

<question>
Suppose that a^2 varies inversely with b^3 . If $a=7$ when $b=3$, find the value of a^2 when $b=6$.
</question>

(a)

<step>
<p>
To solve this problem, we need to establish an equation based on the given information. Let k be the constant of variation. Since a^2 varies inversely with b^3 , we have $a^2 = \frac{k}{b^3}$. Using the given values $a=7$ and $b=3$, we can solve for k .
</p>
<code>
```python  
# a^2 varies inversely with b^3  
# if a=7 when b=3, find the value of a^2 when b=6  
# establish equation  
k = 7\*\*2 \* 3\*\*3  
print(k)  
```  
</code>
<output>
1323
</output>
</step>

$P = 0.99$
 $Q = 0.91$
value = 0.67

(b)

<step>
<p>
Let k be the constant of variation. Since a^2 varies inversely with b^3 , we have the equation $a^2 = \frac{k}{b^3}$. We are given that $a=7$ when $b=3$, so $7^2 = \frac{k}{3^3}$ which implies $k = 7^2 \times 3^3$. Therefore, the equation for a^2 in terms of b is $a^2 = \frac{7^2 \times 3^3}{b^3}$.
</p>
<code>
```python  
import sympy as sp  
# Define the variables  
a, b = sp.symbols('a b')  
# Define the equation for the constant of variation  
k = 7\*\*2 \* 3\*\*3  
# Define the equation for a^2 in terms of b  
a\_squared = k / b\*\*3  
# Find the value of a^2 when b=6  
a\_squared\_when\_b\_is\_6 = a\_squared.subs(b, 6)  
print(a\_squared\_when\_b\_is\_6)  
```  
</code>
<output>
49/8
</output>
</step>

$P = 0.95$
 $Q = 0.77$
value = 0.51

(c)

<step>
<p>
The constant of variation is $k = 1323$. Now we can use this value to find the value of a^2 when $b=6$.
</p>
<code>
```python  
# find the value of a^2 when b=6  
a\_squared = 1323 / 6\*\*3  
print(a\_squared)  
```  
</code>
<output>
6.125
</output>
</step>

$P = 0.99$
 $Q = 0.94$
value = 0.79

(d)

<step>
<p>
From the result, we have $k = 1323$. Now we can use this value to find the value of a^2 when $b=6$.
</p>
<code>
```python  
# find the value of a^2 when b=6  
a\_squared = 1323 / 6\*\*3  
print(a\_squared)  
```  
</code>
<output>
6.125
</output>
</step>

$P = 0.99$
 $Q = 0.94$
value = 0.76

(e)

<step>
<p>
From the result, we can see that when $b=6$, a^2 has a value of $\frac{49}{8}$.
</p>
<p>
Final Answer: $\frac{49}{8}$
</p>
</step>

$P = 0.94$
 $Q = 1.0$

(f)

<step>
<p>
The value of a^2 when $b=6$ is \$6.125\$.
</p>
<p>
Final Answer: \$6.125\$
</p>
</step>

$P = 0.99$
 $Q = 1.0$

(g)

<step>
<p>
From the result, we can see that when $b=6$, the value of a^2 is \$6.125\$.
</p>
<p>
Final Answer: \$6.125\$
</p>
</step>

$P = 0.97$
 $Q = 1.0$

(h)

<step>
<p>
The value of a^2 when $b=6$ is 6.125.
</p>
<p>
Final Answer: \$6.125\$
</p>
</step>

$P = 0.99$
 $Q = 1.0$