Important Information to Volunteers Planning this Project. March 2013

Several of the activities included in this project mention and picture special building block kits which are no longer available and were not available to the general public in stores. While most of the suggested activities can be accomplished with building block basics from such kits as Lego, Mecanno, Kinn'x and similar sets, there are specific activities which will require axles, beams, pulleys and gears to accomplish the movement and designs. 4-H Ontario has available, for loan, two resource kits of beams, gears and pulley [compatible with Lego bricks only] which would allow about 12 members to complete the activities.

Contact Elizabeth Johnston at 4-H Ontario to arrange loan of these kits.

Summary of activities requiring these extra components such as pulleys, beams, gears or motors-

Meeting One:

Activity #2 - Fishing pole –requires pulleys and string

Meeting Two:

Football Launcher [Digging deeper] requires bushings, axles and pegs

Meeting Three:

Ping Pong Launcher [Digging Deeper]- requires, axles, pulleys, beams, gears ,elastics and ping pong balls

Activity #6 Snail car race —can only be accomplished if members have specialized or motorized kits. An alternative to this activity is the Slot car challenge. See attached which uses the weight to propel a car forward by winding down the wheel and axle.

Meeting Four:

Rotating Carousel [Digging Deeper Activity #1] and [Digging Deeper] Carnival Ride Activity #2 Solar powered movement can be accomplished only if members have very specialized kits with solar powered components. Try having the members build a rotating carnival ride of some type using toy people as riders and use gears ,pulleys and cranks to create the movement . Discuss how alternate sources of energy could be used to power this ride.

Activity #7 Cable Car Parachute Ride –requires beams, pulleys, axles as well as fishing line/string

Activity #8 Rubber Band Racer – requires beams, axles, wheels, gears

Meeting Five:

Balloon Powered Rocket Car [Digging Deeper]-requires beams, axles, gears, wheels, balloons.

Activity # 9 Sturdy Car Drop Test- WARNING!!! Dropping expensive building components which are attached in a variety of inexperienced ways can lead to damaged components.] If members have added a motor or gear mechanism to their car, DO NOT DROP IT OR DO THIS TEST!!!! The gears, axles and motors as well as the electric connections will be severely damaged!!! My personal advice would be to do this test with alternate building materials such as design a sturdy egg carton using found materials and drop the enclosed egg.

Activity #10 Tractor Pull - this activity can only be accomplished with <u>motorized components</u> and a variety of gear mechanisms. <u>Motors are not included in the 4-H additional components</u> <u>kits.</u>

Meeting Six:

Activity #11 Mountain Rescue - this activity can only be accomplished with <u>motorized</u> components and a variety of gear mechanisms. <u>Motors are not included in the 4-H additional</u> components kits.

Extra Activities

Activity #15 Peak Performance -this activity can only be accomplished with <u>motorized</u> components and a variety of gear mechanisms. <u>Motors are not included in the 4-H additional components kits.</u>

Here are some additional activities which can be accomplished with minimal components, î.e. no motors

Alternate Challenge # A - Zip Line Ride –designing for balance and movement

Design and build a vehicle that will carry one toy person safely along a zip line. The vehicle [aerial car] must travel the full distance of the line without falling off or losing the person. Vehicle must move freely down the full length of the line without assistance after a push start. Successful vehicles must keep the person in a balanced position throughout the trial.

Evaluation: All vehicles that can move freely down the full length of the line without assistance after a push start and also keep the person in a balanced position throughout the trial will be considered successful. This would be a wonderful challenge to have the members judge the balance and efficiency of each machine in completing the task!

Alternate Challenge # B - Land Yacht -Design the fastest land yacht.-Design and Build a land yacht that will travel the farthest across the floor [or table] with nothing but wind power [a table fan] Hint – a

land yacht is a cross between a car and a sail boat, tissues, cloth and cards make good sails. If beams aren't available for masts use skewers or straws. Land yachts can be evaluated for distance, efficiency, staying in a straight line etc.

Alternate Activity 6 [Snail Car] **Slot Car Racing**-Build a slot car and try to design a vehicle that will travel the farthest using gravity. To test a slot car place two tables of identical height together with a small gap between. The string holding the weight will fall down through the slot and wind down the axle to propel the car forward. The wheels and chassis straddle the gap in the tables. By altering the size of the winding mechanism the car will travel either faster or further. Have the members test several winding mechanism sizes to see which gives speed and which gives distance. Challenge the members to design their car for the greatest distance. Hint: these cars can sometimes travel 8-10 feet so use long tables. Note that as soon as the weight hits the floor the car will travel no further, so the challenge becomes how to make the string last longer...more pulleys, bigger pulleys etc.

Achievement program challenge idea.

1. Plan a family challenge evening. 4-H members may bring up to 3 more people for their building team. Present a challenge and allow 1 hour for building and then have the models demonstrated. Members must show and explain their design. Here is an example

The Challenge:

It's the siege of the castle! Each team must build a machine that will move forward towards the castle wall and upon contact with the wall launch a projectile at the castle. The objective is to hit the castle a glancing blow and thus frighten the occupants into surrender!

Each prototype can take two attempts to move toward the castle wall and launch the projectile. Operator of the machine may walk behind machine or machine can be self—propelled or pushed: however, preference will be given to self-propelled devices if motors are available. Attempts do not need to be back to back but must be completed during the time allowed for elimination rounds. Any machines that do not reach the wall after two attempts will be allowed to demonstrate the firing device or trigger mechanism that can launch the projectile .Machines that can travel and launch successfully will be eligible to enter the final "Siege of the Castle" trials.

Constraints: If motors are available. Battery box may be included/attached to the model [preference shown to these models]

- 2. Model must proceed in continuous motion toward the castle wall without assistance
- 3. Projectile must launch upon contact with the wall [piece of 2"x4" wood]
- 4. Only elements of a single kit are allowed including one set of batteries if using identical kits.

5.Up to 2 coffee stir sticks may be used and one file card if desired
Ability to move toward the wall
Ability to hold projectile
Trigger mechanism/Launching
Accuracy of launching projectile
Design
Total Points

Evaluation of Design Challenge:

- 25 points
- 25 points
- 15 points
- 10 points
- 100

4 .Elimination Rounds

Each team has 2 attempts to complete the task of moving toward the wall and launching a Styrofoam ball toward the castle. Final round will include accuracy points.

Note..I used a childs toy castle as the target..

