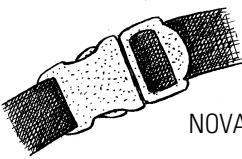
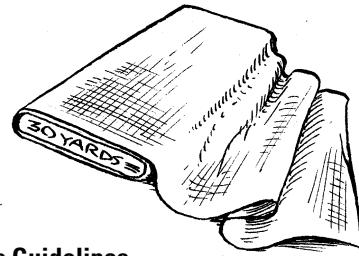


Materials Costs



NOVA Activity **Battle of the X-Planes**

When you have determined the amount of materials needed for your design, use this chart to determine the total materials cost for your backpack. Make sure your backpack meets all the *Materials Guidelines* listed at right.



Materials Guidelines

- Thread must be used along every seam.
- Zippers must have a seam along both sides.
- Each edge must have one extra inch for a seam.
- Heavy-use areas, such as attaching shoulder straps to the main body of the backpack and sewing the bottom, require double seams.

Material	Cost*	Amount Needed	Total
Water-resistant heavy-duty fabric	2 cents per square inch		
Heavy-duty fabric	1 cent per square inch		
Water-resistant light-duty fabric	0.5 cent per square inch		
Light-duty fabric	0.3 cent per square inch		
Expandable fabric (every square inch can equal up to two cubic inches in volume)	4 cents per square inch		
Padding	2 cents per cubic inch		
Heavy-duty zippers	10 cents for first inch; 5 cents for every additional inch		
Light-duty zippers	5 cents for first inch; 2 cents for every additional inch		
Heavy-duty Velcro patch	10 cents per square inch		
Light-duty Velcro patch	5 cents per square inch		
One inch wide nylon strap (to adjust length of shoulder straps)	5 cents per inch		
Plastic piece to tighten shoulder straps	10 cents each		
Reflective tape	15 cents per inch		
Buckle (for optional waist strap)	35 cents		
Heavy-duty thread	1 cents per sewn inch		
Light-duty thread	0.5 cent per sewn inch		
TOTAL COST PER BAG			

* metric equivalents:

1.00 inch = 2.54 centimeters

1.00 square inch = 6.45 square centime

1.00 cubic inch = 16.38 cubic centime

