

Q&A INTRODUCE A GIRL TO ENGINEERING

Questions about the Cars

Shrinidhi I. CA: *How many cars are made in a day?*

With 500,000 cars built last year we averaged just over 1300 every day

Kiara C.M. - California: *How many cars does Tesla make in a month?*

It depends on the month but with 500,000 cars built last year we averaged between 41,000 and 42,000 per month

Kayla P California: *How many cars do they produce a year?*

In 2020 we made about 500,000 cars.

Helena C. California: *How fast does a Tesla go?*

Our fastest car is the Model S Plaid, it can go 200mph (so... pretty fast)

Anonymous: *Which model takes the longest to build?*

The Model X, very complicated to build but REALLY cool so I think it's worth it :)

Melissa S, CA, 7th grade: *What is performance driving?*

Performance driving usually means going really fast around a complicated racetrack with lots of turns and elevation changes. There's a famous racetrack near Monterrey, CA called Laguna Seca where we sometimes test our cars performance. Bet you can find a video of us performance driving Tesla's if you look online!

Myleigh O (NV): *How long do you think It will take to understand how to build a Tesla Product?*

For one person it's pretty complicated and probably would take years. If you break the manufacturing process down to different steps and work with a team it's a lot faster.

McKenzie M. - Nevada: *What was the main problem Tesla had to overcome when making the Roadster?*

We didn't have the ability to make car bodies and other parts like steering wheels, seats, and so on so we had to work with parts from other cars and try to put them all together like a "Frankenstein" car. It was really hard and we ended up needing a bunch of do-overs to make it work the way we wanted.

Questions about Design

Sophie R. -California: *How many people does it take to design a car?*

There's over a hundred people at the design studio but we have a chief designer named Fanz Von Holzhausen who's responsible for being the main design brain behind it all.

Olivia T-California: *How do you come up with new car designs?*

We think about Safety first, then function, then looks, to make cars that will be safe, work great, and look awesome for years to come. We try NOT to look at how other companies have designed cars in the past and instead start from scratch (we call that first principals thinking).

Questions about Education

Aidsa. V - California: *How many years of college does it take to become an engineer?*

Most folks do it in 4 to 5 years for their Bachelors Degree. Add 2 -3 more for a Masters Degree.

Maizy M. -California: Do you need to go to college to have a good job at Tesla?

No, but you need to be able to show us you can do awesome things and solve hard problems (which college CAN help teach you). We think what you can do in real life is more important than your degree.

Lulyana T, NY: *Do you need to have a certain degree in college to work at Tesla?*

Nope, we need all kinds of people with all kinds of skills If you know the kind of problems YOU want to solve you can look at what college degree would help you get the skills you need to solve them, then see how it matches with what TESLA needs.

Emma M-California: *What's the best school to go to if you want to be an engineer?*

The specific school is less important than what you actually can do with the skills you learn.

Diva S (California): *What job would you have to get if you want to code something in TESLA?*

And what would you code? One example is the Self Driving team programs cars to drive themselves and work with AI a ton. Really cutting-edge stuff.

Akshara K - California: *How did you get to where you are today?*

What steps did you take, and what do you encourage us to do? If you pay close attention to the world around you, you will notice there are a lot of things that need to be done that NO ONE ELSE is working on. Find those "holes" and fill them yourself.

Gracie.Z - TX: *How do you prepare at a young age to learn how to be an engineer?*

Elise: What should I do now to get into engineering?

Questions about Engineers

Anonymous: *Do engineers also decide how to make the car look? Or is there a separate job for that?*

Engineers are an important part of the design team. One example is aerodynamics; the more aerodynamic the car is the smoother it "cuts" through the air and the more efficiently it can move. This translates to better range which is REALLY important.

Melia M. NY: *How does someone decide what kind of engineer they want to be?*

I'd start with looking at all the problems that need to be solved (and there's plenty to choose from). Then figure out which problems are most interesting to YOU, then figure out what kinds of skills you need to work on those problems. That way you get to work on things that are interesting to you specifically AND help make the world work better at the same time.

Saanvi R. - (CA): *Is there more Math or Science involved in Engineering?*

I'd guess more math. Science is more about discovering new knowledge, Engineering is more about applying the knowledge we already have to make awesome stuff and solve real world problems.

Neha S. ~ CA: *What kinds of engineers does Tesla hire?*

All kinds, but we prefer Talented, hard working ones who are passionate about our mission to accelerate the worlds transition to sustainable energy.

Questions for Envirolution

Ashmi S. - California: *How did Introduce A Girl to Engineering Day start? What was the reason behind it, like the history, if there is one?*

Introduce a Girl to Engineering Day is a National event. Four years ago, Tesla started celebrating this day by inviting 60 girls out to Gigafactory NV and asked Envirolution to assist with the hands-on activity. After that year we officially partnered on the event and Envirolution took over the main role of organizing the day. The day is focused around inspiring and empower young girls and showing them the possibility of engineering as a career. Statistically there are less female engineers than male so Introduce a Girl to Engineering Day is all about working to open those doors to females.

Tracy G - CA: *is it STEAM or STEM?*

It's both. STEAM: Science, Technology, Engineering, Art and Math. Adding the A for art is a bit newer, but an important part of the process.

Hope O. - California: *Are solar panels sustainable sources of energy for the whole country?*

Yes, they can be! They will be a little less effective in areas that are less sunny, but even on a cloudy day, solar panels can collect the sun's energy.

Addie L. Nevada: *How are the fossil fuel emissions different from battery emissions?*

There are two types of emissions; direct and life cycle. Direct emissions come from a tailpipe while life cycle refers to emissions from vehicle production to fuel. Fossil fuel emissions come from burning fossil fuel in engines and spitting out harmful gas (from the tailpipe of a car for example). Batteries don't have emissions themselves BUT you have to make the electricity to charge it (for example: burning fossil fuel at powerplants to make electricity means the emissions still happen, just at the powerplant instead of in the car engine). Best case scenario is to have a renewable energy source like solar charge your car AND the factory too, then you are a lot closer to true 0 emissions.

Questions about Expansion

Ava C: *Do you think Tesla will eventually expand to other forms of transportation like planes, boats etc?*

Maybe one day but we have our hands full with cars and trucks for now.

Aribella K: *Do you make rovers that can go to different planets?*

No, but Rovers need awesome batteries so maybe one day we will make PARTS for those rovers.

Questions about Factories

Ridhima K. - California: *How many factories does Tesla have?*

We have the Fremont assembly plant in CA, Gigafactory NV, Gigafactory NY, and Gigafactory Shanghai. We are building 2 new factories in Berlin and Austin right now and a bunch of smaller operations for manufacturing seats and other critical components in places like Fremont and Lathrop, CA. We ALSO have an operation in Tillburg (in the Netherlands). We also have the design studio in Hawthorn, CA (which isn't really a FACTORY per say but still a really important part of the company)

Abby T- Buffalo: *Has the power ever gone out in the factory? If so, what do you do?*

YES, one time a construction company made a mistake and dropped a crane on the powerlines that bring electricity to the Fremont, CA factory. We had to work super hard to get power back on as fast as we could but it shut everything down for a while.

Jessica Y. -CA: *What does the “giga” mean in “gigafactory” ?*

Giga is the Latin prefix for a BILLION (like we need to make billions of batteries). KILO = 1 thousand MEGA = 1 million GIGA = 1 Billion.

Hannah B. - Nevada: *Are there other factories than just giga-factories?*

Yup, our Fremont, CA factory is one and Elon has suggested that one day we might make TERA factories
TERA = 1 trillion

Myleigh O (NV): *How long did it take for the Tesla building to get built?*

Depends on which one, our fastest time to build a factory was less than 1 year (Tesla Shanghai factory in China).

Questions about Robots

Kayla P California: *How many many robots does it take to make one car?*

Hundreds and hundreds.

Helena C. California: *How many robots are in the factory?*

Hundreds and hundreds ;)

Alyssa G-NV: *Do you dress the robots up on holidays?*

No but I dressed up like a dinosaur last year. I joked that I was going to be fossil fuel one day ;)

Lily D. NV: *Has there been any malfunctions with the robots while creating cars?*

YES, all the time, that's one reason we need engineers and technicians so we can fix them when they malfunction.

Jasmine s. - Nevada: *How often do the robots malfunction?*

All the time! Takes a lot of hard working people to keep them running well.

Safety

Violet W. - CA: *How do you keep your employees safe, what health precautions do you take?*

We take safety very seriously and have a team called ENVIRONMENTAL HEALTH AND SAFETY who are responsible for making sure we work in as safe a manner as possible. They make sure everyone follows the safety rules, wears their protective gear, and thinks with a safety first mindset. Most important is to look out for each other.

Zia S: *How has tesla changed with Covid-19 and what are the workdays like for the employees?*

We had to start wearing masks, space out our desks, put up barriers on the manufacturing lines where people work next to each other, we have temperature scanners at all of the front doors so everyone gets checked on their way in to the factories and folks who CAN work from home do now. It's kind of a bummer to not get to see my team in person every day but if this is what it takes to keep everyone as safe as possible it's worth it and we can still do our jobs well and keep working towards the mission. Tesla is full of creative problem solving people; adapting to Covid-19 won't be the last hard problem we will have to solve :)

Questions about Solar

Prathithi N. - California: *Do the batteries and solar panels need special storage temperatures and conditions?* Room temperature is best but they can tolerate hotter or colder temps if they need to.

Mikayla W. - Nevada: *How much is it to go Solar? What happens if it's way too expensive for some people, how will you achieve your goal?*

It kind of depends on how big your house is and how much power you need. We have a calculator here <https://www.tesla.com/solarroof/design> that can give you a ballpark idea of the cost for your house. We are working really hard to make solar more affordable so more people can participate at every income level. If we are REALLY successful it might even become the cheapest option out there, then EVERYONE will do it.

Viola G: *Do you see tesla lowering the price of the cars and solar roofs, in order to stop global warming?*

YES, we've done this a bunch of times already and are working on newer even more affordable options right now!

Olivia C. - Nevada: *How expensive would a solar roof be? And would it be cost-efficient?*

It depends on the house but solar roof is generally cheaper than a roof AND solar together. Cost efficiency also depends on where you live, what's the cost of the power you buy from the power companies, but it's pretty easy to calculate if it's going to save you money in the long run. Here's a calculator if you want to check out your house: <https://www.tesla.com/solarroof/design>

Amanda F. - New York: *How well do solar panels work in the winter? Would a family be able to just rely on the energy that they made, or would they have to be able to get more?*

As long as they aren't covered by snow they work pretty well. Relying only on Solar is tricky, you'd need a lot of panels and a lot of batteries and that might get really expensive, so it's usually best to have more than one form of energy generation, like solar AND wind or solar AND a connection to the grid.

Ingrid G-Nevada: *How will we convince people who do not believe in Climate Change to switch to solar energy?*

Keep working on bringing the cost down so Solar is Cheaper than traditional energy. Then even if they don't believe in climate change they will do solar anyway :)

Olivia V, California: *Is everything at Tesla powered by solar energy?*

Not everything no, but we are adding more solar all the time so maybe one day!

Kaili M. - Nevada: *Is Tesla looking into a way to put solar panels on the cars so that you never have to stop to charge it?*

Adding solar to cars is tricky, there isn't enough surface area to make power to drive forever so you would need to stop eventually to charge up. The Cybertruck will have an option to have enough solar onboard to add 15 miles of range per day. Most Americans drive less than 40 miles per day so that's almost HALF of your fuel from onboard solar (pretty good start).

Kaili M. - Nevada: *What happens if you run out of solar energy and it's really cloudy?*

Turn on your Tesla batteries :)

Mira S: *Are the Tesla roofs really expensive? Or can most people afford them?*

Solar roof IS more expensive than a regular roof, but NOT more expensive than a roof + solar panels, so it's a great option for someone building a new house or replacing their roof altogether. Solar Roof also saves you money every month with the power it generates which can help pay for itself over time!

Questions about Superchargers

Lilly B: *How long can you use a supercharger before the energy for it runs out?*

Since it's connected to the grid the power shouldn't run out.

Aarna G. - CA: *Do Tesla superchargers work for other brands of electric cars?*

Not today but maybe one day we will all share the same charging technology and same stations.

Gracie T. (Nevada): *How fast does the supercharger charge?*

The newest ones can charge 1,000 miles of range back on a battery in about 1 hour.

Anika B. (California): *Just wondering, when using the supercharger, isn't there the possibility that the car's battery will overheat/combust? Just like the bucket can overflow? How do you monitor that?*

Totally, but we have a very intelligent battery management system that tracks the process and slows down the flow of electricity as the battery fills. Like your water bucket, if you want to top it off you have to slow down the flow as it gets to the brim or it might overflow. We also have a built in cooling system that kicks in if the batteries start to get hot.

Sophie R. -California: *Would there be a way to make a portable car charger?*

Yes, but you would need a big battery to connect it to. I might know were you could get one...)

Natalia S. (NV): *How long does a Tesla battery last in the car? When will you have to replace it? What do you do when you are done with them? Do you recycle them?*

The battery should last the life of the car, we don't really have replacements unless there's a malfunction. When they are at the end of life stage we will recycle the material in the batteries to make new ones.

Aarna G. - CA: *Is it possible to get electrocuted if you're charging your electric vehicle while it's raining?*

Maybe if a bunch of safety systems broke all at the same time; but we take safety VERY seriously (it's one of our core values) and have lots of insulation and failsafe precautions in place so this is SUPER unlikely.

Questions about Sustainability

Anonymous: *Are the machines that make the batteries and car parts also eco friendly or is that something that might happen in the future?*

It really depends on how the power to run them is generated. We are adding sustainable power generation as fast as we can but not every machine is connected to solar yet. We also put a lot of work into recycling chemicals and making super-efficient systems that require less power than older machines. More efficient is a good step towards more sustainable since it takes less resources to do the same job. We put a LOT of work into finding ways to make our packaging more sustainable too, like eliminating Styrofoam packing material (not great for the environment, hard to recycle) whenever we can.

Ava C: Do you have to replace tesla batteries if so are they sustainable and can they be recycled effectively?

Only if they malfunction and yes, very recyclable. They are full of really expensive metals which would be silly to just throw away. The tricky part is we haven't had a lot of our cars get super old yet so we don't have a lot of batteries coming back to practice recycling on, maybe this changes over the next 10 years, we will work hard to be ready.

Natalia S. (NV): Has Tesla considered other types of sustainable and renewable energy like hydroelectric or wind energy? Or is Tesla's main focus solar energy?

Tesla's main focus is solar but our batteries work with all kinds of power.

Prarthana B - California: Do Tesla cars last forever, and if they don't will they be recycled into new cars?

Not forever, but for a really long time. We have some recycling in place today but it will be a while before we see a lot of old cars and batteries coming back.

Lilly B: Does tesla recycle products?

Yes, we recycle a lot of scrap metal left over from the manufacturing process and we are working on how to best recycle old used up batteries when they start coming back to us one day (might be a while, the cars last a long time).

Tehann G. (Nevada): Do these companies reuse any broken pieces or just throw them away?

If the piece is totally broken we try to recycle the useful parts, especially if it's made out of metal.

Ayza L- Texas: Do you use rechargeable batteries?

Yes, otherwise it would take forever to refuel the car (imagine having to replace thousands of single use batteries by hand!) :)

Lilly B: Does Tesla create all of their own products or do they have a supplier? If they have a supplier, is the supplier eco friendly?

We make a lot of our own parts but still have hundreds of suppliers. We do work with many of them to ensure their contribution is as sustainable as possible.

Emma M-California: Does Tesla have any other ideas for cars or to save energy?

Yup wait and see :)

Jasmine s. - Nevada: Does Tesla have plans for making electric-powered buses or planes?

The Semi truck and Cybertruck are next in line but there's lots of ideas for other kinds of wheeled vehicles (even an ATV). I haven't heard about planes but never say never with Tesla.

Hannah B. - Nevada: Does the process of making batteries pollute the Earth more than the electric cars save it?

No, EV's are so much more efficient than combustion vehicles it makes a big positive difference.

McKenzie M. - Nevada: How energy efficient is a Tesla?

Depends on the model but over 90%

Jasmine s. - Nevada: What is Tesla's most climate-friendly car?

Hard to say but I think because it's so popular (so many people are driving it and contributing to our mission of sustainability) the Model 3 is up there.