

# Frequently Asked Questions (FAQ) about LEGO® MINDSTORMS® Education

(version 1.1)

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<b>Hardware</b>	
1. <i>How many motors are there in the MINDSTORMS Education Base set (9797)?</i>	3 motors.
2. <i>How many sensors are there in the MINDSTORMS Education Base set (9797)?</i>	2 touch, 1 light, 1 sound and 1 ultrasonic.
3. <i>What is a servo motor?</i>	An electric motor whose speed or position is controlled by a closed loop feedback circuit that can sense its position. The speed of the motor is measured by a tachometer. The tachometer produces a voltage that is proportional to the speed. This voltage is compared to a reference point and the difference, or error, is used to adjust the speed of the motor, either up or down.
4. <i>What is the usability of the USB port in the NXT brick?</i>	The USB port is a "slave" which means that it can only communicate with USB "master" ports, e.g. computers. The usage of the USB port is for fast download from pc to the NXT brick via USB cable (included in 9797 Base set).
5. <i>What is "on-brick programming"?</i>	Using the dot matrix display of the NXT Brick, it is possible to make simple programmes without using a computer at all. For one program, it is possible to define 5 steps/actions represented by predefined icons on the display. The icons include motor output (drive forward/backward, turn left/right), sound output, sensor input, wait for time).
6. <i>Is it possible to connect more motors or sensors to the same input/output port like on the RCX?</i>	No.
7. <i>Why is the piece count of MINDSTORMS Education Base set (9797) so higher compared to the existing Robo Technology (431 vs. 240)?</i>	Due to the TECHNIC building system of the NGM Base Set (9797), there are many small building elements (different connectors) that are used to connect beams etc.
8. <i>What is the converter cable used for?</i>	The converter cable makes it possible to connect lamps to the NXT brick. In addition, it also allows sensors and motor from the existing platform to be connected to the NXT brick .
9. <i>Is the new light sensor better than the existing one?</i>	Yes. The new light sensor is much more sensitive and therefore more precise. It is also possible to turn off the infrared light source so that the sensor only measures ambient light from the surroundings
10. <i>Is the new touch sensor better than the existing one?</i>	No. The only functional difference is that the new touch sensor has hole for an axel in the moving part.
11. <i>Why has LEGO changed the building system for the new product (from traditional SYSTEM bricks to TECHNIC beams)?</i>	The TECHNIC building system is ideal for fast and sturdy building of 3D models which is why this is has become the preferred building system for MINDSTORMS.
12. <i>How easy will it be to use SYSTEM bricks from existing sets with new TECHNIC building system?</i>	It will be fairly simple though it will take some practice. By having a larger number of SYSTEM bricks in the 9797 Base Set that also are used in the building instructions, LEGO Education will proactively support this possibility.
13. <i>Will the NXT brick be open source for alternative software programming applications like Java, NQC, Visual Basic, etc.?</i>	Yes. It has been a priority to make the new MINDSTORMS platform as open source as possible. A Software Developers Kit will probably be available.
14. <i>Is the rechargeable battery as powerful as 6 x AA batteries?</i>	Not quite. The rechargeable battery will deliver the same max output but the durability is slightly lower. However, this is compensated for by utilizing the power better than standard AA batteries.
15. <i>What is the charge time and conditions for the rechargeable battery?</i>	Being a lithium battery it can be charged in small chunks without damaging the battery. The full charge time for a flat battery is expected to be 4 hours using the existing charger (9833). The battery cannot be damaged by overcharging.

<p>16. Will the NXT brick accept rechargeable 9-volt AA batteries, and if it will, can they be recharged within the NXT with the 9833 or any third party charger?</p>	<p>Yes, the NXT can be powered by standard AA rechargeable batteries. But no, these batteries cannot be recharged within the NXT since the A/C plug for the charger is situated on the rechargeable lithium battery and not on the NXT itself.</p>
<p>17. What charger is need for the rechargeable battery?</p>	<p>The existing charger (9833) is fully compatible with the rechargeable battery. Third party chargers may also be compatible but with no guarantees.</p>
<p>18. Will LEGO release list of acceptable/compatible third party devices or the technical specs necessary for customer to make decision – plug type, size, charging recommendations, those types of details?</p>	<p>No, LEGO is not likely to make a list of compatible third party devices since this would be a lot of work. However, LEGO is likely to provide relevant technical specifications of all hardware once these are available.</p>

<p><b>Software</b></p>	
<p>19. What is Robot Educator?</p>	<p>By use of approx. 40 animated tutorials, Robot Educator will step-by-step take the user through all areas of the programming software. The in-build progression makes it possible for the teacher to focus on selected areas/functions that match student capabilities and curriculum needs. Robot Educator can also be used as help function. When activated (i.e. not hidden), Robot Educator takes up 1/3 of the screen (on the right hand side).</p>
<p>20. Why does the new MINDSTORMS Education software not contain data logging capabilities (like Investigator in ROBOLAB)?</p>	<p>In order to get the full curriculum potential out of data logging, LEGO Education is developing new, independent software in a different programming environment (launch 2007). This product will be heavily supported by curriculum activities and have new hardware features.</p>
<p>21. What will the new MINDSTORMS Education software look like?</p>	<p>Icon-based but without many “sub” icons like in ROBOLAB. A split between ROBOLAB and RIS 2.0. There will only be one level into the software (as opposed to Pilot, Investor and Investigator in ROBOLAB) but progression will instead be in Robot Educator and in the choice of two different programming palettes. In general, the new software will be more intuitive and user-friendly compared to ROBOLAB.</p>
<p>22. Is there any progression in the new MINDSTORMS Education software?</p>	<p>Yes. The progression is less strict and more natural than in ROBOLAB. In Robot Educator, the many tutorials offer easy accessible progression both in software and model building. The choice of two different programming palettes (one with only 7 available programming icons – the other with all icons) also provide in-build progression.</p>

<p><b>Communication/Bluetooth</b></p>	
<p>23. What is Bluetooth?</p>	<p>Bluetooth is a technical industry standard of short-range radio technology that facilitates communication between wireless devices such as mobile phones, PDAs (personal digital assistants) and handheld computers, and wireless enabled laptop or desktop computers and peripherals. Once the connection between two devices is established (and approved), no third device can interfere. Bluetooth communication does not require eye of sight and can have a range up to 30 meters (and probably more).</p>
<p>24. What can Bluetooth in the NXT brick be used for?</p>	<p>Bluetooth enables the NXT to communicate wireless to all devices with Bluetooth capabilities, e.g. computers, other NXT bricks, mobile phones and PDAs. Exclusive to the MINDSTORMS Education software, Bluetooth also enables the computer to communicate to several NXT bricks at the same time (classroom management). With Bluetooth, two or more NXT bricks can exchange programmes and sound files, and a NXT can be remote controlled by a mobile phone.</p>
<p>25. How far can Bluetooth in the NXT brick reach?</p>	<p>Up to 10 meters as a minimum, but it is very likely to have longer reach.</p>

<i>26. Can Bluetooth communication between the NXT brick and the computer be interrupted or disturbed?</i>	No. When two devices first have accepted to communicate with each other via Bluetooth, this signal cannot normally be interrupted by a third device.
<i>27. Is it possible to safeguard the NXT brick from being “hacked” by others using Bluetooth communication (e.g. during competitions)?</i>	Yes. The NXT brick can operate with “invisible” Bluetooth which means that it can communicate only with selected devices while no other devices will be able to “see” it. Alternatively, Bluetooth on the NXT brick can be switched off completely.
<i>28. Why use a USB cable to connect the NXT brick to the computer when there is Bluetooth communication?</i>	The USB cable ensures a fast and easy-to-use connection between NXT and computer that does not require any Bluetooth capabilities in the computer.
<i>29. Will there be any additional hardware necessary to access the Bluetooth capabilities of the NXT brick from already Bluetooth capable computers?</i>	No. Computers with in-built Bluetooth communication will be able take full advantage of the capabilities in the NXT brick without additional hardware being needed.
<i>30. How can I get full benefit of Bluetooth in the NXT brick when my computer does not have Bluetooth capabilities?</i>	You can give your computer Bluetooth capabilities by using a Bluetooth dongle. A Bluetooth dongle is a small device that is easily plugged into the computers USB port (similar to a USB memory stick). A compatible Bluetooth dongle will be available in the LEGO Education assortment.
<i>31. Will any third party Bluetooth dongle be compatible with the NXT brick?</i>	Most Bluetooth dongles will probably be compatible but LEGO Education cannot take responsibility of the functionality of any third party product. Hence, it is strongly recommended that the LEGO Bluetooth dongle is always used.
<i>32. Will there be software drivers needed for the NXT brick to use the USB cable?</i>	No. All the needed drivers will be available once the MINDSTORMS Education software is installed on the computer.
<i>33. PDA/mobile phones are listed as compatible Bluetooth devices – will the MINDSTORMS software run on these devices?</i>	No. The MINDSTORMS programming software is not meant to be operational on such devices. The level of communication/interaction between the NXT and a PDA/mobile phone is determined by the local software available on these device.

### **Compatibility to existing MINDSTORMS products**

<i>34. Will the new MINDSTORMS Education software be able to communicate with the RCX (backwards compatibility)?</i>	No. But the existing sensors and motors can be used together with the new NXT brick via a converter cable (only from the MINDSTORMS Education software).
<i>35. Why can the new MINDSTORMS Education software not communicate with the RCX (backwards compatibility)?</i>	This type of backwards compatibility has proved impossible to implement without compromising the ambitions for the new software and hardware technology. Hence, in order to maximise the user experience on the new MINDSTORMS platform now and in the future, this feature has been left out of the new software.
<i>36. Is it possible to mix the new MINDSTORMS hardware with the existing?</i>	Yes. By using a converter cable, the existing sensors and motor can be operated from the new NXT brick.
<i>37. Will ROBOLAB be able to communicate with the new NXT brick (forward compatibility)?</i>	Most likely. This will require a ROBOLAB software upgrade which presumably can be used by all ROBOLAB versions in all languages.
<i>38. Will the ROBOLAB upgrade be able to utilise all features of the new hardware platform?</i>	Probably not. Some features such as Bluetooth communication may not be available when using ROBOLAB together with the new hardware.
<i>39. Why is forward compatibility in ROBOLAB (communication to NXT brick) the best compatibility solution between existing platform and the new MINDSTORMS?</i>	Allowing ROBOLAB to communicate with the NXT brick and other new hardware enables teachers to do step-by-step migration while staying in “safe” software environment. Since both hardware platforms can be used in the classroom at the same time, the schools investment in new hardware can be phased over time.

<p>40. <i>What will be done in order to help existing users to migrate to new MINDSTORMS platform?</i></p>	<p>The existing platform will continuously be supported (until end of 2009) so that existing users have time to migrate. Forward compatibility in ROBOLAB will allow users to use new hardware with ROBOLAB and thereby offer step-by-step migration. A migration community web site will provide help and support to existing MINDSTORMS users. Literature (e.g. by Eric Wang) will help transition from ROBOLAB to MINDSTORMS Education software.</p>
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<b>Retail differentiation</b>	
<p>41. <i>Is the MINDSTORMS Education software identical to the retail?</i></p>	<p>The programming language itself is the same but many other software elements are unique for the educational software, e.g. Robot Educator (see separate description), advanced Bluetooth communication and use of existing sensors/motor.</p>
<p>42. <i>What are the educational benefits of the MINDSTORMS Education Base Set (9797) compared to the retail set (8527)?</i></p>	<p>A rechargeable battery, extra touch sensor, converter cables, lamps, storage solution with sorting trays, different selection of LEGO building elements,</p>
<p>43. <i>What is the total piece count in the new MINDSTORMS Education Base set (9797) compared to the retail set (8527)?</i></p>	<p>The Education Base Set has 431 pieces whereas the new retail set has 570.</p>
<p>44. <i>Are the educational and retail NXT bricks identical?</i></p>	<p>Yes.</p>
<p>45. <i>How do the LEGO building elements in the MINDSTORMS Education Base Set (9797) differ from the retail set (8527)?</i></p>	<p>Larger number of traditional SYSTEM building elements, more wheels in different sizes, 3 lamps, LEGO figure.</p>
<p>46. <i>How will the models be different between schools and toy stores?</i></p>	<p>In the classroom, the models will be less time consuming to build and more functional in order to teach students about technology, science and maths. The models will reflect real-life/industrial robots and have a modular (step-by-step) progression.  In the toy stores, the models will be large and impressive but complicated (time consuming) to build. The models include a humanoid robot, a scorpion and a robot arm.</p>

<b>FLL and other competitions</b>	
<p>47. <i>Will it be possible to participate in the FLL 2006 challenge on the new MINDSTORMS platform?</i></p>	<p>Yes. The 2006 Challenge will be designed for the existing platform, but it will be up to each team to decide what platform to participate on. Teams participating with the new product will, however, be handicapped due to minimal preparation time.</p>
<p>48. <i>What MINDSTORMS sets (both educational and retail) will be needed in order to participate in FLL on the new platform?</i></p>	<p>Participation in FLL will require either the MINDSTORMS Education Base Set 9797 + the add-on resource set 9648, or the retail MINDSTORMS set 8527.</p>

<b>Other questions</b>	
<p>49. <i>How long will LEGO Education support ROBOLAB and the existing hardware (RCX)?</i></p>	<p>LEGO Education and partners are committed to keep supporting the existing hardware and software until the end of 2009.</p>
<p>50. <i>What size storage will the 9797 Base Set come in?</i></p>	<p>Medium storage (slightly higher than existing green storage). The 9648 Add-on Resource Set will also come in a medium storage.</p>