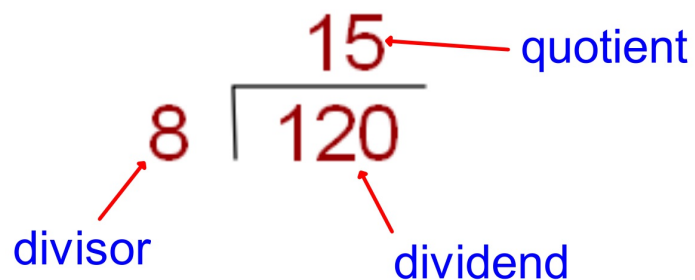


Vocabulary for division:



Find this quotient without a calculator.

$$\frac{51638}{23} =$$

- "goes into"
23 goes into 51 twice
- "multiply"
multiply 2 and 23 = 46
- "subtract"
51 - 46 = 5
- "bring down"
bring down the 6

Handwritten long division of 51638 by 23. The quotient is 2245 with a remainder of 3. The steps are: 23 goes into 51 twice (46), subtract 46 from 51 to get 5, bring down the 6 to get 56, 23 goes into 56 twice (46), subtract 46 from 56 to get 10, bring down the 3 to get 103, 23 goes into 103 four times (92), subtract 92 from 103 to get 11, bring down the 8 to get 118, 23 goes into 118 five times (115), subtract 115 from 118 to get 3. The remainder is 3.

Repeat these steps until you are finished.

Writing remainders:

$$\frac{51638}{23} = 2245 \text{ R}3 \quad \text{OR} \quad \frac{51638}{23} = 2245 + \frac{3}{23}$$

$$\text{OR} \quad \frac{51638}{23} = 2245.13$$

It won't be possible to leave the remainder this way when doing polynomial long division.

Polynomial Long Division:

Handwritten polynomial long division of $x^2 + 9x + 20$ by $x + 4$. The quotient is $x + 5$ with a remainder of 0. The steps are: $x + 4$ goes into $x^2 + 9x + 20$ (written as $x^2 + 4x$), subtract $x^2 + 4x$ from $x^2 + 9x + 20$ to get $5x + 20$, $x + 4$ goes into $5x + 20$ (written as $5x + 20$), subtract $5x + 20$ from $5x + 20$ to get 0. The remainder is 0.

When there is no remainder then both the divisor and the quotient are factors of the dividend.

Find each quotient. Give remainder in any form.

$$\frac{6x^3 - x^2 - 30x + 19}{2x + 5} = 3x^2 - 8x + 5 \quad R = -6$$

$$\begin{array}{r} 3x^2 - 8x + 5 \quad R = -6 \\ 2x + 5 \overline{) 6x^3 - x^2 - 30x + 19} \\ \underline{6x^3 + 15x^2} \\ -16x^2 - 30x \\ \underline{-16x^2 - 80x} \\ 10x + 19 \\ \underline{10x + 25} \\ -6 \end{array}$$

$$\frac{21x^3 - 14x^2 + 24x - 16}{3x - 2} = 7x^2 + 8$$

$$\begin{array}{r} 7x^2 \\ 3x - 2 \overline{) 21x^3 - 14x^2 + 24x - 16} \\ \underline{21x^3 - 14x^2} \\ 24x - 16 \\ \underline{24x - 16} \\ 0 \end{array}$$

Find this Quotient.

$$\frac{3x^4 - 17x^3 + 13x^2 + 76x - 105}{x^2 - 6x + 10} = 3x^2 + x - 11 \quad R = 5$$

$$\begin{array}{r} 3x^2 + x - 11 \quad R = 5 \\ x^2 - 6x + 10 \overline{) 3x^4 - 17x^3 + 13x^2 + 76x - 105} \\ \underline{3x^4 - 18x^3 + 30x^2} \\ -x^3 - 17x^2 + 76x \\ \underline{-x^3 + 6x^2 + 10x} \\ -11x^2 + 66x - 105 \\ \underline{-11x^2 + 66x - 110} \\ 5 \end{array}$$