11. Suppose that $\log_2 3 = a/b$ where $a, b \in \mathbf{Z}^+$ and $b \neq 0$. Then $2^{a/b} = 3$, so $2^a = 3^b$. This violates the fundamental theorem of arithmetic. Hence, $\log_2 3$ is irrational. **13.** 3, 5, and

orem of arithmetic. Hence, $\log_2 3$ is irrational. **13.** 3, 5, and 7 are primes of the desired form. **15.** 1, 7, 11, 13, 17, 19, 23,

7 are primes of the desired form. **15.** 1, 7, 11, 13, 17, 19, 23, 29 **17.** **a)** Yes **b)** No **c)** Yes **d)** Yes **19.** Suppose that n

29 **17.** **a)** Yes **b)** No **c)** Yes **d)** Yes **19.** Suppose that n

of the first $n - 1$ primes. **49.** Because every second integer is divisible by 2, the product is divisible by 2. Because every third integer is divisible by 3, the product is divisible by 3. Therefore, the product has both 2 and 3 in its prime factorization and is therefore divisible by $3 \cdot 2 = 6$. **51.** $n = 1601$ is