Meg, Calvin, and Charles Wallace travel to Camazotz to find Mr. Murry. This planet has physical properties much different from Earth. The inhabitants of this planet use the following units:

- Time: manka, delit \( [782 \text{ manka} = 1 \text{ delit}] \)
- Length: trapac, escon \( [4,200 \text{ escon} = 1 \text{ trapac}] \)
- Mass: veltroz, quiko \( [45.5 \text{ veltroz} = 1 \text{ quiko}] \)
- Temperature: ceca, zambot \( [10 \text{ zambot} = 1 \text{ ceca}] \)

They use the following four variables to describe their environment:

- squidoo = \( \frac{\text{veltroz}^2}{\text{manka}^4} \)
- nafot = \( \text{ceca}^3 \times \text{trapac} \)
- zilma = \( \text{ceca} \times \text{veltroz} \)
- raki = \( \frac{\text{quiko}}{\text{escon}^3} \)

1) Following are other variables used in Camazotz. Circle the letter in front of those variables which are dimensionless. There may be more than one correct answer.
   a. \( \frac{\text{quiko} \times \text{zambot}}{\text{zilma}} \)
   b. \( \frac{\text{squidoo} \times \text{delit}^4}{\text{veltroz}} \)
   c. \( \frac{\text{zilma} \times \text{ceca} \times \text{escon}}{(\text{nafot} \times \text{veltroz})} \)
   d. \( \frac{(\text{raki} \times \text{escon})}{(\text{manka}^2)} \times \text{zambot}^4 \)
   e. \( \frac{\text{squidoo}^{1/2} \times \text{dilit}^2 \times \text{zambot}}{\text{zilma}} \)

2) \( 655.4 \text{ quiko}^2/\text{delit}^4 \) is equal to ____________ squidoo. (answer to 3 sig. figs.) There is only one correct answer.
   a. \( 3.63 \times 10^{-6} \text{ squidoo} \)
   b. \( 38.1 \text{ squidoo} \)
   c. \( 1130 \text{ squidoo} \)
   d. None of the above
   e. You do not have enough information to answer this question
You have three aluminum rods, labeled A, B, and C. They were all manufactured on the same day, at the same factory, on the same shift, from the same mix. Their dimensions are given below:

<table>
<thead>
<tr>
<th></th>
<th>Rod A</th>
<th>Rod B</th>
<th>Rod C</th>
<th>Rod D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>10 cm</td>
<td>12 cm</td>
<td>4.8 cm</td>
<td>6.0 cm</td>
</tr>
<tr>
<td>Diameter</td>
<td>2 mm</td>
<td>2.4 mm</td>
<td>1.5 mm</td>
<td>1.5 mm</td>
</tr>
</tbody>
</table>

Density of solid Aluminum = 2.70 g/cm³  Melting Point = 660.32°C

Molar Mass = 26.98 g/mol;  Young’s Modulus = 70 GPa  Yield Strength = 9 MPa

3) Which aluminum rod will support the greatest load in tension? Circle all correct answers; there may be more than one.
   a. Rod A
   b. Rod B
   c. Rod C
   d. Rod D
   e. There is not enough information to answer this question

4) Which aluminum rod will fail first when placed in compression? Circle all correct answers; there may be more than one.
   a. Rod A
   b. Rod B
   c. Rod C
   d. Rod D
   e. There is not enough information to answer this question

5) What are the dimensions of the Young’s modulus? Circle all that apply.
   a. force/area
   b. force/elongation
   c. percent elongation
   d. density
   e. none of these
6) Look at the Stress-Strain Curve below and circle the correct word to complete the following statements:

a. A is the Elastic Region / Plastic Region / Yield Strength / Fracture Point / Young’s Modulus of the stress-strain curve.

b. B is the Elastic Region / Plastic Region / Yield Strength / Fracture Point / Young’s Modulus of the stress-strain curve.

c. C is the Elastic Region / Plastic Region / Yield Strength / Fracture Point / Young’s Modulus of the material.

d. D is the Elastic Region / Plastic Region / Yield Strength / Fracture Point / Young’s Modulus of the material.

e. The slope of the linear region prior to location C on this stress-strain curve is equal to the Elastic Region / Plastic Region / Yield Strength / Fracture Point / Young’s Modulus of the material.