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Tech Machines

Teacher's Guide





Tech Machines

Using active technology to learn how the world works

There's nothing young children find more exciting than the rough tough world of construction and transport. These machines are impressive in action, and the work they do is as big as it gets – drilling holes, digging roads, hauling dirt, and moving things by land, air and sea. Playing with models of vehicles is not only loads of fun for children – it also provides an ideal opportunity for them to learn about important aspects of the physical world and the way we interact with it.

Taking advantage of the special appeal that vehicles hold for children, and the wealth of knowledge children can acquire by playing with them, LEGO Educational Division has developed a brand new product called Tech Machines.

A complete learning solution, the Tech Machines set allows children to build unique models using special screwdrivers, and includes carefully designed problem-solving activities.

The activities described in this guide follow LEGO Educational Division's four-step approach to learning: **CONNECT, CONSTRUCT, CONTEMPLATE** and **CONTINUE**. This approach allows children to draw on their natural fascination with construction and different means of transport to learn all about mechanics and vehicle functions.

In addition, the set helps children develop their understanding of physical laws and their fine motor skills and kinaesthetic sense – while they work together to get the job done!

Learning how things work with LEGO® EXPLORE

Every product from LEGO Educational Division is designed to support and expand one of the four play worlds that comprise LEGO® EXPLORE, our new platform for pre-school products. Tech Machines forms part of **explore logic**, where the main goal is to help children explore how the physical world is put together and operates.

The set allows children to do so by encouraging them to use the models to solve practical problems relating to the world of construction and transport.





Key learning aspects

Tech Machines from LEGO Educational Division provides educators with a tool for not only helping the children in their care investigate their physical surroundings, but also for covering many aspects of early education curricula. Here are some of the key learning aspects:

- Exploring mechanics
- Investigating design features
- Discussing, planning, organising and testing ideas
- Developing communication skills
- Following instructions
- Sorting and classifying
- Strengthening cognitive skills
- Problem solving

Using Tech Machines in the classroom

This set contains everything you need to use Tech Machines in your classroom. Ideas for in-class learning activities are presented below, and these are organised around the special learning process supported by all LEGO Educational Division solutions. The **CONNECT** section helps you to link the activity to the children's previous knowledge, and to setting the scene, while the activity itself is presented under **CONSTRUCT**, the learning-by-making phase.

The **CONTEMPLATE** section provides "food for thought" relating to problems raised by the activity, and **CONTINUE** contains ideas for further play, generally at a more advanced level. The problem-solving activities are supported by child-centred illustrations and model suggestions.



Construction Helpers



CONNECT

A company that builds and mends roads has bought some new vehicles: a drill, a digger, and a truck. The vehicles have been delivered, but had to be taken apart to fit on the delivery truck. The foreman and his team now have to put the vehicles together and make sure they work, before sending them out on a job.



CONSTRUCT

- Start by discussing what the different vehicles are used for and how they work.
- Sort the vehicle parts into three piles – one for each vehicle.
- Construct the three vehicles.



CONTEMPLATE

- Test the vehicles to make sure they all have the right parts and work properly. Go through the list, testing each part to make sure it functions as it should. Test the digger shovel by lifting LEGO® bricks and placing them in some form of container. Does the drill work? Use the Tech screwdriver and find out. Does the shovel on the drill move? Can it shovel up some gravel? Does the body of the truck tip up and down? Put some bricks in the back and see. Do the wheels move on all the vehicles?
- Think about the real-life vehicles that your models are based on. How big are they? How fast or slowly do they move?
- What about the people who drive them? Why do they have to wear hard helmets?



CONTINUE

- Talk about vehicles that do other jobs or operate in different terrain – then build these. Think about what vehicles work best in the snow, on ice, in the jungle, and on bumpy roads.
- If possible, take a walk to a real construction site and observe which vehicles and tools are being used there.
- Experiment with taking photographs of your completed vehicles – perhaps while you are testing them.



CURRICULUM

- Transferring 2D to 3D
- Using tools appropriately
- Sorting and classifying
- Testing for a purpose



Stormy Weather



CONNECT

A power company has called in the Tech Machines team to help them repair damage caused by a storm. The team has to travel to a remote site a long way from any towns, but where power lines have come off their pylons. To make matters worse, the river Zee has burst its banks and flooded the access road, and even damaged a bridge. The team's mission: to inspect the bridge for damage and repair it, and to repair the power lines as soon as possible so that power is restored for the people living in the area.



CONSTRUCT

- Split up into two groups – one to build the scene and one to prepare the vehicles.
- Group 1: Prepare rescue vehicles for the operation. Think about exactly what kind of vehicles you will need. What kind of tools will be needed? Will any kind of special tyres be required?
- Group 2: Find a large tray of some sort and create the scene? Make the river and the flooded area, and place a bridge over the river. Remove one or two bricks from the bridge and leave them nearby, so the team can find them. Use objects you find outdoors to make the scene look more authentic – twigs can represent fallen trees, and pebbles can be used to make large boulders blocking the road. Decide what to use to make the pylons and use some string to make the power lines.



CONTEMPLATE

- Find some pictures of real emergency repair operations and try to find tools and other equipment that you did not include in your own operation.
- Electricity cables are dangerous. If there is no power, how will the people mend them? Talk about safety issues and how important it is to avoid dangers related to power lines etc.
- How did the team know where to find the flood? What if no one knew where the lines had fallen? Could a helicopter, for instance, be used to fly over the area and radio the team to let them know where to look for trouble?
- How can the flooded area be drained?



CONTINUE

- Change groups and recreate the settings and vehicles for carrying out the mission. Try to include the ideas and activities you just discussed to make this operation bigger and more successful than any other the area has ever seen!

CURRICULUM

- Planning and making
- Solving real-life problems
- Decision-making and cooperation
- Investigating mechanics for a purpose



A Day Out with Charlie and Fiona



CONNECT

Charlie the Chopper and Fiona the Flyer are having a very different sort of day. They usually carry workers and heavy equipment to remote areas where work needs to be done but access is difficult. Today they're going to the Smallville Annual Fair to give people rides for fun. This big fair has lots of stalls, competitions, brass bands, and bouncy castles – and of course ice cream and candy floss stalls.

Before giving rides, however, Charlie and Fiona will need to be altered slightly.



CONSTRUCT

- Build Charlie the Chopper and Fiona the Flyer taking the following points into consideration. How many people will they carry? Before they can give rides to people, both the helicopter and the plane will need extra room for a passenger. Design and make an extra seat.



CONTEMPLATE

- How do helicopters and airplanes take off and land? Can they do it in the same amount of space? Why or why not?
- Charlie and Fiona are nice – but they're noisy! Is there anything you can do to muffle the noise they make or keep the noise from disturbing people too much?
- How many passengers can a helicopter and a plane carry? Can you find ways to make room for more than one passenger?



CONTINUE

- Decide what time the rides will be offered and how much they will cost. Then, make tickets to sell!
- Plan and set up fairgrounds. Where is the best place for Charlie and Fiona to take off and land? Make sure that all the people attending the fair will be safe (for instance, build a barrier to keep people away from the airstrip).
- Make refreshment tents to serve food to hungry show-goers. Try making Flyer Fruit Juice and Chopper Cakes!
- Construct the airport where Charlie and Fiona park at night. Use other LEGO® sets and any materials you can find to help you.



CURRICULUM

- Sharing, listening, discussing, explaining
- Planning, hypothesising, testing, evaluating
- Sorting and classifying
- Investigating design features



Tony Saves the Day



CONNECT

Alpville is linked to Cliffville by a tunnel through the mountain. One day, Tony is driving his truck along the steep mountain road from Alpville, when he suddenly sees a huge pile of rocks blocking the road. He gets out of his truck to have a look and finds that both the road and the tunnel are blocked. This is serious – if people from Cliffville enter the long tunnel, they might not be able to turn around to get out again! What's more, Tony cannot deliver the food and other important supplies he is carrying to the people of Cliffville.



CONSTRUCT

- Help Tony and the Tech Machines team to clear the blocked tunnel by building the tunnel, preparing the vehicles they will use and sending them off on their mission.



CONTEMPLATE

- Discuss the materials you used to build the tunnel and create the rock slide. How are real tunnels built? Are there any other materials that might have helped you make your model tunnel?
- The people of Cliffville must be told very quickly not to use the tunnel. Think of a way to let them know about the trouble. Remember you cannot drive through the tunnel to tell the people of Cliffville – you will need to find another means of reaching them.



CONTINUE

- After Tony and the team have cleared all the rubble, they will need to transport it back down the mountain to Alpville. How will they do this? Can you dispatch other vehicles to help them out?
- Once the road is clear, you need to make sure the tunnel is safe. Build some kind of support to keep the tunnel from collapsing again.
- Once the rocks are cleared, the road surface will probably be left with a lot of mess and dirt, which could be dangerous for drivers, especially if it rains. Find a way for the team to sweep and wash the road.

CURRICULUM

- Discussing, planning, organising and testing ideas
- Solving real-life problems
- Using language to imagine and recreate roles and experiences
- Constructing with a wide range of materials



Visit our web site for more activities!

For more information about how to use Tech Machines in the classroom, and for a wealth of additional activities and information about LEGO Educational Division's unique learning philosophy, please visit our web site at www.LEGO.com/education.



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