Pascal's Triangle and Number Patterns

One simple rule builds a triangle full of patterns: powers of 2, triangular numbers, Fibonacci and more. And India wrote it down centuries before Pascal.

Name: Date: Score: ____ / 19

A. Fill in the blanks

1. Each number is the ____ of the two above it.

2. The sum of row 3 is ____.

3. The third diagonal starts 1, 3, 6, ____.

4. The next number after 1, 1, 2, 3, 5 is ____.

5. In India the triangle is called Meru ____.

B. True or False

6. Row sums are powers of 2. True / False

7. Row 2 gives the coefficients of $(a + b)^2$. True / False

8. Every number in the triangle is odd. True / False

9. The triangle was first written by Pascal. True / False

C. Assertion and reason

10. Assertion (A): The triangle gives binomial coefficients.
Reason (R): Each coefficient of $(a + b)^{n+1}$ is the sum of two coefficients of $(a + b)^n$.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

11. Assertion (A): Row sums double each time.
Reason (R): Each number feeds into two numbers below it.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

D. Choose the correct option

12. Row 4 is:

(a) 1 3 3 1
(b) 1 4 6 4 1
(c) 1 5 10 10 5 1
(d) 1 2 1

Answer: _____

13. The sum of row 5 is:

(a) 16 (b) 25

(c) 32 (d) 64

Answer: _____

14. $(a + b)^3$ has coefficients:

(a) 1, 2, 1 (b) 1, 3, 3, 1

(c) 1, 4, 6, 4, 1 (d) 1, 1

Answer: _____

15. Slanted lines add up to:

(a) primes (b) squares

(c) Fibonacci numbers (d) cubes

Answer: _____

E. Numerical problems

16. Find the sum of row 6.

17. Write the next row after 1 5 10 10 5 1. What is its third number?

F. Short answer questions

18. Write rows 0 to 4 of the triangle.

G. Match the columns

19. Match each item in Column A with the correct item in Column B.

Column A	Column B	Your answer
1. Row sums	(a) natural numbers	1 → ____
2. Second diagonal	(b) Fibonacci	2 → ____
3. Third diagonal	(c) powers of 2	3 → ____
4. Slanted lines	(d) triangular numbers	4 → ____

Detailed solutions

1. sum

2. 8

3. 10

4. 8

5. Prastara

6. True. 1, 2, 4, 8, 16.

7. True. 1, 2, 1.

8. False. 2, 4 and 6 appear.

9. False. It appears much earlier in India.

10. (a) R explains A.

11. (a) R explains A.

12. (b) 1 4 6 4 1. Rows are counted from 0.

13. (c) 32. 2^5.

14. (b) 1, 3, 3, 1. Row 3.

15. (c) Fibonacci numbers. 1, 1, 2, 3, 5, 8.

16. 2^6. **Answer: 64**

17. 5 + 10. **Answer: 15**

18. 1; 1 1; 1 2 1; 1 3 3 1; 1 4 6 4 1.

19. 1 → (c), 2 → (a), 3 → (d), 4 → (b). Each place matches its pattern.