Number Tricks, Patterns & Riddles

1. Choose any 3-digit number (e.g., 524). Multiply it by 7. Then multiply the result by 11. Then multiply the result by 13. What is the final answer?

2. $111^2 =$ _____ so $\sqrt{12,321} =$ _____ .

   $1,111^2 =$ _____ so $\sqrt{1,234,321} =$ _____ .

   $\sqrt{123,454,321} =$ _____ so _____$^2 = 123,454,321$

3. Choose a number. Multiply it by 3. Add 6 to the result. Divide by 3. Subtract the original number. The result is _____ .

4. Choose a number. Double it. Add 9 to the result. Add the original number. Divide by 3. Add 4. Subtract the original number. The result is _____ .

5. Choose any 2-digit number. Multiply it by 13. Multiply the result by 21. Then multiply by 37. The result is _____ .

6. Choose a number. Triple it. Add the natural number one larger than the original number. Add 11. Divide by 4. Subtract 3. The result is _____ .

7. Look for a pattern, then complete the remaining problems.

   27 x 23 = 621   12 x 18 = 216   86 x 84 = 7224   45 x 45 = _____   62 x 68 = _____

8. What is the sum of the 10th row in the following triangular pattern?

$$1$$
$$2 + 3$$
$$4 + 5 + 6$$
$$7 + 8 + 9 + 10$$

9. What's the number? _____
   Clues: It's a 3-digit number and both a perfect square and a perfect cube.

10. True or False.   12 x 42 = 21 x 24 _____
                      13 x 62 = 31 x 26 _____

11. Evaluate: $\sqrt{\sqrt{\left(\sqrt{\left(\sqrt{2^2}\right)^4}\right)^2}}$

12. Evaluate: $1 + \dfrac{1}{1 + \dfrac{1}{1 + \dfrac{1}{1 + \dfrac{1}{1}}}}$

13. Find $\dfrac{1}{2} \cdot \dfrac{2}{3} \cdot \dfrac{3}{4} \cdot \dfrac{4}{5} \cdot \ldots \cdot \dfrac{99}{100}$

14. 1 x 8 + 1 = _____   12,345 x 8 + 5 = _____
     12 x 8 + 2 = _____   123,456 x 8 + 6 = _____
     123 x 8 + 3 = _____
     1,234 x 8 + 4 = _____   123,456,789 x 8 + 9 = _____

15. $99 \times 99 =$ _____
  $999 \times 999 =$ _____
  $9,999^2 =$ _____
  $99,999^2 =$ _____

  $33^2 =$ _____
  $333^2 =$ _____
  $3,333^2 =$ _____

  $66^2 =$ _____
  $666^2 =$ _____
  $6,666^2 =$ _____

16. $1 = 1 \times 1$
  $1 + 3 = 2 \times 2$
  $1 + 3 + 5 = 3 \times 3$
  $1 + 3 + 5 + 7 =$ _____
  $1 + 3 + 5 + 7 + 9 =$ _____
  $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 =$ _____
  _____ $= 10 \times 10$

17. Choose a number from 2 to 9. Multiply it by 41. Multiply the result by 271. The final answer is _____ .

18. Choose any counting number. Multiply it by the next larger counting number. Add 17. The result is _____ (prime or composite).

19. Complete, and also give one more row in each pattern.

  $1 = 1$
  $3 + 5 =$ _____
  $7 + 9 + 11 =$ _____
  $13 + 15 + 17 + 19 =$ _____
  _____

20. $1 = 1$
  $1 + 8 =$ _____
  $1 + 8 + 27 =$ _____
  $1 + 8 + 27 + 64 =$ _____
  _____

21. Find $\dfrac{2^{1000} - 2^{999}}{2^{1000} + 2^{999}}$.

22. Find $\dfrac{1}{2} + \dfrac{1}{5}$ $\dfrac{1}{3} + \dfrac{1}{4}$ $\dfrac{1}{6} + \dfrac{1}{7}$. Generalize: $\dfrac{1}{a} + \dfrac{1}{b} =$ _____ .

*23. Evaluate: $1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \ldots + 199^2$. Hint: Use the "difference of squares" factoring technique.

Do your best! Live and learn!