A. 

**Box Kite**- built by several surfaces connected together as a 3D object. A high performance kite that is noted for having stability and high lift. Typical box design has four parallel struts. The box kite was invented for the purpose of a manned flying machine in 1893. Also was used in World War II as a kite/radio transmitter combination. In modern day times the stability and high lift make the box kite an ideal type for meteorological experiments or aerial photography. 

**Inflatable Kite**- The inflatable kites are usually very large with unique and “impossible” designs. The kites were made to have an air intake in the front to inflate them and an exhaust in the back to help the kite keep its shape and stability. These kites are very expensive and take 100s of hours to design and construct. The inflatable kite is used mostly as a design kite to entertain a crowd. 

**Sled Kite**- Sled kites are great for high flying but can become unstable when near turbulent ground air. This particular kite is used in paragliding and paraboarding because of the power and pull they can provide. Created in the USA 1948-1963. When making a sled kite symmetry is key with spars, vents, flaps, and towing points 

**Diamond Kite**- The diamond kite is a simple kite with 2 crossed sticks as the main design. The horizontal piece usually between ¼ and ½ of the way down the length of the other. It can be made with or without a tail and are relatively easy to make and fly. Most famous instance this kite was used was in Benjamin Franklin’s famous electricity experiment. At one point was used for aerial photography and meteorology but was replaced by box kites. Used mostly for recreation.

**Application**

- Military, Civil Air Patrol Signal Kite
- Red and Green LED’s for night flying
- Reconnaissance(camera)

B. 

**Box Kite**

- Use for a task (flying locations/ capabilities) 
  Can be used where there is wind to provide the lift needed to raise the kite. Can range from low winds to high winds. Can lift heavy objects because of the large amount of lift generated.
Suitable for the task (flying conditions)
Wind speed range from 7-20 mph. From light low wind on the ground to moderate speeds in the air.

Helps manage resources (amount of materials)
Low amount of resources needed because of the simplicity. Also can be made with lots of resources to make more intricate designs for the box kite.

Technology feasible (working design)
A design that has been around since 1893 with countless successful flights. Was able to lift a human a few feet into the air.

Possible cost
Traditional 4 strut box kite with two sails usually go for around $30

Safety
Very easy to put into flight because of lightness and high lift factor. Does not have capabilities to create injuries. Relatively easy to control.

2 Line Delta Stunt Kite

Use for a task (flying locations/ capabilities)
Wide open spaces, ex. beach

Suitable for the task (flying conditions)
Constant wind 6-10 normally, 2-5 mph with correct bridle adjustment

Helps manage resources (amount of materials)
Low amount of fabric due to no tail or dual layering - more string needed than a diamond

Technology feasible (working design)
Very old design - inspired by the earliest hang-glider designs

Possible cost
2 line delta stunt kite ~$40 to build incl. tools

Safety
Very easy to fly - can be controlled and turn left or right with little practice/ skill
Foil Kite

- Use for a task (flying locations/ capabilities)
  - Harnesses air and is able to pull great amounts of weight. Used in water and snow sports to help pull people on sleds or gliders. They are even being used to help pull ships and reduce the work of the engine.
- Suitable for the task (flying conditions)
  - depending on the size they can be used in all different wind conditions. bigger kites work better in lower wind settings
- Helps manage resources (amount of materials)
  - It requires no supporting structure and is made mostly of nylon fabric and string
- Technology feasible (working design)
  - The design includes many air cells that capture the air and cause it to fly at a higher angle than most kites. The design and assembly of this type of kite can be very complicated and possibly difficult
- Possible cost
  - It depends on the size of the kite. Already made kites can be found online anywhere from $20 to thousands. The nylon fabric would be the most effective material but cheaper materials can be substituted
- Safety
  - The bigger kites catch a lot of wind so can be dangerous if the person handling the kite is not strong enough to control it. Letting the string get too long can make it more dangerous.

Sled Kite

- Use for a task (locations/capabilities)
  - a box kite would be good for an urban environment where there are calm gentle breezes near the ground and faster moving air up above.
- Flying Conditions
  - a gentle 1-3 mi/h breeze at ground level and a faster 20-25 mi/h wind above the buildings.
• The sled kite works well with fast gusts of wind but does not handle choppy wind conditions near the ground very well.

• Amount of Materials
  • As far as kites go, the sled kite uses a modest amount of materials, with a healthy amount of sail needed and more structure rods to give it strength.
  • It also requires twice the amount of string compared to a traditional kite.

• Technology Feasible
  • as far as flying here at Penn State, the sled kite would work well since there are a lot of buildings here and the air near the ground is fairly calm.
  • The design is reliable and works well in nearly these conditions.

• Possible Cost
  • as far as kites go, it does use more materials and thus, costs a bit more. Even so, the cost difference compared to a traditional kite is not large.

• Safety
  • the sled kite is a fairly slow moving kite that uses two strings to control it. So safety is almost assured as long as the flyer is paying attention.
c.

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<th>Suitable for the task (flying conditions)</th>
<th>Helps manage resources (amount of materials)</th>
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TOTAL: 1 4.067 4.467 3.735 4.2
D. Detailed Description of the selected final Concept Proposal - use SolidWorks CAD modeling of considered kite design, indicate construction materials, show a forces diagram for your kite, a detailed concept diagram of the proposed application system, cite references, include photos of your tested prototype.

In constructing this kite we used
- ~184.68 inches of ¼” wooden rods
- hot glue
- plastic sheeting
- masking tape
- kite string
- wood blocks for handles