



6th Grade Cohort



Dive In!



'Chuting for More Market Share!



“The future of ecommerce is drone delivery”

--Jeff Bezos



Thank you all for coming in today! As a collective, you represent the finest group of engineers in our Country. Accordingly, we're calling on you to propel our company forward by meeting a new, unique challenge. As you know, we here at FlipKart have been gaining market share on our biggest rival, Amazon, quite rapidly. With online sales making up only a tiny portion of overall retail sales in India, the sky's the limit!..and the sky is also our new challenge. You see, Amazon is beginning to deliver to its customers via drone parachute drops. In a country with cities as congested as ours, being able to skip the clogged roadways will provide them with a huge advantage...one that we simply mustn't let happen. So, we're asking YOU to dive in! We've got plenty of drones...what we need is a parachute design that will safely, accurately carry our products to their buyers...and we need it fast. Time to design....get to work!

Flipkart



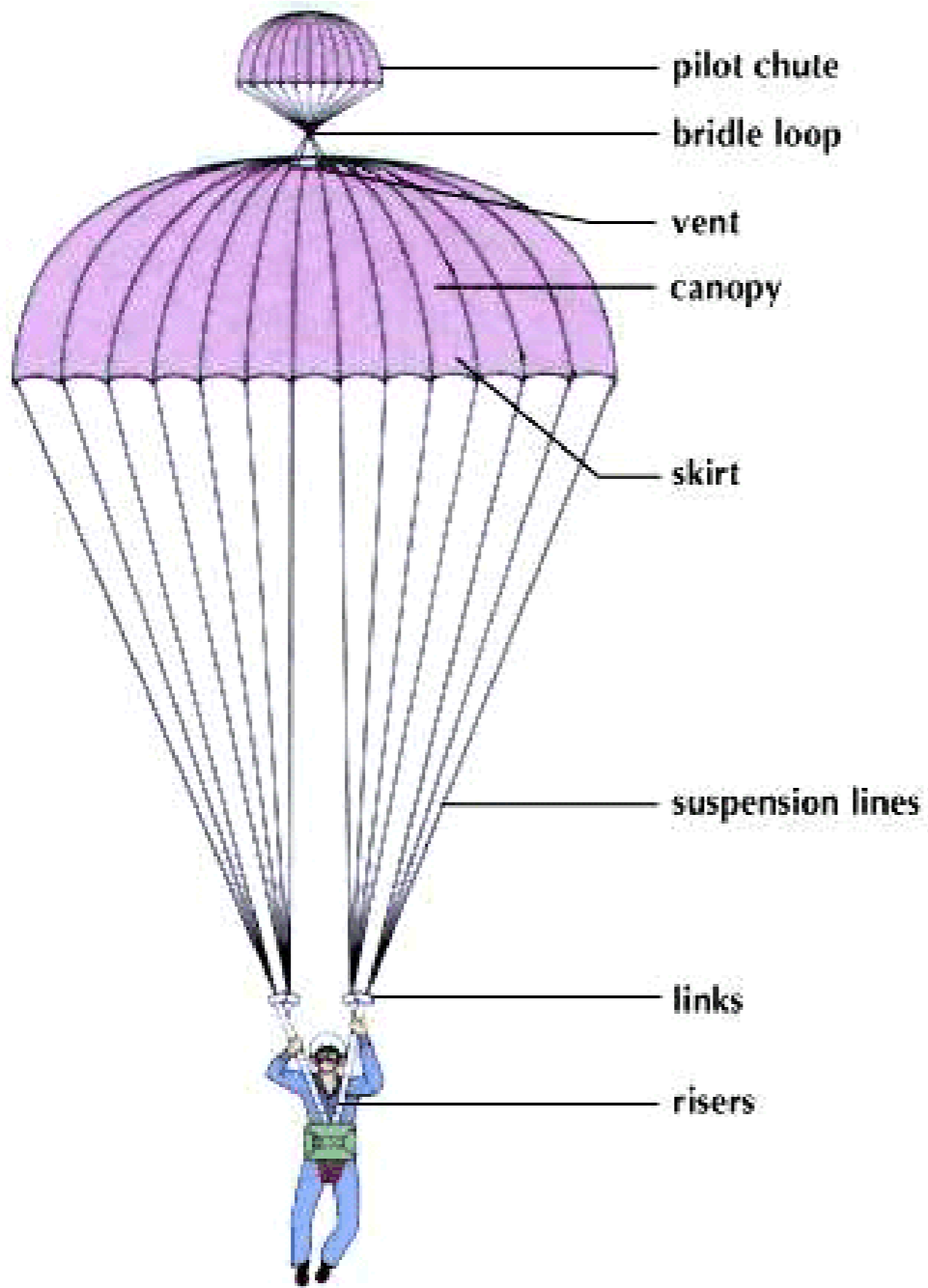
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Kalyan Krishnamurthy

CEO: Flipkart

Parts of the Parachute



“It’s all about that shape, ‘bout that shape, ‘bout that shape.”



PRECISION VS ACCURACY



✓ Precision
✗ Accuracy



✗ Precision
✓ Accuracy



✗ Precision
✗ Accuracy

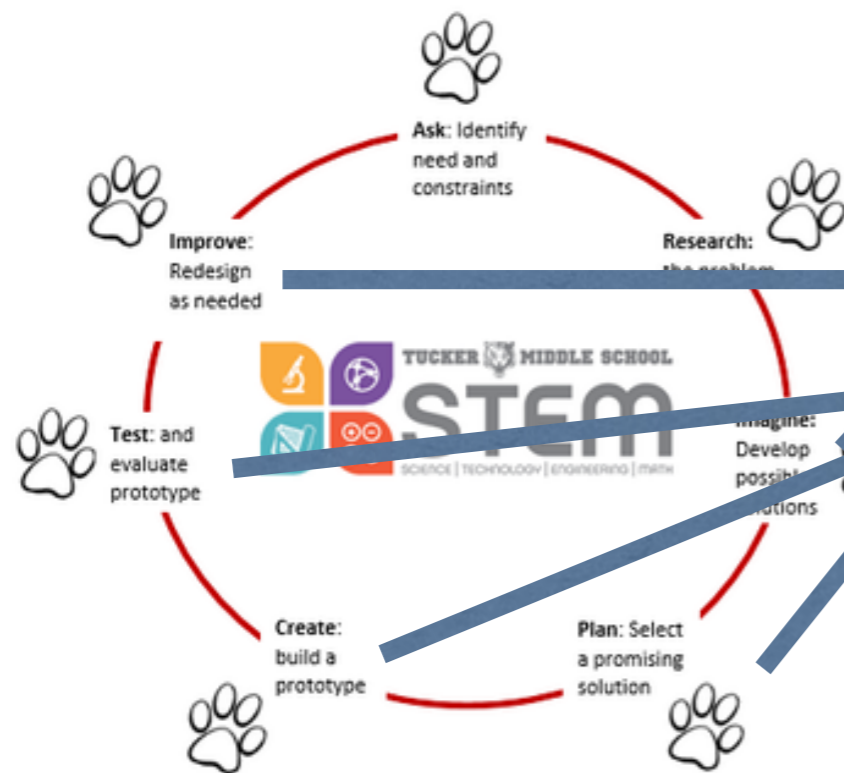


✓ Precision
✓ Accuracy

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Tasks!

ENGINEERING DESIGN PROCESS



The mission of Tucker Middle School STEM is to EXPOSE students to STEM career paths, EQUIP them with skills to be successful in these careers, and ENGAGE students in solving the problems of today.

In teams, discuss current knowledge of challenge-relevant concepts (Precision and Accuracy • Engineering Design Process • Aerodynamics • Drag • Gravity • surface area • ETC.)

- Guided by knowledge gained and using **ONLY** the materials provided, **sketch** your team's parachute design. Be sure to include labels for any necessary explanations. Team sketches **MUST** be submitted for approval prior to building. **Final sketches should be made to scale.**
- Time to **Build!** Remember, design is an iterative process. One idea often builds on another. It will most likely take multiple sketches and builds to produce a successful final product. That's OKAY...this process is when we learn the most!
- Read the overview of *Medicine from the Sky* by the World Economic Forum. Also read the MINT article on Flipkart's drone delivery pilot for vaccines in India. **Create a 1-2-page proposal to submit to the WEF arguing for this initiative to be implemented in Brazil.**
- Prepare a brief (3 minutes or less) **presentation** to the executive board of Flipkart, explaining the science & math behind YOUR parachute design. Be sure to include a discussion of your parachute's surface area. Why should Flipkart choose your design, moving forward!?

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Facilitated Rollout Plan

- PBL Launch by CTAE Facilitator with support from 6th Grade STEM Cohort Math and Science teachers, followed by student independent research and discovery in groups.
- Block periods following the launch will vary in terms of type of instruction and range from 10 to 16 student work hours depending on need, but must include some direct instruction as need on relevant topics as follows:
 - **EDP; Aerodynamics → Led by CTAE Facilitator**
 - **Drag; Gravity; Surface Area → Co-Led by Math & Science Cohort Teachers**
 - **Essay Writing & Presentation Prep: Best Practices → Language Arts Cohort Teacher**
 - **Geopolitics of Brazil → Social Studies Cohort Teacher**

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What will your parachute look like...and how accurate will it be!?

Tasks!

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- A. Guided by knowledge gained and using **ONLY** the materials provided, **sketch** your team's parachute design. Be sure to include labels for any necessary explanations. Team sketches **MUST** be submitted for approval prior to building. **Final sketches should be made to scale.**
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What will your parachute look like...and how accurate will it be!?



Parachute Drop: Criteria & Constraints

- Teams may **ONLY** use the materials provided. Teams that use unvetted materials or materials not represented in the sketch submitted pre-build will be disqualified.
- **8 work-hours provided.**
- Parachute will be dropped using a remote release from a drone hovering at **15 meters** above the target area.
- Package (egg) must be easily removable and free from all other materials in **30 seconds or less. Remember, Human-Centered Design.**
- **See rubric for grading.**

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Dive-In # 1: Fall 2021 Assessment Rubric

Payload lands more than 4 m from the target area AND/OR egg is harmed.	DQ: 0% - 74% depending on sketches, design, build and distance from target.
Payload lands between 2 - 4 meters from the edge of the target area AND egg is unharmed.	75%
Payload lands between 1-2 meters from the edge of the target area AND egg is unharmed.	85%
Payload lands less than 1 meter from the edge of the target area AND egg is unharmed.	90%
Payload lands on 1-3 quadrants IN the target area AND egg is unharmed.	105%
Payload lands on ALL FOUR quadrants IN the target area AND egg is unharmed.	120%

****NOTE: Parachutes will NOT be tested until sketches and flyer have been approved, and presentation has been made. ****

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Materials List



Groups can choose from the available items on the 'Chuting for More Market Share Materials Table. Remember, all materials must be justified, and no materials will be provided until a sketch is approved!

NOTE: Only one piece of polyethylene may be used!

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What STEM Standards Will You Master in this Module!?

Science: **S6E1d:** Develop and use a model to explain the interaction of gravity and inertia that governs the motion of objects in the solar system.

Technology/Engineering: **MSENGR-EET-2** Students will evaluate the impacts of engineering & technology on Society; **MSENGR-EET-4** Students will demonstrate an understanding for a technological world through hands-on projects.

Mathematics: **MGSE7.NS.3** Solve real-world and mathematical problems involving the four operations with rational numbers; **MGSE6.G.1** Find area of right triangles, other triangles, quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems; **MGSE7.G.1** Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Language Arts: **ELAGSE6RL2** Determine a theme and/or central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments; **ELAGSE6RI7** Integrate information presented in different media or formats (e.g. visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue; **ELAGSE6SL4** Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

Social Studies **SS6G1** Locate selected features of Latin America; **SS6G3** Explain the impact of location, climate, distribution of natural resources, and population distribution on Latin America.