VARIATION

If a varies directly as b,

then a = k × b for some constant k. **In other words,** $a = kb$.

If a varies inversely as b,

then a = k ÷ b for some constant k. **In other words,** $a = \frac{k}{b}$.

If a varies jointly as b and c,

then a = k × bc for some constant k. **In other words,** $a = kbc$.

If a varies directly as b and inversely as c,

then a = k × b ÷ c for some constant k. **In other words,** $a = \frac{kb}{c}$.

Examples:

[a] y varies inversely as the square of x.
y = 12 when x = 4.
Find the value of y when x = 6.

[b] The cost per person for a pizza lunch varies directly as the number of pizzas purchased and inversely as the number of people. If 10 pizzas are bought for 25 people and the cost per person is $7, what is the cost per person if 18 pizzas are bought for 40 people ?

HOW TO SHOW YOUR WORK:

[a] **Set up the generic equation:**

Substitute values to find k:

Solve for k:

Set up the specific equation:

Substitute new values:

Solve for the unknown:

[b] **Identify your variables:** Let =

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Set up the generic equation:

Substitute values to find k:

Solve for k:

Set up the specific equation:

Substitute new values:

Solve for the unknown:

Summarize in a sentence:

Follow the format shown above
Do not staple and do not include the pages above
Show organized and tidy work – difficult to read work will earn no points
due Thu Oct 10 in class

[1] The cost to treat a painting with a protectant varies jointly as the length and width of the painting. If it costs $160 to treat a 3 foot by 4 foot painting, what is the cost to treat a 7 foot by 9 foot painting ?

[2] At a fixed time of day, the length of a person's shadow varies directly as the person's height. If a 6.4 foot tall person casts a 4.8 foot long shadow, how tall is a person who casts a 3.6 foot long shadow ?

[3] The number of songs you can store on an MP3 player varies inversely as the memory used by each song. If an MP3 player can store 32250 songs that each require 72 kilobytes of memory, how many songs can it store if each song requires 90 kilobytes of memory ?

[4] The radius of a certain type of metal disc varies directly as the square root of its weight. If a 9 pound disc has a radius of 6 inches, find the radius of a 16 pound disc.

[5] The height of a cone varies directly with its volume and inversely with the area of its base. A 1 liter cone with a base area of 300 cm^2 has a height of 10 cm. What is the height of a 2 liter cone with a base area of 400 cm^2 ?

[6] The bimbot of a blongle varies directly as its wickywack. If a blongle with a wickywack of 14 has a bimbot of 74, find the wickywack of a blongle with a bimbot of 35. **IF YOU UNDERSTAND THE LANGUAGE OF VARIATIONS, YOU SHOULD BE ABLE TO HANDLE THIS PROBLEM EVEN THOUGH SOME OF THE "WORDS" DON'T MAKE SENSE.**

[7] Suppose the value of a certain wine varies jointly as its age and its rating. If a 90 point wine from 2001 is valued at $150, find the value of a 96 point wine from 1983. **BE CAREFUL !**

[8] Suppose the opening day box office of a horror film marketed by Mutant Guerrilla Marketing varies directly as the cost of the marketing campaign and inversely as the **total number** of films opening that day. $18 million was spent on Insipid: Chapter 3's marketing campaign; it opened the same day as 7 other films; and it had an opening day box office of $48 million. The producers are planning to spend $12 million on the marketing campaign of Carry, and to open it on the same day as 3 other films. What should be the opening day box office ?

[9] The pressure exerted by a gas varies inversely as the volume it occupies. If a gas occupying 20 cubic meters exerts a pressure of 12 atmospheres, find the pressure exerted if the gas is compressed to 15 cubic meters.

[10] y varies directly as the square root of x and inversely as z.
y = 12 when x = 16 and z = 12.
Find the value of y when x = 25 and z = 4.