

**Divide using long division. Check your answers.**

1.  $(x^2 - 3x - 40) \div (x + 5)$

2.  $(x^3 + 2x^2 - 5x - 6) \div (x + 1)$

Check:

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**Use your results from #1 and #2 to help you write each equation in factored form.  
(Remember the number of factors should match the degree of the polynomial!!)**

3.  $y = x^2 - 3x - 40$

4.  $y = x^3 + 2x^2 - 5x - 6$

**Use synthetic division and the given factor to completely factor each polynomial function.  
(Remember the number of factors should match the degree of the polynomial!!)**

5.  $y = x^3 + 2x^2 - 5x - 6; (x + 1)$

6.  $y = x^3 - 4x^2 - 9x + 36; (x + 3)$

**Use division to determine whether each binomial is a factor of the given polynomial. Be careful... not all of these can be done using synthetic division!**

7.  $2x^3 + 9x^2 + 14x + 5; (2x + 1)$

8.  $x^4 + 3x^2 + x + 4; (x + 3)$

9.  $3x^4 - 5x^3 + 2x^2 + 3x - 2; (3x - 2)$

10.  $x^4 - 6x^2 - 27; (x + 2)$

**Answer the questions below. The remainder theorem may be helpful.**

11. Given  $\frac{P(x)}{x-3} = x^2 + 3x - 4$  R 25, what is  $P(3)$ ?

12. Determine  $a$  if  $(x-4)$  is a factor of  $f(x) = x^3 + ax^2 - 20x - 48$ .

13. Determine  $a$  if  $\frac{2x^3 + ax^2 - 36x - 36}{x-3} = 2x^2 - 36$  R -144.