

**Exercise 1.**

$$60840 = 2^3 * 3^2 * 5 * 13^2$$

**Exercise 2.**

$$2526 = 378 * 6 + 258,$$

$$378 = 258 * 1 + 120,$$

$$258 = 120 * 2 + 18,$$

$$120 = 18 * 6 + 12,$$

$$18 = 12 * 1 + 6,$$

$$12 = 6 * 2 + 0.$$

$$\text{GCD}(2526, 378) = 6$$

**Exercise 3.**

First we need to convert 2416 to base 10:

$$(2416)_8 = 2 * 8^3 + 4 * 8^2 + 1 * 8^1 + 6 * 8^0 = 1294$$

Second we need to convert  $1294_{10}$  to base 5;

$$1294 = 5 * 258 + 4$$

$$258 = 5 * 51 + 3$$

$$51 = 5 * 10 + 1$$

$$10 = 5 * 2 + 0$$

$$2 = 5 * 0 + 2$$

Answer:  $20134_5$

**Exercise 4.**

$$9 \mid (q - 3) \Rightarrow q = 9a + 3$$

$$14 \mid (q - 6) \Rightarrow q = 14b + 6$$

$$a = 5, b = 3 \Rightarrow q = 48$$