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1	Grade	Category	Project	Comments
2	All Ages	Biomaterials/Polymer Medicine	Design a water proof cast	One of the greatest challenges of patients who need a cast is that they cannot get it wet.
3	All Ages	Biomaterials/Polymer Medicine	Imitate the structure of a puffer fish to develop a system for delivering medicine to a wound. (Consider adding features to a balloon that cause spikes to open and deliver medicine.)	This would be a real breakthrough! If a doctor could place a balloon in a wound and then have medicine flow through small spikes into the patient's wound, this may cause wounds to heal faster!
4	All Ages	Biomaterials/Polymer Medicine	Improve the design of nasal gastric tubes.	Sample Project: Nasal Gastric tubes require repetitive flushing/cleaning; can this be done automatically?
5	All Ages	Biomaterials/Polymer Medicine	Design a multifunctional surgical instrument that can cut tissue and remove thin slices using a pincer arrangement in a single instrument.	Could you combine two other features commonly used by surgeons?
6	All Ages	Biomaterials/Polymer Medicine Cardiovascular/Soft Tissue Wound Healing Musculoskeletal	Design a casting method for the creation of boots for patients with diabetes.	Hint: Try total contact casting! Helpful Link: http://www.youtube.com/watch?v=a4LJdGHbba
7	All Ages	Biomaterials/Polymer Medicine Clinical Trials Health/Medicine Modeling/Simulation	Develop a study to investigate the role of herbal products, clove oil, turmeric and neem extract on the prevention of periodontal disease.	Helpful Link: http://www.usc.edu/CSSF/History/2006/Projects/J1327.pdf
8	All Ages	Biomaterials/Polymer Medicine Health Medicine Modeling/Simulation	Develop a study to compare the antioxidant effects of natural and synthetic preservatives.	Helpful Link: http://www.virtualsciencefair.org/2010/songxa2
9	All Ages	Biomaterials/Polymer Medicine Health/Medicine	Develop a study to compare dental cements.	Hint: Compare materials that cure via catalyst and light!
10	All Ages	Biomaterials/Polymer Medicine Health/Medicine Modeling/Simulation/Medical IT	Develop an experiment to test via human circulation cycles, if your body temperature can tell the time of day.	Helpful Link: http://www.sciencebuddies.org/science-fair-projects/project_ideas/HumBio_p020.shtml
11	All Ages	Biomaterials/Polymer Medicine Health/Medicine Sensors/Imaging	Assess the merits of various gel-like materials for use with ultrasound or EKG probes.	Does honey work as well, or are there other gels that freely available in Third World countries that could work equally well?
12	All Ages	Biomaterials/Polymer Medicine Modeling/Simulation/Medical IT Musculoskeletal	Develop a model to simulate bone degeneration.	Hint: Hard setting foam is a helpful material!
13	All Ages	Biomaterials/Polymer Medicine Modeling/Simulation/Medical IT Musculoskeletal	Develop a mechanical model of the knee.	Sample Project: Examine how different weight bearing situations affect the risk of injury. Consider making a model of a knee using elastic bands and wood.
14	All Ages	Biomaterials/Polymer Medicine Musculoskeletal	Design an experiment to test different materials, and determine which has the properties most similar to bone.	Hint: Bending, breaking strength etc.!
15	All Ages	Biomaterials/Polymer Medicine Sensors/Imaging	Design clothing that monitors/responds to body temperature.	Sample Project: Design clothing that regulates changes in body temperature, to prevent hypo/hyperthermia.
16	All Ages	Cardiovascular/Soft Tissue Wound Healing	Design a suturing system based on the way a grapevine tendril wraps itself around a fence wire.	A faster method of suturing would effect every surgery performed.
17	All Ages	Cardiovascular/Soft Tissue Wound Healing Modeling/Simulation/Medical IT	Design a model to simulate how the diameter of a blood vessel is related to the flow rate, in order to examine the various aspects of atherosclerosis.	Hint: Bernoulli's Principle applies!
18	All Ages	Cardiovascular/Soft Tissue Wound Healing Sensors/Imaging	Design a monitoring system that measures how long patients remain in one position while sleeping, to prevent the occurrence of bed sores.	This would be a great electronics project with the Arduino software. You can check out a related project at http://michaelabrahamsen.com/09/2010/semester-project/
19	All Ages	Clinical Trials	Compare and contrast the effects of temperature and humidity on heart rate during exercise.	Are some conditions better to exercise in than others?
20	All Ages	Clinical Trials	Will frequent texting affect the fingers?	In the U.K. more than 1 billion text messages are sent every week.
21	All Ages	Clinical Trials	Research the onset of diabetes in different second generation immigrant groups.	Are the children of immigrants more susceptible to diabetes?

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22	All Ages	Clinical Trials	Create a faster suturing method.	This would be huge - there are millions of surgeries every day, nearly all of them require some type of suturing.
23	All Ages	Clinical Trials	Develop an easier way of replacing the wire in braces.	Going to the orthodontist isn't any fun.
24	All Ages	Clinical Trials	Design a new method of putting restraining rubber bands on braces.	Could a new tool be developed to make this process easier?
25	All Ages	Clinical Trials Cardiovascular/Soft Tissue Wound Healing Health/Medicine Sensors/Imaging	Design a shoe that senses when "too much" pressure falls on a particular part of the foot (anything over 60 mmHg).	Hint: Think of both the plantar and dorsal surfaces of the foot!
26	All Ages	Clinical Trials Health/Medicine	Develop an automatic pill dispenser.	Sample Project: Patients with high blood pressure and heart failure take many pills. Can this be simplified?
27	All Ages	Clinical Trials Health/Medicine	Research the effects of ginger on digestion.	Natural remedies are always better!
28	All Ages	Clinical Trials Health/Medicine	Research the effects of turmeric as an antibiotic.	Many cultures use turmeric to clean their meat and fish
29	All Ages	Clinical Trials Health/Medicine	Design a new method to help people stop snoring.	Sample Project: Create a mouth guard that reduces snoring.
30	All Ages	Clinical Trials Health/Medicine	Develop an experiment to test whether the major supplements available at health and nutrition stores actually increase muscle enhancement.	Hint: Recruit the football team, and work with a nutritionist to monitor protein intake!
31	All Ages	Clinical Trials Health/Medicine	Develop a study to compare generic to name brand medications.	Think about the different aspects of medication- size, components, dissolve time- that need to be tested.
32	All Ages	Clinical Trials Health/Medicine	Develop a new and improved method to help smokers quit.	There are many programs out there, and they don't all work - think outside the box.
33	All Ages	Clinical Trials Health/Medicine Musculoskeletal	Develop a study that uses an AmmSensor to monitor movement during sports/physical therapy.	Helpful Link: http://www.ammsensor.com/
34	All Ages	Clinical Trials Modeling/Simulation/Medical IT	Design a program or system that can unobtrusively study dementia patients.	People act differently when they know they are being watched
35	All Ages	Clinical Trials Musculoskeletal	Design a game to be used for speech therapy.	This could help children with speech impediments open up to therapists.
36	All Ages	Clinical Trials Musculoskeletal	Develop customized musical instrument supports for patients in wheelchairs.	Create a mount that could work for a various array of instruments.
37	All Ages	Clinical Trials Musculoskeletal	Design a device for turning pages to help patients with disabilities read.	The challenge will be the devices ability to only flip a page at a time.
38	All Ages	Health/Medicine	A sticky backed roll of exam table paper that won't slip around when a patient sits on the table.	It still needs to come off cleanly and quickly!
39	All Ages	Health/Medicine	Create a device that sterilizes teeth.	Could possibly utilize drug release technology or UV light sterilization
40	All Ages	Health/Medicine	Create a system for warming saline bottles for use during abdominal surgery.	Be sure to not over heat the saline!
41	All Ages	Health/Medicine	Create an exercise device to combat muscle atrophy for hospital patients or astronauts.	After returning from a 211 day mission in 1982 a team of Soviet cosmonauts were unable to walk and had to go through extensive physical therapy to regain their strength
42	All Ages	Health/Medicine	Design face masks to protect astronauts from breathing fine lunar dust. Note that lunar soil has very fine particles.	This problem is similar to that faced by many miners. Read up about lung silicosis!
43	All Ages	Health/Medicine	Develop a game for astronauts to relieve stress during long-duration space missions.	The game should not have pieces that can get lost in a microgravity environment.
44	All Ages	Health/Medicine Modeling/Simulation/Medical IT	Design an electronic menu for ordering food in hospitals.	Sample Project: Create a menu that knows a patient's history, and only displays meal options that are appropriate when patients require strict dietary control.
45	All Ages	Health/Medicine Modeling/Simulation/Medical IT	Develop a study to determine if drinking water from a bottle by mouth, or straw will contaminate the remaining water more with bacteria from the mouth.	Helpful Link: http://www.usc.edu/CSSF/History/2005/Projects/J1302.pdf
46	All Ages	Health/Medicine Modeling/Simulation/Medical IT	Design an experiment to test how the digestion of protein differs at various pH levels. Please do not use corrosive pH levels in your study.	Hint: Experiments with agar gel can be used!
47	All Ages	Health/Medicine Modeling/Simulation/Medical IT Musculoskeletal	Design an office chair that can help reduce back/neck pain.	Find out how our spine should ideally be, and why people experience back/neck pain. Then focus on a design that will not put tension on the back or neck.
48	All Ages	Health/Medicine Musculoskeletal Sensors/Imaging	Develop a device that allows quadriplegic patients to take pills without assistance.	Hint: Movements originating from the neck upwards can be used!

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49	All Ages	Health/Medicine Sensors/Imaging	Design a device that detects sleep apnea, or an alarm to prevent sudden infant death syndrome (SIDS).	Some people don't even realize they have sleep apnea until their partner notices.
50	All Ages	Modeling/Simulation/Medical IT	Make a working model of the human knee.	Be creative.
51	All Ages	Modeling/Simulation/Medical IT	Design a game (could be a board game or a computer game) that is fun and playable for both sighted and blind people.	The game should bring sighted and blind people together.
52	All Ages	Modeling/Simulation/Medical IT Musculoskeletal	Create and build a voice-controlled household appliance.	This would be helpful for disabled people.
53	All Ages	Modeling/Simulation/Medical IT Musculoskeletal Sensors/Imaging	Design a GPS device that can be used by patients with limited or no vision.	Helpful Links: Android App Inventor: http://appinventor.googlelabs.com/about/
54	All Ages	Musculoskeletal	Create a simple way for fastening a back brace onto a person with a fractured spine.	If the person has to fasten the brace by themselves their backs cannot be stressed.
55	All Ages	Musculoskeletal	Create a device that reduces the stress on a drummer's wrist when he or she drums.	Drummers can get Carpal Tunnel Syndrome at a young age as a result of the stress on their wrist when drumming.
56	All Ages	Musculoskeletal	Make a parachute deployment system that causes less stress on the body.	Make it possible for elderly people to sky dive!
57	All Ages	Musculoskeletal	A way to splint a fractured arm/leg when they have a laceration which also needs care.	Think multiple pieced splints and/or inflatable splints.
58	All Ages	Musculoskeletal	Design a household feature that allows for easier wheelchair access. Sample Projects: Adjustable counter heights, washers and dryers with relocated controls, redesigned refrigerator with automated movement of shelves etc.	In 2011, Harison Bhanoo, a 6 th grade student from Notre Dame Elementary School designed an "E-Z shelf". This allowed wheelchair users to widen a corridor in their house by raising a shelf using pulleys and cables.
59	All Ages	Musculoskeletal	Develop a portable device that can be used to provide wheelchair access to different buildings.	Study how wheelchairs currently access buildings
60	All Ages	Musculoskeletal	Design a device that enables dressing without hands, for patients with upper-limb amputations.	Don't choose something too easy (like using elastic bands for shoe laces). Try to think of examples that would be a challenge – as an example, how would you connect a zipper on a ski jacket if you only had one hand?
61	All Ages	Musculoskeletal	Redesign daily household items for patients with arthritis.	Sample Projects: Gear shifters, hairbrushes, gas pump handles etc.
62	All Ages	Musculoskeletal	Design weight training equipment for patients with amputations.	Hint: Pick a specific type of amputation, and focus on a design for that specific condition!
63	All Ages	Musculoskeletal	Modify the design of crutches for increased comfort. Sample Project: Does weight bearing always need to occur at the axillary (underarm) region?	Study where the most weight is placed
64	All Ages	Musculoskeletal Sensors/Imaging	Design a recharging device for hearing aids.	Typically, hearing aids take disposable batteries.
65	All Ages	Sensors/Imaging	Design earplugs that block out harmful noises but still allow a person to hear someone talking	This could be a form of active ear protection that only cancels out noises above a certain decibel level
66	All Ages	Value-Driven Engineering	Create a low cost post surgery knee brace for ACL repair patients	The current knee braces to ACL patients are very expensive.
67	All Ages	Value-Driven Engineering	Create a low cost way of making dental retainers.	How many kids do you know that threw their retainer away on a school lunch tray?
68	All Ages	Value-Driven Engineering	Design a chair that is easier for elderly people to get out of that does not involve electric motors	Think mechanical levers.
69	All Ages	Modeling/Simulation/Medical IT Musculoskeletal Sensors/Imaging	Complete a computational reconstruction of knee function.	Hint: MRI and CT scans require the development of non-metallic testing frames that can be utilized to position the knee and induce muscle activity with the knee in the scanner. You can also develop frames for validation of these techniques.
70	Grades 11-12	Biomaterials/Polymer Medicine	Design a band-aid that does not stick to latex gloves	What adhesives don't stick to latex?
71	Grades 11-12	Biomaterials/Polymer Medicine Cardiovascular/Soft Tissue Wound Healing Musculoskeletal	Design a self-shifting seat cushion to prevent bed sores.	Bed sores are a huge problem in nursing homes.
72	Grades 11-12	Biomaterials/Polymer Medicine Modeling/Simulation/Medical IT	Assess effects of knots on suture strength and develop a model to predict failure point.	This could be used to determine the number of sutures needed.
73	Grades 11-12	Biomaterials/Polymer Medicine Musculoskeletal	Design a new artificial ankle joint for patients with arthritis	Many problems exist with current technology such as an extremely complicated installation surgery.
74	Grades 11-12	Cardiovascular/Soft Tissue Wound Healing Sensors/Imaging	Study and identify different techniques that could be used to recharge a pacemaker, to reduce invasiveness.	Think about how pendulum watches work.
75	Grades 11-12	Clinical Trials Modeling/Simulation/Medical IT	Assess risk of diabetes according to school menu lists.	Cafeteria food choices and adolescent obesity are currently a hot topic.
76	Grades 11-12	Health Medicine Modeling/Simulation/Medical IT	Write a computer program that models patient wait times in various clinical settings.	For example, in a physical therapy setting.
77	Grades 11-12	Health/Medicine	Design an operating room that has no equipment that rests on the floor.	Keep in mind surgeons will need to move about the room freely and unrestricted.

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78	Grades 11-12	Health/Medicine Modeling/Simulation/Medical IT	Create an app for a smart phone that will monitor for an unborn baby's heartbeat.	The app could also alert doctors if the baby is in danger
79	Grades 11-12	Health/Medicine Modeling/Simulation/Medical IT	Write a Matlab program to predict bone loss (or strength loss) during space missions of varying durations.	Muscle atrophy is a huge problem for astronauts!
80	Grades 11-12	Health/Medicine Modeling/Simulation/Medical IT	Use Lego Mindstorm to monitor if a patient is taking his/her pills and send text/sms to a hospital database which remotely monitors patient compliance.	Helpful Links: Android App Inventor: http://appinventor.googlelabs.com/about/ Android Bluetooth remote controller : https://tomoueb.com/svn/nxosremote/android/nxosremote/ Mindstorm Project Page: http://mindstorms.lego.com/en-us/community/NXTLog/default.aspx
81	Grades 11-12	Modeling/Simulation/Medical IT	Design a device that can detect when elderly patients fall while minimizing false-positives.	Use of gyroscopes/accelerometers would likely be necessary
82	Grades 11-12	Modeling/Simulation/Medical IT	Program vision-recognizing software to detect cataracts from images.	This will help those living in rural communities
83	Grades 11-12	Modeling/Simulation/Medical IT	A cordless (battery powered?) cauterizer for the operating room.	This would allow surgeons to move about the OR more freely.
84	Grades 11-12	Modeling/Simulation/Medical IT	Create a device that converts sign-language signaling into audio communications.	Hint: Wii remote can be used for finger tracking!
85	Grades 11-12	Modeling/Simulation/Medical IT	Make a device for the deaf and blind that takes speech and turns it into braille.	This would allow for easier communication between the deaf and blind.
86	Grades 11-12	Modeling/Simulation/Medical IT Musculoskeletal	Design a device that simulates upper-limb amputation.	Sample Project: Use the device to model the current problems with today's prosthetics, or use your model to identify new problems with today's prosthetic solutions.
87	Grades 11-12	Modeling/Simulation/Medical IT Sensors/Imaging	Design computerized vision for the blind.	Sample Project: Haptic feedback in walking stick that senses obstacles.
88	Grades 11-12	Musculoskeletal Sensors/Imaging	Explore the role of non-Newtonian fluids as a means of creating artificial knee joints.	Sample Project: Regular use of a prosthetic (walking) vs. tripping, where the stiffness of the knee has to be different. Hint: Consider use of Oobleck!
89	Grades 11-12	Musculoskeletal Sensors/Imaging	Design a go-kart that can be controlled by a joystick for children paralyzed below the waist.	They will also have to be buckled in securely.
90	Grades 11-12	Sensors/Imaging	Design a device that notifies blind people when the person standing in front of them in line has moved forward.	Note: This should be a sensor, tapping someone with a walking cane isn't an option. Hint: Infrared sensors and vibratory alert?
91	Grades 11-12	Sensors/Imaging	Design a sensor to be placed inside the shoe of a diabetic patient that could detect potentially dangerous forces.	Diabetic patients lose feeling in their lower limbs and are unable to feel when a blister might be forming or when a shoe is too tight. Consider making the sensor compatible with normal socks/shoes.
92	Grades 11-12	Value-Driven Engineering	Create a low cost cochlear implant.	Sometimes insurance companies won't cover the cost of a lost or damaged part.
93	Grades 11-12	Value-Driven Engineering	Create a low cost negative pressure system for removing fluid from wounds.	Applying negative pressure to wounds has been shown to help the healing process.
94	Grades 9-12	Biomaterials/Polymer Medicine	Create a material that blocks the radiation that is emitted from a cellular phone.	Is the radiation emitted from a cell phone harmful to us?
95	Grades 9-12	Biomaterials/Polymer Medicine	Contact lenses that offer UV protection.	How do sunglasses achieve UV protection?
96	Grades 9-12	Biomaterials/Polymer Medicine Sensors/Imaging	Create an app for a smart phone that would record/monitor a person's vital signals (body temp, heart rate, etc.)	The app could also be used to directly notify a healthcare provider if signals reach dangerous levels.
97	Grades 9-12	Cardiovascular/Soft Tissue Wound Healing Clinical Trials Health/Medicine Sensors/Imaging	Design clothing that can sense the acceleration of heart rates, sending an alert when the heart rate has exceeded a certain level. Hint: Use the range of 110-130 beats per minute and conduct mandatory physical prior to testing!	This would be a great project to use Arduino software.
98	Grades 9-12	Cardiovascular/Soft Tissue Wound Healing Health Medicine	Develop a study to test the effectiveness of alcohol based vs. non-alcohol based hand sanitizers.	Do different alcohols work better than others?
99	Grades 9-12	Cardiovascular/Soft Tissue Wound Healing Modeling/Simulation/Medical IT	Design an Android App for measuring wound size, based on photographs taken from a cell phone.	Helpful Link: Android App Inventor: http://appinventor.googlelabs.com/about/
100	Grades 9-12	Cardiovascular/Soft Tissue Wound Healing Modeling/Simulation/Medical IT	Develop a study to test if cherries and cranberries can be used as an alternative treatment for inflammation.	Helpful Link: http://www.odec.ca/projects/2003/herna3j/public_html/
101	Grades 9-12	Cardiovascular/Soft Tissue Wound Healing Musculoskeletal	Design a device for removing perspiration from a prosthetic limb.	Could the joint be cooled to prevent any perspiration at all?
102	Grades 9-12	Cardiovascular/Soft Tissue Wound Healing Sensors/Imaging	Design a device that can locate veins before the use of a needle.	Hint: Sensitive microphones can be used to "listen" to blood flow!

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103	Grades 9-12	Cardiovascular/Soft Tissue Wound Healing Sensors/Imaging	Design a device to measure glucose without needing to prick a finger.	Some patients pain threshold is very limited.
104	Grades 9-12	Clinical Trials	Design a method for minimizing scar tissue formation.	There is a huge market for this in the healthcare industry!
105	Grades 9-12	Clinical Trials	Develop a system for removing food that's jammed in your esophagus.	A large number of people are brought to the ER because they are choking on something.
106	Grades 9-12	Clinical Trials Health/Medicine	Design a study to test the effectiveness of alternative methods for preventing motion sickness, without the risks and side-effects of current pharmaceutical options.	Motion sickness prevents some people from travelling on airplanes and going on cruises all together.
107	Grades 9-12	Clinical Trials Health/Medicine	Research the difference between Liquid Gels vs. Tablets.	Which dissolves quicker in pH similar to stomach acid?
108	Grades 9-12	Clinical Trials Health/Medicine Musculoskeletal	Design a wheelchair that can be controlled by quadriplegic patients.	Hint: Movements originating from the neck upwards can be used!
109	Grades 9-12	Health/Medicine	Design a silent (or quieter) dentist drill.	Hint: High speed hardware drills like the Dremel can be used!
110	Grades 9-12	Health/Medicine	Create a low cost way of veneering teeth.	Since veneering teeth is a cosmetic operation it is very expensive.
111	Grades 9-12	Health/Medicine	Add a feature to a stethoscope to make it a multifunctional tool.	Try to avoid the use of a power source
112	Grades 9-12	Health/Medicine	A stethoscope bell/speaker unit so you could take someone's blood pressure & still talk to them (no ear tubes).	Keep the design small!
113	Grades 9-12	Health/Medicine	Create a at home test for strep throat.	This could reduce the healthcare costs of testing for strep.
114	Grades 9-12	Health/Medicine	Design a system for controlling blood loss in trauma cases.	Try to make the system as simple as possible.
115	Grades 9-12	Health/Medicine	Create an epinephrine key chain.	This would help people allergic to bees to always remember their epinephrine.
116	Grades 9-12	Health/Medicine	Create a wrist watch inhaler.	Losing an inhaler can be a nightmare during an asthma attack.
117	Grades 9-12	Health/Medicine	Create a system for collecting saline that flows out of a open abdominal cavity during surgery.	Think vacuums and funnels.
118	Grades 9-12	Health/Medicine	Design a method for measuring an astronaut's mass in space.	Does the human body have a constant density?
119	Grades 9-12	Health/Medicine	Design a system for measuring psychological stress in astronauts during long duration space missions.	Cabin fever is sure to set in on a mission to Mars.
120	Grades 9-12	Health/Medicine	Design a surgical instrument for use by astronauts.	On long journeys in outer space astronauts may need emergency surgery.
121	Grades 9-12	Health/Medicine Modeling/Simulation/Medical IT	Create an app for a smart phone that would present the recommended dosages of/directions for over the counter medications.	Enter in type of medication, age, weight, gender, etc. to discover correct dosage.
122	Grades 9-12	Health/Medicine Musculoskeletal	Design a new exercise device to keep astronauts' legs healthy.	What types of forces can be transmitted with no gravity?
123	Grades 9-12	Health/Medicine Musculoskeletal	Design a high-efficiency respirator that draws upon, and condenses oxygen in the air rather than using a tank.	The device could be equipped with a portable power supply.
124	Grades 9-12	Health/Medicine Sensors/Imaging	Design a method for measuring bone loss in astronauts during missions lasting more than 3 months.	A trip to Mars would take approximately 260 days.
125	Grades 9-12	Health/Medicine Sensors/Imaging	Develop a method for measuring grip force during sports.	Sample Projects: Baseball bat, golf club, tennis racket.
126	Grades 9-12	Health/Medicine Sensors/Imaging	Develop a method for measuring kicking force.	Hint: Use as a model for common football/soccer injuries!
127	Grades 9-12	Modeling/Simulation/Medical IT	Make a device that will dispense pills for elderly patients at the correct time(s) of day.	This could benefit patients with dementia.
128	Grades 9-12	Modeling/Simulation/Medical IT	Create an app for a smart phone that would assess the health of pregnant mothers.	This app would greatly reduce maternity healthcare costs.
129	Grades 9-12	Modeling/Simulation/Medical IT	An alarm for use in nursing homes which would go off if a resident fell out of their chair (pressure sensitive on the seat?).	This could be done with Arduino Technology.
130	Grades 9-12	Modeling/Simulation/Medical IT	Some kind of camera/projector for the end of otoscopes so physicians could show patients what they're talking about.	They have to be light enough for the user to regularly handle.
131	Grades 9-12	Modeling/Simulation/Medical IT	Design an app that can help diabetics keep track of their sugar intake.	This would help diabetics control their sugar intake.
132	Grades 9-12	Modeling/Simulation/Medical IT	Create a computer model of one major organ or organ system.	This would be a valuable asset to teach about the workings of our bodies.
133	Grades 9-12	Modeling/Simulation/Medical IT	Assess the benefits of using a computer modeling program such as AIDA v 4.3b to simulate diabetes.	Hint: Visit http://www.2aida.net/welcome/
134	Grades 9-12	Modeling/Simulation/Medical IT	Design a device that translates numbers in text to numbers in Braille to help sighted teachers teach blind kids math.	Being able to feel the numbers is a huge advantage to blind students (just like seeing the numbers is to you).
135	Grades 9-12	Modeling/Simulation/Medical IT Musculoskeletal	Develop a model to simulate implant loosening.	Sample Project: Ball and socket joint of the hip.
136	Grades 9-12	Musculoskeletal	Design a wheelchair that can maneuver up and down stairs.	Hint: Limit your design to 2-3 steps!
137	Grades 9-12	Musculoskeletal	A head support system for post-retinal surgery patients.	Background: They often treat retinal detachment by injecting a bubble of air into the globe of the eye, which if the head is looking down- exerts pressure on the retina and presses it back up against the posterior eye. But, to heal properly, these patients have to keep their head horizontal (re: looking at the floor) for weeks. Their only good option currently is a chair (like a massage chair) which has an open face support. I was thinking they could use a device so they would be ambulatory but keep their face looking at their toes.
138	Grades 9-12	Musculoskeletal	Develop an improved method for transporting patients from one bed to another.	This is a problem with obese patients.

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139	Grades 9-12	Musculoskeletal	Develop a study to examine the effects of load-splitting on the lower back.	Sample Project: The effects of lifting two loads to the side, versus one heavier load to the front.
140	Grades 9-12	Musculoskeletal	Develop a method for sensing when a person stumbles and a prosthetic that will lock when stumbling occurs.	Could multiple supports spring out of the prosthetic upon stumbling?
141	Grades 9-12	Musculoskeletal Sensors/Imaging	Design a device to analyze strength (torque and motion) in the forearm for physical therapy.	This could be used to monitor the progress of physical therapy.
142	Grades 9-12	Sensors/Imaging	Create binocular vision, using only one eye.	Sample Project: Explore the use of optics and lasers.
143	Grades 9-12	Sensors/Imaging	An alarm for an electrician to wear in case he gets electrocuted.	Time is important - Don't test on humans
144	Grades 9-12	Sensors/Imaging	Develop a device for measuring punching force in boxing.	Could a force plate be in a punching bag or a glove?
145	Grades 9-12	Sensors/Imaging	Design a coffee mug that allows blind people to know when they have filled their coffee mug up enough so they don't overflow it.	This is not an easy task for blind people.
146	Grades 9-12	Value-Driven Engineering	Create low cost adjustable operating room table.	It must be easy to clean.
147	Grades 9-12	Value-Driven Engineering	Develop a low cost Ilizarov limb lengthening system for lengthening bones.	Helpful Links: http://www.ilizarovheightincrease.com/
148	Grades 9-12	Value-Driven Engineering	Create an inexpensive yet clinically useful incubator for neonatal patients.	The current devices are extremely expensive.
149	Grades 9-12	Value-Driven Engineering	Make an inexpensive water filter for impoverished populations.	Access to clean water is a tremendous problem in under developed countries.
150	Grades 6-8	Biomaterials/Polymer Medicine	Redesign an anesthesia mask.	Sample Project: Evaluate how children react to current masks, and redesign accordingly
151	Grades 6-8	Biomaterials/Polymer Medicine	A surgical cap with an absorptive or coolant headband for sweat.	Design a new cap or a small insert that is compatible with existing caps.
152	Grades 6-8	Biomaterials/Polymer Medicine	Design an improved bottom for canes and walkers in order to prevent slipping on wet surfaces.	The bottom should not scratch nice hard wood floors.
153	Grades 6-8	Biomaterials/Polymer Medicine	Research a sturdy material that can be used in prosthetics.	Prosthetics must be sturdy enough for the wearer to regularly use, but light enough not to quickly fatigue them.
154	Grades 6-8	Biomaterials/Polymer Medicine Health Medicine	Develop a study to evaluate the effectiveness of mosquito nets so as to better prevent insects from getting inside the net.	It must be possible to see through the net.
155	Grades 6-8	Biomaterials/Polymer Medicine Health/Medicine	Develop a method for sterilizing a toothbrush before each use.	Helpful Link: http://www.usc.edu/CSSF/History/2005/Projects/J1333.pdf
156	Grades 6-8	Cardiovascular/Soft Tissue Wound Healing	An arm positioner to hold your forearm in place during a blood draw.	Possibly gear this project towards younger patients. Make sure the device is not scary!
157	Grades 6-8	Cardiovascular/Soft Tissue Wound Healing Health/Medicine	Design an experiment to test which foods produce brain freeze most often.	Helpful Link: http://www.usc.edu/CSSF/History/2005/Projects/J1409.pdf
158	Grades 6-8	Cardiovascular/Soft Tissue Wound Healing Modeling/ Simulation/Medical IT	Develop a model to simulate the failure of a balloon angioplasty.	Hint: You can use dried play dough to model calcified arterial wall!
159	Grades 6-8	Cardiovascular/Soft Tissue Wound Healing Modeling/ Simulation/Medical IT	Develop a study to test the effect of electrical simulation on normal human fibroblasts, which have an active role in wound healing.	Helpful Link: http://www.sciencellonline.com/
160	Grades 6-8	Cardiovascular/Soft Tissue Wound Healing Modeling/Simulation/Medical IT	Simulate the calcification of heart valves using pasta.	Hint: A zone of uncooked pasta can be used to resemble a calcified heart valve!
161	Grades 6-8	Clinical Trials	Do women/men get sufficient vitamin D?	How much vitamin D does sunscreen inhibit?
162	Grades 6-8	Clinical Trials	Do left-handers struggle with the mechanisms in different household objects (can openers, sewing machines, blenders, scissors...)?	This could potentially open up an huge "left-hander friendly devices" market
163	Grades 6-8	Clinical Trials Health/Medicine	Conduct a study to find out which type of lighting is best for the eyes in an office.	Hint: Consider the effects of different monitors on the human eye!
164	Grades 6-8	Health/Medicine Modeling/Simulation/Medical IT	Design a method of identifying patients, without the use of plastic bracelets.	Misidentifying patients is a tremendous concern in hospitals.
165	Grades 6-8	Clinical Trials Health/Medicine Musculoskeletal	Design a more comfortable backpack for joggers.	Sample Project: Think about ideal weight distribution to prevent injury from recurring use of the backpack.
166	Grades 6-8	Clinical Trials Health/Medicine Musculoskeletal	Design a backpack that is less stressful on a child's back.	Sample Project: Think about ideal weight distribution to prevent injury from recurring use of the backpack.
167	Grades 6-8	Clinical Trials Health/Medicine Sensors/Imaging	Develop an experiment to identify which parts of the hand are most difficult to wash, and design a device to help the problem areas.	Helpful Link: http://www.sciencebuddies.org/science-fair-projects/project_ideas/MicroBio_p018.shtml?from=Home
168	Grades 6-8	Health/Medicine	Develop a study to test if cooking methods affect the nutritional content of food.	Sample Project: Does baking, frying, sautéing a potato alter the nutritional content of it?
169	Grades 6-8	Health/Medicine	See if the tint of sunglasses affects the ability of a person to see.	Could certain tints enhance clarity?

	A	B	C	D
170	Grades 6-8	Health/Medicine	Do gummy vitamins provide as much vitamin absorption as the chewable type?	Which dissolves quicker in pH similar to stomach acid?
171	Grades 6-8	Health/Medicine	A device to remove foreign materials from the ear canal.	It shouldn't damage the ear though.
172	Grades 6-8	Health/Medicine	Test the nutritional value of vegetables grown under different spectrums or temperatures of light.	This could revolutionize the produce industry!
173	Grades 6-8	Health/Medicine	Design an astronaut glove that does not cause hand fatigue when used during extra-vehicular activities.	Research the HAL (Hydraulic Assisted Limb) technology.
174	Grades 6-8	Health/Medicine Modeling/Simulation/Medical IT	Compare performance in an underwater simulator to that in true microgravity.	The task could involve turning a wrench to tighten a bolt.
175	Grades 6-8	Modeling/Simulation/Medical IT	Develop an experiment to test how digestion is affected by different concentrations of glucose.	Please do not use corrosive pH levels.
176	Grades 6-8	Modeling/Simulation/Medical IT	Explore the role of evolution on the morphology of an organism by playing multiple iterations of Spore.	Sample Project: Compare morphology based on aggressive or defensive behaviors; other strategies can be compared too. See: http://www.spore.com/
177	Grades 6-8	Modeling/Simulation/Medical IT Musculoskeletal	Simulate different bone fractures using carrots.	Hint: Bending/twisting and compressing carrots cause different fracture patterns. Compare these to actual bone fractures.
178	Grades 6-8	Musculoskeletal	Design a device that makes it easier for people with arthritis or carpal tunnel to use a pen/pencil.	There have been some instances where patients cannot button the buttons on their shirts because of the loss of mobility in their hands.
179	Grades 6-8	Musculoskeletal	A device that helps people on crutches carry things like books or drinks.	This would be helpful for student in high school and college with leg injuries.
180	Grades 6-8	Musculoskeletal	Research the pros and cons of running barefoot.	Examine the biomechanical differences of runners with & without shoes.
181	Grades 6-8	Musculoskeletal	Develop a device to help elderly patients open jars.	Be sure to reduce the amount of force required.
182	Grades 6-8	Value-Driven Engineering	Create low cost adjustable height shoes for kids with limb length discrepancies.	Make it possible for them to play sports in the shoes!