

**Worksheet 1**

# How do materials science engineers choose fabrics for parachutes?

As you explore and test the characteristics and properties of each fabric, use this worksheet to record your findings in the appropriate table. Remember to read each section carefully.

## Fabric information

| Fabric    | Fibre         | Source   |
|-----------|---------------|--|
| Terylene  | Synthetic     | Polyester  |
| Cotton    | Natural       | Cotton plant   |
| Rayon     | Semisynthetic | Polyester and cotton                                     |
| Polyester | Synthetic     | Petroleum  |
| Nylon     | Synthetic     | Polymer  |
| Silk      | Natural       | Silkworms  |
| Linen     | Natural       | Flax plants  |
| Canvas    | Semisynthetic | Cotton, linen, and polyvinyl chloride (flexible plastic) |



**Test 1: Observations with a magnifying glass**

Using a magnifying glass, look closely at each fabric and determine its characteristics. Is it synthetic or natural? Write down some of the characteristics you observe.

|           |        |        |
|-----------|--------|--------|
| Terylene  | Canvas | Linen  |
| Rayon     | Nylon  | Cotton |
| Polyester | Silk   |        |



**Test 2: Heat resistance**

Using a heat gun, apply heat to each piece of fabric for one, then two, and then three minutes. Record your observations after every minute. Check if the weave pattern is affected and if changes to the fabric material affect the other tests.

| Fabric    | One minute | Two minutes | Three minutes |
|-----------|------------|-------------|---------------|
| Terylene  |            |             |               |
| Cotton    |            |             |               |
| Rayon     |            |             |               |
| Polyester |            |             |               |
| Nylon     |            |             |               |
| Silk      |            |             |               |
| Linen     |            |             |               |
| Canvas    |            |             |               |



**Test 3: Strength**

Each type of fabric material has a small cut. Try to rip the fabric into two pieces by pulling it apart. One student should be selected to perform this test on all fabrics.

| Fabric    | Strength observation |
|-----------|----------------------|
| Terylene  |                      |
| Cotton    |                      |
| Rayon     |                      |
| Polyester |                      |
| Nylon     |                      |
| Silk      |                      |
| Linen     |                      |
| Canvas    |                      |



**Test 4: Wear and tear**

Using sandpaper, rub it over the fabric. What do you notice? How many scrapes are required for each fabric to show wear? Write your observations below.

| Type of fabric |           | Number of scrapes |              |
|----------------|-----------|-------------------|--------------|
|                |           | First wear        | Breakthrough |
| 1              | Terylene  |                   |              |
| 2              | Cotton    |                   |              |
| 3              | Rayon     |                   |              |
| 4              | Polyester |                   |              |
| 5              | Nylon     |                   |              |
| 6              | Silk      |                   |              |
| 7              | Linen     |                   |              |
| 8              | Canvas    |                   |              |



**Test 5: Absorbency**

Using a pipette, place three water drops on the fabric and time how long it takes for the water to be absorbed.

| Fabric    | Yes | No | Explanation |
|-----------|-----|----|-------------|
| Terylene  |     |    |             |
| Cotton    |     |    |             |
| Rayon     |     |    |             |
| Polyester |     |    |             |
| Nylon     |     |    |             |
| Silk      |     |    |             |
| Linen     |     |    |             |
| Canvas    |     |    |             |



## Results

Answer the following questions:

- a. What properties do you think are important for a parachute?

---

---

---

---

- b. What characteristics of the fabric affect these properties?

---

---

---

---

- c. Do some fabric characteristics affect the properties differently? For example, name fabrics that are very resistant to heat but sensitive to wear.

---

---

---

---

Based on the answers and results of the tests conducted, which fabric do you think would be best for making a parachute? Choose one or two to test in the next activity.

---

---

---

---