Q1) Consider a body of 560 kilograms hooked by a wire with a length of 8 meters and its cutting area is 0.3 square centimeters, if the wire was extended by 0.4 meters then calculate both the stress and the strain and what is the relationship between B and K.

A1) \( F = ma = 9.81 \times 560 = 5493.5 \text{ N} \)

\[ S = \frac{F}{A} = \frac{5493.5}{(0.3 \times 10^{-4})} = 183116666.67 \text{ N/M}^2 \]

\[ \varepsilon = \frac{\Delta L}{L} = \frac{0.4}{8} = 0.05 \]

The relationship between B and K is a reverse relationship.

Q2) From the next table for a refraction calculate \( V_1, V_2, Z \):

<table>
<thead>
<tr>
<th>T(sec)</th>
<th>0</th>
<th>0.05</th>
<th>0.11</th>
<th>0.16</th>
<th>0.19</th>
<th>0.25</th>
<th>0.275</th>
<th>0.30</th>
<th>0.325</th>
<th>0.350</th>
<th>0.375</th>
<th>0.40</th>
</tr>
</thead>
<tbody>
<tr>
<td>X(m)</td>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
<td>125</td>
<td>150</td>
<td>175</td>
<td>200</td>
<td>225</td>
<td>250</td>
<td>300</td>
</tr>
</tbody>
</table>

Slope 1 = \( \frac{0.2 - 0.1}{100 - 50} = 0.002 \), \( V_1 = 1 \div \text{slope 1} = 1 \div 0.002 = 500 \text{ m/s} \)

Slope 2 = \( \frac{0.375 - 0.325}{250 - 200} = 0.001 \), \( V_2 = 1 \div \text{slope 1} = 1 \div 0.001 = 1000 \text{ m/s} \)

\[ Z = \frac{T_i}{2} \times \frac{V_1 \times V_2}{\sqrt{V_2^2 - V_1^2}} = \frac{0.125}{2} \times \frac{500 \times 1000}{\sqrt{1000^2 - 500^2}} = 36.08 \text{ m} \]
Q3) A) Calculate the gravity attraction for a point at 75 degree below the equator.

A3) A) \( G_{\text{lat}} = G_{\text{equator}}(1 + K_1 \sin^2(\text{lat}) - K_2 \sin^2(2\times\text{lat})) \)

\[ G_{\text{lat}} = 978031.846 (1 + 0.0053024 \sin^2(75) - 0.0000059 \sin^2(2\times75)) \]

\[ G_{\text{lat}} = 983038.171 \]

B) Determine the free air correction for a point 200 m above the sea level.

B) \( \text{FAC} = 0.3806 \times h = 0.3806 \times 200 = 76.12 \text{m} \)

Q4) Recognize which of the following sentences is true or false by writing in front of it:

1- Refraction, reflection and gravity attraction are all seismic methods. (False)
2- At the same latitude the gravity at 30 degree east and 45 degree west are the same. (True)
3- The first stage of Hooks low for the material behavior is plastic. (False)
4- Usually when we use the refraction and reflection methods we end up with the same amount of thicknesses. (False)

The Total Marks Earned 10

With my best wishes
Saad M. Alhumidan