 1420, it’s a 1969, side console, syncro-range transmission, it’s got a cab on it, but that cab could easily be taken off; I have the fenders to make it a cabless tractor. But right now it’s my main loader tractor . It’s cold, it’s snowing outside, I kind of like the cab…. so we’re leaving the cab on it for right now.

On that tractor we have a John Deere 148 loader we have it rigged up so that we have the two hydraulic outputs on the back are available, the two hydraulic outlets are… you can use them from the cab with the levers on the side console, and we have a joystick in the cab for the loader, so that’s kind of a cool thing.

We also have a Minneapolis Moline, it’s an older tractor, it’s a Minneapolis Moline M5

It’s kind of our back-up tractor or utility tractor, do a little hay-raking with it, move staff around with it. Like I said, a backup tractor. It’s good to have it around it here. It has some historical significance, not that it was a family tractor, but the family tractors - **are**- have been Minneapolis Moline -my great- no **,** my grandfather had a Minneapolis Moline dealership, so this is a little connection to history we have on the farm.

We also have a John Deere 4430. That’s the newest tractor on the farm. That’s the newest tractor on the farm not only that we have it as the newest. It is the newest as far as the vintage on the farm. It’s the first of the generation two tractors of John Deere, so it’s got the sound-guard cab on it, air conditioning, heat, windshield wipers, blinky lights, the whole nine yards….. It’s our big tractor, it ’s the biggest tractor that we have, it’s over a 100 horse power and I really enjoy that tractor, so it’s here.

As far as going down the list we have some hay equipment. We have a John Deere 935- mo-co- (mower-conditioner) . I think that’s the right number, I have to double check, a John Deere 935- mo-co- (mower-conditioner)We have a new Holland hay rake, we have a new Holland square baler,

We have a bale accumulator, it’s an accumul-8 version, it brings, it accumulates as an 8 the bales behind the square baler into groups of 8, and then I have a bale grabber that **comes** -hooks onto the loader on the 4020, and then you can come and pick up all 8 bales at once, stack them on the wagon, stack them in the shed, all of that good stuff.

Along with the bale equipment to the hay equipment we have a bale spear for the front of the loader that attaches with a quick-hitch apparatus, so you can quickly take the bucket off and put the bale spear on or put the bale grabber on for the three-point on the tractors…

And we still have our Owatonna, our OMC brand grinder-mixer.

So that’s the equipment.

**Key:** 1.consoles, 2. taken off, 3 hydraulic, 4. joystick, 5. backup/ utility, 6. dealership,

7. air conditioning, 8. Wipers 9. 100, 10. Square, 11. 8, 12. Grabber, 13 mixer

**2. Tunnels**

Also called the Tube, the London Underground has a long history. It started with theThames Tunnel in 1843. This was the first underwater tunnel--Londoners built andconnected more tunnels. Today, the London Underground is a large system. Itstunnels are strong and safe. People even took shelter there during World War II whenGerman dropped bombs on London!

The Tube isn’t alone. Around the world, thousands of tunnels provide safe [transportation](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down). The world’s longest road tunnel opened in 2000. It’s called LaerdalTunnel and is found in Norway. At 15.2 miles long, it takes cars straight through amountain range. In[Turkey](https://www.wonderopolis.org/wonder/where-in-the-world-is-turkey), the Marmaray Tunnel is 47 miles long. It connects Asia toEurope. It’s the longest[underwater](https://www.wonderopolis.org/wonder/how-do-you-build-a-tunnel-underwater) tunnel in the world! Another underwater tunnel,the Seikan Tunnel, runs 34 miles in Japan. It opened in 1988 and goes deeper thanany other rail tunnel. Its lowest point is 800 feet below sea level.

Other tunnels are known for a number of reasons. The Tunnel of Love in Ukraine isformed by [trees](https://www.wonderopolis.org/wonder/can-you-drive-through-a-tree). The Bund Sightseeing Tunnel in China is an interesting sight. It hasbrightly colored lights. It also plays loud music all day long. In Colorado, USA, theEisenhower Tunnel has an [ele-vation](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down) of 11,013 feet. It’s the highest vehicle tunnel inthe world.

We could go on and on about these cool tunnels. People travel through them everyday without a second thought. For some, however, the thought of going through atunnel causes [fear](https://www.wonderopolis.org/wonder/can-dogs-smell-fear). They worry that, like London Bridge, the tunnel will fall. It’s ascary thought.

Luckily, tunnels are highly unlikely to fall. Civilengineers work hard to build safe,strong tunnels. They know that tunnels have to stand up to forces of [tension](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down),[torsion](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down), [compression](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down), and

[shearing](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down). Tunnels also need to carry the weight of peopleand vehicles traveling through them. That’s why tunnels are built with strong[materials](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down). Most tunnels use steel, iron, and[concrete](https://www.wonderopolis.org/wonder/how-do-you-build-a-road). The strength of these [materials](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down) helps keep tunnels from falling.

Before [materials](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down) are even ordered, though, [engineers](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down) start planning to make surethe tunnel won’t fall. They do this by learning about the ground where they will digand build the tunnel.

[engineers](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down) start by studying the soil and rock types. This helpsthem decide how to dig the tunnel. They also learn about water patterns and anynearby[fault lines](https://www.wonderopolis.org/wonder/whose-fault-is-an-earthquake). All of this information helps [engineers](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down) dig tunnels that won’t fall.

[engineers](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down) decide on the shape of a tunnel based on everything they’ve learned. Thelikelihood of soil and rock moving determines a lot about how a tunnel will be built. For instance, tunnels built inside of stratified rock may have flat roofs. This isbecause, for that type of rock, a flat roof is less likely to fall. Tunnels shaped likehorseshoes or with Gothic ceilings are also common. That’s because those shapesare more stable.

In larger tunnels, the [engineers](https://www.wonderopolis.org/wonder/what-keeps-tunnels-from-falling-down) add supports to make the tunnel more stable. Forinstance, they use steel rock bolts to secure tunnels in rock. These drill into the rockto prevent collapse and protect the tunnel. Some types of rock need less supportthan others, so the supports vary by location.

**Key**: 1.Large/ strong/safe 2. Norway, 3. connects 4. 800, 5. vehicle, 6. Torsion 7. weight, 8. iron, 9. Rock types 10. Horseshoe 11. Support 12. steel

**3.Helicopters**

When it comes to aircraft, the [sleek](https://www.wonderopolis.org/wonder/how-do-helicopters-work)lines and lightning-fast speeds of [airplanes](https://www.wonderopolis.org/wonder/how-do-airplanes-fly) can easily [amaze](https://www.wonderopolis.org/wonder/how-do-helicopters-work) people. [Bulky](https://www.wonderopolis.org/wonder/how-do-helicopters-work), oddly-shaped helicopters rarely [incite](https://www.wonderopolis.org/wonder/how-do-helicopters-work)the same kinds of feelings. Once you learn about what helicopters can do, though, you might think twice the next time you see one!

Unlike airplanes, helicopters feature spinning wings called blades or rotors on top. As a helicopter's blades spin, they create a force called [lift](https://www.wonderopolis.org/wonder/how-do-helicopters-work) that allows the helicopter to rise into the air. A helicopter's rotors perform the same function as an [airplane](https://www.wonderopolis.org/wonder/why-do-airplanes-leave-tracks-in-the-sky)'s wings.

In addition to the rotors on top, helicopters also have a [rotor](https://www.wonderopolis.org/wonder/how-do-helicopters-work)in the back. The rear [rotor](https://www.wonderopolis.org/wonder/how-do-helicopters-work)can face different directions, allowing the helicopter to move forward, backward, and sideways.

Helicopters can do many things that airplanes cannot. For example, helicopters can move straight up or down and [hover](https://www.wonderopolis.org/wonder/how-does-a-hovercraft-work/) in the air without moving. They can also fly backwards and sideways. They can even take off or land without a [runway](https://www.wonderopolis.org/wonder/how-do-helicopters-work)!

These capabilities make helicopters ideal for many tasks. They've been used by the [military](https://www.wonderopolis.org/wonder/how-do-helicopters-work)for many years to move [troops](https://www.wonderopolis.org/wonder/how-do-helicopters-work), deliver supplies, and serve as flying ambulances. Their [mobility](https://www.wonderopolis.org/wonder/how-do-helicopters-work)allows helicopters to get to people in hard-to-reach places, such as mountains and oceans.

Helicopters are also used often by the media to report on breaking news and traffic. Because of their ability to [hover](https://www.wonderopolis.org/wonder/how-do-helicopters-work)and land without a [runway](https://www.wonderopolis.org/wonder/how-do-helicopters-work), helicopters are ideal for moving large objects. They can also be used to carry large loads of water to fight [forest fires](https://www.wonderopolis.org/wonder/what-is-a-smokejumper/).

The father of the modern helicopter is Igor Sikorsky, a Russian [aeronautical](https://www.wonderopolis.org/wonder/how-do-helicopters-work) [engineer](https://www.wonderopolis.org/wonder/how-do-helicopters-work)who later came to the United States. He first filed a [patent](https://www.wonderopolis.org/wonder/what-is-a-patent/) for a helicopter design in 1931. The first working [prototype](https://www.wonderopolis.org/wonder/how-do-helicopters-work) of his design didn't take flight until eight years later, though.

**Key:** 1. rotors/blades 2. rises 3. backward 4. hover 5.deliver 6. oceans 7. traffic 8. large objects, 9. fires 10 aeronautical 11. 1931, 12. 8

**4.Voice assistants**

**Have you ever had a chat with Siri? Do you ask Google to play your favorite song? Have you ever had Alexa order a pizza for dinner? Today’s voice assistants can help you out with just about anything!**

Voice assistants are programs on [digital](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) devices that listen and respond to [verbal](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) commands.  A user can say, “What’s the[weather](https://www.wonderopolis.org/wonder/what-is-the-weather-like-on-other-planets)?” and the voice assistant will answer with the weather report for that day and location. They could say, “Tell me a [story](https://www.wonderopolis.org/wonder/whats-your-favorite-ghost-story),” and the assistant will jump into a tale. The user could even say, “Order my favorite[pizza](https://www.wonderopolis.org/wonder/who-created-frozen-pizza),” and dinner will be on its way!

Voice assistants are so easy to use that many people forget to stop and WONDER how they work. How do voice assistants understand us? Is it magic? A [complex](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) system of[codes](https://www.wonderopolis.org/wonder/how-do-you-unlock-a-secret-code)? An actual person listening on the other end? The answer is less complicated than you might think.

It all starts with a [signal](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) word. Have you ever called a friend’s name to get their attention? Users say the names of their voice assistants for the same reason. They might say, “Hey Siri!” or simply, “Alexa!” Whatever the [signal](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) word is, it wakes up the [device](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us). It signals to the voice assistant that it should begin paying attention.

After the voice assistant hears its [signal](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) word, it starts recording. The [device](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) waits for a pause to know you’ve finished your [request](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us). The voice assistant then sends your recorded [request](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) over the Internet to its [database](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us).

Once in the [database](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us), your [request](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) is compared to other requests. It’s split into separate commands your voice assistant can understand. The [database](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) then sends these commands back to the voice assistant. Once it receives the commands, the voice assistant knows what to do next. The [device](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) might ask a question to make sure it understands what you want. If it thinks it understands, the voice assistant will carry out the task you asked for.

If you’ve ever used a voice assistant, you know all of that happens very quickly! If you say, “Hey Siri! What’s the weather?” Siri reports back to you in seconds. The more directions the devices receive, the better and faster they get at [fulfilling](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) our requests.

Voice assistants are improving all the time. They learn the same way people do. Have you ever asked a voice assistant for something and received results you didn’t expect? Each time this happens, the voice assistant learns from its mistake. If you say, “Alexa, play rock music,” and it plays country music, you’ll tell Alexa to stop. That teaches the [device](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) that the [command](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) it received from its [database](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) was wrong. It communicates that with the [database](https://www.wonderopolis.org/wonder/how-can-voice-assistants-understand-us) and tries to do better next time.

Voice assistants can do just about anything you can think of. They answer questions, make calls, and can even control parts of your[home](https://www.wonderopolis.org/wonder/how-does-a-house-become-a-smart-home) like the lights and thermostat!

**Key:** 1.-2: weather/ story/ pizza 3. signal word . 4. wakes up the device, 5. the pause 6. a database 7. commands 8. in seconds / very quickly 9. from their mistakes 10. light 11. thermostat

**5.Women plumbers**

Picture a plumber and you are probably envisioning a hulking man with a giant toolbelt tinkering with the pipes in your kitchen or bathroom. And that image is partly accurate, because plumbing is still very much a man’s world.

But today on the Conversation you’ll hear from two women who are passionate about plumbing.

But why the profession remains so stubbornly male and how they are working more women and girls into the trade?

Hattie Hasan has been a plumber for nearly 30 years. She started a network of female plumbers in the UK, and since it became a franchise business

-Hattie, welcome!

-Hello. Thank you

-Judaline Cassidy has worked on the pipes of some of New York City's most iconic buildings in a career that has spanned two decades. Judaline is also the founder of Tools & Tiaras, an organisation dedicated to introducing young women and girls to trade professions.

She is originally from Trinidad & Tobago.

Judaline, welcome!

-Thank you, Valerie.

* Now why has the plumbing industry remained so stubbornly male when great strides have been made for women in other traditionally male industries? Hattie?
* It’s a very difficult question to answer, because if you ask a male plumber, he’ll say: “What’s the problem? Why do you have to say you are a woman plumber? “. I think they need to see the problem so that they can begin to address it, rather than waiting for us, as women in the industry, already as a tiny minority, fighting against the tide all the time. That’s a problem that we face.

Judaline?

* I think part of the problem is visibility. So as a young girl watching the television or going to the movies and there is a scene with a plumber or a commercial they never use a woman in these roles. So you can’t be it, if you don’t see it. So I really believe we have to change that and I challenge people all the time when I speak to say why can’t you envision a woman in that role, in your movie that has a scene with a plumber, why it has to be that guy with the crack?

So I think that’s part of it, and then also I believe a huge part is in the schools. Girls don’t tend to sign up- and not only girls, but also a lot of guys also-don’t tend to sign up for plumbing, because society and the media and everybody always shows plumbers as beneath them. And that is part of the things that needs to change.

* **Hattie**, when you decided to get into the field, why plumbing?
* Not the usual route. I was 27 when I decided I wanted to do leave teaching and become a plumber. I wanted to do something with my hands. I knew it was going to be a trade, but I didn’t know which one. I thought about it for a bit, and I actually I harked back to my schooldays. I went to school in the seventies, I wasn’t allowed to do the subject I wanted to do. I wanted to do engineering, I wanted to do metal work. They wouldn’t allow me to do that, they’d say “You are a girl, those subjects are for boys, you have to choose between cookery, needle work, and all those things”. Very traditional. So when I had the choice and I started to think what do I actually really want to do, I remembered I wanted to engineering, I remembered I wanted to do metal work. I have a great affinity with water, I’m a water baby, I love water, plus it’s the stuff of life, isn’t it, so when you put all those things together, it had to be plumbing. And as soon as I started, like, immediately, the first minute, I knew that I made the right decision.

-Judaline? What compelled you to get into plumbing?

I’ve originally grown up wanting to be a lawyer, and I wanted to be wonder woman. And I grew up at my great-grandmother, so after I finished secondary school, I couldn’t afford to go to law school, like I wanted, because my grandmother passed away. So the trades was the next best option. (unSimilar to Hattie)***,*** at school I ended up doing boys’ classes, because I was not good at the things she was saying, the culinary, all those things. So I was actually put into technical drawing and the stuff that the boys did.

I was kicked out of typing, I still cannot type, so I think in secondary school I was kind of already in the trades without knowing it. So I decided to apply for electrical or plumbing. And in my mind I figured that in electrical you get shocked, in plumbing you get wet, so here I come. And just like Hattie, I actually almost instantly fell into love with it, because it works to my strengths. I love using my hands, I love solving puzzles - and plumbing is one of the biggest puzzles there is. It just works to those strengths that I have.

-Don’t you love water? Don’t you love the autonomy? It just wants to do what it wants to do. So to be able to control it is amazing. To get it to do the things that you want it to do. It’s amazing.

**Key:** Male 2. 30 3. franchise 4. Tools 5. problem

6. can’t see 7. sign up 8. engineering /metal work, 9. water

10. technical drawing 11. electricity, 12. hands 13. puzzles

**6. Women Nobel Prize winners**

A warm welcome to the Conversation, a programme that explores the successes and struggles of women around in the world. Each week we are bringing together two women from different countries who have a shared passion, profession or experience.

I’m Kim Chakanetsa.

And usually when my guests come onto the programme they are meeting for the very first time.

But my guests today met in Sweden, last December when they made history by winning two of the most prestigious awards in the world: the Nobel prizes for chemistry and physics.

Until last year, only 2 women had won the Nobel prize in physics. My guest, Donna Strickland became the third, ending a 55-year drought.

The award was given on her game changing work on high intensity laser pulses. You have probably never heard of Chirped Pulse Amplification, but it has helped create your smart phone and may also have helped correct your vision through laser eye surgery.

Donna is currently a professor in the Department of physics and astronomy at the University of Waterloo in Canada, where she runs her own laser lab.

-Donna, welcome!

-Thank you very much for having me.

**My other guest, Frances Arnold**, is professor in chemical Engineering at the California Institute of Technology (CELTEC). She is also director of Rosen Centre for Bioengineering. Frances was recognised for revolutionising how new enzymes are designed. Among other things, this breakthrough has allowed pharmaceutical companies to make drugs more cleanly and cheaply.

Frances became one of just 5 women who won the chemistry Nobel since the prize’s inception in 1901.

-Frances, welcome!

-Thank you. Delighted to be here.

-Given how few Nobel Prizes in physics and chemistry have been awarded to women, and that the 2017 prizes were criticised for being all male, how significant is it that you both won in the same year?

-Oh, it is beyond belief almost, having two women in one year is quite unprecedented, I believe it is the first time in the sciences, but it reflects the fact that women are flooding into these fields, engineering, biotechnology, chemistry, even more so in physics, and I think we’ll to see lot more prizes given to women.

- Now Frances, you were very much a female pioneer in your field of biotechnology, do you think there was a liberation in not fitting the stereotype of what a person in that field would look like, do you think it made you more daring, for example?

Well, I used my differentness to my benefit. In other words, all of us in science we want an audience, we want our work to get out there and be used by people, to be studied by others, and to let other people build on it. So you have to be storyteller, you have to go out and explain what you do in a way that gets other people interested.

I was so rare as a female chemical engineer, that I at least had their attention when I walked out to give a talk, and then I worked to try to keep that attention.

**Key: 1.** Success, 2. Last December, 3. Chemistry, 4. 2, 5. High intensity, 6. Smart phone

1. Laser lab, 8.chemical, 9.Designed, 10. Flooding, 11.Explain, 12. To keep

**7.The Space Era**

-Kat, what do you think really rivals the Moon landing?

**Speaker 1:**

-There's lots of things has actually been happening since the Apollo era. Obviously there was I think now we're going through a renaissance of space exploration and so privileged to be living in this time and age and be working in this sector that I can actually see it evolve, there's so many things that can I would definitely single out : astroid sample return missions because it's one thing to send a piece of kit to a planetary body that’s millions of miles away but it's completely another endevour to actually bring a sample back, so that is an amazing technological endeavor and that exoplanets is one of the reasons why I’ve gone so interested in astronomy, so I have a little love for them because they opened up my eyes that we are not alone in the universe because when we started discovering exoplanets you just realizing that in a teeny bit of space in a space of things, I couldn’t think of a better word right because it's so mesmerizing and then I think having exoplanets and knowing about them is definitely outpaving the future for exploration.

**Speaker 2:**

I think it's something that a lot of people heard about and I'm sort of pulling that definition of space exploration out a little bit but the thing that sticks out in my mind was that detection of gravitational waves. I mean suddenly we have this whole other way of being able to view our universe.

It's really remarkable, and again going back to the feat of human achievement of being able to do something for the first time I think the amount of human effort that went into that first gravitational wave detection really can't be understated. like we were talking decades and decades and decades, and generations of scientists to get to that point of that first detection and now we are seeing lots of them because yeah the first one is always the hardest to find and now they're doing upgrades even more to the instrument that detects them. And there is more in the future and who knows what we're going to be able to discover with entirely new way of being able to observe and explore our universe**.**

**Key:** 1. Space exploration, 2. Sample, 3. Planetary, 4. Bring back, 5. Astronomy

6. gravitational waves 7. Decades / human efforts 8. Generations, 9. Upgrades,

10. observing / exploring

**8.Rebooting**

**Speaker 1:**

First though, back to computers since it's probably the first thing you think of when someone mentions rebooting. But why is it that ***go to fix*** and why doesn't your microwave or your calculator ever need to reboot?

**Speaker 2:**

To understand why we spoke to Rob Miles he's a lecturer in computer science at the university of Hull. Rob's been working on computers for decades and Microsoft had honoured him as a most valuable professional for his services to IT.

**Speaker 1:**

So is it the case since the dawn of computer science that turning things on and off again is a way to fix a problem?

**Speaker 3: (Rob Miles)**

I don't think so, I think it got to be a problem when things got more complex. If you have a computer that runs a single program forever, and it only runs that one piece of code as perhaps even a single task

**Speaker 1:**

What kind of computer program would that be?

**Speaker 3:**

Okay, take, go back to cars the engine management system in your car is a program which is running that device, the program that runs inside your remote control and ***lets you sense your TV set*** to change channels that’s a single purpose embedded device.

Your microwave is another one, so these are all things that have a single program that does just one thing at a time and it's been written to do just that, and those kind of things because they’re sort of fairly simple they will run pretty much forever, whereas a modern computer where your changing your applications every few seconds perhaps and you're running several at once in ways that designers may not have quite foreseen, that's a bit more complicated.

**Speaker 2:**

that's where the trouble comes in and with these sort of newer devices

**Speaker 3:**

from my point of view it's to do with the fact that the computer has to respond to several things at once, so in any given instant you got signals from the mouse the network connecter, the graphics display unit, any other peripherals, printers and things you’ve got plugged in, and the job of the operating system is to basically orchestrate this lot. If things happen in the sequence it wasn't expecting or if there's one component written by someone who didn't quite follow the spec correctly, that component can then take longer to finish or interrupt something or reserve a resource and not release it in a way that means that degrades the way the OS works and then we have to think about rebooting that further down the track.

**Speaker 1:**

so is your is rebooting about kind of wiping the slate clean?

**Speaker 3:**

Pretty much exactly that. If you have your computer starts off with four gig of memory, say, and when you turn it on and the operating system loads, that four gig is one big lump of free space, then you start loading programs in and they start grabbing memory and releasing it, and over time that means that memory can get fragmented into several small areas of free space with areas of occupied space in the middle. Now the OS is actually pretty good tidying up after itself, but sometimes you can get programs that grab memory and never release it and these kind of issues can cause the amount of free memory to slowly decline and at that point the OS should step in and sort things out but sometimes it just can’t and sometimes a reboot is the way you fix it.

**Key:** 1: lecturer, 2. since they became more complex, 3. They ran simple programs /single tasks, 4. single purpose embedded device, 5. microwave, 6. changing your applications quickly and you're running several at once (in ways that designers may not have foreseen), 7. Signals from several parts/ applications 8. Their sequence 9. Becomes fragmented / free memory slowly declines 10. The OS (operation system)11. rebooting

**9.Concrete**

<https://www.theguardian.com/cities/audio/2019/mar/15/concrete-the-most-destructive-material-on-earth-podcast>

After water, concrete is the most widely used substance on Earth. If the cement industry were a country, it would be the third largest carbon dioxide emitter in the world with up to 2.8bn tonnes, surpassed only by [China](https://www.theguardian.com/world/china) and the US.

The material is the foundation of modern development, putting roofs over the heads of billions, fortifying our defences against natural disaster and providing a structure for healthcare, education, transport, energy and industry.

Concrete is how we try to tame nature. Our slabs protect us from the elements. They keep the rain from our heads, the cold from our bones and the mud from our feet. But they also entomb vast tracts of fertile soil, constipate rivers, choke habitats and – acting as a rock-hard second skin – desensitise us from what is happening outside our urban fortresses.

Our blue and green world is becoming greyer by the second. By [one calculation](https://www.vox.com/science-and-health/2018/5/29/17386112/all-life-on-earth-chart-weight-plants-animals-pnas), we may have already passed the point where concrete outweighs the combined carbon mass of every tree, bush and shrub on the planet. Our built environment is, in these terms, outgrowing the natural one. Unlike the natural world, however, it does not actually grow. Instead, its chief quality is to harden and then degrade, extremely slowly.

All the plastic produced over the past 60 years amounts to 8bn tonnes. The cement industry pumps out more than that every two years. But though the problem is bigger than plastic, it is generally seen as less severe. Concrete is not derived from fossil fuels. It is not being found in the stomachs of whales and seagulls.

Concrete is beloved for its weight and endurance. When combined with steel, it is the material that ensures our dams don’t burst, our tower blocks don’t fall, our roads don’t buckle and our electricity grid remains connected.

At times an unyielding ally, at times a false friend, concrete can resist nature for decades and then suddenly amplify its impact. Take the floods in New Orleans after Hurricane Katrina and Houston after Harvey, which were more severe because urban and suburban streets could not soak up the rain like a floodplain, and storm drains proved [woefully inadequate](https://www.theatlantic.com/technology/archive/2017/08/why-cities-flood/538251/) for the new extremes of a disrupted climate.

It also magnifies the extreme weather it shelters us from. Taking in all stages of production, concrete is said to be responsible for [4-8%](https://www.chathamhouse.org/sites/default/files/publications/2018-06-13-making-concrete-change-cement-lehne-preston-final.pdf) of the world’s CO2. Among materials, only coal, oil and gas are a greater source of greenhouse gases. Half of concrete’s CO2 emissions are created during the manufacture of clinker, the most-energy intensive part of the cement-making process.

But other environmental impacts are far less well understood. Concrete is a thirsty behemoth, sucking up almost a 10th of the world’s industrial water use. This often strains supplies for drinking and irrigation, because [75% of this consumption is in drought and water-stressed regions](https://www.nature.com/articles/s41893-017-0009-5). In cities, concrete also adds to the heat-island effect by absorbing the warmth of the sun and trapping gases from car exhausts and air-conditioner units – though it is, at least, better than darker asphalt.

It also worsens the problem of silicosis and other respiratory diseases.

**Key**: 1. Emission, 2. Roof, 3. Disaster (s), 4. Structure, 5. Elements, 6. Habitats, 7. Grey, 8. Very slowly, 9. Fossil fuels, 10. Weight, 11. Water, 12. heat island, 13. dark asphalt

1. **Carbon capture with air conditioners**

[Air-conditioning and fans](https://blogs.scientificamerican.com/plugged-in/the-air-conditioner-that-makes-electricity/) account for a full [10 percent of the world's electricity usage](https://www.iea.org/newsroom/news/2018/may/air-conditioning-use-emerges-as-one-of-the-key-drivers-of-global-electricity-dema.html). Or to put another way, "It's a lot of air you pump around."

(Roland Dittmeyer, a chemical engineer at the Karlsruhe Institute of Technology in Germany.) Another thing that takes a lot of pumping air around, he says, Carbon capture, "because the concentration of the CO2 in air is evidently quite low." Even though it’s enough to cause climate change, it’s only 400 parts per million.

So, he says, [why not retrofit air conditioners with modules that capture carbon](https://www.scientificamerican.com/article/could-air-conditioning-fix-climate-change/)? Several companies already make materials that strip carbon dioxide from the air. You'd then need to convert that captured CO2 into hydrocarbons—that’s an energy-intensive process. But Dittmeyer's vision is that we'd use clean, carbon-free renewable energy to power that step.

Do this on a large enough scale and you produce significant amounts of this synthetic, renewable oil. Dittmeyer and his colleagues calculated that if you outfitted the AC system of the Fair Tower, a large skyscraper in Frankfurt, with these carbon-capture devices, the building’s units alone could produce an estimated 15,000 barrels of synthetic oil a year.

The full write-up, in the journal Nature Communications, is called "Crowd oil, not crude oil."

If the idea gets traction, it could transform the devices that cool our homes and offices into machines that help cool the planet—or at least stop warming it up while chilling us down.

(Scientific American, 60-second Science)

**Key:** 1. chemical engineer 2. concentration 3. climate change, 4. 400, 5. modules, 6. strip, 7. hydrocarbons, 8. renewable, 9. oil, 10. skyscraper, 11, 15 thousand 12. homes, offices