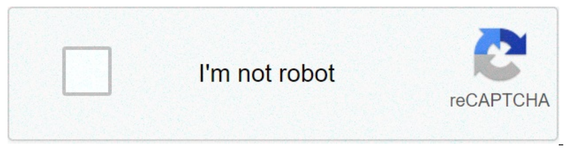

Continue

Finding the divisor dividend and quotient

Dividend, Divisor, Quotient, and Remainder Problems will look like dividenddivisor or dividend ÷ divisor, where the dividend and divisor are polynomials. Problem and answer will look like dividenddivisor = quotient + remainderdivisor Check that the division has been performed correctly (i.e., the correct quotient and remainder have been found) by quotient · divisor + remainder = dividend That is, multiplying the quotient by the divisor and adding in the remainder has to result in the dividend. Example Problem: x2 + 5x + 9x + 2 Dividend: x2 + 5x + 9 Divisor: x + 2 Answer: x + 3 + 3x + 2 Quotient: x + 3 Remainder: 3 Note that (x + 3)(x + 2) + 3 = x2 + 5x + 9, that is, quotient · divisor + remainder = dividend. Dividing a Polynomial by a Monomial To divide a polynomial by a monomial, divide each term of the polynomial by the monomial. That means, apply the distibutive property and simplify. Example 3x2y + 5xy3 + 93xy = 3x2y3xy + 5xy33xy + 93xy = x + 5y23 + 3xy Example a2b2c - 6abc2 + 5a3b52abc2 = a2b2c2abc2 - 6abc22abc2 + 5a3b52abc2 = ab2c - 3 + 5a2b42c2 Answer: ab2c - 3 + 5a2b42c2 Long Polynomial Division Long polynomial division may always be used when the divisor has more than one term. That is, the divisor is a binomial or trinomial or etc. Long polynomial division is a technique for finding the quotient and remainder given the dividend and divisor. Long polynomial division is performed much like long division of numbers. The following examples will demonstrate how to do long polynomial division: Example 1 Example 2 Example 3 Topics in P R E C A L C U L U S Table of Contents | Home 12 The remainder theorem The factor theorem IN ARITHMETIC we write, for example, or, Equivalently, 47 = 9· 5 + 2 5 is called the divisor, 47 is the dividend, 9 is the quotient, and 2 is the remainder. Dividend Divisor = Quotient + Remainder Divisor Or, Dividend = Quotient· Divisor + Remainder. In algebra, if we divide a polynomial P(x) by a polynomial D(x) (where the degree of D is less than the degree of P), we would find P(x) = Q(x)· D(x) + R(x). P(x) is the dividend, Q(x) is the quotient, and R(x) is the remainder. For example, if, by long division, we divided x3 − 5x2 + 3 x − 7 by x − 2, we would find x − 2 = x2 − 3x − 3 − 13 x − 2 Or, = (x2 − 3x − 3)(x − 2) − 13. x3 − 5x2 + 3x − 7 is the dividend, x2 − 3x −3 is the quotient, and −13 is the remainder. Here is how to do this problem by synthetic division. First, to use synthetic division, the divisor must be of the first degree and must have the form x − a. In this example, the divisor is x − 2, with a = 2. Here again is the problem: x − 2 Proceed as follows: 1. Write the coefficients of the dividend: 1 − 5 + 3 − 7 2. Put a, in this case 2, in a box to the right, leave a space, and draw a 2. line: 3. Bring down the leading coefficient (1), multiply it with a (2), and 3. write that product (1· 2) in the second column: 4. Add: 5. Repeat the process. −3· 2 = −6. And so on, until all the coefficients 5. have been exhausted. The first three numbers, 1 − 3 − 3, are the coefficients of the quotient, and the final number, −13, is the remainder. We have x3 − 5x2 + 3 x − 7 = (x2 − 3x −3)(x − 2) − 13. Example 1. Use synthetic division to divide 2x5 + 3x4 + 25x2 − 1 by x + 3. Solution. There are a couple of points here. First, we must account for all six coefficients of the general form. 2 + 3 + 0 + 25 + 0 − 1 The coefficient of x3 is 0, as is the coefficient of x. Next, the divisor is x + 3. But the divisor must have the form x − a. x + 3 = x − (−3). Therefore, a = −3. Here is the synthetic division: This tells us x + 3 = 2x4 − 3x3 + 9x2 − 2x + 6 − 19 x + 3 Or, 2x5 + 3x4 + 25x2 − 1 = (2x4 − 3x3 + 9x2 − 2x + 6)(x + 3) − 19. Dividend = Quotient· Divisor + Remainder. Note: The degree of the quotient is one less than the degree of the dividend. And the degree of the remainder is less than the degree of the divisor, x + 3, which in this case is 1. The remainder therefore is of degree 0, which is a number. In general, if we divide a polynomial of degree n by a polynomial of degree 1, then the degree of the quotient will be n − 1. And the remainder will be a number. Problem 1. Use synthetic division to divide x3 − 8x2 + x + 2 by x − 7. Write your answer in the form P(x) = Q(x)· D(x) + R. To see the answer, pass your mouse over the colored area. To cover the answer again, click "Refresh" ("Reload"). x3 − 8x2 + x + 2 = (x2 − x − 6)(x − 7) − 40 The remainder theorem The value of a polynomial P(x) at x = a, P(a), is equal to the remainder upon dividing P(x) by x − a. That is, when P(x) = Q(x)(x − a) + R, where Q(x) is the quotient and R is the remainder, then P(a) = R. For, P(a) = Q(a)(a − a) + R = Q(a)· 0 + R = 0 + R = R. Example 2. Let f(x) = x3 − 3x2 − 13x + 15. We will use synthetic division to divide f(x) by x + 4. Now, what does the remainder theorem tell us? The value of f(x) at x = −4, is equal to the remainder: f(−4) = −45. Now let us divide f(x) by x − 5: What does the remainder theorem tell us here? f(5) = 0. But this means that 5 is a root of f(x) Moreover, since the remainder is 0 -- there is no remainder -- then (x − 5) is a factor of f(x). The synthetic division shows: x3 − 3x2 − 13x + 15 = (x2 + 2x − 3)(x − 5) This illustrates the Factor Theorem: The Factor Theorem. x − r is a factor of a polynomial P(x) if and only if r is a root of P(x). Problem 2. Let f(x) = x3 − 5x2 − 4x + 7. Use synthetic division to divide f(x) by x − 7. Therefore, according to the remainder theorem, f(7) = 77. Since the remainder is not 0 -- f(7) 0 -- upon dividing f(x) by x − 7, then (x − 7) is not a factor of f(x). And according to the factor theorem, 7 is not a root of f(x). Problem 3. Let g(x) = 3x 4 + 17x3 + 16x 2 − 10x + 4. Use synthetic division to divide g(x) by x + 2. According to the remainder theorem, g(−2) = 0. Therefore, what do you conclude about −2? −2 is a root of g(x). What do you conclude about (x + 2)? (x + 2) is a factor of g(x). Problem 4. Use synthetic division to divide x3 + 125 by x + 5. x3 + 125 = (x2 − 5x + 25)(x + 5) Next Topic: Roots of polynomials Table of Contents | Home Please make a donation to keep TheMathPage online.Even $1 will help. Copyright © 2021 Lawrence Spector Questions or comments? E-mail: themathpage@yandex.com If you're seeing this message, it means we're having trouble loading external resources on our website. If you're behind a web filter, please make sure that the domains *.kastatic.org and *.kasandbox.org are unblocked. Number System (Consolidating the Sense of Numberness) Estimation Numbers in India and International System (With Comparison) Place Value Natural Numbers and Whole Numbers (Including Patterns) Negative Numbers and Integers Number Line HCF and LCM Playing with Numbers Sets Ratio Proportion (Including Word Problems) Unitary Method Fractions Decimal Fractions Percent (Percentage) Idea of Speed, Distance and Time Fundamental Concepts (Algebra) Fundamental Operations (Related to Algebraic Expressions) Substitution (Including Use of Brackets as Grouping Symbols) Framing Algebraic Expressions (Including Evaluation) Simple (Linear) Equations (Including Word Problems) Fundamental Concepts (Geometry) Angles (With their Types) Properties of Angles and Lines (Including Parallel Lines) Triangles (Including Types, Properties and Construction) Quadrilateral Polygons The Circle Revision Exercise on Symmetry (Including Constructions on Symmetry) Recognition of Solids Perimeter and Area of Plane Figures Data Handling (Including Pictograph and Bar Graph) Mean and Median When we divide a number by another number, we will have the terms dividend, divisor, quotient and remainder.The number which we divide is called the dividend. The number by which we divide is called the divisor. The result obtained is called the quotient. The number left over is called the remainder.More clearly, Division Algorithm We can write the relationship among dividend, divisor, quotient and remainder using division algorithm as given below. Dividend = Quotient x Divisor + Remainder Example : Practice Problems Problem 1 :Divide 300 by 7, list out dividend, divisor, quotient, remainder and write division algorithm. Solution :Let us divide 300 by 7 using long division as given below. From the above long division, we have Dividend = 300Divisor = 7Quotient = 42Remainder = 6Division algorithm for the above division Problem 2 :Divide 258 by 9, list out dividend, divisor, quotient, remainder and write division algorithm. Solution :As we have seen in problem 1, if we divide 258 by 9 using long division, we getDividend = 258Divisor = 9Quotient = 28Remainder = 6Division algorithm for the above division is 258 = 28x9 + 6Problem 3 :Divide 400 by 8, list out dividend, divisor, quotient, remainder and write division algorithm. Solution :As we have seen in problem 1, if we divide 400 by 8 using long division, we getDividend = 400Divisor = 8Quotient = 50Remainder = 0Division algorithm for the above division is 400 = 50x8 + 0Problem 4 :Divide 1675 by 13, list out dividend, divisor, quotient, remainder and write division algorithm. Solution :As we have seen in problem 1, if we divide 1675 by 13 using long division, we getDividend = 1675Divisor = 13Quotient = 128Remainder = 11Division algorithm for the above division is 1675 = 128x13 + 11Problem 5 :Divide 750 by 16, list out dividend, divisor, quotient, remainder and write division algorithm. Solution :As we have seen in problem 1, if we divide 750 by 16 using long division, we getDividend = 750Divisor = 16Quotient = 46Remainder = 14Division algorithm for the above division is 750 = 46x16 + 14 Apart from the stuff given above, if you need any other stuff in math, please use our google custom search here. If you have any feedback about our math content, please mail us : v4formath@gmail.comWe always appreciate your feedback. You can also visit the following web pages on different stuff in math. WORD PROBLEMSHCF and LCM word problemsWord problems on simple equations Word problems on linear equations Word problems on quadratic equationsAlgebra word problemsWord problems on trainsArea and perimeter word problemsWord problems on direct variation and inverse variation Word problems on unit priceWord problems on unit rate Word problems on comparing ratesConverting customary units word problems Converting metric units word problemsWord problems on simple interestWord problems on compound interestWord problems on types of angles Complementary and supplementary angles word problemsDouble facts word problemsTrigonometry word problemsPercentage word problems Profit and loss word problems Markup and markdown word problems Decimal word problemsWord problems on fractionsWord problems on mixed fractrionsOne step equation word problemsLinear inequalities word problemsRatio and proportion word problemsTime and work word problemsWord problems on sets and venn diagramsWord problems on agesPythagorean theorem word problemsPercent of a number word problemsWord problems on constant speedWord problems on average speed Word problems on sum of the angles of a triangle is 180 degreeOTHER TOPICS Profit and loss shortcutsPercentage shortcutsTimes table shortcutsTime, speed and distance shortcutsRatio and proportion shortcutsDomain and range of rational functionsDomain and range of rational functions with holesGraphing rational functionsGraphing rational functions with holesConverting repeating decimals in to fractionsDecimal representation of rational numbersFinding square root using long divisionL.C.M method to solve time and work problemsTranslating the word problems in to algebraic expressionsRemainder when 2 power 256 is divided by 17Remainder when 17 power 23 is divided by 16Sum of all three digit numbers divisible by 6Sum of all three digit numbers divisible by 7Sum of all three digit numbers divisible by 8Sum of all three digit numbers formed using 1, 3, 4Sum of all three four digit numbers formed with non zero digitsSum of all three four digit numbers formed using 0, 1, 2, 3Sum of all three four digit numbers formed using 1, 2, 5, 6 Enjoy this page? Please pay it forward. Here's how... Would you prefer to share this page with others by linking to it? Click on the HTML link code below. Copy and paste it, adding a note of your own, into your blog, a Web page, forums, a blog comment, your Facebook account, or anywhere that someone would find this page valuable. copyright onlinemath4all.com SBI! Something went wrong. Wait a moment and try again.