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## Examples of combined variation problems with answers

Here are the steps needed to solve problems with combined variability: Step 1: Enter the right equation. Combined variation problems are solved using a combination of direct variability ( $y = kx$ ), reverse variability and joint variability ( $y = kxz$ ) equations. When dealing with word problems, consider using variables other than  $x$ ,  $y$ , and  $z$ . Also, read the problem carefully to determine if there are other changes to the combined variation equation, such as squares, cubes, or square roots. Step 2: Use the information provided in the problem to find the value of  $k$ , called variability rate or proportionality. Step 3: Rewrite the step 1 equation by replacing the value of the  $k$  in step 2. Step 4: Answer the questions asked using the equation in step 3 and the remaining information about the problem. When solving word problems, be sure to include the units in your final response. Example 1 – If  $y$  varies directly in  $x$  and inversely in  $z$  and  $y = 24$  when  $x = 48$  and  $z = 4$ , look for  $x$  when  $y = 44$  and  $z = 6$ . Step 1: Enter the correct equation. Combined variation issues are resolved by a combination of variation equations. In this case, we combine direct and reverse variation equations. Step 2: Use the information provided in the problem to find the value of the  $k$ . In this case, you need to find  $k$  when  $x = 48$ ,  $y = 24$  and  $z = 4$ . Step 3: Rewrite the step 1 equation by replacing the value of the  $k$  in step 2. Step 4: Answer the questions asked using the equation in step 3 and the remaining information about the problem. In this case, you need to find  $x$  when  $y = 44$  and  $z = 6$ . Example 2 — If  $f$  varies directly in equal to  $g$  and inversely as  $h$  square and  $f = 20$  when  $g = 50$  and  $h = 5$ , look for  $f$  when  $g = 18$  and  $h = 6$ . Step 1: Enter the correct equation. Combined variation issues are resolved by a combination of variation equations. In this case, you combine direct and inverse variation equations, use  $f$ ,  $g$ , and  $h$  formulas instead of  $x$ ,  $y$ , and  $z$ , and notice how the word square changes the equation. Step 2: Use the information provided in the problem to find the value of the  $k$ . In this case, you need to find  $k$  when  $f = 20$ ,  $g = 50$  and  $h = 5$ . Step 3: Rewrite the step 1 equation by replacing the value of the  $k$  in step 2. Step 4: Answer the questions asked using the equation in step 3 and the remaining information about the problem. In this case, you need to find  $f$  when  $g = 18$  and  $h = 6$ . Click here for example 3 for training problems – If  $y$  varies together in  $a$  and  $b$  and inversely as the square root of  $c$  and  $y = 12$  when  $a = 3$ ,  $b = 2$  and  $c = 64$ , look for  $y$  when  $a = 5$ ,  $b = 2$  and  $c = 25$ . Step 1: Enter the correct equation. Combined variation issues are resolved by a combination of variation equations. In this case, you connect the joint and reverse variation equations, use the  $y$ ,  $a$ ,  $b$  and  $c$ ,  $w$ ,  $x$ ,  $y$  and  $z$  equations and see how the word square root changes the equation. Step 2: Use the information provided in the problem to find the value of the  $k$ . In this case, you need to find  $k$  when  $y = 12$ ,  $a = 3$ ,  $b = 2$  and  $c = 64$ . Step 3: Rewrite the step 1 equation by replacing the value of the  $k$  in step 2. Step 4: Answer the questions asked using the equation in step 3 and the remaining information about the problem. In this case, you need to find  $y$  when  $a = 5$ ,  $b = 2$  and  $c = 25$ . Click Here, example 4 for training problems – The number of minutes needed to solve training problems varies directly depending on the number of problems and inversely than the number of people working with solutions. It takes 4 people 36 minutes to solve 18 problems. How many minutes it takes 6 people to solve 42 problems. Step 1: Enter the correct equation. Combined variation issues are resolved by a combination of variation equations. In this case, we combine direct and reverse variation equations and use problems  $m$ ,  $p$  and  $w$  to work instead of  $x$ ,  $y$  and  $z$ . Step 2: Use the information provided in the problem to find the value of the  $k$ . In this case, you need to find  $k$  when  $m = 36$ ,  $p = 18$  and  $w = 4$ . Step 3: Rewrite the step 1 equation by replacing the value of the  $k$  in step 2. Step 4: Answer the questions asked using the equation in step 3 and the remaining information about the problem. In this case, you need to find  $m$  when  $p = 42$  and  $w = 6$ . Click Here for training problems Example 5 – The electrical resistance of the wire varies directly depending on its length and inversely in square diameter. A wire with a length of 200 inches and a diameter of a quarter inch is a resistance of 20 ohm. Find the electrical resistance on a 500-inch wire with the same diameter. Step 1: Enter the correct equation. Combined variation issues are resolved by a combination of variation equations. In this case, you combine direct and inverse variation equations, use  $r$ ,  $l$ , and  $d$  formulas instead of  $x$ ,  $y$ , and  $z$ , and see how the word square changes the equation. Step 2: Use the information provided in the problem to find the value of the  $k$ . In this case, you need to find  $k$  when they are  $l = 200$ ,  $d = 0.25$ . Step 3: Rewrite the step 1 equation by replacing the value of the  $k$  in step 2. Step 4: Answer the questions asked using the equation in step 3 and the remaining information about the problem. In this case, you need to find  $r$  when  $l = 500$  and  $d = 0.25$ . Click Here training problems The combined variation describes a situation where a variable depends on two (or more) other variables and varies directly with some variables and varies inversely with others (when other variables are considered constant). For example, if  $z$  fluctuates directly in  $x$  and inversely as  $y$ , we have the following combined variation equation:  $z = k(x/y)$  Example: If  $x$  varies directly as  $y$  and inversely as  $z$  and  $x = 10$ , when  $y = 5$  and  $z = 3$ , which  $z$ 's value  $x = 3$  and  $y = 47$ ?  $x = k \cdot y / z$   $10 = k \cdot 5 / 3$   $k = 6$   $z$  when  $x = 3$  and  $y = 43 = 6 \cdot 43 / z$   $z = 24$   $z = 8$  Solving problems of combined variability - Training problems Move the mouse over the answer to reveal the answer or click on the Full Solution link to reveal all the steps needed to solve the problems of combined variability. If  $y$  varies directly in  $x$  and reverse in  $z$  and  $y = 22$  when  $x = 4$  and  $z = 6$ , look for  $y$  when  $x = 10$  and  $z = 25$ . The maximum load that a cylindrical column with a circular cross-section can withstand varies directly in the fourth power of the diameter and inversely as a square of height. A column of 9 meters in diameter of 2 meters supports 64 tons. How many tonnes can be supported by a column 9 metres high and 3 metres in diameter? If  $a$  varies in combination between  $b$  and  $c$  and inversely like a square of  $d$  and  $a = 120$  when  $b = 5$ ,  $c = 2$  and  $d = 9$ , look for  $b = 12$ ,  $c = 9$  and  $d = 9$ . The volume of gas varies directly depending on the temperature and inversely as pressure. If the volume is 230 cubic centimeters, when the temperature is 300°K and the pressure is 20 kg per square centimeter, what is the volume when the temperature is 270°K and the pressure is 30 kg per square centimeter? If  $p$  varies directly in the square form of  $q$  and inversely as the square root of  $r$  and  $p = 60$  when  $q = 6$  and  $r = 81$ , look for  $p$  when  $q = 8$  and  $r = 144$ . The centrifugal force of an object moving in a circle varies together with the radius of the circular path and the mass of the object, and inversely as the square of time spent on the movement of one full circle. A 6 g object moving in a circle with a radius of 75 cm at a speed of 1 revolution every 3 seconds, the centrifugal force is 5000 dynary. Find the centrifugal force of a 14-gram object moving in a circle with a radius of 125 centimeters at a speed of 1 turn every 2 seconds. In these lessons, we learn how the number varies in relation to two or more other amounts. Related Topics: More Algebra Word Problems Algebra Spreadsheets Algebra Games The following charts give different types of variations: direct variation, reverse variation, common variation, and combined variation. Scroll down the page for examples and solutions. What is common variability and combined variation? A common variation is a change in which the quantity varies directly as a product of two or more other quantity. For example, the area of a rectangle varies whenever its length or width varies. We say that  $A = lw$  where  $A$  is the area,  $l$  have the length and  $w$  is the width. Combined variation is a variation in which the quantity depends on two (or more) other quantities and varies directly depending on some quantities and varies inversely with others. Example 1: The quantity varies inversely like two or more other quantity. The figure below shows a rectangular solid with a fixed volume. Indicate its width  $w$  as a common variation of length,  $l$  and height,  $h$ . Solution:  $w \propto 1/(lh)$  In other words, what  $l$  or height  $h$ , narrower is width  $w$ . Example 2: The quantity varies directly in one quantity and inversely as another quantity. The speed of the moving object  $s$  varies directly when the distance has been travelled,  $d$  and varies inversely as time,  $t$ . Express  $s$  as a common variation of  $d$  and  $t$ . Solution:  $s \propto d/t$  In other words, the longer the distance or the shorter the time, the faster the speed. How to solve joint variation problems? Example: Assume that  $y$  varies together in  $x$  and  $z$ . What is  $y$  when  $x = 2$  and  $z = 3$ , if  $y = 20$ , when  $x = 4$  and  $z = 3$ ? Show step-by-step solutions Co-variation issues Example:  $z$  varies along with  $x$  and  $y$ . Find  $z$  when  $x = 6$  and  $y = 4$ . Show step-by-step solutions How to solve common variation term issues and applications? Example: The energy an object has because of its movement is called kinetic energy. The kinetic energy of the object (measured in joules) varies together depending on the mass of the object and the square of its speed. If the kinetic energy of a 12 m/s 3-kilogram ball is 216 Joules, what about the mass of the ball producing 250 joules of energy when travelling at 10 m/s? Show step-by-step solutions direct, reverse, and common variation Example: Specify whether table data is an example of direct, reverse, or arithitis. Then identify the equation that represents the relationship. Show step-by-step solutions What is a combined variation? In Algebra, we sometimes have functions that vary in more than one element. When this happens, we say that there is articulated variation or combined variability in the functions. Articulated variation is a direct variation for more than one variable (e.g.  $d = f(t)$ ). With combined variation, we have both direct variation and indirect variation. How do I set up and solve combined variation problems? Example: Assume that  $y$  varies together with  $x$  and  $z$ . When  $y = 20$ ,  $x = 6$  and  $z = 10$ . Find  $y$  when  $x = 8$  and  $z = 15$ . Show step-by-step solutions Lesson on combining straight and reverse or joint and inverse variations Example:  $y$  varies directly in  $x$  and inversely like a square of  $z$  and when  $x = 32$ ,  $y = 6$ , and  $z = 4$ . Find  $x$  when  $y = 10$  and  $z = 3$ . View step-by-step solutions To resolve problems related to shared and combined variability? Examples: 1) If  $t$  varies along with you and  $v$  square and  $t$  is 1152 when you are 8 and  $v$  is 4, find  $t$  when  $v$  is 5 and you are 5. (2) The amount of oil used by a vessel travelling at a steady speed varies according to speed distance and square. If a ship uses 200 barrels of oil while traveling 200 miles at 56 miles per hour, specify how many barrels of oil to use when the ship travels 360 miles at 29 miles per hour. 3) Designer Dolls found that the number of dress-up dolls sold,  $N$ , varies directly in terms of their advertising budget,  $A$ , and inversely inverse to the price of each doll,  $P$ . When \$54,000 was spent on advertising and the price of the doll is \$90 9,600 units are sold. Set up Set up dolls are sold if the ad budget is increased to \$144,000. Show step-by-step solutions combined variation Example:  $y$  varies together in  $x$  and  $z$  and inversely in  $w$  and  $y = 3/2$  when  $x = 2$ ,  $z = 3$  and  $w = 4$ . Find the variation equation. Show step-by-step solutions Try the free Mathway calculator and problem solver below to practice a variety of math topics. Try the given examples or type your own problem and check your answers with step-by-step explanations. We receive feedback, comments and questions about this site or page. Send your feedback or enquiries via our feedback page. Page.

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