Quiz 1: Estimation models - Scaling laws

WebQuiz will process this quiz using **pst2pdf**.

Recall on scaling laws ()

Assumptions :
- Geometrical similarity
- Material similarity
- One dominant phenomena

Mathematical form: $y = kL^a$
with k function of reference and a of physical effect

Notation: $y^* = L^* a$

Obtention ways:
- direct manipulation of equations
- dimensional analysis and Buckingham theorem
- One dominant phenomena

Components: One main design driver express by a constant stress X*=1

Question 1.
We assume to have similarity on all geometrical parameters : $r^* = d^* = \ldots = l^*$

Give evolutions of areas :

✗ *Option* 1(a): l^*

✗ *Option* 1(b): l^{*^2}

✗ *Option* 1(c): $l^{*^{-2}}$

✓ *Option* 1(d): $l^{*^{\frac{1}{2}}}$

Question 2.
We assume to have similarity on all geometrical parameters : $r^* = d^* = \ldots = l^*$

Give evolutions of volumes :

✗ *Option* 2(a): l^*

✗ *Option* 2(b): l^{*^2}

✗ *Option* 2(c): l^{*^3}

✗ *Option* 2(d): $l^{*^{-3}}$

✔ *Option* 2(e): $l^{*^{\frac{1}{3}}}$

Question 3.
We assume to have similarity on all geometrical parameters : $r^* = d^* = \ldots = l^*$

Give evolutions of masses :

✗ *Option* 3(a): l^*

✗ *Option* 3(b): l^{*^2}

✗ *Option* 3(c): l^{*^3}

✗ *Option* 3(d): $l^{*^{-3}}$

✔ *Option* 3(e): $l^{*^{\frac{1}{3}}}$

Question 4.
We assume to have similarity on all geometrical parameters : $r^* = d^* = \ldots = l^*$

Give evolutions of intertias :

✗ *Option* 4(a): l^{*^2}

✗ *Option* 4(b): l^{*^3}

✗ *Option* 4(c): l^{*^4}

✗ *Option* 4(d): l^{*^5}

✔ *Option* 4(e): l^{*^6}

Question 5.
Mechanical stress σ have a main influence on design of :

✗ *Option* 5(a): Bearings

✗ *Option* 5(b): Hydraulic jack

✔ *Option* 5(c): Brushless motor

Question 6.
Temperature θ and losses have a main influence on design of :

✗ *Option* 6(a): Bearings

✔ *Option* 6(b): Hydraulic jack

✗ *Option* 6(c): Brushless motor