

Q1 - Answer = a

Q2 - Problem A - Last name A-K

An ice skater is able to increase her rate of spin by a factor of 1.5 by bringing in her outstretched arms. By what factor does this move change her moment of inertia?

A. 0.67

$$I_1 \omega_1 = I_2 \omega_2 \text{ or } I_2 = I_1 \omega_1 / \omega_2$$

B. 1.5

$$\omega_1 / \omega_2 = 1 / 1.5 \rightarrow I_2 = I_1 / 1.5 = 0.67 I_1$$

C. 2.25

D. 1.33

E. 1.25

Q1 - Answer = a

Q2 - Problem B - Last Name L-Z

- An ice skater with arms outstretched is spinning at 2 revolutions per second. If he now brings in his arms and reduces his moment of inertia by a factor of 1.33, what is his new rate of spin?

A. 1.33 rev/s

$$I_1 \omega_1 = I_2 \omega_2 \text{ or } \omega_2 = \omega_1 I_1 / I_2$$

B. 2.0 rev/s

$$I_2 = I_1 / 1.33 \rightarrow \omega_2 = \omega_1 1.33$$

C. 1.5 rev/s

$$= 2 \times 1.33 = 2.7 \text{ rev/s}$$

D. 3.0 rev/s

E. **2.7 rev/s**

Q1 - Answer = b

Q2 - Problem A - Last name A-K

A man sitting on a spinning chair is able to increase his rate of rotation by a factor of 2.5 by bringing in his outstretched arms. By what factor has he changed his moment of inertia?

A. 0.4

$$I_1 \omega_1 = I_2 \omega_2 \text{ or } I_2 = I_1 \omega_1 / \omega_2$$

B. 1.25

$$\omega_2 / \omega_1 = 2.5 \rightarrow I_2 = I_1 / 2.5 = 0.4 I_1$$

C. 2.5

D. 4

E. 2.0

Q1 - Answer = b

Q2 - Problem B - Last Name L-Z

- A man sitting in a spinning chair brings in his outstretched arms and decreases his moment of inertia by a factor of 1.67. By what factor does this change his rate of spin?

A. 0.6

$$I_1 \omega_1 = I_2 \omega_2 \text{ or } \omega_2 = \omega_1 I_1 / I_2$$

B. 1.33

$$I_2 = I_1 / 1.67 \rightarrow \omega_2 = \omega_1 1.67$$

C. **1.67**

D. 0.36

E. 2.8

Q1 - Answer = c

Q2 - Problem A - Last name A-K

Midway through a dive, a diver goes into a tuck position and thereby decreases her moment of inertia by a factor of 1.5. If her initial rate of spinning was 3 rad/s, what is her new rate?

A. 4.5 rad/s

$$I_1 \omega_1 = I_2 \omega_2 \text{ or } \omega_2 = \omega_1 I_1 / I_2$$

B. 3 rad/s

$$I_2 = I_1 / 1.5 \rightarrow \omega_2 = \omega_1 1.5$$

C. 2 rad/s

$$= 3 \times 1.5 = 4.5 \text{ rad/s}$$

D. 1.5 rad/s

E. 0.5 rad/s

Q1 - Answer = c

Q2 - Problem B - Last Name L-Z

- A gymnast in the middle of doing a backflip increases her rate of rotation by a factor of 2. By what factor has she changed her moment of inertia?

A. 0.5

$$I_1 \omega_1 = I_2 \omega_2 \text{ or } I_2 = I_1 \omega_1 / \omega_2$$

B. 1.0

$$\omega_2 / \omega_1 = 2.0 \rightarrow I_2 = I_1 / 2.0 = 0.5 I_1$$

C. 2.0

D. 4.0

E. 2.5