SolveNook

Prime and composite practice

Questions - name: _____ date: _____

1. Neither prime nor composite

Classify 0 and 1. Explain why neither belongs in the prime or composite group.

2. The smallest primes

Classify 2 and 3. List the positive divisors of each. Does every even number have to be composite?

3. Perfect squares

Classify 49 and 121. Give a factor pair greater than 1 for each. Does being odd guarantee that a number is prime?

4. Prove a small prime

Is 97 prime? Find floor(sqrt(97)), then test every prime divisor through that bound. Record each remainder.

5. A shortcut is not a proof

91 is odd, does not end in 5 and has digit sum 10. Is that enough to call it prime? Find a factor pair or rule out every prime through its square-root bound.

6. Do not stop before the bound

Classify 143. What is floor(sqrt(143))? Test the primes through that bound until you find a divisor or rule them all out.

Check prime divisors through the square-root bound; show why.

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Prime and composite practice

Worked answers - compare the reasoning, not only the result.

1. Neither prime nor composite

Prime and composite numbers are whole integers greater than 1. Neither 0 nor 1 meets that definition.

2. The smallest primes

The positive divisors of 2 are 1 and 2; those of 3 are 1 and 3. Each has exactly two positive divisors, so both are prime. The even prime 2 is an exception to the even-number shortcut.

3. Perfect squares

49 = 7 x 7 and 121 = 11 x 11. Both are composite because each has factors greater than 1. Being odd does not guarantee primality.

4. Prove a small prime

floor(sqrt(97)) = 9. Test 2, 3, 5 and 7: the remainders are 1, 1, 2 and 6. None divides 97. Any composite must have a prime divisor at or below its square root, so 97 is prime.

5. A shortcut is not a proof

Those shortcuts rule out 2, 3 and 5, but not every possible prime divisor. 91 = 7 x 13, so 91 is composite. Its square-root bound is 9; testing 7 finds the factor pair.

6. Do not stop before the bound

floor(sqrt(143)) = 11. The prime candidates are 2, 3, 5, 7 and 11. The first four do not divide 143, but 143 = 11 x 13, so it is composite. Stopping at 7 would miss the divisor.

Check prime divisors through the square-root bound; show why.

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