

Name: _____

1. (2) Find the prime factorization of 100.

$$100 = 2 \times 2 \times 5 \times 5$$

2. (2) Find the prime factorization of 7×7 (7 multiplied by itself twenty times). Hint: You don't actually have to calculate the number!

$$\begin{aligned} & 7 \times 7 \\ &= 7^{20} \\ & \text{(7 is a prime number!)} \end{aligned}$$

3. (2) Give the formal definition of a prime number, i.e. "p is prime if and only if..."

p is prime if and only if whenever $p = r \times s$ then $r=p$ or $s=p$

4. (2) "The product of three prime numbers is prime".
True/False? If true, give a proof. If false, give an example where it is false.

False: for example, 7 is prime but $7 \times 7 \times 7$ has 49 as a factor.

5. (2) If p,q,r, and s are distinct primes, how many distinct divisors does $pxqxrxs$ have (excluding 1)? Explain.

Since $pxqxrxs$ has p, q, r, and s as its prime factors, find all the ways to put those numbers together. We get:

$$\begin{array}{cccccccccc} p & q & r & s & pq & pr & ps & qr & qs & rs \\ pqr & pqs & prs & qrs & pqrs & 1 & & & & \\ \text{which is 16 in all!} \end{array}$$